Responses to the Call for Input and Consultation on next steps of the release of spectrum within the frequency ranges 143 MHz to 169 MHz

Consultation

Publication date: 24 March 2014

Closing Date for Responses: 26 May 2014

Contents

Section 1

Executive Summary

1.1 This document provides a summary of responses to an earlier Call for Input (CFI) regarding the release of VHF spectrum and, taking these responses into account, sets out proposals on how we would plan and release around 6 MHz of spectrum in the 143 to 169 MHz band, returned to civil use by the Emergency Services.

1.2 This consultation follows on from the CFI we published in July 2012[1] regarding potential uses of spectrum in England, Wales and Northern Ireland between 143 and 156 MHz. Given that it is highly unusual for VHF spectrum to become available in such large amounts, especially in significant blocks of contiguous bandwidth of up to 1 MHz, we decided to publish a CFI to seek stakeholder views on potential uses for this spectrum. The CFI closed on 12th October 2012 and we received 29 responses, six of which were marked as confidential. The responses to the CFI identified a number of potential uses that the spectrum could be put to and these included:

- Existing Business Radio products on a licensed basis to allow industry sectors such as transport and utilities to maintain and improve their communications systems, for example to deploy wide area trunked networks;
- A requirement to facilitate Amateur Radio development applications such as digital Amateur TV and satellite;
- Spectrum for maritime and safety of life applications;
- Spectrum for a 'LTE' type application / service;
- An allocation for Citizens' Band Radio; and
- Higher power licence exempt use.

1.3 Since the CFI, spectrum between 143 MHz and 156 MHz in Scotland has also been returned by the Emergency Services, as has around 0.5 MHz of UK wide spectrum in the range 168 MHz and 169 MHz. The proposals in this consultation also encompass this recently release spectrum.

1.4 Based on the responses received to the CFI we are proposing to:

- Make the spectrum in this range available on a first-come-first-served basis through our current Business Radio licence products. This would be in line with the use of this spectrum in Europe and consistent with the European Electronic Communication Committee (ECC Decision (06) 06)[2] which recommends the use of this band for PMR.
- Employ an assignment approach that makes new channels available to business radio through a graduated approach in response to spectrum management needs. Our intention is to maintain maximum flexibility for the band should new types of demand emerge in the future.

[1] http://stakeholders.ofcom.org.uk/binaries/consultations/call-for-input/summary/condoc.pdf
[2] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC0606.PDF

- Allocate 0.4 MHz of spectrum on an exclusive basis to Maritime and Land Search and Rescue to meet the demand of new search and rescue technologies and to ensure safety of life channels have adequate protection from adjacent channel users in this band; and

- Make spectrum that is not currently being used for Business Radio in this range available on a temporary basis for Amateur Radio and Programme Making and Special Events (PMSE).

1.5 Whilst it is anticipated that narrowband PMR use will continue, there is also the possibility of radio use for applications / technologies that have not been present in these areas of spectrum previously. A number of responses to the CFI identified emerging requirements for broader-band applications, particularly among the utilities sector for telemetry, Machine-to-Machine (M2M) and possible 'LTE' type applications.

1.6 We believe that these bands in the longer term may offer particular opportunities for new types of use that are not readily accommodated by our licensing arrangement. The approach we have outlined in this document acknowledges that new demand may emerge and our proposed assignment approach is specifically designed to preserve future flexibility. If demand for wideband access or other technologies (such as M2M or 'LTE' type services) emerges we may decide to review our assignment approach and may also consult on alternative allocation models, including an award of available spectrum.

1.7 As demand for both operational and potential future services in the short to medium term is likely to be low we are also proposing to permit temporary access to 1 MHz of this spectrum (146 to 147 MHz) for Amateur Radio use, until such a time as it is needed by Business Radio or other services. Should additional spectrum be needed to meet operational requirements, we will remove the temporary allocation. Amateur Radio use of this frequency will be on a non-protection/ non-interference basis and will be subject to some geographical restrictions to ensure that there is no interference to neighbouring countries. We propose that the authorisation will be implemented by an individual Notice of Variation (NoV) to the Amateur Radio licence.

1.8 It is also our preferred policy to grant temporary access to this spectrum for Programme Making and Special Events (PMSE). This is already the case with Business Radio spectrum and we will also continue to apply this policy to these spectrum bands.

1.9 We welcome stakeholder feedback to this consultation document. The deadline to submit responses to us is 5 pm on 26th May 2014. We expect to release a Statement on this consultation later this year having taken into account stakeholder responses to our proposals.

Section 2

Introduction

2.1 Ofcom is responsible for authorising civil use of the radio spectrum and achieves this by granting wireless telegraphy licences under the Wireless Telegraphy Act 2006 (the "WT Act") or by making regulations exempting users of particular equipment from the requirement to hold such a licence.

Our general duties

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

- to further the interests of citizens in relation to communications matters; and
- to further the interests of consumers in relevant markets, where appropriate by promoting competition.

2.3 In carrying out these duties, we are required, among other things, to secure a number of objectives such as the desirability of promoting competition, investment and innovation.[3] Ofcom is also required to have regard to the principles under which regulatory activities should be transparent, accountable, proportionate, consistent, and targeted only at cases in which action is needed.[4]

2.4 Section 4 of the Communications Act requires Ofcom to act in accordance with the six Community requirements, which give effect to the requirements of Article 8 of the European Framework Directive.[5]

Our spectrum duties

2.5 In carrying out our general duties, we are required under the Communications Act to secure, in particular, the optimal use of the electromagnetic spectrum for wireless telegraphy,[6] and to have regard to the different needs and interests of all persons who may wish to make use of the spectrum for wireless telegraphy.[7]

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

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

[3] Sections 3(4)(a) and (d) Communications Act 2003
[4] Section 3(3) Communications Act 2003
[5] Section 4(2) Communications Act 2003
[6] Section 3(2)(a) Communications Act 2003
[7] Section 3(4)(f) Communications Act 2003

2.7 Section 3(2) of the WT Act provides that Ofcom must also have regard to the desirability of promoting the efficient management and use of the spectrum for wireless telegraphy, the economic and other benefits that may arise from the use of wireless telegraphy, and the development of innovative services and competition in the provision of electronic communications services.

Purpose and structure of this document

2.8 This consultation builds on the Call for Input "*VHF Spectrum Release in the range 143 MHz to 156 MHz*" published 12th July 2012[8] (the "CFI"). Given that it is highly unusual for VHF spectrum to become available in such large amounts, especially in significant blocks of contiguous bandwidth of up to 1 MHz, we decided to publish a CFI to seek stakeholder views on potential uses for this spectrum. This CFI only included spectrum released in England, Wales and Northern Ireland.

2.9 When discussing the release of VHF spectrum, this document also includes spectrum between 143 MHz and 156 MHz that has been released in Scotland since the publication of the CFI. An additional 0.5125 MHz of spectrum released by the Emergency Services after the CFI has also been included. This additional spectrum is located between 168 MHz and 169 MHz and has previously been used for police and fire services.

2.10 This document sets out our proposals for the use of this newly available VHF spectrum. It details our proposed approach to managing this spectrum and explains how we have come to this outcome, as well as potential future uses in this band. The rest of this document is set out in the following way:

- Section 3 outlines the responses to the CFI and summarises the key points raised by each sector.
- Section 4 of this document sets out our proposals for allocating the VHF spectrum.
- Annexes 1 to 3 provide information on our approach to consultation.
- Annex 4 contains a copy of questions.
- Annex 5 contains an illustration of the current VHF configuration between 143 MHz and 169 MHz.
- Annex 6 details our analysis of the possibility of interference from Amateur use of this spectrum.
- Annex 7 contains a copy of the proposed Amateur Notice of Variation.
- Annex 8 is a list of respondents to the CFI.

Impact assessment

2.11 The analysis presented in this document constitutes an impact assessment as defined in section 7 of the Communications Act.

[8] http://stakeholders.ofcom.org.uk/consultations/ia_guidelines/

2.12 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.

2.13 We are required to carry out an impact assessment 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 our activities. However, as a matter of policy, we are committed to carrying out 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', which are on our website.[9]

Equality Impact Assessment

2.14 We are required by statute to assess the potential impact of all our functions, policies, projects and practices on the following equality groups: age, disability, gender, gender reassignment, pregnancy and maternity, race, religion or belief and sexual orientation. Equality Impact Assessments (EIAs) also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity.

2.15 We have not identified any particular impact of our proposals to authorise the spectrum in the manner which we have described, in relation to the identified equality groups. Specifically, we do not envisage the impact of any outcome to be to the detriment of any particular group of society.

2.16 Nor have we seen the need to carry out separate EIAs in relation to the additional equality groups in Northern Ireland: religious belief, political opinion and dependants. This is because we anticipate that our proposals will not have a differential impact in Northern Ireland compared to consumers in general.

2.17 If you have any questions regarding the information presented in this document please contact kevin.delaney@ofcom.org.uk

[9] http://stakeholders.ofcom.org.uk/consultations/better-policy-making/

Section 3

Responses to the Call for Input – 143 MHz to 156 MHz

3.1 Our CFI published information concerning the availability of 5.875 MHz of spectrum between 143 MHz and 156 MHz that was becoming available for civil use following its release by the Emergency Services in England, Wales and the Northern Ireland. We sought stakeholders' views on potential uses for this spectrum.

3.2 We received twenty-three non-confidential responses and six confidential responses to the Call for Input. The non-confidential respondents are listed in Annex 8 of this document and can be viewed on our website[1]. The respondents suggested that Ofcom allocate spectrum for:

- Existing Business Radio products on a licensed basis to allow industry sectors such as transport and utility to maintain and improve their communications systems, for example to deploy wide area trunked networks;
- A requirement to facilitate Amateur Radio development applications such as digital TV and satellite;
- Protection of safety of life spectrum for Maritime radio;
- Spectrum for land search and rescue services;
- Spectrum for a 'LTE' type application / service;
- An allocation for Citizens' Band Radio (CB Radio); and
- Licence exempt use using a higher effective radiated power of up to five watts.

Existing Business Radio use

3.3 There was overall support for allocating this spectrum for Business Radio use, in particular for digital Public Mobile Radio (PMR).

3.4 In their response, Joint Radio Company (JRC) preferred for the spectrum to be used for existing licence products in contiguous blocks. They indicated an allocation of 2x1 MHz would be required to provide wide area trunked services. They advised that currently, there is no non-proprietary trunked digital technology available to UK users wishing to migrate from MPT1327 systems. JRC argued that allocation of this additional spectrum would enable the migration to digital for the larger PMR systems. They were concerned that plans for the use of this spectrum are currently compromised by uncertainty surrounding the future of equivalent spectrum in Scotland. JRC noted that this should be clarified before any firm decision is reached as it may affect potential uses which require either UK or GB-wide deployment.

3.5 Transport for London (TFL) favoured an allocation made for Digital PMR technologies. They stated that standardised, cost effective technologies for wider

[1] http://stakeholders.ofcom.org.uk/consultations/call-for-input/?showResponses=true

bandwidth services do not appear to exist at present. They preferred a licence period of at least 5 to 10 years and stated that a contiguous allocation of spectrum would be preferred, primarily due to technology considerations. If the spectrum were to be non-contiguous and / or offered in limited blocks of spectrum, TFL believed that securing licences for appropriate spectrum and to design networks would become increasing complex and ultimately impractical.

3.6 Wall To Wall Radio Communications Limited stated a preference for additional duplex channels for Technically Assigned and Area Defined licensed and 5 to 10 additional Simple Site base / mobile (2W ERP) simplex frequencies. With no additional UHF channels being available, they recommended that three 2 x 25 kHz VHF channels be allocated to the Simple Suppliers' licence. They asked that this spectrum should be released as soon as possible and on a first-come-first-served basis.

3.7 Similarly, Andy Digby, Geoffrey Ma and Michael Tubby stated a preference for spectrum to be allocated to Business Radio to help alleviate some of the congestion currently being experience by users. However, they did not feel the spectrum needed to be continuous.

3.8 After speaking to their members, the Federation of Communication Services (FCS) advised that the band should be kept for PMR as it represents a viable alternative to congested bands. They stated that among members there was also some support for making this band digital-only. As there is more than one digital technology it was felt this would not contravene the principle of Technology Neutrality. Where spectrum is scarce, the FCS reasoned that additional spectrum should be used with a preference for wider bandwidth use on a wide area basis. They also advised that Ofcom may want to consider holding back some of the spectrum from release. FCS further noted the opportunity such spectrum provides spectrum managers to perform band adjustments and even re-alignments. They advised that there may be a case to use these frequencies to enhance the light licensing spectrum pool but this was not considered a high priority. They felt that licences should be assigned on a first-come-first-served basis.

Tetra

3.9 The TETRA and Critical Communications Association supported the use of spectrum to deploy TETRA technology. They stated that the bandwidth does not need to be contiguous as TETRA can fit in alongside other technologies without the need for guard bands.

PMR446 type services

3.10 Geoffrey Ma and Andy Foad both stated a preference for spectrum to be allocated for a licence exempt use similar to the PMR446. Andy Foad that licence exempt use would have little impact upon existing spectrum users or the current licensing regimes. He suggested a 3 to 8 channel licence exempt service similar to the FRS/GMRS/MURS service in the United States.

Maritime

3.11 An unnamed respondent requested that spectrum be granted to inland waterways for communication between boaters and marinas. He advised that using the band to organise joint use of locks and bridges would conserve water and restrict traffic congestion from bridges.

3.12 Wall To Wall Radio Communications Limited and Andy Digby suggested that the spectrum could be used for existing Maritime licensing products.

3.13 The Maritime and Coastguard Agency (MCA) sought assurances from Ofcom that any decision would not adversely impact on the safety of life VHF channel centred on 156.0 MHz, designated as Channel 0. MCA stated that release of adjacent spectrum to Channel 0 raises the issue of adjacent channel interference.

Telemetry

3.14 TAWUI, JRC and Radio Data Networks all proposed use of the spectrum for telemetry. TAUWI stated a preference for a minimum allocation of 600 kHz in a contiguous block. They also advised that licensing should be on a first-come-first-served basis and similar to existing licences. TAUWI favoured minimum licence tenure of 15 years.

3.15 JRC stated that there should be a flexibility of licensing terms and licence durations of up to 25 years to guarantee service. Their preference was for MPT1411 type point-to-multipoint scanning telemetry using proprietary digital modulation techniques for data rates of 9.6 kbits/sec and 19.2 kbits/sec. They did not support licensing on a first-come-first-served basis as they felt this would quickly sterilise valuable blocks of continuous spectrum.

3.16 Radio Data Networks favoured a maximum channel bandwidth of 25 kHz with mandatory duty cycle restrictions and no audio permitted. They advised that any access should be for minimum duration for this spectrum should be 10 years as they believed investment in this band would not be forthcoming otherwise. They highlighted that the technology already has a battery life of 10 year or more and that cost of ownership is based upon this.

LTE

3.17 Cambridge Consultants advised that there could be potential use for LTE for emergency services. However they noted that the minimum required block allocation for LTE is 1.4 MHz of continuous bandwidth.

Amateur

3.18 The Radio Society of Great Britain (RSGB) and five other respondents advised that they wanted 146 to 148 MHz to be wholly allocated to the amateur service, with due provision for any remaining legacy use. They argued that this would reduce pressure on the existing 144 to 146 MHz amateur band, as well as provide for the increasing use of the existing allocation for amateur satellite activities by CubeSat and similar spacecraft which are being developed by UK University student teams in collaboration with radio amateurs. RSGB advised that the reuse of this segment purely for narrow-channelled (business) radio would represent a major lost opportunity. They argued that such usage would still leave ample opportunity in other VHF spectrum such as 155 to156 MHz for Business Radio use.

3.19 Geoffrey Ma's preference was for the expansion of the Amateur band by 0.5 to 1 MHz, on a primary or secondary basis, to all existing Amateur Radio licensees. Contiguous block of spectrum are required to provide a continuous tuning range.

3.20 Professor David Kenward stated a preference for amateur TV and amateur satellite, reserved for digital transmissions only. He advised that the 1 MHz slot above the 145 MHz amateur band would allow digital television pictures to be sent, perhaps with a

further allocation of a 500 kHz orbiting satellite band from 147 MHz for general data reception from experimental satellites. At these lower frequencies he felt it would be possible to communicate with European users as they occupy these channels for Ham radio.

Citizens' Band Radio

3.21 Geoffrey Ma requested that Ofcom re-introduce a 20 channel CB service at a frequency range which does not have the propagation characteristics of the 27 MHz band. He advised that an allocation at VHF would allow practical antenna lengths to be used in vehicles and buildings and felt CB radio could be integrated within the existing licensing framework. He argued that UK IR 2044 would be suitable for a CB service on VHF as equipment which meets these criteria is already available. He felt the obligation on the end-user to hold a licence may be beneficial on a VHF CB service using high-power levels and suggested a registry of all users would be useful for tackling abuse. He stated that this form of licence could be integrated into the Business Radio Licence products on the same basis as a Business Radio Simple UK, Simple Site or Suppliers Light licence upon payment of a fee.

3.22 One respondent advised that part of this spectrum should support a VHF license free allocation of roughly 40 specific channels, with all modes allowed when using type approved equipment and a maximum output power of 12W P.E.P SSB.

Wireless metering

3.23 Cambridge Consultants Ltd supported the allocation of spectrum for wireless metering and the smart home. They advised that as this is a narrowband, use of the spectrum contiguous bandwidth would not be required.

Aeronautical

3.24 Martin Trott preferred for some of the channels to be allocated to hang gliding and paragliding pilots.

Licence exempt

3.25 Most of the responses were against non-PMR licence exempt use, apart from the following responses:

3.25.1 An unnamed respondent favoured licence exemption for voluntary agencies.

3.25.2 Radio Data Networks proposed that telemetry and telecommand applications with a maximum power of 10 mW on a duty cycle of 0.1% with a maximum repetition rate of once per minute.

3.25.3 TETRA and Critical Communications Association advised that some of this spectrum should be kept for licence exempt use.

Section 4

Proposals for the allocation of available spectrum within the VHF band

Introduction.

4.1 The responses to our CFI demonstrated that Business Radio stakeholders see advantages in the availability of additional spectrum for narrow band communication purposes in this range. Our own assessment does identify benefits from supplementing existing bands with spectrum in this range to deal with localised congestion and noting that existing equipment will readily tune to the band. Additional channels might also create the opportunity for Ofcom to implement more efficient spectrum configurations (for instance we are exploring whether digital only channels may deliver more efficient assignments), and create capacity for large but transitory Business Radio requirements (such as the communications in support of the build phase of major infrastructure projects). However, our expectation is that demand for this band in the short to medium term is likely to be moderate.

4.2 A number of respondents identified emerging requirements for broader-band applications, particularly among the utilities sector for telemetry and M2M type applications, and also saw this spectrum as a possible band for LTE. Our existing licensing regime would accommodate access for some broader-band systems, but access to larger tranches of spectrum might not best be accommodated through the existing regime. While the CFI and subsequent engagement with stakeholder has not provided evidence of an immediate appetite for access for this purpose, there are benefits in maintaining flexibility to release larger tranches of spectrum, possibly through an alternative mechanism, should demand manifest itself.

4.3 We also noted interest from the amateur community for spectrum in this range. As we have identified demand from other services in the short to medium term is likely to be relatively low, we have considered whether amateur use could share this spectrum on a temporary basis. Similarly, providing temporary access to some channels for PMSE use could have operational advantages for special events.

4.4 The MCA highlighted the emergence of new Land Search and Rescue (LANDSAR) technologies that would need to be accommodated, combined with the need to formalise sharing arrangements with existing services as the spectrum transitions into commercial use. We agree that provision should be made to address these points.

4.5 In the following section we explore a number of options that address these key themes identified in responses to the CFI.

Spectrum management options

4.6 After taking into account the responses to the CFI we considered three options for the strategic management of this spectrum. These options are further outlined in the table 1 below.

Option 1 – Do Not Release Spectrum at This Time

4.7 Noting the possibility that new technologies may emerge that would benefit from access to large contiguous blocks of spectrum in this range, Ofcom could decide not

to release any spectrum at this time, but would maintain the option to review this band in the future should new demand manifest or a review be judged timely.

4.8 This approach would maintain maximum future flexibility for the band. However, it does not respond to the immediate requirements for access identified by respondents to the CFI.

Option 2 – Managed Release to Existing Product Set

4.9 This approach addresses the need for immediate access to some spectrum in this range by Business Radio applications identified by respondents to the CFI. The proposed graduated assignment approach would also avoid the unnecessary fragmentation of spectrum and so help preserve flexibility for possible alternative uses of the band.

4.10 However, although our current licence products allow for a high degree of technical flexibility they may not efficiently facilitate all current wideband technologies. The allocation of spectrum in the short to medium term for business radio would also reduce the overall amount of spectrum available for alternative uses should they emerge.

Option 3 – Spectrum Award

4.11 In general auctions are the best method of assigning spectrum access rights that enable use of a block of spectrum primarily for dedicated use. This is because the successful bidders in an auction are likely to be those that can generate most value though its subsequent use and so support the objective of securing efficient spectrum use. In certain circumstances, auctions can also be an effective way to ensure the most efficient provider is awarded spectrum for the delivery of specific public policy objectives, e.g. where there are coverage obligations in a licence

4.12 However, it is not obvious at this time that there is demand for larger exclusive blocks of spectrum that would suggest an auction would be an appropriate approach to allocating spectrum in this range. We also recognise that while there are signals that new types of use may seek access to this spectrum, there is still uncertainty regarding the nature of this new demand. Given the impact this knowledge can have on the value derived from spectrum use, therefore, there may be some potential users of the spectrum who may believe they have insufficient information to participate in an auction.

4.13 Further, we note that there was no clear appetite for an award of this spectrum in the responses to the CFI and that this approach would take longer to deliver than the alternative options. Experience suggests that from the point at which a decision was taken to make an award it would take a minimum of a year to design, plan and deliver an auction of this type. This timeframe takes account of the need to consult on the details of the auction design and consult on and make auction regulations. Indeed, it could take longer than a year from the point of a decision if the auction design needed to be more complicated or if contentious issues arose during the consultation process.

Table 1 – Spectrum management options

Option	Description	Analysis
1 – Do not release spectrum at this	Noting emerging demand for this spectrum we would do nothing at this time	+ Preserves options of future award for emerging wideband/M2M demand. - Does not respond to stakeholder

time.	other than signal our intention to re-examine the management of the band should new demand emerge.	requirements for immediate access to the band for the Business Radio community. - The spectrum lays fallow (other than for temporary access purposes).
2- Managed release to existing product set	In principle we would make the spectrum available on a first-come-first-served basis through the Business Radio product set, but spectrum would be "stewarded" to maintain future flexibility. In addition spectrum would be allocated to PMSE, Maritime and Land Search and Rescue to meet specific operational needs.	+ Responds to stakeholder input and current equipment availability. + Addresses a number of congestion issues in the band. + Creates unencumbered spectrum to allow new assignment strategies to be introduced. + Creates possible target spectrum for large temporary requirements. + Does not unduly prejudice possible future options for band. - Does not currently provide spectrum solution for wideband applications. - Decreases the amount of spectrum for future uses. - Risks some fragmentation of the bands.
3 – Award	Competitive release/award of some neutral spectrum in use neutral form.	+ Could potentially provide for optimal allocation of available spectrum. + Could allow dedicated spectrum for the development of new technologies. - The CFI did not indicate a strong stakeholder interest in an award at the present time. - Would involve a high administrative burden and the spectrum release would be delayed. - Issues around legacy use in this spectrum not addressed. - There is a lack of any obvious alternative technologies for current deployment in this spectrum, so this band may remain unused for the short to medium term.

Proposed Option

4.14 Our preferred option is to implement Option 2. This would involve making spectrum in this range available on a first-come-first-served basis through our current Business Radio licence products. We would employ an assignment approach that makes new channels available to business radio through a graduated approach in response to spectrum management needs. Specific provision would also be made for Maritime and LANDSAR Use. Temporary access would be facilitated for amateur and PMSE use. We believe this approach delivers the right balance between responding to immediate interest in accessing the band and the possible emergence of new demand for the band in the medium to long-term.

4.15 We also believe that these bands in the longer term may offer particular opportunities for new types of use that are not readily accommodated by our proposed approach. The approach we have outlined in this document acknowledges that new demand may emerge and our proposed assignment approach is specifically designed to preserve future flexibility. If demand for wideband access or other technologies (such as M2M or 'LTE' type services) emerges we may decide to review our assignment

approach and may also consult on alternative allocation models, including an award of available spectrum.

4.16 As demand for both operational and potential future services in the short to medium term is likely to be low we are also proposing to permit temporary access to 1 MHz of spectrum (146 to 147 MHz) for Amateur Radio use, until such a time as it is needed by Business Radio or other services. Should additional spectrum be needed to meet operational requirements, we will remove the temporary allocation. Amateur Radio use of this frequency will be on a non-protection/ non-interference basis and will be subject to some geographical restrictions to ensure that there is no interference to neighbouring countries. We propose that the authorisation will be implemented by an individual Notice of Variation (NoV) to the Amateur Radio licence. The NoV will be for a period of 12 months.

4.17 We will also continue to grant temporary access to this spectrum for Programme Making and Special Events (PMSE).

4.18 In the following section we set out more detail of our proposals.

Q1. Do you agree with the proposed approach for spectrum management?

Detailed proposals

Business Radio

4.19 We propose to allocate some of this spectrum for Business Radio use, to be allocated as operational needs require on a first-come-first-served basis.

4.20 The use of this spectrum for Business Radio is in keeping with spectrum management elsewhere in Europe. The ECC Decision (06) 06[1] recommends the use of VHF spectrum for PMR use. Although the decision is not binding, across Europe this spectrum is mainly used for PMR, as shown in the European Table of Frequency Allocations.[2] Allocating this spectrum to Business Radio would keep the UK in line with our European neighbours. In the UK many of the bands adjacent to this spectrum are also used for PMR.[3]

4.21 The VHF band's characteristics provide greater coverage than UHF, especially in sub-urban and rural areas. This makes the band useful to PMR even though its building penetration is not as good as UHF. Congestion in VHF Mid Band (137.9625 to 165.04375) and VHF High Band (165.04375 to 173.09375) for PMR is starting to become evident in some major conurbations. By allocating the released spectrum to PMR use we would hope to prevent any future congestion in these bands.

4.22 We intend for the existing Business Radio licence classes to be used. At present we will allocate the spectrum to both Technically Assigned and Area Defined licence classes. We are not proposing to add any new spectrum to the other licence classes at this moment in time. If we see that there is a need for additional spectrum for these other classes we will reconsider this decision and provide sufficient spectrum to meet demand.

4.23 The licence will be available under the standard terms and conditions for Business Radio licence products. The licence fees for this spectrum would be charged in line

[1] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC0606.PDF
[2] http://www.erodocdb.dk/Docs/doc98/official/pdf/ERCREP025.PDF
[3] See Annex 5

with current Business Radio fees which already apply to this frequency range, information about which can be found on our website.[1] As set out in our recent Cost Based Fees consultation, we plan to review fees for the Business Radio sector in the coming year.[2] Any changes to the current fees charged for Business Radio licence products will be subject to consultation. Until such time as a decision is made and regulations introduced, the fees will remain the same.

4.24 For the most part we expect to see the spectrum assigned to systems using channel widths of 6.25 kHz, 12.5 kHz and 25 kHz to cater for a variety of technologies. These frequency widths do not have technology restrictions on the use of analogue or digital equipment. Please note that this does not stop applicants applying for contiguous spectrum to facilitate frequency use greater than 25 kHz.

4.25 Our existing licensing regime could accommodate access for some broader band systems that meet the criteria set out in IR 2044 for PMR technology, although the existing regime may not be appropriate for allocating access to larger tranches of spectrum. We would welcome discussions with anyone wishing to obtain spectrum for wider-band systems in order to ascertain their needs and understand the potential demand for such spectrum.

Q2. Do you agree with the proposed approach for Business Radio assignments?

Maritime / Land Search and Rescue

4.26 In the CFI the Maritime and Coastguard Agency (MCA) registered an interest in protecting international maritime safety channels. They noted the existing allocation to MCA at 156 MHz 'Channel 0' which is used for safety of life communications. They requested that the adjacent spectrum to this channel be used to safeguard Channel 0. In addition due to changes introduced as part of the World Radio Conference in 2012, the MCA also highlighted the need to relocate some existing LANDSAR channels that are currently in spectrum identified for the future development of digital technologies. Additional spectrum, below 156 MHz, will permit these affected channels to be relocated and also permit the transfer of other non-affected LANDSAR channels so that the LANDSAR channels can be re-grouped.

4.27 Given the importance of Channel 0 we are minded to allocate the adjacent channels surrounding it to the MCA. This would safeguard the channel against potential interference from adjacent services. Our proposal is to allocate 400 kHz on an exclusive basis to MCA to address these operational needs. Access to spectrum will be coordinated by the MCA on a licensed basis. We will authorise access to the spectrum through the standard Coastal Station Radio (UK) or Coastal Station Radio (Search and Rescue) licence products.

Q3. Do you agree with the proposal to allocate spectrum for Maritime and/or Land Search and Rescue use?

Temporary Access

Amateur Radio

4.28 The Radio Amateur community have made a case for utilising additional spectrum to develop new digital technologies for voice, data and video and we have considered

[1] http://licensing.ofcom.org.uk/radiocommunication-licences/business-radio/forms/
[2] http://stakeholders.ofcom.org.uk/consultations/cbfframework/

this request carefully. We propose to make around 1 MHz[1] of spectrum temporarily available with restrictions through a time limited Notice of Variation (NoV) for full Amateur Radio licence holders. We propose to make available the spectrum from 146 to 147 MHz for this use. This is adjacent to the existing Amateur Radio allocation at 144 to 146 MHz.

4.29 It should be noted that the 146 to 147 MHz band is not allocated in the UK Frequency Allocation Table (FAT) to Amateur use and we have no plans to amend this. The band is allocated for Fixed and Mobile use throughout ITU Region 1 (Europe, Russia and Africa), although Amateur Radio is permitted in Regions 2 (Canada, North and South America) and Region 3 (Asia and Australia). Therefore it should be noted that NoVs issued in the band for Amateur Radio use will be offered on a time limited (initial maximum period of 1 year), non-protection, non-interference basis. Users are free to re-apply for new NoVs after each 12 month period.

4.30 In addition, the allocation of this spectrum is made on a temporary basis, and will be reallocated to Business Radio or other services as it is required. However, we are minded to give 12 months' notice of any such reassignment. This notice would be provided through an announcement on our website. Given the amount of spectrum being made available we expect Amateur Radio to have access for at least the next couple of years.

4.31 Our proposed allocation to Amateur Radio would be in derogation of the Radio Regulations for Region 1. Therefore we need to be satisfied that use of frequencies within the 146 to 147 MHz band for Amateur Radio would not cause harmful interference to designated use in surrounding countries.

4.32 Given the existing constraints relating to international coordination (based on PMR), we undertook some technical analysis to identify whether Amateur Radio use in the band could be facilitated. Our analysis can be found in Annex 6 of this document. Through this work we believe that, subject to the restrictions of the NoV, Amateur Radio use in this band could be permitted. However, if use is shown to cause interference to neighbouring countries access to this spectrum will be removed with immediate effect.

4.33 Based on our technical analysis we have set out a number of restrictions on use which relate to geographical deployment, transmit power, and antenna height, these are listed in the NoV and are summarised below:

4.33.1 Only available to holders of Full Licences, including Full (Club) and Full (Reciprocal) licences.

4.33.2 Fixed station use and mobile use permitted.

4.33.3 Maximum power of 25W ERP referenced to a half wave dipole.

4.33.4 Maximum antenna height of 20m.

4.33.5 Geographical restrictions apply and use within the shaded areas of the maps (as defined by the list of coordinates) in Annex 7 is not permitted.

4.33.6 Any transmission must comply with international co-ordination limits.

4.33.7 Use would be on a non-protected, non-interference basis.

[1] Emergency Services use will remain in some channels

4.33.8 The NoV would require renewing on an annual basis.

4.34 It should be noted that although designation of the spectrum has changed from Public Safety to Civil there is some legacy Public Safety use that will remain on a small number of specific narrowband channels. Emergency Services are happy to share these channels with Amateur Radio users however, should there be interference; Ofcom would prioritise the Emergency Service access to the retained channels in the band and Amateur Radio users may be requested to cease operations on these channels.

4.35 A copy of the draft NoV is available to view in Annex 7 of this document.

Q4. Do you agree with the proposal to make some spectrum not currently assigned to other applications available on a temporary for Amateur Radio use with these restrictions?

Programme Making and Special Events (PMSE)

4.36 For major events it is common that access is required for narrowband short-term requirements in Business Radio VHF spectrum. We therefore will permit temporary PMSE access as and when it is required to spectrum in these bands that we are not currently planning on assigning for Business Radio use. Given the short term use by PMSE we do not see this having any impact on the future availability of this spectrum for other services.

Future Technologies and Alternative Uses

4.37 Whilst it is anticipated that narrowband PMR use will continue, there is also the possibility of radio use for applications / technologies that have not been present in these areas of spectrum previously. A number of responses to the CFI identified emerging requirements for broader-band applications, particularly among the utilities sector for telemetry, Machine-to-Machine (M2M) type applications and possible 'LTE' type applications.

4.38 Our existing licence regime could accommodate access for some broader-band systems based on PMR type technologies, but access to large blocks of spectrum may be harder to accommodate through the existing regime. Should demand for wideband systems or future technologies emerge (such as M2M or 'LTE' type services), we may decide to assign any unallocated blocks of the released spectrum for these uses, subject to consultation.

4.39 Our proposed assignment approach aims to avoid the fragmentation of continuous blocks of spectrum, which have the potential to be used for wideband PMR or alternative new technologies in future by preserving flexibility. We believe that there are benefits in maintaining a flexible approach to authorisation and that it will ensure the most optimal and efficient use of spectrum. If demand for wideband access or other technologies emerges we may decide to review our assignment approach and may consult on alternative allocation models, including an award of available spectrum.

4.40 The VHF band could in the longer term offer particular opportunities for new types of use that are not readily accommodated by our proposed management approach. Although some of the alternative uses for this band as identified in the CFI are still in their infancy, spectrum availability may accelerate their development. We are and will remain open to enquiries from anyone who thinks they may wish to deploy an alternative technology which could make use of this spectrum.

Annex 1

Responding to this consultation

How to respond

A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm 23rd May 2014**.

A1.2 Ofcom strongly prefers to receive responses using the online web form at http://stakeholders.ofcom.org.uk/consultations/vhf-143-169mhz/ 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 Kevin.Delaney@ofcom.org.uk attaching your response in Microsoft Word or Open Office 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.

Kevin Delaney
03:193
Spectrum Policy Group
Riverside House
2A Southwark Bridge Road
London SE1 9HA

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 Kevin Delaney on 020 7981 3143.

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 period allowed for responding, we will assess responses and, where appropriate, publish proposals for the way we will manage the spectrum bands.

A1.12 We expect to publish this document later this year.

A1.13 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

A1.14 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.

A1.15 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.

A1.16 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Graham Howell, Secretary to the Corporation, who is Ofcom's consultation champion:

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

Tel: 020 7981 3601

Email Graham.Howell@ofcom.org.uk

Annex 2

Ofcom's consultation principles

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

Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

During the consultation

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

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

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

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

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

After the consultation

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

Annex 3

Consultation response cover sheet

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

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

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

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

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

Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

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

Nothing ☐

Whole response ☐

Part of the response ☐

Name/contact details/job title ☐

Organisation ☐

If there is no separate annex, which parts?

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

DECLARATION

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

Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here. ☐

Name

Signed (if hard copy)

Annex 4

Consultation questions

A4.1 Please note below the questions where Ofcom requires your input.

Q1. Do you agree with the proposed approach for spectrum management?

Q2. Do you agree with the proposed approach for Business Radio assignments?

Q3. Do you agree with the proposal to allocate spectrum for Maritime and/or Land Search and Rescue use?

Q4. Do you agree with the proposal to make some spectrum not currently assigned to other applications available on a temporary for Amateur Radio use with these restrictions?

Annex 5

VHF current configuration – 143 MHz to 169 MHz

Annex 6

International Co-Ordination Analysis – Amateur Radio Use of 146 to 147 MHz

A7.1 To conduct the analysis into potential international coordination issues around the Amateur Radio use of the 146 to 147 MHz band in the UK, fixed transmitters were distributed along the border and/or coast of neighbouring countries at approximately 10 km intervals with the following parameters:

7.1.1 ERP: 25 W

7.1.2 Antenna height: 10 m

7.1.3 Frequency: 146.5 MHz

7.1.4 Omni-directional antenna

A7.2 The predicted coverage of these stations was calculated into the UK using ITU-R Recommendation P.1546-4[1] with the following model parameters:

7.2.1 Time: 10%

7.2.2 Locations: 50%

7.2.3 Receive antenna height: 20 m

7.2.4 Path direction reversed

A7.3 Applying a threshold of 12 dBμV/m determines whether a station would breach the co-ordination agreement with the neighbouring country.

[1] http://www.itu.int/dms_pubrec/itu-r/rec/p/R-REC-P.1546-4-200910-S!!PDF-E.pdf

Annex 7

Notice of Variation for Temporary Amateur Access

WIRELESS TELEGRAPHY ACT 2006
TEMPORARY VARIATION OF AMATEUR RADIO (FULL) LICENCE FOR THE PURPOSE OF OPERATING BETWEEN 146 MHz AND 147 MHz

1. Introduction

Ofcom, in exercise of the power conferred by Schedule 1, paragraph 6 of the Wireless Telegraphy Act 2006 (as amended, "the Act"), hereby varies the Amateur Radio Full Licence ("the Licence") identified below, in accordance with Schedule 1, paragraph 7 of the Act, as detailed below.

Name of Licensee:	**«OFC_NOV_Title_X» «OFC_NOV_First_Name_X» «OFC_NOV_Last_Name_X»**
Licensee's Main Station Address:	**«OFC_NOV_KEEPER_Addr_Line_1_X»**
	«OFC_NOV_KEEPER_Addr_Line_2_X»
	«OFC_NOV_KEEPER_Addr_Line_3_X»
	«OFC_NOV_KEEPER_Addr_Line_4_X»
Postcode:	**«OFC_NOV_KEEPER_Post_Code_X»**
Telephone Number(s):	**«OFC_NOV_Home_Phone_X»**
Licensee's Call Sign:	**«OFC_NOV_Call_Sign_X»**
Licence reference:	**«OFC_NOV_License_Ref_X»**
Date of Issue of this Variation:	**21 March 2014**
Date of expiry of this Variation:	**12 months from date of issue**

2. Purpose

(a) The purpose of this variation is to authorise the licensee to use the Station between 146 MHz and 147 MHz.

3. General

(a) Terms and expressions defined in the Licence shall have the same meaning herein except where otherwise stated or the context requires otherwise.

(b) This Variation and the Schedules associated herewith shall be read as an integral part of the Licence and the following additional terms shall apply in respect of the Station.

(c) This Variation shall remain in force unless:
  (i) The Variation expires (that is to say that it passes the Date of Expiry given above) or
  (ii) Ofcom revokes the licence or
  (iii) Ofcom further varies the Licence, such that the effect of this Variation is altered or cancelled or
  (iv) the licensee surrenders the licence

(d) This Variation forms part of the Licence and must be attached to the Licence.

(e) This Variation replaces and supersedes any other Variation issued to vary the Licence for the purpose stated in 'Purpose', above.
(f) This Variation does not grant any authorisation on its own. It has effect only when read together with the Licence, which it varies.
(g) This Variation is valid only if the Licence is an Amateur Radio (Full) licence, including Amateur Radio (Full) (Club) licence and Amateur Radio (Full) (Reciprocal) licence.

4. Variation

(a) Subject to the terms and conditions below and to any further restrictions in the Schedules to this Variation, the Licence is varied such that it authorises the Licensee to use the Station in the Authorised Band.

5. Withdrawal of this authorisation

(a) Without prejudice to any other power that Ofcom may have to vary or revoke the Licence, Ofcom may vary the Licence in accordance with 3(c)(iii), above (such that the effect of this Variation is withdrawn or cancelled) in the following circumstances:
  (i) If the use of the Station in the Authorised Band causes or contributes to interference to another authorised user of the Authorised Band
  (ii) If Ofcom has evidence that the use of the Authorised Band by Amateur Radio, generally, is causing or contributing to or has caused or contributed to interference to authorised users of the Authorised Band in services to which the Authorised Band is allocated in the United Kingdom or in the Crown Dependencies or in any other country.
  (iii) For other purposes associated with the management of the radio spectrum

6. Geographic limits and extent

(a) The Variation authorises the use of the Station in the Authorised Band only in the United Kingdom, as may further be qualified elsewhere in the Variation.
(b) The Variation does not authorise the use of the Station in the Authorised Band on the high seas or in any other country or territory or anywhere in the Isle of Man or Guernsey or Jersey or, in each case, in their territorial seas.
(c) In the United Kingdom, the Station must not be used to transmit in the Authorised Band in any 25 km x 25 km square the bottom left-hand corner of which is described by a National Grid Reference in Schedule 2 to this Variation.
(d) The use of the Station in the Authorised Band must not breach the agreed international coordination limits applicable to the Authorised Band.
(e) If the Licensee can demonstrate that the use of the Station in the Authorised Band complies with relevant provisions of the Harmonised Calculation Method agreement, it may be taken to show that the use of the Station in the Authorised Band is not breaching the agreed international coordination limits applicable to the Authorised Band.

7. Terms and conditions

(a) Subject to the provisions of clause 6, above, relating to geographic limits and extent, the Station may be used in the Authorised Band at the Main Station Address (specified in Section 1, above), from a Temporary Location, from an Alternative Address, Mobile or Maritime Mobile.
(b) The use of the Station in the Authorised Band must not cause or contribute to interference to any other authorised radio user, whether that user be situated in the United Kingdom or elsewhere.
(c) In respect of the use of the Station in the Authorised Band, the Licensee may not claim protection from any other authorised radio user, whether that user be situated in the United Kingdom or elsewhere.
(d) The use of the Station in the Authorised Band must be in accordance with the technical restrictions in Schedule 1.

8. Interpretation

(a) "the Station" means the station identified in Section 1 of this variation and/or any apparatus for wireless telegraphy associated with it.

(b) "the Licence" means the licence identified in Section 1 of this variation.

(c) "the Authorised Band" means the frequencies between 146 MHz and 147 MHz as qualified and further provided for in Schedule 1, below, including any notes thereto.

(d) "this Variation" means this variation document, including any schedule(s) associated herewith.

(a) "effective radiated power" means the product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction

(b) "the Harmonised Calculation Method agreement" means the *Agreement between the Administrations of Austria, Belgium, the Czech Republic, Germany, France, Hungary, the Netherlands, Croatia, Italy, Liechtenstein, Lithuania, Luxembourg, Poland, Romania, the Slovak Republic, Slovenia and Switzerland on the co-ordination of frequencies between 29.7 MHz and 43.5 GHz for the fixed service and the land mobile service*, including Annexes and published in English at http://hcm.bundesnetzagentur.de/http/englisch/verwaltung/index_berliner_vereinbarung.htm.

(c) "the United Kingdom" includes her territorial seas, as provided for by section 1 of the Territorial Sea Act 1987.

Issued by Ofcom:

Spectrum Licensing
Ofcom Licensing Centre
Riverside House
2a Southwark Bridge Road
London, SE1 9HA
UK
Tel. +44 (0)20 7981 3131
Fax. +44 (0)20 7981 3333

VARIATION FOR THE PURPOSE OF USING 146 MHz TO 147 MHz
SCHEDULE 1 TO VARIATION

TECHNICAL RESTRICTIONS FOR USE OF THE AUTHORISED BAND

Lower band limit[1]	Upper band limit	Maximum transmit power (effective radiated power)	Maximum antenna height above ground level
146.000 MHz	147.000 MHz[2]	25 Watts	20 metres

Notes

[1] These band limits are absolute limits and not centre frequencies.

[2] In Scotland or anywhere within 40km of the border between England and Scotland or within 40 km of the Scottish coast, the upper band limit is 146.93750 MHz.

End of Schedule 1

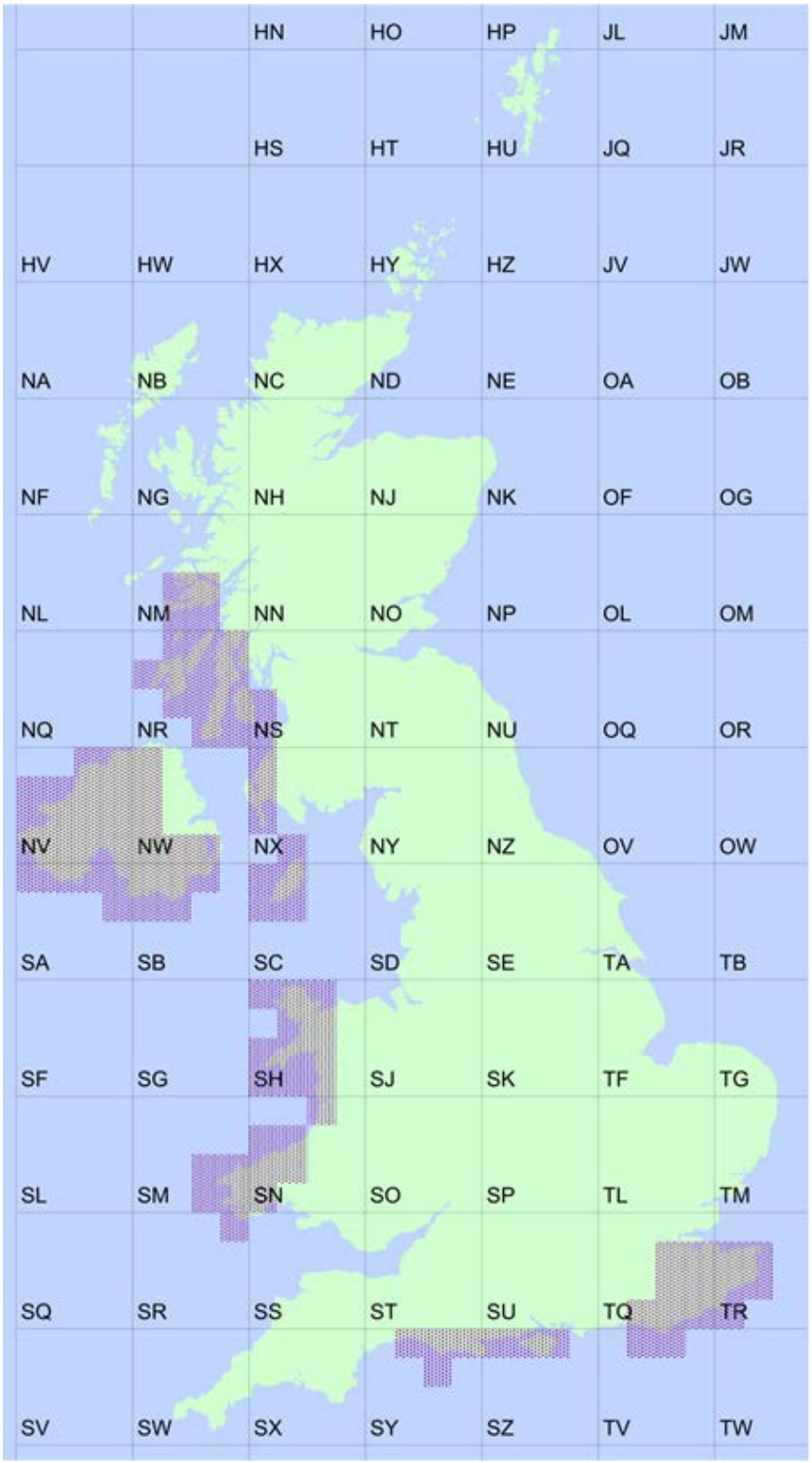
VARIATION FOR THE PURPOSE OF USING 146 MHz TO 147 MHz
SCHEDULE 2 TO VARIATION

LIST OF 25km x 25km SQUARES IN WHICH USE IS NOT AUTHORISED

NGR of South West corner of 25km x 25km square		
NM 25000 00000	NX 00000 25000	SN 50000 75000
NM 25000 25000	NX 00000 50000	SR 75000 75000
NM 50000 00000	NX 00000 75000	SY 25000 75000
NM 50000 25000	NX 25000 00000	SY 50000 50000
NR 00000 50000	SA 00000 75000	SY 50000 75000
NR 25000 25000	SA 25000 75000	SY 75000 75000
NR 25000 50000	SA 50000 75000	SZ 00000 75000
NR 25000 75000	SA 75000 50000	SZ 25000 75000
NR 50000 00000	SA 75000 75000	SZ 50000 75000
NR 50000 25000	SB 00000 50000	TQ 25000 00000
NR 50000 50000	SB 00000 75000	TQ 50000 00000
NR 50000 75000	SB 25000 50000	TQ 50000 25000
NR 75000 00000	SB 25000 75000	TQ 50000 50000
NR 75000 25000	SB 50000 75000	TQ 75000 00000
NR 75000 50000	SC 00000 50000	TQ 75000 25000
NR 75000 75000	SC 00000 75000	TQ 75000 50000
NS 00000 00000	SC 25000 50000	TR 00000 00000
NS 00000 25000	SC 25000 75000	TR 00000 25000
NV 00000 00000	SH 00000 00000	TR 00000 50000
NV 00000 25000	SH 00000 25000	TR 25000 25000
NV 00000 50000	SH 00000 75000	TR 25000 50000
NV 25000 00000	SH 25000 00000	TV 25000 75000
NV 25000 25000	SH 25000 25000	TV 50000 75000
NV 25000 50000	SH 25000 50000	
NV 50000 00000	SH 25000 75000	
NV 50000 25000	SH 50000 00000	
NV 50000 50000	SH 50000 25000	
NV 50000 75000	SH 50000 50000	
NV 75000 00000	SH 50000 75000	
NV 75000 25000	SM 50000 00000	
NV 75000 50000	SM 50000 25000	
NV 75000 75000	SM 75000 00000	
NW 00000 00000	SM 75000 25000	
NW 00000 25000	SN 00000 00000	
NW 00000 50000	SN 00000 25000	
NW 00000 75000	SN 00000 50000	
NW 25000 00000	SN 25000 25000	
NW 50000 00000	SN 25000 50000	

End of Schedule 2

Areas in which use is not authorised (for illustrative purposes only)



Annex 8

List of respondents

Andy Digby
Andy Foad
Bruce Fisher
Cambridge Consultants Ltd
David Kenward
Federation of Communications Services (FCS)
Geoff Ma
Joint Radio Company (JRC)
Martin Trott
Michael Tubby
Maritime and Coastal Agency (MCA)
Name withheld 1
Name withheld 2
Name withheld 3
Name withheld 4
Name withheld 5
Radio Data Network
Radio Society of Great Britain (RSGB)
Robin Maddison
Telecommunications Association of the UK Water Industry (TAUWI)
TETRA Critical Communications Association
Transport for London
Wall to Wall Radio Communications Ltd