OFFICE OF COMMUNICATIONS

Spectrum Framework Review for the Public Sector

Notice of Ofcom's proposal to make regulations on Recognised Spectrum Access for public bodies and consultation on technical conditions

Consultation

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Section 1

Summary

Introduction

1.1 We consulted last year on a new spectrum framework for the public sector (SFRPS) and published a statement on 31 January 2008 announcing our intention to make regulations to allow public bodies to hold and trade recognised spectrum access (RSA)[1]. This document gives notice of and consults on our intention to make the necessary regulations and an order for the 406.1-430 MHz band as the first step.

1.2 It also consults on the technical conditions to be included in the initial grant of RSA. Without suitable technical conditions, a change of use following spectrum release or sharing could give rise to unacceptable interference. Our proposals are intended to allow flexibility for desirable changes while ensuring that users, including the Cospas-Sarsat satellite emergency position-indicating radio system, are not affected by unacceptable levels of interference.

Radio spectrum is a valuable and limited resource

1.3 The radio spectrum is a valuable and limited resource that underpins an estimated 3% of UK GDP[2]. Demand is exceeding availability in the most sought-after frequency bands. We are using market mechanisms such as incentive pricing, auctions and trading to meet this demand and secure the best use of the spectrum for citizens and consumers.

Managing and using public sector spectrum holdings more efficiently

1.4 The public sector[3] has extensive spectrum holdings amounting to about half of the spectrum below 15 GHz with a value that could exceed £20bn[4]. In view of the economic and social value of radio spectrum, it is essential that public sector holdings are managed and used as efficiently as possible. In 2004, the Government commissioned Professor Martin Cave to review major spectrum holdings with the aim of releasing the maximum amount of spectrum to the market and increasing opportunities for innovation in wireless services. Following his December 2005 report, the *Independent Audit of Spectrum Holdings*, the Government, supported by Ofcom, committed to a programme for improving the efficiency with which public bodies manage and use their spectrum holdings[5].

1.5 A key element of the programme involves giving public bodies enhanced incentives and opportunities to use spectrum efficiently by enabling them to trade their holdings through the market. The regulations that this document consults on will make this possible by allowing the formalisation of certain public sector holdings as grants of tradable and technology and application neutral RSA.

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[1] http://www.ofcom.org.uk/consult/condocs/sfrps/
[2] Source: http://www.ofcom.org.uk/research/radiocomms/reports/economic_spectrum_use/
[3] This term is used here to include civil aviation and maritime use (even though most airlines, airports, shipping lines and ports are private sector).
[4] Source: *Independent Audit of Spectrum Holdings* at www.spectrumaudit.org.uk.
[5] The Government's response and related documents are also available at www.spectrumaudit.org.uk.

1.6 The Ministry of Defence (MOD) is committed to releasing a significant proportion of its spectrum holdings, which are the largest in the public sector, and is consulting on its plans[6]. The MOD's consultation gives further details of its proposals.

Ofcom is working with the Government to facilitate change

1.7 We are working closely with government departments and other public bodies to construct the new framework for public sector spectrum management. The regulations and order described in this document are a key element of that new framework.

1.8 In line with our previous statement, we intend to phase in the new framework beginning with the 406.1-430 MHz band, which the MOD has proposed as an early candidate for selective spectrum release or sharing.

1.9 Extension of the reforms will be synchronised with the MOD's release programme and with progress by government departments in agreeing procedures for managing and releasing spectrum shared by the MOD and other public bodies.

1.10 The document outlines the process for trading RSA and converting it to licences so that the spectrum can be released to and used by commercial operators. This is based on existing trading procedures and encompasses a variety of different types of trading: total or partial and outright or concurrent. We propose to create a new licence product for licences formed following transfers of RSA.

[6] *UK Defence Spectrum Management A Consultation on an Implementation Plan for Reform* at http://www.mod.uk/NR/rdonlyres/8B9CFFD1-6C36-476A-A6C3-8A3E5635DC55/0/dsm_consultation_report.pdf

Section 2

Notice of proposals

2.1 Following consultation in 2007, Ofcom published a statement[7] in January 2008 on its intention to make regulations to allow Crown bodies to be granted and to trade RSA in selected frequency bands, to allow RSA granted for radio astronomy to be traded and to provide for conversion between RSA and wireless telegraphy (WT) licences. We now propose to make regulations and an order to:

- allow Ofcom to grant RSA at 406.1-430 MHz to the Crown;
- limit the number of grants of RSA;
- allow trading of RSA granted under the proposed regulations and of RSA granted for radio astronomy;
- amend the Wireless Telegraphy Register (WTR) regulations to provide for certain information about the grants of RSA and licences issued on transfer of RSA to be published in the WTR.

2.2 The general effect of the proposed regulations and order is described in the following sections of this notice. Annexes 5 to 9 contain drafts of the proposed regulations and order and an illustrative templates for grants of RSA and WT licences in the frequency band 406.1-430 MHz, which the MOD has proposed as an early candidate for release or sharing.

2.3 The Regulatory Impact Assessment (RIA) at Annex 12 analyses the risks, costs and benefits of the proposals.

Comments or representations

2.4 Comments or representations with respect to the proposed regulations, order and specimen RSA are invited by 1 August 2008. These should preferably be emailed, or may be posted, to Laurence Green at the address in Annex 1 on how to respond to this notice.

2.5 Copies of this notice and the proposed regulations and order can be obtained from Laurence Green at the address in Annex 1. Electronic copies are also available and this notice has been placed on Ofcom's website http://www.ofcom.org.uk.

Next steps

2.6 Following completion of this consultation, Ofcom intends to make the regulations as soon as practicable.

[7] The *Spectrum Framework Review for the Public Sector*, published 31 January 2008, is at http://www.ofcom.org.uk/consult/condocs/sfrps/statement/statement.pdf .

Section 3

Background

Introduction

3.1 This section summarises the background to the making of the proposed regulations and order.

Radio spectrum is a valuable and limited resource

3.2 The radio spectrum is a valuable and limited resource that generates substantial value for citizens and consumers. Wireless applications are used by businesses throughout the economy to generate large and growing economic benefits worth over £40bn a year, equivalent to about 3% of UK GDP[8], and by a range of essential public sector services. Demand for spectrum is growing and shortages in the most sought-after frequencies below 15 GHz are expected[9].

3.3 It is important to make the best use possible of the spectrum to promote competition, innovation and choice. One of our principal duties is to secure the optimal use of the radio spectrum for citizens and consumers. For reasons discussed in various documents, such as our *Spectrum Framework Review*[10], we are making increasing use of market mechanisms such as spectrum trading, to achieve this.

It is important that the public sector uses spectrum efficiently

3.4 The public sector[11] holds about a half of all spectrum below 15 GHz. The Ministry of Defence (MOD) accounts for about 75% of these holdings. It is essential that the public sector manages and uses these extensive spectrum holdings as efficiently as possible if growing demand from businesses is to be met and innovation and competition are not to be held back.

3.5 A review commissioned in 2004 by the then Chancellor of the Exchequer and led by Professor Martin Cave[12] recommended far-reaching reforms of public sector spectrum management in order to maximise spectrum efficiency and opportunities for the commercial sector to access spectrum. In particular, it recommended that public bodies should normally acquire spectrum through the market instead of administrative assignment by Ofcom and that they should be enabled to trade spectrum so as to have opportunities and incentives to improve spectrum efficiency. The Government accepted these recommendations and has committed to a programme, supported by Ofcom, to reform public sector spectrum management while ensuring that national security and public safety remain paramount and that the UK continues to comply with international obligations.

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[8] Source *Economic Impact of the Use of Radio Spectrum in the UK* by Europe Economics, available at http://www.ofcom.org.uk/research/radiocomms/reports/economic_spectrum_use/

[9] *Spectrum demand for non-government services 2005-2025* by Analysys and Mason for the Independent Audit at http://www.spectrumaudit.org.uk/pdf/spectrum_demand.pdf

[10] http://www.ofcom.org.uk/consult/condocs/sfr/

[11] "Public sector" is used here to include civil aviation and maritime use.

[12] The *Independent Audit of Spectrum Holdings,* published December 2005. This, together with the Government's response and much additional material, is available at www.spectrumaudit.org.uk.

Spectrum trading and liberalisation will help secure best use of the spectrum

3.6 The regulations and order that are the subject of this notice form the regulatory framework needed to support and implement the first stage of this programme.

3.7 As explained in our previous statement, spectrum trading is a key element of our approach to securing optimal use of the radio spectrum. Combined with our policy of removing unnecessary restrictions on the use to which spectrum may be put, known as 'spectrum liberalisation', trading enables spectrum to be transferred to those who can use it best to generate economic and social benefits and to migrate to the most valuable use for society. We have published a number of documents about our approach to spectrum trading and liberalisation[13].

Crown bodies cannot trade spectrum at present but the proposed regulations will allow them to do so in future

3.8 The relevant legislation, the Wireless Telegraphy Act 2006 (the WT Act), does not require Crown bodies such as government departments to be authorised by Ofcom to use spectrum. They do not hold spectrum licences and their spectrum holdings currently rest on non-binding administrative arrangements that cannot be traded. This is a barrier to implementing the recommendations of the Independent Audit and to improving spectrum efficiency.

3.9 The proposed regulations would remove this barrier by enabling government departments to trade their spectrum holdings. The mechanism for this involves formalising their current use as grants of RSA for Crown bodies and making these tradable. Making the RSA technology and application neutral will promote spectrum efficiency by facilitating release to or sharing with alternative uses.

Radio astronomy RSA will also become tradable

3.10 RSA has already been introduced for radio astronomy on a non-tradable basis as a result of regulations we made last year[14]. We now propose to make this RSA tradable in the frequency bands listed in the schedule to the draft trading regulations at Annex 9. We are not currently proposing stage to introduce tradability in frequency bands in which active services are prohibited by the ITU Radio Regulations, radio astronomers have already returned or agreed to return spectrum to Ofcom or change of use to an active service would require particularly complex coordination with other users.

What is RSA?

3.11 RSA is a form of spectrum holding that is suitable for bodies, such as Government departments, that are outside the scope of the licensing provisions of the WT Act and for so-called 'passive' services, such as radio astronomy, that receive radio signals but do not transmit and so are generically exempt from licensing. The RSA form of spectrum holding may be traded and converted into WT licences (and vice versa) in accordance with regulations made by Ofcom.

[13] See, for example, http://www.ofcom.org.uk/consult/condocs/spec_trad/ and http://www.ofcom.org.uk/consult/condocs/liberalisation2/.
[14] The Wireless Telegraphy (Recognised Spectrum Access) Regulations 2007, SI 2007 No.393

Reform will benefit citizens and consumers

3.12 The proposed regulations and order would allow public bodies' spectrum holdings to be:

- expressed in the form of RSA;
- released, shared or added to by spectrum trading.

3.13 This will enable public bodies to engage directly with the market to meet their, or the market's, needs for additional spectrum and to release or share surplus spectrum. For the reasons set out in our previous statement, we believe this will improve public sector spectrum efficiency and, over time, generate potentially substantial benefits for citizens and consumers.

3.14 The rest of this document is arranged as follows:

- Section 4 - General effect of the proposed regulations
- Section 5 - The Wireless Telegraphy (Recognised Spectrum Access) Regulations and Limitation Order
- Section 6 – Terms and conditions of grants of Crown RSA
- Section 7 – Trading regulations
- Section 8 – Wireless Telegraphy Register regulations
- Section 9 – Licensing issues
- Annex 1 – Responding to this Notice
- Annex 2 – Ofcom's consultation principles
- Annex 3 – Consultation response cover sheet
- Annex 4 – Consultation questions
- Annex 5 – Draft Wireless Telegraphy (Recognised Spectrum Access) Regulations 2008
- Annex 6 - Calculation of technical limits
- Annex 7 – Illustrative templates for RSA grants and WT licences
- Annexes 8 to 10 – Drafts of the Wireless Telegraphy (Limitation of Number of Grants of Recognised Spectrum Access) Order 2008, the Wireless Telegraphy (Recognised Spectrum Access and Wireless Telegraphy Licence Trading) Regulations 2008 and the Wireless Telegraphy (Register) (Amendment) (No.2) Regulations 2008
- Annex 11 – Details of the change of use process
- Annex 12 – Regulatory Impact Assessment

- Annex 13 - Glossary

Section 4

General effect of the proposed regulations

Introduction

4.1 The previous section explained that a key feature of the new framework is that public sector bodies should be enabled to trade their spectrum holdings. This requires Crown bodies' holdings to be formalised as Crown RSA and, along with radio astronomy RSA, to be made tradable. This section discusses in general terms the regulations that we propose to make to allow this.

4.2 Responses to our 2007 consultation on the SFRPS broadly supported our proposals while expressing qualifications about national security, public safety and compliance with international obligations. Our subsequent statement[15] announced our decision to proceed in a phased manner to introduce tradable RSA for public bodies taking account of issues raised in the responses once certain matters had been clarified about the way in which departments intend to hold, manage and release spectrum. The MOD is now consulting on its plans for spectrum reform to facilitate spectrum sharing and release[16] and the draft regulations and order in this notice take account of the MOD's proposals in respect of its holdings.

4.3 We said in our statement that we intended to phase in the new framework. Accordingly, the regulations in this notice are limited to the 406.1-430 MHz band that the MOD has proposed as a candidate for early release or sharing next year. We will consult further in due course on extending the new framework to other bands, including those that are shared with other public bodies. This will depend on progress by the MOD and other departments and other public bodies in agreeing practical arrangements for the management, release and sharing of those bands. Inter-departmental discussions are continuing.

Radio astronomy

4.4 We have previously said that we intend to make RSA for radio astronomy tradable and the proposed regulations provide for this. As illustrated in the preceding statement, the application of administered incentive pricing (AIP) to radio astronomy RSA has resulted in significant releases of spectrum. The extension of spectrum trading to radio astronomy RSA will generate additional incentives to improve spectrum efficiency over time.

4.5 Radio astronomers also share MOD's spectrum holdings, including at 406.1-410 MHz. The radio astronomy community and the MOD are discussing the terms on which this sharing will continue. We understand that, at present, the radio astronomers prefer to continue to rely on their agreement with the MOD so we do not propose at this time to introduce a separate RSA for radio astronomy in this band.

[15] http://www.ofcom.org.uk/consult/condocs/sfrps/statement/
[16] *UK Defence Spectrum Management A Consultation on an Implementation Plan for Reform* at http://www.mod.uk/NR/rdonlyres/8B9CFFD1-6C36-476A-A6C3-8A3E5635DC55/0/dsm_consultation_report.pdf

Satellite emergency position-indicating radio beacons: Cospas-Sarsat

4.6 The Cospas-Sarsat system operates just below the 406.1-430 MHz band that the MOD proposes to release. As described in Annex 6, we propose technical limits at the lower edge of the RSA designed to avoid causing it harmful interference.

Use of spectrum for military purposes or civil contingencies

4.7 As a Crown body, the MOD is not required by section 8 of the WT Act to be authorised by Ofcom to use spectrum. The grant of RSA does not constrain its use of spectrum, for example for military purposes or in civil emergencies.

The statutory framework

4.8 Ofcom manages the radio spectrum within a statutory framework created by the Communications Act 2003 (the 'Communications Act') and the Wireless Telegraphy Act 2006 (the 'WT Act'). These Acts[17], which give effect to EU requirements[18], set out our duties, functions and powers. In particular, we have a duty to secure optimal use of the radio spectrum having regard to the different needs and interests of all who may wish to use it and to have regard to the desirability of promoting its efficient management and use, economic and other benefits, innovation and competition.

4.9 Our duties require us to balance a range of considerations. We have a variety of regulatory tools and market mechanisms[19] at our disposal to manage the radio spectrum and use these to carry out our functions.

4.10 Under the WT Act, it is an offence to install or use radio equipment without authorisation from Ofcom[20]. This requirement is imposed because, without careful planning and management, neighbouring transmitters that are not adequately separated geographically, by frequency or in time are likely to interfere with each other impairing the value of the airwaves as a communications medium and the benefits from its use. A primary aim of our spectrum management policy is to control the level of interference.

4.11 Radio equipment may be authorised either by being individually licensed or by being exempted from the need for a licence by regulations made by Ofcom. We are required to exempt equipment that is unlikely to cause harmful interference[21] and to avoid imposing or maintaining unnecessary regulatory burdens[22].

Purpose of the proposed regulations

4.12 The purpose of the proposed regulations and order is explained in the following section. In summary, it is to:

- enable Ofcom to grant RSA in specified frequency bands to government departments;

[17] This is a condensed account, not a comprehensive description of the legislative framework.
[18] Including the Authorisation Directive 2002/20/EC and the Framework Directive 2002/21/EC
[19] An umbrella term used to encompass the application of market forces through spectrum pricing, auctions, liberalisation and trading.
[20] This requirement originated in the Wireless Telegraphy Act 1904 and was continued by the Wireless Telegraphy Act 1949. The Wireless Telegraphy Act 2006 is a consolidation measure that combined several statutes, including the 1949 Act, without substantive change.
[21] Section 8(4) of the WT Act
[22] Section 6 of the Communications Act

- specify the procedure for applying for and granting the RSA;
- express the limitations that Ofcom will apply to the grants of RSA in the interests of spectrum efficiency;
- allow the RSA (including that granted for radio astronomy under previous regulations) to be traded and specify the ways in which and the process by which trading may take place;
- provide for certain information about RSA to be published in the WT Register.

Extent of the regulations

4.13 The proposed regulations apply in the UK but not in the Channel Islands or Isle of Man. The provisions of the WT Act relating to spectrum trading have been extended to Guernsey but not to Jersey or the Isle of Man and it would require an Order in Council to extend them there. The current spectrum trading regulations do not extend to Guernsey.

4.14 Our statement said that we would discuss the application of the new framework with the Channel Islands and Isle of Man administrations. No change is envisaged at this time but we will, together with the administrations, keep the position under review.

Section 5

The Wireless Telegraphy (Recognised Spectrum Access) Regulations and Limitation Order

The legislative framework

5.1 The proposed regulations and order are to be made under sections 18 and 29 of, and paragraph 1 of schedule 2 to, the WT Act.

Legislation on RSA

5.2 Section 18(1) of the WT Act prescribes the circumstances in which Ofcom may grant RSA. These circumstances are where:

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

b) the circumstances of use are circumstances specified for the purposes of the section in regulations made by Ofcom; and

c) that use does not require a wireless telegraphy licence but will involve the emission of electromagnetic energy with a view to reception at places in the UK or in the territorial sea.

5.3 Section 18(3) to (7), in summary, provide that Ofcom may make grants by reference to such factors as Ofcom thinks fit, that the grant is made to a person by giving that person notification containing the grant and that the grant may be subject to such restrictions and conditions as Ofcom thinks fit.

5.4 Schedule 2 makes provisions about making, revoking and modifying grants of RSA. The proposed regulations incorporate provisions on these matters.

5.5 Section 20 of the WT Act requires us, in carrying out our functions in relation to granting WT licensing or RSA and some of our other radio spectrum functions, to take account of any existing grant of RSA and its provisions on a comparable basis as we would a licence with equivalent terms, provisions or limitations.

5.6 The proposed RSA regulations are discussed in greater detail in the following paragraphs and are set out in full in Annex 5.

The Wireless Telegraphy (Recognised Spectrum Access) Regulations 2008

5.7 In order to introduce Crown RSA as part of the reforms of public sector spectrum management, the WT Act requires us to make regulations to specify the circumstances in which the RSA may be granted and to specify the process for granting RSA and its ongoing administration.

5.8 Section 18(1)(b) of, and paragraph 1 of schedule 2 to, the WT Act provide that Ofcom may specify in regulations the circumstances of the use in respect of which the grant of RSA is made and the procedures for making and determining applications for

grants of RSA. These procedures must include (a) time limits for dealing with applications for grants of RSA, (b) requirements which must be met before a grant is made and (c) the restrictions and conditions to which grants may be made subject.

5.9 Accordingly, the proposed regulations define:

- the circumstances of use, including the frequencies and locations at which we may grant RSA;
- particulars of the restrictions and conditions to which a grant may be made subject;
- information and requirements which must be met by the applicant before a grant will be made; and
- time limits for dealing with applications for a grant of RSA.

Extent of application

5.10 Regulation 1(2) of the proposed regulations states that they will apply to the UK and will not extend to Guernsey, Jersey and the Isle of Man. Application to the Channel Islands and Isle of Man may be reviewed in the future.

Circumstances of use

Frequency bands in which RSA will be introduced

5.11 We said in our statement that we intend to extend the new framework to the generality of public sector spectrum holdings over time but will proceed initially on a phased basis to enable experience to be gained of how the reforms operate. We also said that we were likely to focus initially on bands that are managed by the MOD. Extension to bands shared by the MOD and other public bodies will depend on their progress in agreeing arrangements for joint management and decision-making.

5.12 The MOD, which is in advance of other public sector bodies in preparing to release or share spectrum, is currently consulting on its plans and has not yet finalised these but has proposed to begin with a pilot trial in the 406.1-430 MHz band and possibly also at 3.4-3.6 GHz. The draft regulations cover the 406.1-430 MHz band, excluding 412-414 paired with 422-424 MHz, which is licensed to Arqiva, and 425-429 MHz, which is already extensively shared. This is discussed further in section 6 and Annex 6 below.

5.13 The position in the 3.4-3.6 GHz band is complicated by various international requirements.

- The 2007 World Radio Conference decided that, from 2010, the 3.4– 3.6 GHz band should be identified for mobile IMT Advanced systems on a country by country basis, including in the UK.
- A recent EU Decision[23] requires the UK and other Member States to designate the band and make it available on a non-exclusive basis for terrestrial electronic communications networks. Ofcom and the MOD are discussing how implementation of the Decision will affect plans to release the band.

[23] http://ec.europa.eu/information_society/policy/radio_spectrum/docs/in_transit/bwa/bwa_en.pdf

- The bottom 10 MHz is reserved for NATO use.

5.14 There are also various other sharing arrangements in the band with emergency services and programme-making and special events (PMSE).

5.15 The MOD consultation discusses options for this band and states that it plans to give further information about its intentions in its statement in November 2008.

5.16 We will consider whether to extend the proposed regulations to the 3.4-3.6 GHz band in the light of future decisions by the MOD and would consult further before extending the regulations to it. Meanwhile, we propose to limit the initial regulations on which we are consulting in this document to the 406.1-430 MHz band.

5.17 We have designed the technical limits on use, following an analysis of use of the band and technical modeling and simulations, to provide flexibility while controlling the risk of unacceptable interference and are seeking views on them. Section 6 and Annex 6 contain further explanation and detail.

Time limit for dealing with applications for a grant of RSA

5.18 Regulation 3 sets a time limit of six weeks for dealing with an application requesting a grant of RSA. This is consistent with the time limit set for decisions about grants of WT licences or RSA for radio astronomy.

Information requirements for applications requesting a grant of RSA

5.19 Paragraph 1 of schedule 2 to the WT Act requires us to specify any requirements that must be met before grants of RSA are made. Regulation 4 of the proposed regulations specifies the following details that we need in order to determine applications:

- the name and address of the person applying for the RSA on behalf of the Crown;

- the frequency band and range in which the applicant wishes to operate a wireless telegraphy station or wireless telegraphy apparatus.

Restrictions and conditions to which a grant is subject

5.20 Paragraph 1 of schedule 2 to the WT Act requires us to specify any restrictions and conditions to which a grant of RSA may be made subject. Regulation 5 specifies the restrictions and conditions that we consider to be necessary for spectrum management reasons in the 406.1-430 MHz band to enable us to fulfill our spectrum management duties. They include conditions relating to location of apparatus, signal type and strength and operating frequencies and mirror those that are typically included in WT licences. The technical conditions are discussed in the following section.

5.21 The proposed RSA Regulations are set out in full at Annex 5 and an illustrative template for a grant of RSA is provided at Annex 7. The associated RIA is included in Annex 12.

The limitations order

5.22 Under section 29 of the WT Act, where Ofcom consider it appropriate, for the purpose of securing the efficient use of the electro-magnetic spectrum, it must make an order to impose limitations on grants of RSA at particular frequencies.

5.23 It is envisaged that grants of RSA in the band will be limited to the Crown. This is because the purpose of granting RSA under the proposed RSA regulations is to formalise the Crown's existing allocations as recorded in the UK Frequency Allocation Table (UKFAT) in order to allow Crown bodies to engage in spectrum trading. In practice, it is expected that grants will be made to a specific Secretary of State, such as the Secretary of State for Defence, on behalf of the Crown. The number of grants is to be limited to the number that would be most likely to secure optimal use of the spectrum and promote competition in electronic communication services having regard to the matters set out in sections 3(1) and (2) of the WT Act, ie availability of and demand for spectrum, efficient management and use of spectrum, innovation and competition.

5.24 The draft limitations order is set out at Annex 8. The associated RIA is included in Annex 12.

Section 6

Terms and conditions of grants of RSA to Crown bodies

6.1 This section, together with Annexes 6 and 7, outlines the content of a grant of Crown RSA and seeks views on our approach to defining the technical terms and conditions of grants of RSA to government departments with particular reference to the 406.1-430 MHz band.

6.2 Grants of RSA under the proposed regulations will define the rights and obligations that may be traded and that will have to be complied with by any person that acquires a licence created by transferring the RSA. Any changes to the terms and conditions would need to be made by variation. This would involve applying to Ofcom for the variation.

Non-technical conditions

6.3 Our non-technical licence terms and conditions, for example on revocation, variation and modification, are fairly standard and are set out in our General Licence Conditions booklet[24]. We envisage that those for RSA will follow that pattern.

Technical conditions: defining RSA to avoid unacceptable interference

6.4 Our previous statement noted that it will be necessary to set the technical parameters in the grant of RSA to avoid unacceptable interference. An incoming commercial service might well require a different deployment of transmitters compared to the incumbent public sector application and use the spectrum more intensively. Without suitable technical conditions, there would be a risk that this could give rise to unacceptable interference to others in the same or neighbouring bands. But, if the conditions are too restrictive, there is a risk that they will block beneficial changes of use. Our duty to secure optimal use while avoiding imposing unnecessary restrictions requires us to allow maximum flexibility for changes of use that benefit society while protecting other users from unacceptable levels of interference.

6.5 The technical parameters will need to be based on a careful band-by-band analysis. Where a safety-critical application is involved, it will also be necessary to consider the safety case. We will, where necessary, consult about the technical parameters to be included in the grants of RSA.

6.6 The technical limitations included in the RSA grants, and that will be transferred to an incoming licensee following a trade, will, in line with our liberalisation policy, be designed to be as technology and application neutral as possible. This will give users maximum flexibility in how they use the spectrum. If, however, a new application or technology cannot be accommodated within those terms, it will be possible to negotiate with neighbouring users and apply for a variation of the technical parameters as described in paragraph 6.27 below and Annex 11.

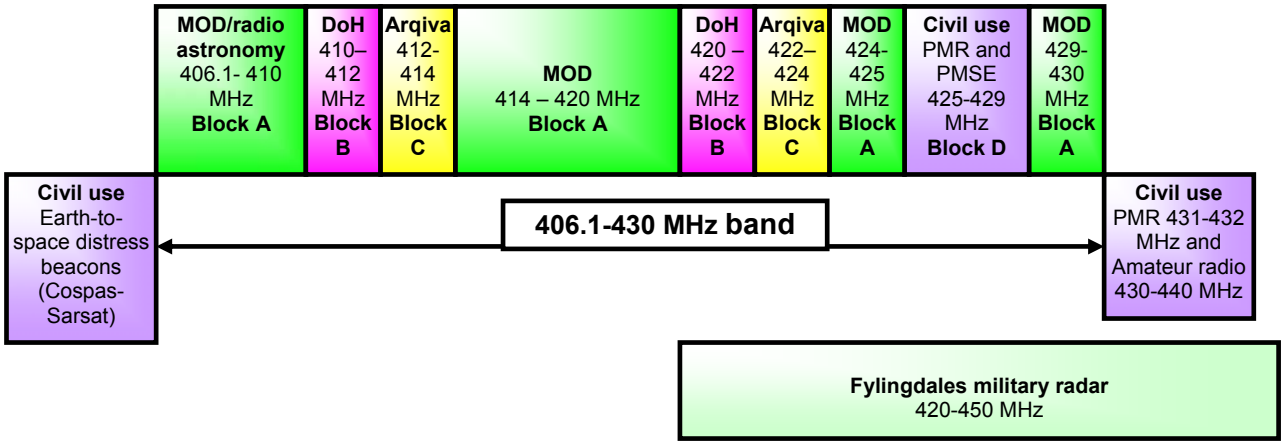
6.7 Following paragraphs summarise how we have derived our proposed technical limits for the 406.1-430 MHz band. Further detail is given in Annex 6.

[24] http://www.ofcom.org.uk/radiocomms/ifi/licensing/booklet.pdf

Mapping the band

6.8 Current usage of the 406.1-430 MHz band is illustrated in figure 1 below.

Figure 1: band plan for 406.1-430 MHz and adjacent spectrum



6.9 For the purposes of the analysis, we have divided the band into four non-contiguous blocks depending on the primary user.

Block A: 406.1-410 MHz, 414-420 MHz, 424-425 MHz and 429-430 MHz – MOD use

This block is designated UK2 in the UKFAT. This means that it is reserved exclusively for military use except as agreed by the National Frequency Planning Group (NFPG). The MOD shares and coordinates 406.1-410 MHz with passive radio astronomy; the radio astronomers and the MOD wish this arrangement to continue so we are not proposing separate RSA for radio astronomy in this block.

There are no other civil users that we are aware of except for a single maritime licence for a 5 watt transmitter at 408 MHz. The band is not currently open to maritime use and no maritime use is recorded in the UKFAT or UK Plan for Frequency Authorisation.

It will be the responsibility of the MOD to ensure coordination with the military radar using 420-450 MHz and located at Fylingdales, including by commercial users to whom spectrum is transferred by trading.

Block B: 410-412 MHz paired with 420-422 MHz – emergency service use

Block B has been allocated for emergency service to the Department of Health (DoH). We propose to formalise this arrangement by granting RSA to the DoH for this block. We are discussing the precise arrangements with the DoH. There will be appropriate technical limits to avoid unacceptable interference to blocks A and C.

Block C: 412-414 MHz paired with 422-424 MHz – awarded to Arqiva

This block has been awarded by auction to Arqiva. The auction Information Memorandum (IM)[25] included statements about spectrum quality which it is intended to reflect in the technical specification of the RSA in neighbouring blocks A and B. The IM contains

[25] The information memorandum is available at http://www.ofcom.org.uk/radiocomms/spectrumawards/completedawards/award_412/documents/im/im.pdf

information to enable bidders to infer spectrum quality but does not fully specify it so we are seeking views on the technical limits that should apply in blocks A and B to maintain spectrum quality in block C at an acceptable level.

Block D: 425-429 MHz – shared by mobile radio and PMSE

Block D is already shared by numerous business radio and PMSE users that are individually licensed by Ofcom and the Joint Frequency Management Group (JFMG) respectively on a geographically limited basis. There is a complex pattern of sharing in the block with a patchwork of large numbers of individual localised narrowband assignments covering areas tens of kms wide. In the particular circumstances of this block, gains from trading RSA would appear to be limited and disproportionate to the complexity of defining the RSA. We do not propose to make RSA available in this frequency band at this time so it is unnecessary to consult on technical parameters for it.

Setting flexible technical parameters to avoid unacceptable interference

6.10 The following paragraphs and Annex 6 describe our proposals for technical limits for RSA grants in blocks A and B in the form of technology and application neutral SURs. Arqiva's licence in block C is based on a spectrum mask[26].

We propose to specify RSA in terms of technology and application neutral SURs

6.11 We have published a series of documents about our approach to stating licences in the form of SURs[27] based on power flux density (pfd) limits. We believe that, generally speaking, SURs offer advantages in terms of maximising flexibility while controlling and managing the risk that change of use will give rise to harmful interference. However, they are not suitable in all cases and need to be applied on a case-by-case basis.

What are SURs?

6.12 SURs are a way of defining spectrum use that takes into account both the characteristics of the transmitters used and the density of transmitter deployment and so controls the aggregate level of unwanted emissions from all the transmitters in a band or area. They differ in this respect from alternatives such as block-edge masks that specify transmitter characteristics but not their density of deployment and so give rise to a risk of interference if a change of use leads to a significantly different network architecture. For example, an increase in transmitter density following a change of use, such as is likely to follow spectrum release or sharing by a public sector user, can lead to an increase in unwanted emissions even if the individual transmitters comply with the specified mask. In a liberalised environment, SURs can provide users with greater confidence about spectrum quality.

SURs will help secure optimal use of the 406.1-430 MHz band

6.13 We consider that specifying RSA in the form of SURs in the 406.1-430 MHz band is likely to help secure optimal use of the spectrum compared to the alternatives.

[26] See pages 16-19 of IM at http://www.ofcom.org.uk/radiocomms/spectrumawards/completedawards/award_412/documents/im/im.pdf.

[27] See for example *Spectrum Usage Rights: a statement on controlling interference using Spectrum Usage Rights* published 14 December 2007 and available at http://www.ofcom.org.uk/consult/condocs/surfurtherinfo/statement/statement.pdf.

Spectrum release or sharing by the MOD in the 406.1-430 MHz band is likely to lead to a change in the way the spectrum is used. This is because an incoming commercial operator is likely to have different operational requirements from the MOD and so wish to deploy different technologies or network architectures. Specifying technical conditions as SURs would allow flexibility to accommodate such changes while maintaining acceptable spectrum quality for neighbouring users.

6.14 For this reason, we believe that the alternative of a block-edge mask would carry a risk of unacceptable interference following change of use as it would not effectively control aggregate emissions affecting other users. Restricting the band to particular technologies or applications could reduce the risk of interference but the resulting lack of flexibility would likely hold back innovation and competition and carry a high risk that the spectrum would not be used optimally.

6.15 We therefore propose to make grants of RSA in the form of SURs in the 406.1-430 MHz band and are consulting on the technical limits to be included. Our aim is to maintain a spectrum quality that is consistent with published documents such as spectrum award information memoranda and Ofcom's published technical frequency assignment criteria (TFAC).

6.16 We use spectrum quality benchmarks (SQBs) or indicative interference levels (IILs) as indicators of spectrum quality. These may be inferred from the pfd limits in neighbouring SURs.

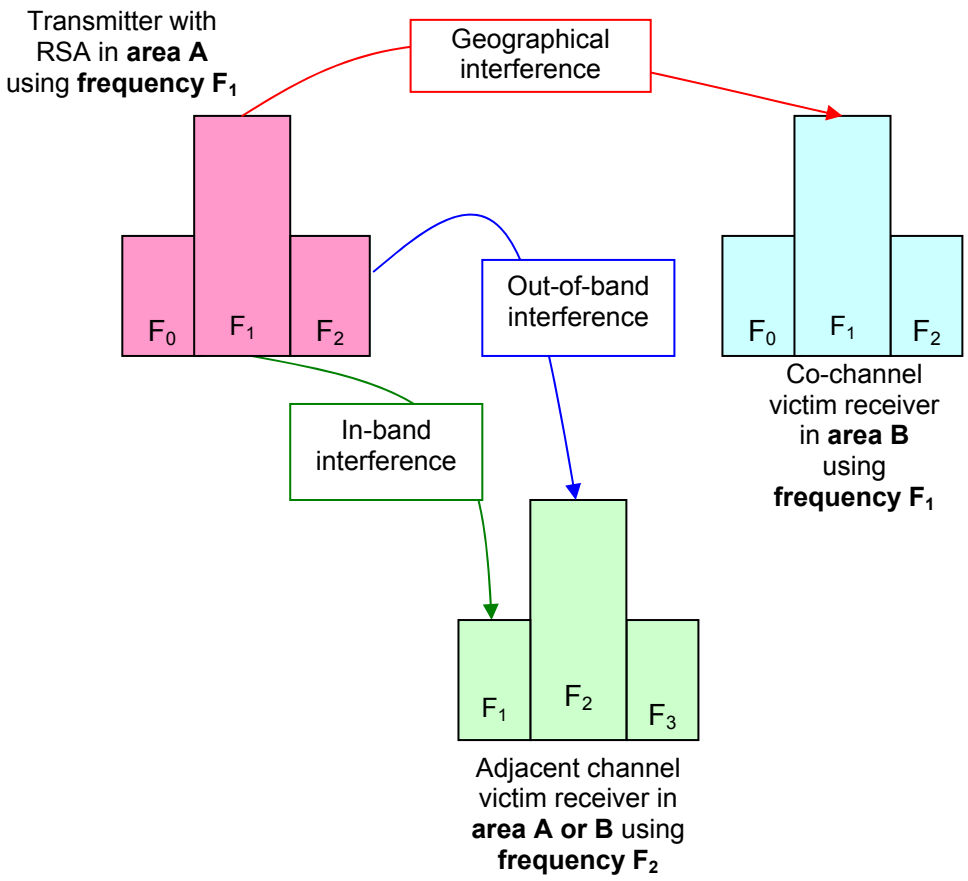
Types of interference and assumptions

6.17 Previous publications on SURs have identified three main types of interference:

- interference caused by co-channel emissions across geographical boundaries (referred to as 'geographical interference');
- interference caused by in-band emissions determined by the in-band power of the transmitter and the out-of-band performance of the victim receiver ('in-band interference');
- interference caused by out-of-band emissions falling across frequency boundaries ('out-of-band interference').

6.18 These are illustrated in the following diagram.

Figure 2: Types of interference



Form of technical limits

6.19 SUR technical limits are typically expressed in the following form:

- the aggregate power flux density (pfd) at height H metres above ground level should not exceed X dBW/m^2/MHz at more than Z% of locations at a defined boundary (for geographical interference) or in a defined test area (for in-band and out-of-band interference).

6.20 This may need to be adapted to the characteristics of the band in question and the expected types of use.

Deriving SUR parameters

6.21 Our proposals are based on publicly available information and certain assumptions based on known characteristics of the way the band is currently planned and the most likely services and technologies expected to be deployed.

6.22 We consider that the type of service most likely to be deployed in the 406.1-430 MHz band is mobile. The band could be used for fixed applications but there is a shortage of frequencies suitable for mobile services as these cannot be provided using current technology at frequencies much in excess of about 3 GHz. Frequencies around 400 MHz are attractive for a variety of mobile applications, including wideband, whereas

fixed services can use higher frequencies that are relatively more plentiful. The band is likely to have a higher marginal value for mobile applications than for fixed and so it seems probable that it would be acquired for mobile use if offered to the market on a technology and application neutral basis.

6.23 Our approach is based on maintaining an acceptable level of spectrum quality in the adjacent band. We propose to do this by assessing the likely technologies in the adjacent band, selecting the one most sensitive to interference and using this as the basis for determining the level of unwanted emissions that it would be reasonable to expect to be tolerated. This will define the IIL and hence the spectrum quality that may be expected.

6.24 Land mobile technologies that are likely to be used in blocks B and C include 25 kHz TETRA, standard private mobile radio (PMR) analogue with 12.5 or 25 kHz channels or digital PMR with 6.25 kHz channels or wideband technologies up to 200 kHz. In order to determine expected spectrum quality, we have based our technical analysis on TETRA and analogue PMR as these are more sensitive to interference than digital PMR; a limit based on these should adequately protect other mobile technologies likely to use the band.

6.25 Our proposed technical limits for blocks A and B are shown in the following table and figure.

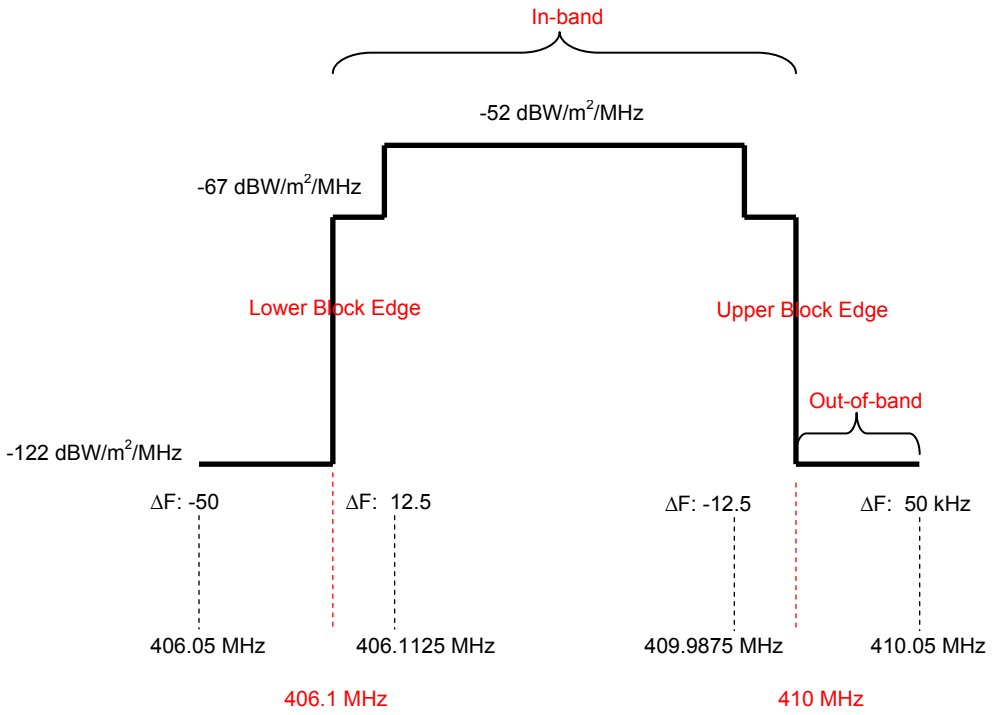
Table 6.1: proposed aggregate pfd limits in blocks A and B in the 406.1-430 MHz band

Frequency band (MHz)	**Maximum aggregate pfd outside the frequency band at 1.5 metre above ground level at more than 95% of locations within a test area[a] for ΔF[b] up to 50kHz (dBW/m^2/MHz)**	**Maximum aggregate pfd in the frequency band at 1.5 metre above ground level at more than 95% of locations within a test area[a] (dBW/m^2/MHz)**
406.1–410 & 410-412	-122	-67 for ΔF[b] from 0 to12.5 kHz -52 for ΔF[b] greater than 12.5 kHz
414–420 & 420-422		
424–425		
429–430		

[a] The test area is defined as a square area including at least ten transmitters. Its location is defined by the 4-figure National Grid Reference of the bottom left corner. The test area is the smallest of the following that includes at least ten transmitters: 1 km^2, 4 km^2, 25 km^2, 100 km^2, 400 km^2, 2500 km^2 or 10000 km^2. All test points that occur over a water feature (eg sea, lake or river) will be ignored and pfd levels there will not contribute to establishing compliance.

[b] ΔF denotes the offset from the outer edge of the frequency range for out-of-band pfd and from the inner edge for in-band

Figure 3: maximum aggregate pfd profile for 406.1-410 MHz* at 1.5m above ground level at more than 95% of locations within a test area



*The profiles for the other frequency ranges in blocks A and B are similar.

6.26 Further detail of our proposals is given in Annex 6. The main features are as follows.

- SUR parameters are derived from protection requirements for receivers in adjacent bands so as to provide an acceptable level of protection for other users.
- Interference management follows our 14 December 2007 statement on controlling interference using SURs[28].
- The SUR is defined by in-band and out-of-band pfd limits.
- 'Hole punching' will be partially controlled by the out-of-band pfd limits and otherwise by better quality receivers or transmitter co-location.
- The initial grants will be national in coverage so there will be no need for them to include geographical interference limits. Geographical interference limits might be required in the event of a partial trade by geographical division as discussed in the following section. In that case, it will be open to the parties to apply to Ofcom for a variation to add a suitable limit. This will enable them to tailor the limits to their particular needs and to suit the applications they wish to deploy.
- Spectrum quality in blocks B and C is based on the TETRA mask. The IM for the award in block C[29] stated that the MOD will, under normal circumstances, comply

[28] http://www.ofcom.org.uk/consult/condocs/surfurtherinfo/statement/statement.pdf

with the limit on out-of-band emissions from the TETRA mask although that limit might be exceeded in exceptional circumstances.

- The pfd limit at the lower end of block A at 406.1 MHz is based on the SQB for the land mobile service as this is more conservative than the ITU protection requirement for the Cospas-Sarsat system.

- The limit at the upper end is based on the spectrum quality requirements for land mobiles even though there is a separation of I MHz from the mobile allocation at 431-432 MHz.

Question 1: do you agree that the technical conditions should be in the form of SURs, with our approach to defining these and to our specific proposals for the 406.1-430 MHz band?

It will be possible to apply to Ofcom for the limits to be varied

6.27 Our proposals for technical limits are based on certain assumptions about the technologies and the applications that will be deployed. This does not prevent the spectrum from being used for other applications or technologies that meet these limits. However, if it is wished to use the band for a technology that does not comply with the limits, it will be necessary to apply to Ofcom for the limits to be varied. We described the variation process for SURs in our 14 December 2007 statement on controlling interference using SURs[30]. This is summarised in Annex 11 and might require the RSA or licence holder to negotiate with other users that could be affected by any increase in unwanted emissions.

Interference resolution and enforcement

6.28 Our statement of 14 December 2007 on controlling interference using SURs[31] described in paragraphs 6.15 to 6.22 how Ofcom will ensure compliance with SUR licences and take appropriate enforcement action in the event of a breach. In the case of licensees, we have the ultimate sanction of prosecution for breaches of the WT Act or licence conditions although this is very much a last resort and most cases are resolved in other ways by discussion and agreement.

6.29 Although the position of the Crown under the WT Act is different from that of users that are authorised by Ofcom, the MOD has said that it will normally aim to keep within the terms and conditions of its RSA and we would seek to follow similar procedures in dealing with any interference that it may cause[32].

6.30 Our process for dealing with interference is summarised below.

6.30.1 *If there has been a breach of terms and conditions*, Ofcom will take appropriate action according to what is proportionate and necessary in the circumstances. For example, a transmitter fault resulting in spurious emissions, possibly unknown to the user, could be solved by negotiation

[29] See Annex 3 to the information memorandum at http://www.ofcom.org.uk/radiocomms/spectrumawards/completedawards/award_412/documents/im/im.pdf.
[30] http://www.ofcom.org.uk/consult/condocs/surfurtherinfo/statement/statement.pdf
[31] http://www.ofcom.org.uk/consult/condocs/surfurtherinfo/statement/statement.pdf
[32] Paragraph 4.66 of the MOD's consultation *UK Defence Spectrum Management A Consultation on an Implementation Plan for Reform*

and agreement on a voluntary basis if the user cooperates. If the breach was not due to transmitter fault and was deliberate, however, Ofcom would, in the case of a licensee, probably consider issuing a Conformity Notice in accordance with sections 39 to 41 of the WT Act. This process gives time for remedial action or representations to be made before a criminal prosecution is brought. An immediate interim close-down would be possible, especially if there was a threat to public safety or serious operational or economic problems were caused to other users. The sanction of varying or revoking a licence or RSA is separate to the legal enforcement process.

6.30.2 *If the fault lies in the victim installation*, Ofcom will not generally take any action as remedial action is the user's own responsibility in such a case but may, for a fee charged at commercial rates, advise the operator on remedial action.

6.30.3 *If the originator of the interference is operating within the terms and conditions* and acted in good faith but interference nonetheless results from a discrepancy between the predicted and actual effects of the transmission, Ofcom will consider the facts of the case, representations by the parties and any other relevant considerations and decide what, if any, action to take. If the victim had previously agreed to the change that caused the interference, Ofcom will generally expect the parties to resolve the situation themselves in line with the terms of their agreement. If they cannot or if the victim was not party to such an agreement, Ofcom will consider appropriate intervention action.

6.31 We propose to use modelling rather than measurement to check compliance with the terms of the grant of RSA.

6.32 Further details are given in the December SUR statement referenced above. The modelling method we would use in the band is set out in the illustrative RSA at Annex 6 to this document.

Section 7

Trading regulations

7.1 This section discusses the regulations and process for RSA to be traded and the issue of a new licence in the course of trading.

The legislative framework

7.2 The proposed regulations are to be made under sections 30 of the WT Act. Under section 30(1), Ofcom may by regulations authorise the transfer to another person by the holder of a WT licence or RSA of rights and obligations arising by virtue of the grant or licence. Under section 30(4), transfers that fail to comply with these regulations will be void.

7.3 The following paragraphs describe the main features of the proposed trading regulations. Annex 9 contains the draft trading regulations that we propose to make. Annex 12 includes the associated RIA.

Extent of application

7.4 The regulations will apply in the UK but not in the Channel Islands or Isle of Man. This is the effect of regulation 1(2). They might be extended there in future subject, in the case of Jersey and the Isle of Man, to the requisite Order in Council to extend section 30 of the WT Act there.

The trading regulations

7.5 The draft regulations apply to grants of RSA under the draft RSA regulations, to grants in certain frequency bands of radio astronomy RSA made under the Wireless Telegraphy (Recognised Spectrum Access) Regulations 2007[33] and to WT licences issued as a result of trades of RSA.

7.6 We indicated in our statement that we were minded to use the existing WT licence trading regulations as the starting point for trading RSA. We see no reason or need to differentiate between RSA and WT licences in respect of the procedure to be followed in trading. Accordingly, the draft regulations are modelled on the present Wireless Telegraphy (Spectrum Trading) Regulations 2004[34] as amended.

7.7 Regulations 4 and 5 specify the types of transfer that are authorised. These may be 'total' or 'partial' and 'outright' or 'concurrent'. This provides a wide measure of flexibility for the parties to arrange transfers in ways that meet their wishes and requirements.

- Total transfers: a transfer of all rights and obligations in the RSA or licence.
- Partial transfers: a transfer of rights and obligations relating to parts of the range of frequencies or parts of the geographical coverage. The RSA or licence may be subdivided by frequency, by area or by both.

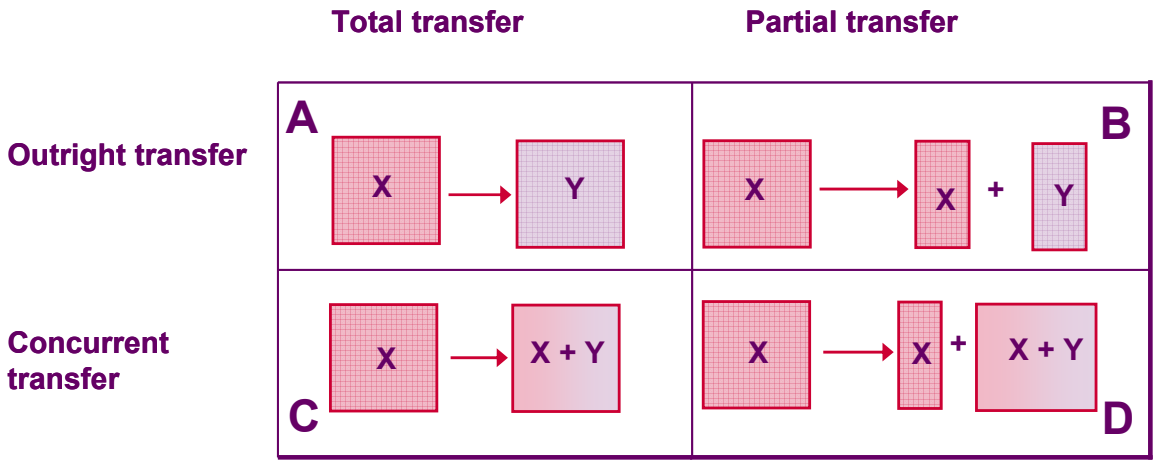
[33] Statutory instrument 2007 No. 393
[34] Statutory instrument 2004 No. 3154

- Outright transfers: the rights and obligations of the transferor become rights and obligations of the transferee to the exclusion of the transferor. The transferor ceases to have any rights to recognition or to use the spectrum.

- Concurrent transfers: the rights and obligations being traded continue concurrently to be rights and obligations of the transferee. This enables the parties to share use of the spectrum as they see fit over a period of time without the need to undertake further transfers under the regulations, which gives them added flexibility to adjust their arrangement over time without going through the formal process, described below, prescribed by the trading regulations.

7.8 These four permitted modes of trading are illustrated in the following diagram, in which X denotes the transferor and Y the transferee. **A** is total outright, **B** is partial outright, **C** is total concurrent and **D** is partial concurrent.

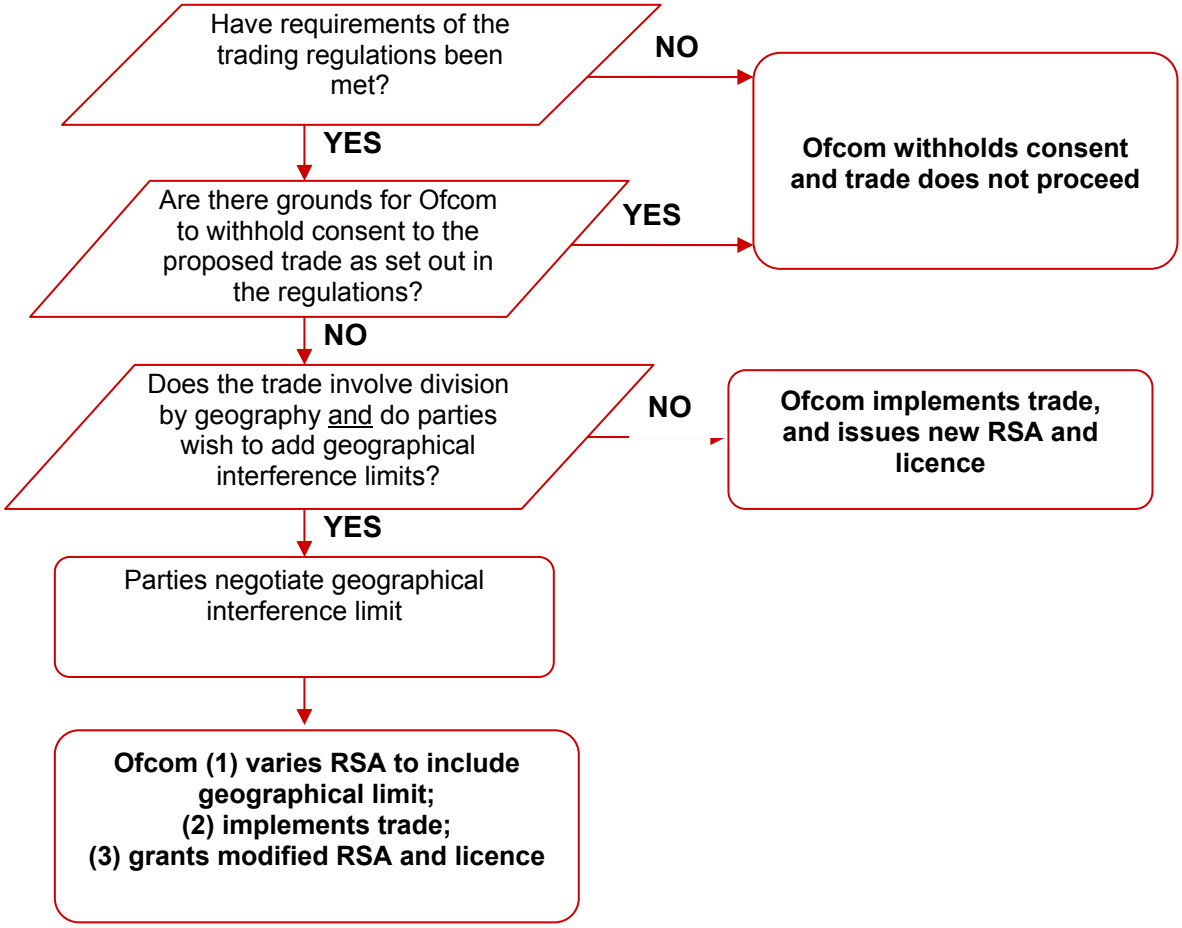
Figure 4: Permitted modes of spectrum trading



Partial transfers

7.9 Partial transfers raise particular issues. They may create a new geographical boundary and a need to have a geographical interference limit across it. As described in Annex 6, we propose that geographical limits should be added by way of variation at the time of the trade. This will enable them to be tailored to the services on either side of the boundary and to the parties' requirements. The process is illustrated in the following diagram.

Figure 5: trading process



7.10 The above assumes there is no change in the in-band and out-of-band pfd limits. If either party wishes to vary these, for example to accommodate a change of use, it will be necessary to apply to Ofcom for a variation as described in paragraph 6.27 and Annex 11.

Spectrum Trading Units

7.11 It is necessary to consider whether to impose limits on the smallest unit of geographical coverage or frequency bandwidth that will be allowed to be transferred in a partial trade. This minimum amount is referred to as the spectrum trading unit (STU).

7.12 Making the STU small increases the flexibility of users to enter into arrangements that suit their purposes. On the other hand, it also increases the complexity of administering and operating the trading system.

7.13 We considered this issue in relation to Business Radio liberalisation[35] and decided to define the STU as an area of 50 kms square and bandwidth of 6.25 kHz. The 406.1-430 MHz band is likely to be used for similar applications and technologies and we consider that a similar trading unit would be appropriate in it. If the parties wish to transfer rights to a fraction of a STU, they will be able to arrange this through a

[35] http://www.ofcom.org.uk/consult/condocs/brtrading/ and http://www.ofcom.org.uk/consult/condocs/busrad/

concurrent transfer that contractually divides the holding in whatever proportion they wish within the original boundary.

Circumstances in which trades may not be authorised

7.14 Regulations 4 and 5, which authorise the different types of transfer, are subject to regulation 6, which sets out the circumstances in which transfers are not authorised and so will be invalid. These circumstances are those that currently apply in respect of trading of WT licences under the 2004 trading regulations. They are as follows.

- The holder or all concurrent holders and the transferee have not consented to the transfer. The requirement in regulation 7(1)(e) for all the parties to provide a consent form to Ofcom is to protect Ofcom from any liability arising from its involvement in good faith in a transaction that later proves to be void.

- Amounts are outstanding to Ofcom in respect of the grant of the RSA or licence. If the fee is being paid in instalments, the holder could pay any that were outstanding before approaching Ofcom concerning the transfer.

- Ofcom has served notice of a proposal to revoke or vary the RSA or licence. This is to ensure that revocation or variation cannot be frustrated by transfers.

    - In the case of a variation, the variation would be implemented quickly once the holder consents so this provision should not cause lengthy delay.

    - If Ofcom has served a notice of intention to revoke or vary, the RSA or licence will continue to be tradable until the notice is served. We would, in such a case, ensure that the notice continued to apply to the transferred RSA or licence.

    - There may be a period between a holder requesting or consenting to a variation or revocation and implementation of that variation or revocation during which transfers are not authorised but this should be short.

The transfer process

Notification of a trade

7.15 Once a transfer has been agreed, the RSA or licence holder or concurrent holders must notify Ofcom about the proposed trade (regulation 7(1)) and provide to Ofcom a document confirming that all parties to the trade have consented to the proposed transfer. This should be signed by or on behalf of:

- the holder or each concurrent holder of the RSA or licence;

- the transferee or transferees to whom rights and obligations are to be transferred.

7.16 We will also require other information such as the name and address of the proposed transferee, a description of the type of transfer which is to be effected and any information necessary for us to determine whether to consent to the transfer (regulation 7(1)(f)). This may include information about how the technical limitations are to apply to the parties, for example to ensure that the aggregate pfd limit in the original SUR is not exceeded. Parties who give false information or who seek to implement transfers without obtaining the necessary consent will be in breach of the regulations and the transfer could be void.

7.17 Once all the information is provided, we will check the documentation in order to ensure that the mandatory information requirements have been met and that the proposed transfer is consistent with the information that we hold. We will then publish a notice stating the names of the transferor and the transferee and setting out basic information about the transferred holding (regulation 7(2)).

Giving consent to a trade

7.18 Regulation 8 would require Ofcom, when deciding whether or not to consent to a transfer, to take into account the following factors.

- Whether the holder (or concurrent holders) is (or are) in breach of the terms of the RSA or licence. This is included to ensure that holders cannot evade their obligations by transferring the RSA or licence.

- Whether the transferee (and transferor in the case of a partial transfer) is able to meet the terms of the RSA or licence. This is included because there may be situations in which it is clear that the transferee will not be able to comply with the terms of the RSA or licence. It is undesirable that persons should be able to acquire RSA or a licence through trading if they would be ineligible to be granted it in other circumstances. We are entitled under paragraph 3 of schedule 1 and paragraph 2 of schedule 2 to the WT Act to take an applicant's ability to comply with RSA or licence terms into account when considering whether to refuse to grant RSA or a licence.

- Whether the transferee is able to meet any criteria in relation to the persons to whom RSA or a licence may be granted. Again, this is imposed to deal with any situation in which a person attempts to gain through trading a grant of RSA or licence for which it would otherwise be ineligible. Such criteria are generally set out in limitations orders.

- Whether it is requisite or expedient to refuse consent on grounds of national security, compliance with EU or international obligations or a direction by the Secretary of State.

7.19 In some circumstances, we may consent to a trade but to direct the parties that the consent will be processed when certain of the above matters have been resolved. Regulation 10 allows this.

7.20 The above matters that we are required to consider and that provide grounds to withhold consent to proposed trades are the same as for trades of WT licences at present. We consider that these are the minimum necessary for spectrum management reasons. Additional grounds would increase uncertainty and delay, which would be contrary to our duty to avoid unnecessary regulatory burdens.

7.21 Responses to our SFRPS consultation stressed the importance of giving full weight in designing the new framework to national security, public safety and compliance with the UK's international obligations. We undertook in our statement to design the new framework that will be implemented through the proposed regulations to be consistent with the Government's commitment that national security and public safety will remain paramount and also with compliance with international obligations. We have given effect to this by including national security and compliance with international obligations as matters that we must consider in determining whether or not to consent to proposed trades of RSA.

Conversion

7.22 Regulation 9 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 under regulation 7(1)(h). This provides 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 RSA and licences. For example, in the case of transfer from RSA for a passive service such as radio astronomy 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 Ofcom's usual planning criteria so as to avoid unacceptable interference. Section 9 below discusses our proposal to create a new licence product for licences formed by conversion of RSA.

Enacting the transfer

7.23 Regulation 7(3) would require us to decide whether to consent to the transfer and whether to issue directions under regulation 10 and then to notify the parties.

Time taken for decisions

7.24 The regulations do not include deadlines for Ofcom 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.

7.25 Nonetheless, we recognise that it is important that our decisions are timely. Consequently, we publish guidelines on the trading process[36] that include targets for the time taken to consent (or not) to a trade and these will apply in respect of trades under the proposed trading regulations. We currently aim to complete trades within 42 calendar days.

The transfer process

7.26 In order to effect a transfer, the RSA or licence will need to be surrendered. In the case of an outright transfer, Ofcom 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 case of a concurrent transfer, we will also issue replacement RSA or licence to both the transferor and the transferee (regulation 7(5)).

Proposed extension of the Transfer Notification Register

7.27 Regulation 7(2) would require us to publish details of trades of RSA or WT licences. 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.

[36] http://www.ofcom.org.uk/radiocomms/ifi/trading/tradingguide/tradindguidencenotes.pdf

7.28 Together with the proposed extension of the WT Register described in the following section, this will provide basic information likely to be of interest to the market about public sector spectrum holdings. The information published in the TNR contains:

- the names of the transferor or transferors and transferee;
- the date the information was provided to Ofcom;
- the licence class and reference number of the licence that is the subject of the transaction;
- in the case of a partial transfer, a description of the rights being transferred.

7.29 We are currently examining the issue of spectrum information provision more generally and plan to consult on it later this year. Our consultation document of 6 June 2008 on the Digital Dividend Review spectrum award design included a question on this issue[37]. If any changes are made to the arrangements for providing information on WT licences generally, this could also affect the information published about RSA.

7.30 It will, in any case, be open to bodies with public sector spectrum holdings to make such additional arrangements as they think fit to publicise opportunities to gain access to those holdings.

Question 2: do you agree that Ofcom should make trading regulations in the form proposed and that the minimum trading unit should be 50 kms square and 6.25 kHz bandwidth?

[37] See question 19 of the document, which may be found at http://www.ofcom.org.uk/consult/condocs/clearedaward/condoc.pdf.

Section 8

Wireless Telegraphy Register regulations

8.1 This section discusses the information to be published about grants of RSA in the WT Register, which is published on Ofcom's website.

Background

8.2 Under section 31 of the WT Act, Ofcom may make regulations to provide for the establishment and maintenance of a WT Register of "relevant" information. Section 31(3)(b) of the WT Act provides that information is "relevant" for the purposes of the WT Register if it relates to the making, renewal, transfer, modification or revocation of grants of RSA. Under section 31(2), Ofcom may include in the register only that information that is of a description prescribed by regulations.

8.3 Ofcom made the Wireless Telegraphy (Register) Regulations 2004 in December 2004. Since then, these Regulations have been amended on several occasions to incorporate more classes of licences to be included on the Register and were extended to radio astronomy RSA in March 2007[38].

Proposed extension of the WT Register

8.4 The proposed regulations would amend the current WT Register regulations to expand the Register to include the information in table 8.1 below about grants of public sector RSA in the 406.1-430 MHz band and the proposed new licence product discussed in section 9 below for licences created by trading public sector RSA. This information is similar to that currently provided in the WT Register for WT licences and RSA for radio astronomy.

Publication of information is beneficial but might need to be curtailed for security reasons

8.5 We believe that it is necessary to publish this information in order to ensure openness and transparency and to facilitate spectrum release and sharing. Publication of information about spectrum holdings is an important facilitator of trading as it enhances transparency and aids the market by informing potential purchasers of the opportunities that are available.

8.6 However, there might be a need for certain sensitive information to be withheld for security reasons. We will discuss with the MOD for each RSA whether publication of any of the information in table 8.1 would compromise national security or public safety and withhold any details of a particularly sensitive nature.

Table 8.1: Information proposed to be included in the WT Register

Data field	Description
RSA or licence reference number	Identification number assigned to the individual grant
Name of holder	Name of the individual or enterprise holding the grant as

[38] The Wireless Telegraphy (Register) (Amendment) Regulations 2007 No.381

Data field	Description
	notified to Ofcom
Contact details	Contact postal address, e-mail addresses, telephone number or agent's contact details
RSA or licence class	Description of the type of spectrum use covered by the RSA or licence
Frequencies assigned	The radio frequency range for the recognised transmission or reception specified either in terms of a central frequency with channel width (eg, 415.25MHz with a 100kHz channel) or a frequency range (eg 415.15 to 415.35MHz)
Geographical information	The geographical area within which transmission or reception is recognised or authorised

Keeping the WT Register up to date

8.7 We will take reasonable steps to ensure the WT Register contains accurate information and is regularly updated. However, there is a balance to be struck between creating a register quickly to facilitate trading and undertaking extensive checks on the accuracy of the information we hold. This may be less of an issue for largescale holdings such as those of the MOD than in licence classes containing a large and shifting population. However, those considering trades, whether of RSA or licences, should use the WT Register as a guide only and not rely on it without carrying out further checks. The Register contains a 'health warning' that it should not be regarded as conclusive 'proof of title'.

Extent of the regulations

8.8 It is not currently proposed to extend the regulations to the Channel Islands or Isle of Man although this might change in future.

Question 3: do you agree with our proposal to publish information in the Transfer Notification Register and WT Register?

Question 4: do you agree that we should make WT Register regulations in the form proposed?

Section 9

Licensing issues

Introduction

9.1 This section discusses a new licence product for licences formed by conversion from RSA.

A new licence product

9.2 As described above, trading RSA may result in grant of a WT licence to the transferee. Such licences will not necessarily fit readily within any of our existing licence products so we intend to create a new licence product for them. Annex 7 contains a sample template for the new licence product.

Interface Requirement

9.3 Creation of the new licence product will involve publishing a Radio Interface Requirement (IR) as required by Articles 4.1 and 7.2 of Directives 1999/5/EC and 98/34/EC, to specify the requirements for the licensing and use of radio equipment in the specified frequency bands. Our proposal for a technology and application neutral IR is included in Annex 6. Following this consultation, we will review our proposal in the light of comments received before submitting it to the European Commission. It will then go through a 3 month standstill period to allow other Member States and the Commission to object or comment on the draft. After that period, if there are no objections, we will be free to adopt it. The final IR will be published on the ERO Frequency Information System and the Ofcom website.

Spectrum trading

9.4 In accordance with the draft trading regulations described in this document, the new licence product will be tradable in the same way as the original RSA. Our proposals are described in section 7 above.

Licence fees

9.5 The MOD is not licensed by Ofcom and does not pay licence fees. Instead, the department pays an amount to Ofcom by agreement under section 28 of the WT Act. The Government's policy, reaffirmed by the Independent Audit and response, is that this amount should be comparable to the AIP that a commercial user would pay.

9.6 The Independent Audit identified various approaches to charging for spectrum following a trade of Crown RSA depending on whether the MOD:

- continues to pay AIP for the original Crown RSA as it was before the transfer and collects a commercially negotiated sum from the incoming transferee; or
- pays an amount that is reduced pro rata to the transfer and Ofcom collects AIP from the transferee.

9.7 The Independent Audit preferred the first of these, ie:

- the MOD would continue to pay for the RSA to Ofcom on the same terms as before the trade; and

- the licensee would make a payment to the MOD on commercial terms as agreed for the transaction but pays no fee to Ofcom as it is already paying the market rate to the MOD.

9.8 As stated in the response to the Independent Audit, this approach has advantages and we are inclined to pursue it. We are continuing to discuss its implementation with the MOD and will consider it further in the light of those discussions and the outcome of the MOD's consultation on its spectrum release plans.

Inclusion in the WT Register

9.9 Information about the new licences will be added to the WT Register as proposed in the preceding section.

Question 5: do you agree with our proposal to create a new licence product and with the proposed Interface Requirement?

Annex 1

Responding to this Notice

How to respond

A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 1 August 2008**.

A1.2 Ofcom strongly prefers to receive responses using the online web form at http://www.ofcom.org.uk/consult/condocs/sfrps08/howtorespond/form 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 laurence.green@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.

Laurence Green
Floor 3
Spectrum Markets Team
Riverside House
2A Southwark Bridge Road
London SE1 9HA

Fax: 020 7981 3990

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

A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together 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 Laurence Green on 020 7783 4289.

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 make the regulations as soon as practicable and will publish a statement.

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

Question 1: do you agree that the technical conditions should be in the form of SURs, with our approach to defining these and to our specific proposals for the 406.1-430 MHz band?

Question 2: do you agree that Ofcom should make trading regulations in the form proposed and that the minimum trading unit should be 50 kms square and 6.25 kHz bandwidth?

Question 3: do you agree with our proposal to publish information in the Transfer Notification Register and WT Register?

Question 4: do you agree that we should make WT Register regulations in the form proposed?

Question 5: do you agree with our proposal to create a new licence product and with the proposed Interface Requirement?

Annex 5

Draft Wireless Telegraphy (Recognised Spectrum Access) Regulations 2008

2008 No XXX

ELECTRONIC COMMUNICATIONS

Wireless Telegraphy (Recognised Spectrum Access) Regulations 2008

Made XXXX 2008

Coming into force XXXX 2008

The Office of Communications ("OFCOM") make the following Regulations in exercise of the powers conferred by section 18(1)(b) and Schedule 2, paragraph 1 of the Wireless Telegraphy Act 2006 ("the Act").

Before making the Regulations OFCOM have given notice of their proposal to do so in accordance with section 122(4)(a) of the Act, published notice of their proposal in accordance with section 122(4)(b) of the Act and have considered the representations made to them before the time specified in the notice in accordance with section 122(4)(c) of the Act.

1 Citation, commencement and extent

(1) These Regulations may be cited as the Wireless Telegraphy (Recognised Spectrum Access) Regulations 2008 and shall come into force on XXXX 2008.

(2) These Regulations shall not extend to the Channel Islands or to the Isle of Man.

2 Circumstances of use

The circumstances of the use of a wireless telegraphy station or wireless telegraphy apparatus, specified for the purpose of section 18(1)(b) of the Act, are circumstances where the station or apparatus operates within any of the frequency bands listed in the Schedule.

3 Time limit for dealing with grants of recognised spectrum access

A decision on an application for a grant of recognised spectrum access which is made to OFCOM will be made, notified to the applicant and published not more than six weeks after the day of the receipt of the application by OFCOM.

4 Requirements that must be met for a grant of recognised spectrum access

(1) The Crown may apply for a grant of recognised spectrum access where--

(a) it is proposing to use or to continue to use a wireless telegraphy station or wireless telegraphy apparatus in the circumstances specified in regulation 2; and

(c) it provides to OFCOM the information specified in paragraph (2).

(2) The information to be provided is--

(a) the name and address of the person applying on behalf of the Crown;

(b) the frequency band in which the Crown wishes to operate a wireless telegraphy station or wireless telegraphy apparatus.

5 Restrictions and conditions to which a grant of recognised spectrum access is subject

A grant of recognised spectrum access may be subject to--

(a) a condition providing for the duration of the grant;

(b) a restriction on the exercise by OFCOM of their power to revoke or modify the grant;

(c) a condition requiring payment of fees; and

(d) conditions describing the limits of the use of the electromagnetic spectrum which is recognised by the grant by reference to--

(i) the location of the wireless telegraphy station or wireless telegraphy apparatus;

(ii) the purpose of use of the electromagnetic spectrum;

(iii) the frequencies for that use; and

(iv) the strength and type of signal.

Chief Executive of the Office of Communications

For and by the authority of the Office of Communications

XXXXXX 2008

SCHEDULE

Regulation 2

Frequency bands
406.1 – 410 MHz
410 – 412 MHz
414 – 420 MHz
420– 422 MHz
424 – 425 MHz
429 – 430 MHz

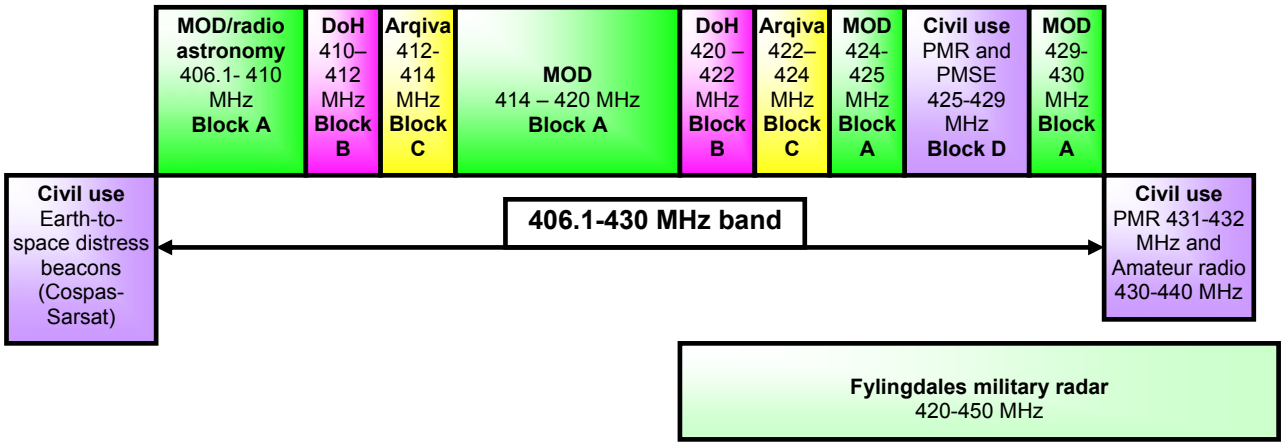
Annex 6

Calculation of technical limits

Introduction

A6.1 This Annex explains how we have calculated our proposed limits for in-band and out-of-band pfd limits in the 406.1-430 MHz band. It also contains details of the associated Interface Requirement (IR).

Figure 6: band plan for 406.1-430 MHz and adjacent bands



Derivation of proposed technical limits

A6.2 We are now starting to base technical conditions on SURs in order to provide users with greater certainty and utility in an environment in which spectrum use is being liberalised. SURs directly control the total interference that users may cause. Because licences have in the past been based instead on the permitted signal levels from individual transmitters, setting SUR parameters requires us to make certain assumptions about the characteristics of the services likely to use the frequency bands in question. These assumptions do not prevent other technologies or services from being deployed as long as they operate within the stated limits.

A6.3 In setting the technical limits, we aim to provide maximum flexibility to use the spectrum while maintaining an acceptable level of spectrum quality for neighbouring assignments. In judging what is acceptable, we will take into account relevant published statements about the spectrum quality in the band, such as our published technical frequency assignment criteria and information memoranda for spectrum awards. This needs to be done on a band-by-band basis. The following paragraphs describe our proposals for the 406.1-430 MHz band.

A6.4 We have based them on various documents as described below, including the Information memorandum (IM) for the spectrum award at 412-414 MHz paired with 422-424 MHz[39] (block C). This stated that the MOD would deploy systems that met certain out-of-band emission limits in respect of the bands adjacent to 410 MHz, 414 MHz, 420 MHz and 424 MHz (block A) but might use systems that exceed

39 http://www.ofcom.org.uk/radiocomms/spectrumawards/completedawards/award_412/documents/im/im.pdf

those levels within designated MOD training areas and, in exceptional circumstances, might also deploy them elsewhere.

A6.5 It further stated that emergency and public safety services planned to use TETRA technology for both direct and trunked mode operation in the bands adjacent to 412 MHz and 422 MHz (block B).

A6.6 Spectrum release or sharing by the MOD in the band is likely to lead to a change of use as an incoming commercial operator is likely to want to deploy different technologies or network architectures. The above statements from the IM do not provide a sufficiently clear indication of the levels of emissions that might be expected to affect neighbouring bands in these circumstances. Our proposals for SURs are intended to secure more optimal use of the spectrum by providing greater certainty and more effective control of interference while allowing flexibility to deploy the systems and technologies that maximise benefits for citizens and consumers and ensuring that public safety and security remain paramount.

Out-of-band emission limits

A6.7 Out-of-band emission limits for SURs are intended to protect victim receivers that might be in the same geographical area as the transmitter but operate on neighbouring frequencies.

A6.8 In setting out-of-band limits, it is necessary to make certain assumptions about the ability of the victim receiver to withstand signals in the adjacent channel. This may be inferred from international standards or specifications, the technology used and the network deployment.

A6.9 Users in blocks B and C are assumed to be TETRA since the technical conditions in the licence in block B and the letter of recognition in block C are based on the block edge mask for TETRA while not precluding other technologies that fit within that mask.

'Hole punching'

A6.10 It is possible that a transmitter complying with this limit might still interfere with a receiver in an adjacent band if sufficiently close. This phenomenon is sometimes referred to as 'hole punching' or 'dead zones'. It is controlled in part by the out-of-band limits but, where problems arise, we would expect, in line with our general approach to SURs, that users would be able to find solutions, for example by employing receivers with greater selectivity or co-locating transmitters.

In-band limits

A6.11 In-band emission limits are needed to protect receivers in blocks B and C. Their susceptibility to these emissions will depend on their ability to reject out-of-band signals so, in setting in-band limits, it is necessary to make assumptions about victim receiver performance in blocks B and C. In the case of the 406.1-430 MHz band, we assume that receivers comply with various relevant international standards for land mobile receivers as listed in paragraph A6.19h below.

Geographical (co-channel) interference limits

A6.12 It is envisaged that grants of RSA in block A will extend to the entire UK so there will initially be no need to control co-channel emissions to protect services operating

on the same frequency. However, it is proposed in the following section that we should allow partial transfers by geographical area as one of the permitted modes of trading. If a partial transfer by geographical area takes place, this will create a geographical interface across which interference might occur between the transferor and the transferee or between two transferees where parts of the geographical area are transferred to different transferees.

A6.13 The co-channel limits will depend on the technologies and applications on either side of the geographical boundary, which are not yet known. As they are not needed in advance of a partial trade, we propose not to include them in the initial grant but to leave it to the parties to decide whether to apply for a variation to add them to the RSA in the light of their knowledge about the technologies and applications likely to use the transferred spectrum.

A6.14 If the parties wish geographical interference limits to be included in the RSA and licence, they may agree that the transferor (the MOD in the first instance) should apply to Ofcom for a variation to impose a boundary condition before the trade takes place. This would then be carried over in the transfer and would apply as a condition of the remaining RSA and the new licence created as a result of the trade. It would be for the parties to agree on a limit that suited them based on their knowledge of the application, technology and transmitter deployment density on either side of the boundary.

A6.15 The existing in-band and out-of-band pfd limits would continue to apply to protect other users from unacceptable interference.

Intermodulation, overload and spurious emissions

A6.16 These types of interference are generally an issue only where relatively high-power transmitters are relatively close together. Intermodulation and overload are to some extent controlled by the out-of-band emission limits. In general, they do not cause problems in practice and we have concluded in relation to SURs generally that it would be disproportionate to impose complex regulatory mechanisms to deal with them. We see no reason why this conclusion should not hold for the 406.1-430 MHz band.

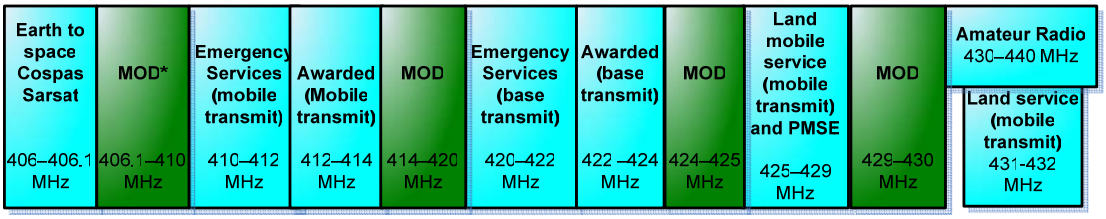
A6.17 Where intermodulation occurs as a result of interaction between two transmitters, it will be the responsibility of the operator of the more recently deployed to resolve it.

Deriving SUR parameters for 406.1 – 430 MHz Band

Assumption of Adjacent User Service/ Technology

A6.18 SUR parameters are defined for the following frequency ranges: 406.1-410 MHz, 410-412 MHz, 414-420 MHz, 420-422 MHz, 424-425 MHz and 429-430 MHz shown in figure 7 below.

Figure 7: Band plan for 406.1-430 MHz



*shared with radio astronomers

A6.19 We base our proposed technical limits for block A, which comprises 406.1-410, 414-420, 424-425 and 429-430 MHz, and block B, which comprises 410-412 MHz paired with 420-422 MHz, on the following.

a) adjacent users are emergency services (operated by Department of Health), spectrum awarded to Arqiva, land mobile service, Cospas-Sarsat earth-to-space distress beacons and the Radio Amateur service.

b) Arqiva's licence and DoH's letter of recognition are technology-neutral but contain technical conditions based on the TETRA mask.

c) For land mobile service, a wide range of technologies may be used such as:

- TETRA 25kHz;
- narrowband analogue PMR (12.5 kHz and 25 kHz) or digital PMR (6.25kHz);
- wideband PMR (200kHz / CDMA PMR).

d) Ofcom and JFMG currently manage business radio and PMSE in the 425 – 429 MHz band.

e) The protection requirement for Cospas-Sarsat is defined in ITU-R M.1478 ,which states that the maximum acceptable spectral pfd at the Cospas-Sarsat antenna due to systems at the adjacent band should not exceed −138.6 dBW/m^2/ MHz. The interference effect from terrestrial towards space is very low as the propagation loss for the Cospas-Sarsat antenna at 1000km altitude is 144dB. It is proposed that the protection requirement at this block edge is based on the land mobile service which provides a more conservative value than required for the protection of Cospas-Sarsat antenna.

f) The protection level above 430 MHz is based on the land mobile service at 431-432 MHz. The Radio Amateur service at 430-440 MHz has secondary status.

Calculation of out-of-band and in-band pfd

g) The proposed protection requirement is based on analogue PMR technology which is more sensitive to interference and hence would protect digital PMR technology. The value chosen will also provide the necessary protection for TETRA system from harmful interference.

h) In defining the protection requirement for land mobile service, the following technical documents are considered:

- ETSI Standard EN 300 392-2 V3.2.1 for TETRA;

- ETSI Standard EN 300 113-1 V1.5.1 for Land Mobile Service (Digital and Analogue);

- Of164 Ofcom Business Radio Technical Frequency Assignment Criteria;

Table A6.1: parameters used to calculate technical limits

	Parameters	Values
1	Receiver Sensitivity Level (RSL) (dBm)	-104[40]
2	Co-channel interference (C/I) (dB)	12
3	Maximum tolerable single entry interference level (dBm): RSL – C/I	- 116
4	Maximum tolerable aggregate interference[41] (dBm): RSL – C/I – 6dB	- 122
5	Maximum tolerable aggregate interference (dBm/ MHz)	-106
6	Aggregate pfd interference (dBW/m^2/MHz) = Aggregate out-of-band pfd: (5)-16.4dB	-122.4
7	Adjacent channel selectivity (dBc)[42]	55 for 12.5kHz frequency offset 70 for frequency offset beyond 12.5kHz
8	Aggregate in-band pfd (dBW/m^2/MHz): (6) + (7)	-67.4 for 12.5kHz frequency offset -52 for frequency offset beyond 12.5kHz

i) As the typical channel for business radio is 25kHz, the out-of-band pfd will be defined for frequency offset of 50 kHz from the band edge.

j) The in-band pfd limit will be defined at height 1.5 metre above ground level at more than 95% of locations to protect both base transmit and mobile transmit.

k) Although the antenna height for base transmit will be higher than mobile transmit, we have carried out a simulation that shows that the proposed SUR parameters will provide sufficient protection to the adjacent band base station receiver at 30m and at 50% of locations.

l) The resulting in-band and out-of-band pfd limits are shown in the following table.

Table A6.2: proposed pfd limits in block A in the 406.1-430 MHz band

Frequency band	Maximum aggregate pfd outside the frequency band at 1.5 metre above ground level at more than 95% of locations	Maximum aggregate pfd in the frequency band at 1.5 metre above ground level at more than 95% of locations within a test

[40] This value is based on Of 164 for 12.5 kHz analogue PMR. However, we apply the same value for 25 kHz channel to be on the conservative side and to take account of TETRA technology.
[41] Adding 6dB to allow for 4 equal interferers
[42] Based on ETSI standard EN 300 392-2 V3.2.1 for TETRA where adjacent channel selectivity at the 12.5 kHz offset is less than that for land mobile service EN 300 113-1 V1.5.1 for Land Mobile Service (Digital and Analogue)

	within a test area[a] for ΔF[b] up to 50kHz (dBW/m²/MHz)	**area[a] (dBW/m²/MHz)**
406.1 – 410 MHz	-122	-67 for ΔF[b] from 0 to12.5 kHz and -52 for ΔF[b] greater than 12.5 kHz
414 – 420 MHz		
424 – 425 MHz		
429 – 430 MHz		

[a]The test area is defined as a square area including at least ten transmitters. Its location is defined by the 4-figure National Grid Reference of the bottom left corner. The test area is the smallest of the following that includes at least ten transmitters: 1 km², 4 km², 25 km², 100 km², 400 km², 2500 km² or 10000 km². All test points that occur over a water feature (eg sea, lake or river) will be ignored and pfd levels at these points will not contribute to establishing compliance.

[b]ΔF - offset from the outer edge of the frequency range for out-of-band pfd and from the inner edge for in-band

Proposed Radio Interface Requirement

A6.20 Section 9 referred to our proposal to create a new licence product for licences formed as a result of spectrum trading to a non-Crown body in the band and for the associated technology and application neutral IR. The following table gives details of our proposal for the IR for these licences and for the RSA.

Table A6.3: Proposed Radio Interface Requirement

Minimum requirements for the use of radio equipment operating in the 406.1 - 430 MHz band		
Mandatory (1-9)		
1	**Frequency / Bands**	406.1 to 412.0 MHz 414.0 to 422.0 MHz 424.0 to 425.0 MHz 429.0 to 430.0 MHz
2	**Radio service**	Any
3	**Application**	Any
4	**Channelling / modulation**	Any
5	**Maximum transmit power limit**	TBD
6	**Channel occupation rules**	N/A
7	**Duplex type / separation**	N/A
8	**Licensing Regime**	Yes
9	**Additional essential requirements**	N/A
Informative (10-13)		
10	Frequency planning assumptions	
11	Reference	
12	Remarks	
13	Notification Number	2008/XXX/UK

Annex 7

Illustrative templates for grants of RSA and the new WT licences

This Annex contains illustrative templates for grants of RSA in the 406.1-430 MHz band and WT licences issued following trading of the RSA. They are provided for background information only to illustrate the outline form that RSA and licences might take in the band; actual grants will be drafted to take account of the particular circumstances and might include different terms and conditions. The templates include details of the modelling method we would propose to use in interference resolution and enforcement.

RSA template

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

Product Code	
RSA grant reference number	
RSA	**Crown RSA**
RSA grant holder	**Secretary of State for XXX**
RSA grant holder address	
Date of granting	**« date »**
RSA start date	**« date»**
RSA end date	**« date »**
Fee payment date	

PART 1 - GENERAL

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

   The Secretary of State
   XXXXX

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

RSA Term

2. This grant of RSA shall commence on [day, month, year] 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;
   b. for reasons related to the management of the radio spectrum, provided that in such case the power to revoke may only be exercised after five (5) years notice served on the grantee;
   c. immediately (subject to the procedures in the Act) if it appears to Ofcom to be necessary or expedient to revoke the RSA for the purposes of complying with a

direction by the Secretary of State given to Ofcom under section 5 of the Act, or under sections 5 of the Communications Act 2003;

d. immediately (subject to the procedures in the Act) in accordance with any international obligations placed on the UK under European Community or other agreement which may affect the spectrum recognised;
e. if there has been a failure to pay the fee prescribed in accordance with paragraph 8;
f. if there has been a 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. The transfer of rights and obligations arising as a result of this grant may be authorised in accordance with regulations made by Ofcom under powers conferred by section 30 of the Act.

7. The RSA grantee must give immediate notice to Ofcom in writing of any proposed 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 for in the 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 Grantee (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. This RSA applies to the use of the electromagnetic spectrum for wireless telegraphy in the United Kingdom.

Recognised purpose of spectrum use

11. This RSA applies to transmit and receive use of the electromagnetic spectrum for wireless telegraphy at ground level that complies with the provisions specified in Schedules 1 and 2.

Recognised frequencies

12. The frequency bands of use recognised in this RSA are specified in Schedules 1 and 2.

Effect of Grant

13. 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

Interpretation

14. In this grant of RSA:
    a. "wireless telegraphy" has the meaning set out in section 116 of the Act
    b. "dBW/nMHz" means decibels relative to one Watt of power per bandwidth of n MegaHertz of frequency
    c. "dBW/mkHz" means decibels relative to one Watt of power per bandwidth of m kiloHertz of frequency

SCHEDULE 1 TO RSA NUMBER: **[xxxxxx]**

Schedule Date: **[date]**

RSA Category: **Recognised Spectrum Access 406.1 to 430.000 MHz Band**

1. Description of Radio Equipment

"Radio Equipment" means any radio transmitting and receiving stations and/or any radio apparatus

2. Interface Requirements for the Radio Equipment use

Use of the radio equipment shall be in accordance with the following Interface Requirement ("IR"):

IR XXXX.

3. Special Conditions relating to the Operation of the Radio Equipment

(a) During the period that this RSA remains in force and for six (6) months thereafter, unless consent has otherwise been given by Ofcom, the Grantee shall compile and maintain accurate written records of:

(i) the following details relating to the Radio Equipment:

a) postal address;

b) National Grid Reference (to one hundred (100) metres resolution);

c) antenna height (above ground level) and type, bearing east of true north; and

d) radio frequencies used by the Radio Equipment; and

(ii) the operational details of base station sites required in Schedule 2 Paragraph 5 required to establish compliance in any particular area;

and the Grantee must produce these records if requested by a person authorised by Ofcom.

(b) The Grantee shall inform Ofcom of the address of the premises at which this RSA and the information detailed at sub-paragraph 3(a) above shall be kept.

(c) The Grantee must submit to Ofcom copies of the records detailed in sub-paragraph 3(a) above at such intervals as Ofcom shall notify to the Grantee.

(d) The Grantee must also submit to Ofcom in such manner and at such times, all information relating to the establishment, installation or use of the Radio Equipment, whether stored in hard copy or electronic form, as reasonably requested for the purposes of verifying compliance with this RSA or for statistical purposes.

(e) The Grantee must ensure that the Radio Equipment is established and installed only for terrestrial use.

4. Cross-border coordination

The Grantee must ensure that the Radio Equipment is operated in compliance with such cross-border coordination and sharing procedures as may be notified to the Grantee by Ofcom.

5. Frequency Bands

Subject to the Out-of-Block Emissions permitted under Paragraph 8, the Radio Equipment must only transmit and/or receive on the following frequency bands (the "Frequency Bands"):

(i) 406.1 – 410 MHz
(ii) 414.0 – 420 MHz
(iii) 424.0 – 425 MHz

(iv) 429.0 – 430 MHz

6. Maximum permissible aggregate PFD

The maximum aggregate PFD in the Frequency Band(s) specified in:

- Paragraph 5(i) shall not exceed xxx dBW/m^2/MHz at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10.
- Paragraph 5(ii) shall not exceed xxx dBW/m^2/MHz at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10
- Paragraph 5(iii) shall not exceed xxx dBW/m^2/MHz at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10
- Paragraph 5(iv) shall not exceed xxx dBW/m^2/MHz at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10

The maximum aggregate PFD is due to transmissions by radio equipment located in the above test area and which is operating in the Frequency Band(s) as specified in Paragraph 5(i) to 5(iv).

7. Maximum permissible EIRP

(If applicable)

8. Permissible Out-of -Block aggregate PFD

The maximum aggregate PFD outside the Band(s) specified in Paragraph 5(i) shall not exceed:

Offset from block edge ΔF	**Maximum aggregate PFD**
	At a receive antenna height of 1.5 m above ground level (dBW/m^2/MHz)

at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10.

The permissible out-of-block aggregate PFD is due to transmissions by radio equipment located in the above test area and which is licensed to operate in the Frequency Band(s) as specified in Paragraph 5(i).

Where: Δ_F is the frequency offset from the block edge (in MHz)
The lower block edge being xx MHz
The upper block edge being xx MHz

9. Compliance with PFD conditions

For the purpose of establishing compliance with the PFD conditions set out in Paragraphs 6 and 8 a methodology based on radio-frequency propagation modelling shall be used. This methodology is set out in Schedule 2 to this grant.

10. Definition of a test area

The test area is a square area including at least ten transmitters. The location of the area is defined by the (4-figure) National Grid Reference of its bottom left corner. The appropriate test area is the smallest of the following areas, 1 km^2, 4 km^2, 25 km^2, 100 km^2, 400 km^2, 2500 km^2 or 10000 km^2, which includes at least ten transmitters.

All test points that occur over a water feature (e.g. sea, lake or river) will be ignored. PFD levels at these points will not contribute to establishing compliance.

11. Interpretation

In this Schedule:

(a) "EIRP" means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);

(b) "ERP" means the effective radiated power. This is the power fed to the antenna multiplied by the maximum gain of the antenna with respect to a half-wave dipole.

(c) "dBm" means the power level in decibels (logarithmic scale) referenced against 1 milliWatt (i.e. a value of 0 dBm is 1mW);

(d) "dBW" means the power level in decibels (logarithmic scale) referenced against 1 Watt (i.e. a value of 0 dBw is 1 W).

(e) "Out-of-Block Emissions" means radio frequency emissions generated by the Radio Equipment and radiated into the frequency bands adjacent to the Grantee's Frequency Bands.

(f) "Base station" means a radio transmitter not intended to be used while in motion to provide a communications service, typically used in mobile or broadcasting radio systems.

(g) "Mobile station" means a radio transmitter intended to be used while in motion or during halts at unspecified locations.

(h) "PFD" means power-flux density and is a measure of the power received per unit area per unit frequency. For the purposes of this RSA it is expressed in the following units dBW/m^2/MHz.

(i) "aggregate PFD" means the combined PFD caused by all transmitters used within the test area defined in Schedule 1, Paragraph 10.

SCHEDULE 2 TO RSA NUMBER: [xxxxxx]

Schedule Date: **[date]**

RSA Category: **Recognised Spectrum Access 406.1 to 430 MHz Band**

1. Radio-frequency propagation model

For the purpose of radio-frequency propagation modelling ITU-R Recommendation P.1546-3 (P.1546) shall be used.

2. Terrain data

Ordnance Survey "Panorama DTM" 50 m resolution digital terrain map data shall be used.

3. Clutter data

The 50 m resolution clutter database produced by Infoterra shall be used.

This database identifies 10 different clutter categories. For the purposes of incorporation into P.1546 these categories are mapped to the categories noted in P.1546, namely: urban, dense urban, suburban, sea, open. The mapping that will be used is shown in Table A1.

Code	Clutter Database Category	P.1546 category	Reference Antenna Height (m)
1	**Dense urban**	Dense Urban	30
2	**Urban**	Urban	20
3	**Industrial**	Suburban	10
4	**Suburban**	Suburban	10
5	**Village**	Suburban	10
6	**Parks/recreation**	Open	10
7	**Open**	Open	10
8	**Open in urban**	Urban	20
9	**Forest**	Open	10
10	**Water**	Sea	10

Table A1. Mapping of clutter categories

4. Calculation methodology

Field strength values will be calculated using any suitable radio-frequency software planning tool implementing the radio-frequency propagation model and terrain and clutter data sets described in Paragraphs 1, 2 and 3.

Compliance to the terms of this Grant is established if the aggregate field strength values predicted by the radio-frequency software planning tool are no greater than those given in

Schedule 1 Paragraphs 6 and 8 for the specified percentage of locations (pixels) within the test area.

Detailed specification of the methodology is given below:

a) **Pixel Size.** The test area defined in Schedule 1, Paragraph 10 will be divided into square pixels of size 50m by 50m.

b) **Summation of signals from transmitters**. The aggregate field strength at a pixel will be defined to be the summation of the predicted field strengths for each outdoor transmitter (expressed in linear units) on an r.m.s. basis (linear addition of power density).

c) **Excluded pixels.** Aggregate field strength will not be calculated for pixels which contain a transmitter. Pixels containing a transmitter will not be considered in determining compliance. Pixels which are of P.1546 clutter type 'Sea' will not be considered in determining compliance.

   The term "adjacent to sea" as described in P.1546, Annex 5, Section 9 is interpreted as "located over the sea". These pixels will therefore not be considered in determining compliance.

d) **Path profile extraction.** Both terrain height and clutter height will be assumed to be constant over the area of a pixel. No interpolation of heights will be undertaken. The path profile will be extracted using the Bresenham algorithm. Ofcom will publish an example of modelling compliance for a reference network against which Grantees can verify their own compliance modelling software.

e) **P.1546 location variability.** Field strengths will be predicted for a 50% location variability

f) **P.1546 time variability**. Field strengths will be predicted for a 50% time variability**.**

g) **P.1546 field-strength predictions for distances less than 1 km.** For path lengths of less than 1 km, the method described in P.1546, Annex 5, Section 14 will be used.

h) **Receiving/mobile antenna height.** Field strengths will be calculated at the height specified in Schedule 1 Paragraphs 6 and 8

i) **P.1546 correction for receiving/mobile antenna height.** For pixels which are classified as P.1546 categories "dense urban", "urban" or "suburban environment", equation *27a* of P.1546 shall be used to determine the correction for receiving/mobile antenna height. For pixels which are classified as P.1546 categories "open" or "sea", equation *27b* shall be used to determine the correction for receiving/mobile height.

j) **Terrain Clearance Angle.** Terrain Clearance Angle correction as described in P.1546, Annex 5, Section 11 will be used.

k) **P.1546 Correction for short urban/suburban paths.** (P.1546, Annex 5, Section 10,). No correction for short urban/suburban paths will be applied.

l) **P.1546 Land paths shorter than 15 km.** For paths less than 15 km in length, as described in P.1546, Appendix 5, Section 3.1, equation *6* of P.1546, Annex 5 will be used to determine *h1* in all cases. In using this equation the actual value of path length *d* will be used, including cases when *d* is less than 1 km.

m) **Transmit antenna gain**. The transmit EIRP assumed will be that in the direction of the reference receiver at the clutter height

5. Operational details of transmitting stations

The operational details of all transmitting stations within the area for which compliance is to be established will be entered into the radio-frequency software planning tool, excluding indoor transmitting stations with an EIRP not greater than 2 Watts per 1.7 MHz. These details may include:

(a) the National Grid Reference to ten (10) metres resolution of each transmitting site;

(b) the height above ground level of each transmitting antenna to an accuracy of 1 metre;

(c) the azimuth of each transmitting antenna on each site;

(d) the horizontal and vertical profile of each transmitting antenna on each site (without taking into account any down-tilt);

(e) the down-tilt (physical and electrical) of each transmitting antenna;

(f) Class of Emission of the radiated signal;

(g) the mean operational EIRP per MHz over the frequency bands given in Schedule 1 Paragraph 5, averaged over a specified 3 minute interval; and

(h) the out-of-block emission profile in EIRP per MHz to a maximum of 4 MHz either side of the frequency bands given in Schedule 1 Paragraph 5 of each transmitting antenna

WT licence template

Draft Licence 406.1 to 430 MHz Band

1. The Office of Communications (Ofcom) grants this Licence (the "Licence") to

[…]

to establish, instal and use radio transmitting and receiving stations and/or radio apparatus as described in Schedule 1 (the "Radio Equipment") subject to the terms, set out below.

Licence Term

2. This Licence shall continue in force until revoked by Ofcom in accordance with Paragraph 3 below or surrendered by the Holder.

Licence Variation and Revocation

3. Pursuant to Paragraph 8 of Schedule 1 to the Wireless Telegraphy Act 2006 (the "Act"), Ofcom may not revoke this Licence under Paragraph 6 of Schedule 1 to the Act except:

(a) at the request of, or with the consent of, the Licensee;

(b) if there has been a failure to pay the fee prescribed in accordance with Paragraph 7;

(c) if there has been a breach of a term of the Licence;

(d) if, in connection with the transfer or proposed transfer of rights and obligations arising by virtue of the Licence, there has been a breach of any provision of Regulations made by Ofcom under the powers conferred by section 30 of the Act;

(e) in accordance with Paragraph 8(5) of Schedule 1 to the Act;

(f) for reasons related to the management of the radio spectrum, provided that in such case this power to revoke may only be exercised after at least five (5) year's notice is given in writing to the Licensee.

4. Ofcom may only revoke or vary this Licence by notification in writing to the Holder and in accordance with Paragraphs 6 and 7 of Schedule 1 to the Act.

Changes

5. This Licence is not transferable. The transfer of rights and obligations arising by virtue of this Licence may however be authorised in accordance with regulations made by Ofcom under powers conferred by section 30(1) and (3) of the Act[43].

6. The Licensee must give prior notice to Ofcom in writing of any proposed change to the Licensee's name and address from that recorded in the Licence.

Fees

7. The Licensee shall pay to Ofcom the relevant sums as provided in section 12 of the Act and the regulations made thereunder:

(i) on or before the date of issue of the Licence; and
(ii) on or before the payment date or dates as shall be notified in writing to the Licensee, in accordance with those regulations and any relevant terms, provisions and limitations of the Licence.

For the avoidance of doubt, the fee shall be exclusive of any VAT which may ultimately be payable.

8. The Licensee shall also pay interest to Ofcom on any amount which is due under the terms of this Licence or provided for in any Regulations made by Ofcom under sections 12 and 13(2) of the Act from the date such amount falls due until the date of payment, calculated with reference to the Bank of England base rate from time to time. In accordance with section 15 of the Act any such amount and any such interest is recoverable by Ofcom.

9. If the Licence is surrendered or revoked, no refund, whether in whole or in part of any amount which is due under the terms of this Licence or provided for in any Regulations made by Ofcom under sections 12 and 13(2) of the Act will be made, except at the absolute discretion of Ofcom.

Radio Equipment Use

10. The Licensee must ensure that the Radio Equipment is established, installed and used only in accordance with the provisions specified in Schedule of this Licence. Any proposal to amend any detail specified in Schedule of this Licence must be agreed with Ofcom in advance and implemented only after the Licence has been varied or reissued accordingly.

11. The Licensee must ensure that the Radio Equipment is operated in compliance with the terms of this Licence and is used only by persons who have been authorised in writing by the Licensee to do so and that such persons are made aware of, and of the requirement to comply with, the terms of the Licence.

[43] See Ofcom's website for the latest position on spectrum trading and the types of trade which are permitted.

Access and Inspection

12. The Licensee shall permit a person authorised by Ofcom:

(a) to have access to the Radio Equipment; and

(b) to inspect the Licence and to inspect, examine and test the Radio Equipment,

at any and all reasonable times or, when in the opinion of that person an urgent situation exists, at any time to ensure the Radio Equipment is being used in accordance with the terms of the Licence.

Modification, Restriction and Closedown

13. A person authorised by Ofcom may require the Radio Equipment to be modified or restricted in use, or temporarily or permanently closed down immediately if in the opinion of the person authorised by Ofcom:

(a) a breach of a term of the Licence has occurred; and/or

(b) the use of the Radio Equipment is causing or contributing to undue interference to the use of other authorised radio equipment.

14. Ofcom may require any of the radio stations or radio apparatus that comprise the Radio Equipment to be modified or restricted in use, or temporarily closed down either immediately or on the expiry of such period as may be specified in the event of a national or local state of emergency being declared. Ofcom may only exercise this power after a written notice is served on the Licensee or a general notice applicable to holders of a named class of Licence is published.

Geographical Boundaries

16. This Licence authorises the establishment, installation and use of the Radio Equipment in the United Kingdom.

Interpretation

17. In this Licence:

(a) the establishment, installation and use of the Radio Equipment shall be interpreted as establishment and use of stations and installation and use of apparatus for wireless telegraphy as specified in section 8 of the Act; and

(b) the expressions "undue interference", "station for wireless telegraphy" and "apparatus for wireless telegraphy" shall be construed in accordance with section 115 of the Act.

18. The schedules to this Licence form part of this Licence as the case may be together with any subsequent schedules which Ofcom may issue as a variation to this Licence at a later date.

19. The Interpretation Act 1978 shall apply to this Licence as it applies to an Act of Parliament.

Issued by Ofcom

Signed by

For the Office of Communications

SCHEDULE 1 TO LICENCE NUMBER: **[xxxxxx]**

Schedule Date: **[date]**

LICENCE Category: **[XXXXX] 406.1 to 430 MHz Band**

1. Description of Radio Equipment Licensed

In this Licence, the Radio Equipment means any radio transmitting and receiving stations and/or any radio apparatus.

2. Interface Requirements for the Radio Equipment use

Use of the radio equipment shall be in accordance with the following Interface Requirement ("IR"):

IR XXXX

3. Special Conditions relating to the Operation of the Radio Equipment

(a) During the period that this Licence remains in force and for six (6) months thereafter, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate written records of the following details relating to the Radio Equipment:

a) postal address;

b) National Grid Reference (to one hundred (100) metres resolution);

c) antenna height (above ground level) and type, bearing east of true north; and

d) radio frequencies used by the Radio Equipment;

and the Licensee must produce these records if requested by a person authorised by Ofcom.

(b) The Licensee shall inform Ofcom of the address of the premises at which this Licensee and the information detailed at sub-paragraph 3(a) above shall be kept.

(c) The Licensee must submit to Ofcom copies of the records detailed in sub-paragraph 3(a) above at such intervals as Ofcom shall notify to the Licensee.

(d) The Licensee must also submit to Ofcom in such manner and at such times, all information relating to the establishment, installation or use of the Radio Equipment, whether stored in hard copy or electronic form, as reasonably

requested for the purposes of verifying compliance with this Licence or for statistical purposes.

(e) The Licensee must ensure that the Radio Equipment is established and installed only for terrestrial use.

4. Cross-border coordination

The Licensee must ensure that the Radio Equipment is operated in compliance with such cross-border coordination and sharing procedures as may be notified to the Licensee by Ofcom.

5. Permitted Frequency Bands

Subject to the Out-of-Block Emissions permitted under Paragraph 8, the Radio Equipment must only transmit and/or receive on the following frequency bands (the "Permitted Frequency Bands"):

(i) 406.1 – 410 MHz
(ii) 414 – 420 MHz
(iii) 424 – 425 MHz
(iv) 429 – 430 MHz

6. Maximum permissible EIRP

(if applicable)

7. Maximum permissible aggregate PFD

The maximum aggregate PFD in the Permitted Frequency Band(s) specified in:

- Paragraph 5(i) shall not exceed xxx dBW/m^2/MHz at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10.
- Paragraph 5(ii) shall not exceed xxx dBW/m^2/MHz at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10
- Paragraph 5(iii) shall not exceed xxx dBW/m^2/MHz at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10
- Paragraph 5(iv) shall not exceed xxx dBW/m^2/MHz at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10

The maximum aggregate PFD is due to transmissions by equipment located in the above test area and which is licensed to operate in the Permitted Frequency Band(s) as specified in Paragraph 5(i) to 5(iv).

8. Permissible Out-of-Block aggregate PFD

The maximum aggregate PFD outside the Permitted Frequency Band(s) specified in Paragraph 5 shall not exceed:

Offset from block edge ΔF	**Maximum aggregate PFD**
	At a receive antenna height of 1.5 m above ground level (dBW/m^2/MHz)

at a height of 1.5m above ground level at more than 95% of locations within a test area as defined in Paragraph 10.

The permissible out-of-block aggregate PFD is due to transmissions by equipment located in the above test area and which is licensed to operate in the Permitted Frequency Band(s) as specified in Paragraph 5(i).

Where: Δ_F is the frequency offset from the block edge (in MHz)
The lower block edge being xx MHz
The upper block edge being xx MHz

9. Compliance with PFD conditions

For the purpose of establishing compliance with the PFD conditions set out in Paragraphs 7 and 8 a methodology based on radio-frequency propagation modelling shall be used. This methodology is set out in Schedule 2 to this licence.

10. Definition of a test area

The test area is a square area including at least ten transmitters. Its location is defined by the (4-figure) National Grid Reference of its bottom left corner. The appropriate test area is the smallest of the following areas, 1 km^2, 4 km^2, 25 km^2, 100 km^2, 400 km^2, 2500 km^2 or 10000 km^2, which includes at least ten transmitters.
All test points that occur over a water feature (e.g. sea, lake or river) will be ignored. PFD levels at these points will not contribute to establishing compliance.

11. Interpretation

In this Schedule:

(a) "EIRP" means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);

(b) "ERP" means the effective radiated power. This is the power fed to the antenna multiplied by the maximum gain of the antenna with respect to a half-wave dipole.

(c) "dBm" means the power level in decibels (logarithmic scale) referenced against 1 milliWatt (i.e. a value of 0 dBm is 1mW);

(d) "dBW" means the power level in decibels (logarithmic scale) referenced against 1 Watt (i.e. a value of 0 dBw is 1 W).

(e) "Out-of-Block Emissions" means radio frequency emissions generated by the Radio Equipment and radiated into the frequency bands adjacent (in terms of frequency) to the Licensee's Permitted Frequency Bands.

(f) "Base station" means a radio transmitter not intended to be used while in motion to provide a communications service, typically used in mobile or broadcasting radio systems.

(g) "Mobile station" means a radio transmitter intended to be used while in motion or during halts at unspecified locations.

(h) "PFD" means power-flux density and is a measure of the power received per unit area per unit frequency. For the purposes of this Licence it is expressed in the following units dBW/m^2/MHz.

(i) "aggregate PFD" means the combined PFD caused by all transmitters authorised by this licence within the test area defined in Schedule 1, Paragraph 10.

SCHEDULE 2 TO LICENCE NUMBER: **[xxxxxx]**

Schedule Date: **[date]**

LICENCE Category: **[XXX] 406.1 to 430 MHz Band**

1. Radio-frequency propagation model

For the purpose of radio-frequency propagation modelling ITU-R Recommendation P.1546-3 (P.1546) shall be used.

2. Terrain data

Ordnance Survey "Panorama DTM" 50 m resolution digital terrain map data shall be used.

3. Clutter data

The 50 m resolution clutter database produced by Infoterra shall be used.

This database identifies 10 different clutter categories. For the purposes of incorporation into P.1546 these categories are mapped to the categories noted in P.1546, namely: urban, dense urban, suburban, sea, open. The mapping that will be used is shown in Table A1.

Code	Clutter Database Category	P.1546 category	Reference Antenna Height (m)
1	**Dense urban**	Dense Urban	30
2	**Urban**	Urban	20
3	**Industrial**	Suburban	10
4	**Suburban**	Suburban	10
5	**Village**	Suburban	10
6	**Parks/recreation**	Open	10
7	**Open**	Open	10
8	**Open in urban**	Urban	20
9	**Forest**	Open	10
10	**Water**	Sea	10

Table A1. Mapping of clutter categories

4. Calculation methodology

Field strength values will be calculated using any suitable radio-frequency software planning tool implementing the radio-frequency propagation model and terrain and clutter data sets described in Paragraphs 1, 2 and 3.

The aggregate field strength values predicted by the radio-frequency software planning tool shall be no greater than those given in Schedule 1 Paragraphs 7 and 8 for the specified percentage of locations (pixels) within the test area.

Detailed specification of the methodology is given below:

a) **Pixel Size.** The test area defined in Schedule 1, Paragraph 10 will be divided into square pixels of size 50m by 50m.

b) **Summation of signals from transmitters**. The aggregate field strength at a pixel will be defined to be the summation of the predicted field strengths for each outdoor transmitter (expressed in linear units) on a r.m.s. basis (linear addition of power density).

c) **Excluded pixels.** Aggregate field strength will not be calculated for pixels which contain a transmitter. Pixels containing a transmitter will not be considered in determining compliance. Pixels which are of P.1546 clutter type 'Sea' will not be considered in determining compliance.

The term "adjacent to sea" as described in P.1546, Annex 5, Section 9 is

interpreted as "located over the sea". These pixels will therefore not be considered in determining compliance.

d) **Path profile extraction.** Both terrain height and clutter height will be assumed to be constant over the area of a pixel. No interpolation of heights will be undertaken. The path profile will be extracted using the Bresenham algorithm. Ofcom will publish an example of modelling compliance for a reference network against which licensees can verify their own compliance modelling software.

e) **P.1546 location variability.** Field strengths will be predicted for a 50% location variability

f) **P.1546 time variability**. Field strengths will be predicted for a 50% time variability**.**

g) **P.1546 field-strength predictions for distances less than 1 km.** For path lengths of less than 1 km, the method described in P.1546, Annex 5, Section 14 will be used.

h) **Receiving/mobile antenna height.** Field strengths will be calculated at the height specified in Schedule 1 Paragraphs 7 and 8

i) **P.1546 correction for receiving/mobile antenna height.** For pixels which are classified as P.1546 categories "dense urban", "urban" or "suburban environment", equation *27a* of P.1546 shall be used to determine the correction for receiving/mobile antenna height. For pixels which are classified as P.1546 categories "open" or "sea", equation *27b* shall be used to determine the correction for receiving/mobile height.

j) **Terrain Clearance Angle.** Terrain Clearance Angle correction as described in P.1546, Annex 5, Section 11 will be used.

k) **P.1546 Correction for short urban/suburban paths.** (P.1546, Annex 5, Section 10,). No correction for short urban/suburban paths will be applied.

l) **P.1546 Land paths shorter than 15 km.** For paths less than 15 km in length, as described in P.1546, Appendix 5, Section 3.1, equation *6* of P.1546, Annex 5 will be used to determine *h1* in all cases. In using this equation the actual value of path length *d* will be used, including cases when *d* is less than 1 km.

m) **Transmit antenna gain**. The transmit EIRP assumed will be that in the direction of the reference receiver at the clutter height

5. Operational details of transmitting stations

The operational details of all transmitting stations within the area for which compliance is to be established will be entered into the radio-frequency software planning tool, excluding indoor transmitting stations with an EIRP not greater than 2 Watts per 1.7 MHz. These details may include:

(i) the National Grid Reference to ten (10) metres resolution of each transmitting site;

(j) the height above ground level of each transmitting antenna to an accuracy of 1 metre;

(k) the azimuth of each transmitting antenna on each site;

(l) the horizontal and vertical profile of each transmitting antenna on each site (without taking into account any down-tilt);

(m) the down-tilt (physical and electrical) of each transmitting antenna;

(n) Class of Emission of the radiated signal;

(o) the mean operational EIRP per MHz over the permitted frequency bands given in Schedule 1 Paragraph 5, averaged over a specified 3 minute interval; and

(p) the out-of-block emission profile in EIRP per MHz to a maximum of 4 MHz either side of the permitted frequency bands given in Schedule 1 Paragraph 5 of each transmitting antenna

Annex 8

Draft Wireless Telegraphy (Limitation of Number of Grants of Recognised Spectrum Access) Order 2008

2008 No XXX

ELECTRONIC COMMUNICATIONS

Wireless Telegraphy (Limitation of Number of Grants of Recognised Spectrum Access) Order 2008

Made XXXXX 2008

Coming into force XXXXX 2008

The Office of Communications ("OFCOM") make the following Order in exercise of the powers conferred by section 29(1) to (3) of the Wireless Telegraphy Act 2006 ("the Act").

Before making the Order OFCOM have given notice of their proposal to do so in accordance with section 122(4)(a) of the Act, published notice of their proposal in accordance with section 122(4)(b) of the Act and have considered the representations made to them before the time specified in the notice in accordance with section 122(4)(c) of the Act.

1 Citation, commencement and extent

(1) This Order may be cited as the Wireless Telegraphy (Limitation of Number of Grants of Recognised Spectrum Access) Order 2008 and shall come into force on XXXX 2008.

(2) This Order shall not extend to the Channel Islands or to the Isle of Man.

2 Limitation of grants

(1) OFCOM will make a limited number of grants of recognised spectrum access for use of the frequency bands listed in the Schedule.

(2) In determining the limit on the number of grants of recognised spectrum access and the persons to whom they may be granted OFCOM shall apply the criteria set out in paragraph (3), (4) and (5).

(3) The grant shall only be made to the Crown.

(4) The criteria are that grants shall only be made to the Crown where a wireless telegraphy station or wireless telegraphy apparatus operates within any of the frequency bands listed in the Schedule.

(5) The number of grants of recognised spectrum access to be granted should be the number of which is most likely to secure the optimal use of the electromagnetic spectrum and promote competition in the electronic communication services having regard to the matters set out in section 3(1) and (2) of the Act.

Chief Executive of the Office of Communications

For and by the authority of the Office of Communications

XXXX 2008

SCHEDULE

Article 2

Frequency bands
406.1 – 410 MHz
410 – 412 MHz
414 – 420 MHz
420– 422 MHz
424 – 425 MHz
429 – 430 MHz

Annex 9

Draft Wireless Telegraphy (Recognised Spectrum Access and Wireless Telegraphy Licence Trading) Regulations 2008

2008 No **XXX**

ELECTRONIC COMMUNICATIONS

Wireless Telegraphy (Recognised Spectrum Access and Wireless Telegraphy Licence Trading) Regulations 2008

Made **XXX** 2008

Coming into force **XXX** 2008

Whereas the Office of Communications ("OFCOM") have given notice of their proposal to make these Regulations in accordance with section 122(4)(a) of the Wireless Telegraphy Act 2006 ("the 2006 Act") and published notice of their proposal in accordance with section 122(4)(b) of the 2006 Act and have considered the representations made to them before the time specified in the notice:

Now, therefore, OFCOM, in exercise of the powers conferred upon them by section 30(1) and (3) and section 122(7) of the 2006 Act hereby make the following Regulations:

1 Citation and commencement

These Regulations may be cited as the Wireless Telegraphy (Recognised Spectrum Access and Wireless Telegraphy Licence Trading) Regulations 2008 and shall come into force on **[XXXX]**.

2 Extent

These Regulations shall not extend to the Channel Islands or the Isle of Man.

3 Interpretation

In these Regulations "concurrent holders" means persons who concurrently hold the rights and obligations under a grant for recognised spectrum access or a wireless telegraphy licence by virtue of a transfer authorised by these Regulations which has that effect.

4 Transfer of all of the rights and obligations arising by virtue of a grant for recognised spectrum access or a wireless telegraphy licence

(1) Subject to regulation 6, a transfer by the holder of a grant for recognised spectrum access or a wireless telegraphy licence to which this paragraph applies of all of the rights and obligations arising by virtue of that grant for recognised spectrum access or that wireless telegraphy licence is authorised if it satisfies one of the two conditions set out in paragraph (2).

(2) Those conditions are--

(a) that the rights and obligations of the person making the transfer become rights and obligations of the transferee to the exclusion of the person making the transfer;

(b) that the transferred rights and obligations become rights and obligations of the transferee while continuing, concurrently, to be rights and obligations of the person making the transfer.

(3) Paragraph (1) shall apply to grants for recognised spectrum access and wireless telegraphy licences specified in Column 1 of the Schedule which apply to a station or apparatus operating within any of the frequency bands specified in Column 2.

5 Transfer of part of the rights and obligations arising by virtue of a grant for recognised spectrum access or a wireless telegraphy licence

Subject to regulation 6, transfers satisfying one of the two conditions set out in regulation 4(2) are also authorised where the transfer is of

(a) all of the rights arising by virtue of a grant for recognised spectrum access or a wireless telegraphy licence

which relate to -

(i) part frequency channels which have in each case a bandwidth of 6.25 kHz or a multiple thereof;

(ii) a geographical area being a fifty kilometre square part of the total geographical area in which the holder establishes, installs and uses radio transmitting and receiving stations or apparatus under one of the grants for recognised spectrum access or one of the wireless telegraphy licence specified in Column 1 of the Schedule which apply to a station or apparatus operating within any of the frequency bands specified in Column 2; and

(b) the corresponding part of each of the obligations under the grant for recognised spectrum access or wireless telegraphy licence.

6 Circumstances in which a transfer is not authorised

A transfer of rights and obligations arising under a grant for recognised spectrum access or a wireless telegraphy licence is not authorised where --

(a) any holder of the grant for recognised spectrum access or the wireless telegraphy licence, or all of the concurrent holders, and the transferee have not consented to the transfer;

(b) any sum payable in respect of the grant for recognised spectrum access or the wireless telegraphy licence is owing to OFCOM because it has not been paid by the time it became due;

(c) any instalment payment is to be paid to OFCOM in respect of the grant for recognised spectrum or the wireless telegraphy licence;

(d) OFCOM has served notice under section 10 and Schedule 1(7) or section 19 and Schedule 2(6) of the 2006 Act on the holder, or the concurrent holders, of a proposal to revoke or vary the grant for recognised spectrum access or the wireless telegraphy licence but that revocation or variation has not yet been made;

(e) the holder of the grant for recognised spectrum access or the wireless telegraphy licence has, or all of the concurrent holders have, requested OFCOM to revoke or vary the grant for recognised spectrum access or the wireless telegraphy licence or have consented to a revocation or variation proposed by OFCOM but that revocation or variation has not yet been made; or

(f) OFCOM have not given their consent, under regulation 7(3)(a), to the transfer being made.

7 Transfer procedure

(1) The holder, or concurrent holders, of a grant for recognised spectrum access or a wireless telegraphy licence, who wish, to make a transfer authorised by regulation 4(1), or 5 must provide to OFCOM--

(a) the reference number of the grant for recognised spectrum access or the wireless telegraphy licence under which rights and obligations are to be transferred;

(b) the name and address of the holder or concurrent holders of the grant for recognised spectrum access or the wireless telegraphy licence;

(c) the name and address of the proposed transferee;

(d) a description of which type of transfer authorised by regulation 4(1), or 5 is proposed;

(e) a document signed by or on behalf of the holder, or each concurrent holder, of the grant for recognised spectrum access or the wireless telegraphy licence and signed by or on behalf of the transferee, under which each of those persons warrants to OFCOM that he has consented to the proposed transfer;

(f) all information necessary for OFCOM to determine whether or not they shall consent to the transfer; and

(g) in the case of a transfer authorised by regulation 5, a description of which rights and obligations under the grant for recognised spectrum access or the wireless telegraphy licence are to be transferred.

(h) a notice of whether the transfer will involve a conversion under regulation 9.

(2) OFCOM shall, after determining that the requirements of paragraph (1) have been met, publish a notice stating:

(a) the name of the holder or concurrent holders of the grant for recognised spectrum access or the wireless telegraphy licence and the name of the transferee to whom it is proposed that the rights and obligations arising under the grant for recognised spectrum access or the wireless telegraphy licence shall be transferred;

(b) the date when OFCOM determined that the requirements of paragraph (1) were met;

(c) the grant for recognised spectrum access or the wireless telegraphy licence class and the reference number of the grant for recognised spectrum access or the wireless telegraphy licence under which rights and obligations are to be transferred; and

(d) in the case of a transfer authorised by regulation 5, a description of which rights under the grant for recognised spectrum access or the wireless telegraphy licence are proposed to be transferred.

(3) After publishing a notice under paragraph (2) OFCOM shall decide--

(a) if they consent to the transfer in accordance with regulation 8; and

(b) if they shall give any directions under regulation 10.

(4) OFCOM shall notify the parties to the proposed transfer of their decisions under paragraph (3).

(5) A transfer shall be effected by the holder or concurrent holders of the grant for recognised spectrum access or the wireless telegraphy licence under which rights and obligations are to be transferred by surrendering that grant for recognised spectrum access or that wireless telegraphy licence and by OFCOM granting a new one to the transferee and--

(a) in the case of a transfer which satisfies the condition set out in regulation 4(2)(b), the holder or concurrent holders who made the transfer; and

(b) in the case of a transfer authorised by regulation 5, to the holder or concurrent holders who made the transfer.

(6) OFCOM shall publish the information specified in paragraph (2) in relation to transfers that have been effected pursuant to paragraph (5).

8 Consent by OFCOM

In determining whether or not to consent to a proposed transfer OFCOM shall take into account whether--

(a) the holder is, or the concurrent holders are, in breach of the terms of the grant for recognised spectrum access or the wireless telegraphy licence under which the rights and obligations are to be transferred;

(b) the transferee is able to meet the terms, provisions and limitations of the grant for recognised spectrum access or the wireless telegraphy licence which is to be granted as a result of the transfer;

(c) in the case of a transfer authorised by regulation 5 the transferor is able to meet the terms, provisions and limitations of the grant for recognised spectrum access or the wireless telegraphy licence which is to be granted as a result of the transfer;

(d) the transferee is able to meet any criteria relating to the persons to whom a grant for recognised spectrum access or a wireless telegraphy licence which rights and obligations are to be transferred may be granted; and

(e) it is requisite or expedient to refuse consent to the transfer--

(i) in the interests of national security;

(ii) for the purposes of complying with a Community obligation of the United Kingdom or with any international agreement or arrangements to which the United Kingdom is party; or

(iii) for the purposes of complying with a direction by the Secretary of State given to OFCOM under section 5 of the Communications Act 2003 or section 5 of the 2006 Act.

9 Conversion

If the holder of a grant for recognised spectrum access or a wireless telegraphy licence who proposes to make an authorised transfer gives notice to Ofcom under regulation 7(1)(h), the rights and obligations acquired by the transferee take effect –

(i) if they are rights and obligations under a wireless telegraphy licence, as rights and obligations under a grant of recognised spectrum access; and
(ii) if they are rights and obligations under a grant of recognised spectrum access, as rights and obligations under a wireless telegraphy licence.

10 Directions by OFCOM

(1) If OFCOM consent to a transfer they may also direct that a transfer shall only be put into effect in accordance with regulation 7(5) after compliance with conditions which may relate to any matter mentioned in any of the paragraphs of regulation 8.

(2) A transfer may not be put into effect in accordance with regulation 7(5) until after compliance with the conditions set out in any such direction.

Chief Executive of the Office of Communications

For and by authority of the Office of Communications

XXX 2008

SCHEDULE

GRANT OF RECOGNISED SPECTRUM ACCESS, WIRELESS TELEGRAPHY LICENCE CLASS AND FREQUENCY BANDS

Regulations 4 and 5

Column 1	*Column 2*
Grant and/or Licence Class	**Frequency bands**
Crown Recognised Spectrum Access Converted Spectrum Access	406.1 – 410 MHz 410 – 412 MHz 414 – 420 MHz 420– 422 MHz 424 – 425 MHz 429 – 430 MHz
Radio Astronomy	150.05 – 152 MHz 1660.5 – 1668 MHz 1668 – 1670 MHz 42.5 – 43.5 GHz

Annex 10

Draft Wireless Telegraphy (Register) (Amendment) (No.2) Regulations 2008

2008 No XXX

ELECTRONIC COMMUNICATIONS

Wireless Telegraphy (Register) (Amendment)(No2) Regulations 2008

Made XXXXX 2008

Coming into force XXXX 2008

The Office of Communications ("OFCOM") make the following Regulations in exercise of the powers conferred by section 31(1) and (2) and section 122(7) of the Wireless Telegraphy Act 2006 ("the Act").

Before making the Regulations OFCOM have given notice of their proposal to do so in accordance with section 122(4)(a) of the Act, published notice of their proposal in accordance with section 122(4)(b) of the Act and have considered the representations made to them before the time specified in the notice in accordance with section 122(4)(c) of the Act.

1 Citation and commencement

These Regulations may be cited as the Wireless Telegraphy (Register) (Amendment)(No2) Regulations 2008 and shall come into force on XXXX 2008**.**

2 Amendment of the Wireless Telegraphy (Register) Regulations 2004

Part 4 of the Schedule to The Wireless Telegraphy (Register) Regulations 2004 is amended by inserting at the end –

"Crown Recognised Spectrum Access	406.1- 410 MHz
	410 – 412 MHz
	414 – 420 MHz
	420 – 422 MHz
	424 – 425 MHz
	429 – 430 MHz".

Part 4 of the Schedule to The Wireless Telegraphy (Register) Regulations 2004 is amended by inserting at the end -

" Converted Spectrum Access	150.05 – 152 MHz

406.1 – 410 MHz

410 – 412 MHz

414 – 420 MHz

420 – 422 MHz

424 – 425 MHz

429 – 430 MHz

1660.5 – 1668 MHz

1668 – 1670 MHz

42.5 – 43.5 GHz".

Partner, Spectrum Policy

For and by authority of the Office of Communications

XXXX 2008

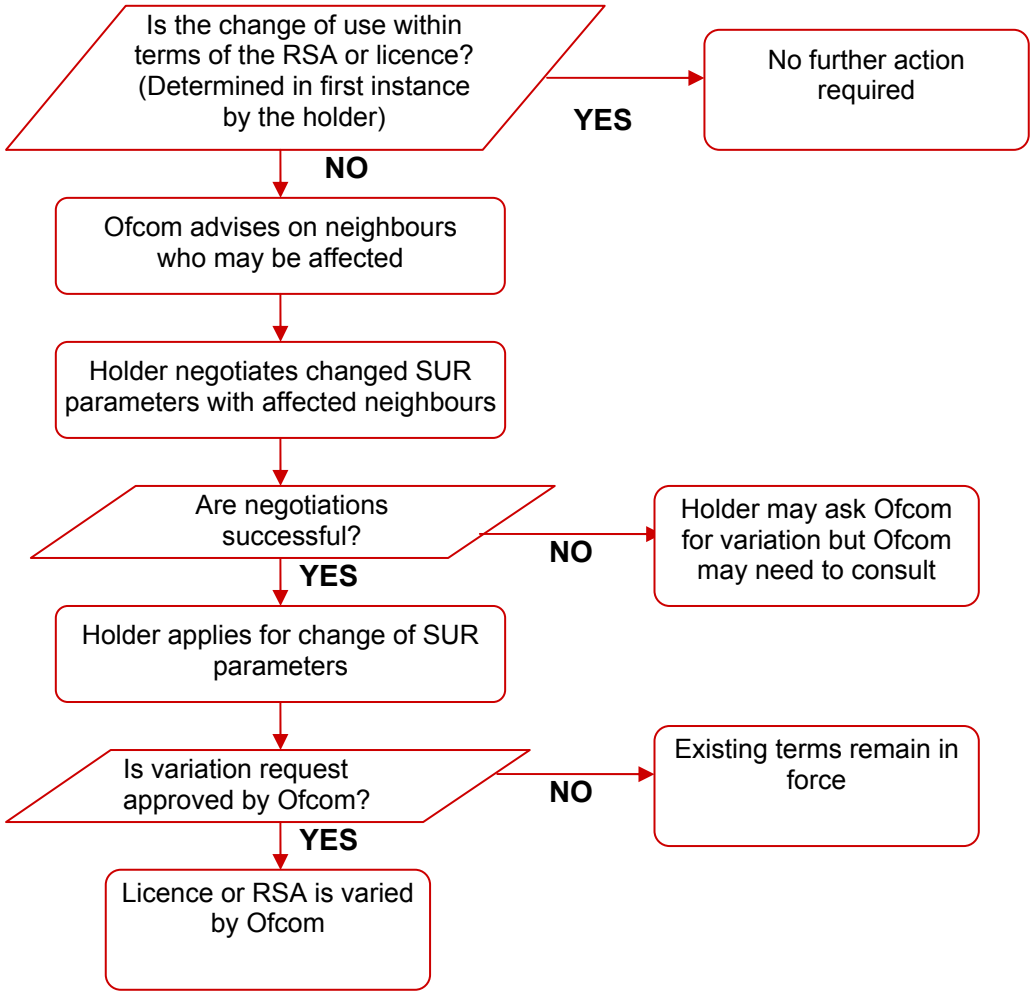
Annex 11

The process for varying technical limits

A11.1 SURs are stated in the most flexible manner possible, allowing users to change their use of the spectrum without needing to make a change to their licence or RSA provided the existing terms are not exceeded. However, this may not be possible in all cases and a user may need to seek a variation in order to accommodate a proposed change of use. Another case in which users might seek a variation is if they conclude that a change in the interference they can cause each other would allow them to optimise their network design and so reduce costs.

A11.2 If neighbouring users wish to make a change in their terms and all affected parties agree, they may present this proposal to Ofcom to consider. The process is illustrated below.

Figure 8: summary of process for change of use for SURs



A11.3 First, the party wishing to change its usage should determine whether the change can be accommodated within its existing SUR parameters. If it cannot, it needs to ask Ofcom to advise on who may be affected by the change of use and enter into negotiations with the identified parties to agree necessary changes to the SUR parameter values.

A11.4 Notifying Ofcom will also trigger where necessary a government process and release of information, for example provision of information on international co-ordination constraints.

A11.5 If the agreement of all affected parties can be obtained, the requested changes to the SUR parameter values are made. If the potentially affected parties do not agree, Ofcom will still, if requested, consider the change request, as is its statutory duty, but might need to consult as part of this process.

Negotiating change of use

A11.6 Once the affected neighbours have been determined, then the party wishing to change its SUR will need to negotiate appropriate terms with them, including any payments to them. Ofcom will not normally expect to have any involvement in this process.

Registration of change of use

A11.7 If negotiations conclude satisfactorily, then the person wishing to change use and all other affected parties will need to apply for variations to their licences or RSA. It is at this stage that Ofcom will formally approve or reject the proposed change of use. If the changes are accepted, the requisite variations will be made.

Modifying pfd limits for different regions

A11.8 In-band and out-of-band pfd limits are defined throughout a licensee's operational area. If a higher pfd limit in a particular part of the coverage area is required, a variation request should be submitted to Ofcom. This should include a clear definition of the region in which or the boundary along which the new pfd limit is required. If the request is approved following due process, the geographical details for the new pfd limit will be specified in the variation.

Annex 12

Regulatory Impact Assessment

Introduction

A12.1 The analysis presented in this Annex represents a regulatory impact assessment (RIA), as defined in section 7 of the Communications Act 2003 (the Act).

A12.2 You should send any comments on this impact assessment to us by the closing date for this consultation. We will consider all comments before deciding whether to implement our proposals.

A12.3 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. This is reflected in section 7 of the Act, which means that generally we have to carry out impact assessments 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. However, 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 impact assessments, see the guidelines *Better policy-making: Ofcom's approach to impact assessment* on our website: http://www.ofcom.org.uk/consult/policy_making/guidelines.pdf

The citizen and consumer interest

A12.4 The regulations and order that are the subject of this RIA implement changes to the arrangements for managing public sector spectrum holdings on which we have previously consulted and published a policy statement[44]. In our statement, we said that we intended to proceed to make regulations to provide for grants of tradable, convertible recognised spectrum access (RSA) to Crown bodies and to make RSA for radio astronomy tradable.

A12.5 That statement included an impact assessment (IA) that concluded that allowing public bodies to trade their spectrum holdings would benefit citizens and consumers. Citizens would benefit as public services would be provided at lower cost to the taxpayer and to the economy. That IA concluded that:

- the phased introduction of spectrum trading and liberalisation enabled by grants of public sector RSA would secure optimal use of the radio spectrum;
- consumers would benefit as enhanced access to spectrum for businesses would promote competition, innovation and choice in communications services;
- citizens would benefit from more efficient public services, provided that essential defence, emergency and safety-critical services are not unacceptably affected, and public bodies would benefit from having their spectrum rights defined more clearly;
- estimated costs to spectrum users would be low relative to the potential benefits, which could be of the order of £1bn a year;

[44] http://www.ofcom.org.uk/consult/condocs/sfrps/

- the risks associated with the introduction of tradable public sector RSA are manageable.

Ofcom's policy objective

A12.6 Our overall policy objective in introducing tradable RSA is, as set out in our earlier consultation and statement, to secure optimal use of the radio spectrum by providing public bodies with incentives and opportunities to use spectrum more efficiently. We will achieve this by enabling them to trade their spectrum holdings. The proposed regulations and order to which this notice and RIA relate aim to implement that policy in a way that is consistent with:

- our duties to avoid imposing unnecessary regulatory burdens;
- the Government's commitment that national security and public safety will remain paramount; and
- compliance with international obligations and any directions from the Secretary of State.

A12.7 The following sections of this RIA consider the draft regulations and order in turn.

The Wireless Telegraphy (Recognised Spectrum Access) Regulations 2008 and Wireless Telegraphy (Recognised Spectrum Access and Wireless Telegraphy Licence Trading) Regulations 2008

A12.8 We consider these regulations together as the main purpose of the RSA regulations is to allow public bodies to acquire, release and share spectrum through the market in accordance with the trading regulations; and the spectrum trading regulations would be largely ineffective without the RSA regulations. The Wireless Telegraphy (Recognised Spectrum Access) Regulations 2008 enable Ofcom to grant RSA in the 406.1-430 MHz band. The Wireless Telegraphy (Recognised Spectrum Access and Wireless Telegraphy Licence Trading) Regulations 2008 allow RSA held by public bodies, including that granted for radio astronomy, to be traded and converted into tradable licences and vice versa.

Purpose of the proposed regulations

A12.9 The purpose of the proposed regulations is to enable Ofcom to grant RSA to the MOD and DoH, so that they may trade their spectrum rights and obligations in accordance with the trading regulations. It is not possible to grant them licences because they are Crown bodies. This means that, in order to define their rights and obligations in relation to spectrum in a form that they can trade, it is necessary to grant them RSA. Without the regulations, it would not be possible for the MOD and other government departments to engage in spectrum trading. The draft trading regulations also allow RSA for radio astronomy to be traded.

Options

A12.10 We have considered two options.

- Option 1: do nothing. Most public sector users already pay administered incentive pricing (AIP), which would continue to provide some incentive to use spectrum efficiently but public sector spectrum trading and conversion would not be

possible, incentives for spectrum efficiency would be weaker and spectrum release would be slower.

- Option 2: make the regulations to introduce public sector spectrum trading including conversion between licences and RSA.

Stakeholders likely to be affected

A12.11 Stakeholders likely to be affected by the proposed regulations include the following:

- consumers of new spectrum-using communications services that gain access to spectrum released or shared by public bodies;
- citizens as users of public services and taxpayers;
- public bodies enabled to release, share or add to their spectrum holdings through the market;
- providers of spectrum-using communications services that gain access to spectrum released or shared by those public bodies.

Cost, benefit and risk analysis

Benefits

A12.12 The benefits and costs flowing from the options will depend on decisions to be taken by public and private sector stakeholders and by the Government. It is therefore not possible to provide accurate quantitative estimates. However, the benefits of greater spectrum efficiency and enhanced opportunities for commercial services to access spectrum could be substantial and might be of the order of £1bn a year[45], although such estimates are difficult to quantify and are subject to wide margins of uncertainty. Furthermore, the Independent Audit estimated that the total current market value for public sector spectrum holdings could be between £3bn and over £20bn depending on methodology and subject to the caveat that calculating spectrum value is difficult because of the early stage of development of the spectrum market and because the value of spectrum will depend on the physical characteristics of the frequency in question and on past regulatory decisions.

A12.13 We conclude that the potential benefits from spectrum trading and liberalisation in the public sector are real and significant even if they cannot be precisely quantified.

A12.14 The benefits of trading under the proposed regulations will be smaller than the figure quoted in the preceding paragraph as the regulations are limited to a specific frequency range that the MOD proposes to include in the pilot phase of its programme. But they represent the first stage in the process that could lead to substantial benefits over time.

[45] Derived from *Study on conditions and options for introducing secondary trading of radio spectrum in the European Community* by Analysys Consulting Ltd and others for the European Commission at http://ec.europa.eu/information_society/policy/radio_spectrum/docs/ref_docs/secontrad_study/secontrad_final.pdf and assuming that the benefits to the UK equate to approximately 1/6th of the benefits to all Europe.

A12.15 In addition to the benefits of trading, the RSA regulations will, by formalising spectrum rights in the band, provide public bodies and others with greater certainty and security and increase transparency about how spectrum is utilised.

Costs

A12.16 Costs may be considered under three headings.

i) The *costs to the public sector* of managing their spectrum holdings. It will be necessary for public sector bodies to carry out detailed audits of their spectrum needs and actively to manage their spectrum holdings. This may require investment in systems and specialist staff or procurement of spectrum management services from outside contractors. It is for the Government to allocate the necessary resources to implement the policies it adopted in its response to the Independent Audit. The impact assessment for spectrum trading[46] assumed that costs of trading in the commercial sector would be about 5% of the total benefits so it seems likely that the costs to public bodies will be exceeded by the gains to society.

ii) The *costs to Ofcom* are unlikely to be significant relative to the potential benefits. The impact assessment for spectrum trading estimated that the set-up costs associated with the introduction of spectrum trading across all licence classes would amount to about £2.8m with ongoing administrative costs of around £300,000 a year. Those incurred in connection with trading public sector spectrum holdings are likely to be lower because of the smaller number of holdings involved.

iii) *Transaction costs* associated with trading and sharing where such transactions are entered into. The transaction costs incurred will be voluntary in that there will be no compulsion to lease or trade and the parties would not enter into such arrangements unless it was to their mutual advantage to do so. The impact assessment produced for the consultation on spectrum trading[47] estimated that the costs of spectrum trading in the private sector would be likely to be far outweighed by the benefits, even on a relatively conservative basis. There is no reason to assume that this conclusion would be fundamentally different in the public sector although there might be additional expense associated with producing safety cases for sharing with safety-critical applications.

The proposed regulations require public bodies to notify Ofcom before a transfer is made and on completion of the trade. Use of low-cost methods of notification, such as electronic means, can reasonably be expected to minimise the costs of the process.

Risks

A12.17 It has been suggested that the extension of spectrum trading to the public sector is a significant change in the way in which public bodies manage spectrum and carries a risk of unforeseen consequences.

A12.18 As we said in our earlier statement, we intend to mitigate this risk by proceeding on a phased basis. The proposed RSA and trading regulations, which are the first stage in this process, are limited to the 406.1-430 MHz band. We intend over time

[46] http://www.ofcom.org.uk/consult/condocs/spt_wtr/statement/stwtr.pdf
[47] http://www.ofcom.org.uk/consult/condocs/spec_trad/

to extend the new framework across the public sector but a phased approach will enable all concerned to learn from experience.

A12.19 We discussed in our previous statement how the risks that we have identified could be managed or mitigated and this is summarised in the following table.

Table A12.1: Benefits, costs and risks of public sector spectrum trading

Benefits	Costs / risks	Management / mitigation
Option 1 Do nothing - no spectrum trading or conversion of public sector holdings		
Stability: no change to management of spectrum – absence of costs or risks associated with change	No positive incentives from potential gains from trading Spectrum not transferred to uses and users of greatest value Competition, innovation and consumer benefits foregone or delayed Shortages of spectrum for public and commercial services	Can increase incentives for spectrum efficiency through applying AIP or spectrum release targets (although this is likely to be less effective than if reinforced by trading on a basis that allows change of use). Released spectrum can be returned to and awarded by Ofcom. Spectrum shortages could in principle be partially mitigated by more dynamic regulatory assignment but scope for this is limited in practice.
Option 2 Introduce spectrum trading and conversion of public sector holdings		
Trading and conversion enable spectrum to migrate to uses and users that value it most. Enhanced spectrum efficiency. Innovation and competition promoted as new services gain access to spectrum more quickly than by regulation. Allows direct engagement with market by public sector bodies to release and acquire spectrum more speedily. Enhanced public sector efficiency and potential gains from spectrum trading proceeds. Greater security, certainty and transparency as spectrum rights of public bodies are formalised.	Trades might take place in environment of limited information and not lead to most efficient outcome.	Ofcom will provide information to the market in WT Register and TNR.
	Spectrum is traded without consideration of international obligations, national security or public safety.	The draft regulations require Ofcom to be notified of proposed trades and to consider whether to withhold consent in the interests of national security or compliance with international obligations.
	Interference from band sharing services compromises public safety or national security.	Decision on whether to trade and technical restrictions that apply will be decided by public sector body concerned.
	Interference from band sharing services affects adjacent assignments.	The technical conditions imposed on RSA or a licence issued as a result of a transfer will be designed to avoid causing unacceptable interference to neighbouring assignments. We will continue to be involved in investigating interference and enforcement.

Benefits	Costs / risks	Management / mitigation
	Release of spectrum compromises operational effectiveness, public safety or national security.	Decision on whether to trade and technical restrictions that apply will be decided by public sector body concerned. There will be pre-emption rights for spectrum to be reclaimed in the event of an emergency requiring access for essential security or safety services.
	Disclosure of sensitive information prejudices public safety or national security or prejudices public bodies' commercial interest.	We will discuss with Government information to be placed on the Transfer Notification Register and the WT Register (see below) and withhold sensitive information on a case-by-case basis. The proposed trading regulations do not provide for any commercially sensitive information to be included in the TNR.
	Public sector users have insufficient resource to manage their holdings.	Public sector bodies can bid for resource they require in the usual way through the budgetary process. Scope for public-private partnership.
	Public sector bodies have insufficient spectrum.	Bodies can assess their needs and choose not to trade. They will also be able to acquire more spectrum through the market. If necessary, Ofcom could be directed to assign spectrum administratively.
	Market mechanisms provide insufficient incentives for spectrum efficiency in public sector.	Trading will complement and reinforce the incentive effect of AIP. There is evidence, cited in the preceding consultation and statement that AIP is effective in the public sector and trading and conversion will reinforce this effect. The effectiveness of policy will be reviewed in 2012.
	Excessive transaction costs or burdensome or cumbersome procedures.	Draft regulations have been designed to minimise transaction costs and administrative burdens. We will aim to determine applications to trade within 42 days.
	Release of spectrum conflicts with broader policy considerations or international developments. Market failure leads to undesirable outcome.	UKSSC will consider wider policy issues. We will advise and participate in UKSSC. Regulatory intervention to correct market failure where necessary.

Benefits	Costs / risks	Management / mitigation
	Trading leads to anti-competitive outcome.	General competition law available to deal with anti-competitive behaviour[48].
	Unforeseen consequences of change.	The phased introduction will mitigate this risk. We will consult with stakeholders and be ready to revise procedures if necessary in the light of experience.
	Excessive restrictions on spectrum access inhibit beneficial change of use.	Restrictions in RSA will be kept to the minimum necessary to provide maximum scope for change of use without the need to seek variations of licences or RSA. Public bodies will have incentives not to impose unnecessary restrictions when they trade.

A12.20 Option 1 represents the *status quo*. Where AIP is applied to public sector spectrum holdings, public sector users will have an incentive to return surplus spectrum to Ofcom or to allow Ofcom to award licences that share spectrum as they will then pay a reduced fee. However, they will have less of an incentive than if they could enter into arrangements direct with commercial sharers and receive income from this. Also, spectrum release or sharing could take place only by returning spectrum to Ofcom to award, which would be more cumbersome and could delay or prevent beneficial transactions from taking place.

A12.21 There is evidence in our preceding statement that market mechanisms are effective in the public sector in promoting spectrum release. We believe it is far more likely than not that public sector spectrum trading and conversion will be advantageous provided that effective measures are in place to avoid unacceptable effects on public safety and national security. The Government has undertaken that public safety and national security will remain paramount. The proposed regulations support this by placing decisions on spectrum release or sharing in the hands of the public bodies concerned.

A12.22 It seems likely that there would be less spectrum release or sharing under option 1 ('do nothing') than under option 2 ('trading including conversion'). Public sector users would forego the income from spectrum trading; commercial bodies would gain less access to spectrum and have reduced opportunities to launch new wireless services; consumers would gain less from innovation and competition; and citizens would forego the benefits from public sector efficiency gains. Moreover, it appears to us that the regulations are drafted in a way that avoids imposing unnecessary burdens and that effectively mitigates the risks that have been identified.

A12.23 The only reason not to proceed would be if the proposed regulations were considered to give rise to costs or risks that exceeded the benefits of public sector spectrum trading. This seems unlikely given our assessment of the scale of those benefits.

[48] See our 2004 consultation and statement on *Ensuring effective competition following the introduction of spectrum trading* at http://www.ofcom.org.uk/consult/condocs/sec/.

Conclusions on the proposed regulations

A12.24 We therefore conclude that there are good grounds to conclude that it will be optimal to make the regulations in the form proposed as a first step in implementing the new framework.

The Wireless Telegraph (Limitations) Order 2008

Purpose of the proposed order

A12.25 The purpose of the proposed order is to limit, for reasons of spectrum efficiency, the number of grants of RSA made in accordance with the proposed RSA regulations. The proposed order would restrict grants of RSA to the Crown and limit the number to that most likely to secure optimal use of the spectrum.

Options

A12.26 We have considered two options.

- Option 1: making the proposed order to limit grants of RSA.
- Option 2: imposing no limitations on grants of RSA.

Assessment of options

A12.27 We have assessed these options against the criterion set out in section 29 of the WT Act that we must make a limitations order if we consider it appropriate for the purpose of securing efficient use of the electromagnetic spectrum.

A12.28 The purpose of granting RSA to the Crown is to formalise the Crown's existing allocations; and grants will therefore be issued to the Crown. In practice, the grants will be issued to specific Secretaries of State.

A12.29 If the number of grants is too high, this can give rise to excessive fragmentation and make it more difficult to manage the band effectively. If the number is too low, access might be denied to those that could make good use of it. The optimal balance will depend on the particular circumstances, which might vary over time. The numerical restriction in regulation 2(5) allows Ofcom flexibility to tailor the number of grants according to its view of what would be most likely to secure optimal spectrum use and promote competition.

Conclusions on the proposed limitations order

A12.30 In the light of the foregoing analysis, we conclude that the limitations proposed in option 1 above are necessary to secure efficient use of the spectrum and that we should make the proposed order.

The Wireless Telegraphy (Register) Amendment Regulations 2008

Purpose of the proposed regulations

A12.31 The purpose of the proposed regulations is to support and facilitate public sector spectrum trading by making available to the market information about public sector RSA and licences resulting from transfers of RSA so that prospective buyers can find out which spectrum is potentially available, the constraints on its use and the

identity of the holder, whom they may approach for further details or to express an interest in trading.

A12.32 Information about proposed and completed transfers will complement this information and is proposed to be made available in the TNR in accordance with the draft trading regulations discussed above. The information that we propose to include in the WT Register comprises the RSA or licence reference number, name of the holder, contact details, RSA or licence class, frequency range and certain geographical information. This is similar to information about tradable licences that is currently included in the Register. Subject to concerns in specific cases about inclusion of sensitive information, for example on grounds of national security, there seems no need at this time to publish different information about RSA than about licences.

Options

A12.33 We have considered two options.

- Option 1: amending the existing regulations to provide for addition of information about public sector RSA to the WT Register on a similar basis as for WT licences.

- Option 2: not including the information in the WT Register.

Cost, benefit and risk analysis

Benefits

A12.34 The main benefits of adding information about adding the RSA to the WT Register are:

- transaction costs of spectrum trades are lower since the relevant information on the rights and obligations of holdings that can be traded is readily available;

- potential users of spectrum are fully aware of the opportunities for trading and gaps in spectrum usage are more transparent, facilitating access to spectrum for innovative uses;

- equipment manufacturers can evaluate and monitor the size of their markets more accurately.

A12.35 Economic theory stresses the importance of information to markets in general. There is no empirical evidence on which a reliable evaluation of the impact of the WT Register on the market for spectrum can be based. However, it is relevant to note that the benefits from public sector spectrum trading, to which publication of relevant information in the WT Register will contribute, are potentially substantial. Ofcom is keeping under review the general issue of how much information to make available to support spectrum trading and plans to consult on this later in 2008.

Costs

A12.36 Given that we have already established and are already operating the WT Register for licences, we anticipate that the marginal cost of adding information about public sector RSA would be minimal and negligible compared with the overall benefits of public sector spectrum trading.

Risks

A12.37 The risks of establishing a register of licences and trades are two-fold. Firstly, there is a risk of compromising the security of wireless telegraphy systems if too much is disclosed about their operation. We have mitigated this risk in relation to WT licences by publishing only basic information about licensees and by specifically not publishing precise details about transmitters. We would, moreover, discuss with the public bodies concerned whether publication of the information would compromise national security or public safety and withhold it if necessary.

A12.38 The second risk is that publishing commercially sensitive information about planned and actual trades could create disincentives to trading. We mitigate this risk by publishing only basic details about licences that are traded and the identity of the parties to the trade.

A12.39 This risk may be mitigated to the extent that commercial organisations compile and offer for sale information relating to spectrum trading. However, commercial organisations are unlikely to be able to gather information as comprehensively or at as low a cost as Ofcom, and it would take time for them to establish themselves.

Conclusions on the proposed WT Register regulations

A12.40 Without publication of information about public sector RSA, the effectiveness of spectrum trading would be likely to be impaired by the lack of availability of information on the availability of the spectrum holdings that might be acquired. The lack of information and the increased cost of searching for it could prevent some beneficial trades from going ahead, either because the lack of information means that potential purchasers are unaware of the opportunity or because of the increased transaction costs of obtaining the information.

A12.41 Though they are difficult to quantify, Ofcom believes that these benefits are likely to exceed the small costs involved. If we were not to include the information in the WT Register, the effectiveness of trading would likely be impaired with resulting loss of benefits for citizens and consumers.

A12.42 The above risk analysis shows that the risks associated with including information in the WT Register about public sector RSA can safely be mitigated. On the other hand, if the information is not included, there is a real risk that the effectiveness of spectrum trading will be damaged and this is unlikely to be wholly mitigated by commercial information providers. We therefore conclude that we should make the draft WT Register regulations.

Annex 13

Glossary

AIP	Administered incentive pricing – setting charges for spectrum holdings to reflect the value of the spectrum in order to promote efficient use of the spectrum
Allocation	Used of a frequency band. Entry in the table of frequency allocations of a given frequency band for the purpose of its use by one or more terrestrial or space radio communications services or the radio astronomy service under specified conditions. This term is also applied to the frequency band concerned.
Assignment	Used of a radio frequency or radio frequency channel. Authorisation given by an administration for a radio station to use a radio frequency or radio frequency channel under specified conditions.
CDMA	Code division multiple access
Communications Act	The Communications Act 2003, which sets out Ofcom's powers, functions and duties
Concurrent	(Of *spectrum trading*) a transaction in which rights and obligations are transferred while continuing to be rights and obligations of the transferor, cf *outright*
DoH	Department of Health
EIRP	Effective isotropic radiated power
ERO	European Radiocommunications Office
Exemption	Exemption regulations made by Ofcom allow anyone to use specified radio equipment without the need to have a *WT licence*
FWA	Fixed Wireless Access – means of connecting to homes and offices using wireless as opposed to copper wires or fibre optics
GHz	Gigahertz – unit of frequency equal to one thousand *MHz*
Harmful interference	*Interference* that creates danger or a risk of danger or degrades, obstructs or repeatedly interrupts a transmission or broadcast
Hz	Hertz – the basic unit of frequency equivalent to one cycle per second
IIL	Indicative interference level – a measure of spectrum quality derived from *SURs*
IMT	International Mobile Telecommunications, an *ITU* term embracing IMT-2000 and IMT-Advanced. IMT systems are intended to provide telecommunication services on a worldwide scale regardless of location, network or terminal used. The technical characteristics of IMT-2000 are specified in ITU Recommendations.
Interference	Unwanted disturbance caused in a radio receiver or other electrical circuit by electromagnetic radiation emitted from an external source
ITU	International Telecommunication Union - the United Nations agency for information and communication technology responsible for developing

	and publishing the *International Radio Regulations*
JFMG	Joint Frequency Management Group – a private sector organization that has been given delegated powers to grant WT licences for programme-making and special events
Market mechanisms	Approach to managing spectrum where key decisions, eg on acquiring or disposing of spectrum and what service to provide are made by spectrum users rather than by the regulator.
MHz	Megahertz – unit of frequency equal to one million *Hz*
MOD	Ministry of Defence
NFPG	National Frequency Planning Group, a sub-committee of the UKSSC
Opportunity cost	The cost of a decision or choice in terms of the benefits which would have been received from the most valuable of the alternatives that was foregone
Outright	(Of *spectrum trading*) a transaction in which the transferred rights and obligations pass to the transferee and are no longer rights and obligations of the transferor, cf *concurrent*
Partial	(Of *spectrum trading*) a transaction in which some rights and obligations are transferred while others are kept by the transferor, cf *total*
PFD	Power flux density – a measure of the strength of radio emissions per unit area per unit of frequency, usually in units of dBW/m^2/MHz
PMSE	Programme Making and Special Events – a class of radio application that supports a wide range of activities in entertainment, broadcasting, news gathering and community events
PSSPG	Public Safety Spectrum Policy Group
Radio Regulations	International Radio Regulations made by the *ITU*, which have the status and force of a treaty, allocate frequencies globally to various applications and deal with cross-border *interference*
Radio spectrum	The portion of the electromagnetic spectrum below 3000 *GHz* that is used for radiocommunications
RSA	Recognised Spectrum Access - a spectrum management instrument created by the *Communications Act* to complement *WT licences*
Spectrum	The electromagnetic *spectrum* ranging from visible light to x-rays and gamma rays
Spectrum liberalisation	Removal of restrictions from *WT licences* and *RSA* to allow holders greater flexibility to change how they use spectrum
Spectrum trading	Ability of spectrum users to transfer rights and obligations under *WT licences* to another person in accordance with regulations made by Ofcom. Trades may be *total*, *partial*, *outright* or *concurrent*
SQB	Spectrum quality benchmark – an indicator of the level of interference from emissions from other services that a WT licensee or *RSA* holder can reasonably expect to experience
Standardisation	Development of an open standard for a particular type of equipment
STFC	Science and Technology Facilities Council, formerly the Particle Physics and Astronomy Research Council

STU	Spectrum trading unit – the smallest quantum of spectrum that may be transferred in a *partial* trade
SUR	Spectrum usage rights – a way of formulating the terms and conditions in a *WT licence* or *RSA* in a way that is independent of technology or service
Total	(Of *spectrum trading*) a transaction in which all of the rights and obligations are transferred from transferor to transferee, cf *partial*
TNR	Transfer Notification Register maintained by Ofcom giving information about *spectrum trading* transactions
UKFAT	The UK Frequency Allocation Table identifies responsibilities for the management of frequency bands or services and is published by Ofcom on behalf of the *NFPG*
UKSSC	Cabinet Office committee that discusses matters relating to the use of the radio spectrum, including by government departments and other public sector bodies
VHF	Very high frequency (30-300 *MHz*)
WRC	World Radiocommunication Conference - conference of the *ITU* that revises or amends the International *Radio Regulations*
WT Act	The Wireless Telegraphy Act 2006, which sets out the statutory framework for management of the radio spectrum consolidating a number of older Acts dating back to 1949.
WT licence	Licence granted by Ofcom to authorise installation or use of radio equipment as required by section 8(1) of the *WT Act*
WT Register	Register maintained by Ofcom containing information about grant, renewal, transfer, revocation or variation of *WT licences* and *RSA*