Decision to make the Wireless Telegraphy (White Space Devices) (Exemption) Regulations 2015

Statement

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About this document

This document confirms that Ofcom has made the Wireless Telegraphy (White Space Devices) (Exemption) Regulations 2015. These regulations enable licence exempt use of white space devices in the UHF TV band and give effect to a decision announced in February 2015.

‘White spaces’ are gaps in the radio spectrum in frequency bands, which can be used to offer new wireless applications to benefit consumers and businesses.

The white spaces covered by the draft regulations are in frequencies currently used for digital terrestrial TV and wireless microphones, among other services, in the 470 - 790 MHz spectrum band. Use of white space devices would be permitted on the basis that the devices meet certain technical conditions.

To avoid harmful interference being caused to existing spectrum users, devices will need to communicate with databases which will apply rules, set by Ofcom, to put limits on the power levels at which devices can operate.

The regulations come into effect on 31 December 2015.

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Section 1

Executive summary

1.1 This document confirms that after consultation Ofcom has made the Wireless Telegraphy (White Space Devices) (Exemption) Regulations 2015 (the 'WSD Regulations') that enable the use of certain wireless telegraphy equipment complying with the technical parameters set out in the WSD Regulations on a licence exempt basis. The WSD Regulations were signed on 18 December 2015 and come into effect on 31 December 2015.

1.2 The WSD Regulations implement Ofcom's decision, as set out in our statement published on 12 February 2015 entitled "*Implementing TV White Spaces*" (the "TVWS Statement")[1], to allow white space devices access to unused frequencies in the UHF TV Band under a licence exemption regime, provided that the devices meet certain minimum technical requirements.

1.3 Before deciding to make regulations, in accordance with the requirements of section 122(4) and 122(5) of the Wireless Telegraphy Act 2006 ('WT Act'), we published the Notice[2] setting out our proposals to make them. The Notice also contained a draft of the WSD Regulations and invited comments from stakeholders on the drafting of the regulations. We received seven non-confidential responses and one part confidential response to the Notice.

1.4 We considered these comments in accordance with section 122(4)(c) of the WT Act. After doing so, and for the reasons set out in this document, we have decided to adopt the WSD Regulations with some amendments. The details of the changes made to the draft regulations can be found in section 3. Copies of the Regulations can be obtained through the National Archives[3]. A link to the Regulations will also be available on our website[4].

1.5 We have published the Regulatory Impact Assessment (RIA) in respect of the WSD Regulations alongside this Statement on our website.

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[1] http://stakeholders.ofcom.org.uk/binaries/consultations/white-space-coexistence/statement/tvws-statement.pdf

[2] http://stakeholders.ofcom.org.uk/consultations/wireless_telegraphy_white_space_devices_exemption_regulations/

[3] A link to the online version will be available at http://www.legislation.gov.uk/

[4] http://stakeholders.ofcom.org.uk/spectrum/information/licence-exempt-radio-use/wireless-telegraphy-regulations/

Section 2

Background

Regulatory framework

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") and by making regulations exempting users of particular equipment from the requirement to hold such a licence.

2.2 In particular, under section 8(1) of the WT Act, it is an offence to establish, install or use wireless telegraphy ('WT') equipment in the UK except where such use is authorised either by the issue of an appropriate wireless telegraphy licence or where the use of such equipment is exempted from the need to hold such a licence by regulations (i.e. a statutory instrument) made under section 8(3) of the WT Act.

2.3 Under section 8(3) of the WT Act, Ofcom may by regulations exempt from the requirement of a licence the establishment, installation or use of equipment of such class as may be specified in the regulations, either absolutely or subject to such terms, provisions and limitations as may be so specified.

2.4 Under section 8(4) of the WT Act, we have to make regulations to exempt equipment if its installation or use is not likely to:

- involve undue interference with wireless telegraphy;
- have an adverse effect on technical quality of service;
- lead to inefficient use of the part of the electromagnetic spectrum available for wireless telegraphy;
- endanger safety of life;
- prejudice the promotion of social, regional or territorial cohesion; or
- prejudice the promotion of cultural and linguistic diversity and media pluralism.

2.5 In accordance with the requirements of section 8(3B) of the WT Act, the terms, provisions and limitations specified in the regulations must be:

- objectively justifiable in relation to the wireless telegraphy stations or wireless telegraphy apparatus to which they relate;
- not such as to discriminate unduly against particular persons or against a particular description of persons;
- proportionate to what they are intended to achieve; and
- transparent in relation to what they are intended to achieve.

2.6 Before making any regulations we are required by section 122(4) of the WT Act to give notice of our proposal to do so. Under section 122(5), the notice must state that

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Ofcom proposes to make the regulations in question, set out their general effect, specify an address from which a copy of the proposed regulations or order may be obtained, and specify a time before which any representations with respect to the proposal must be made to Ofcom. In accordance with section 122(6), that time must be at least one month beginning with the day after that on which the notice is given or published.

Policy Background

What are TV white spaces?

2.7 The UHF TV band is currently allocated for use by Digital Terrestrial Television (DTT) broadcasting and Programme Making and Special Events (PMSE). Currently, Freeview TV channels are broadcast using up to ten multiplexes. Each multiplex requires an 8 MHz channel. Multiplexes are transmitted at different frequency channels across the country in the frequency range 470 to 790MHz.

2.8 Whilst a total of 32 channels each 8 MHz wide are reserved for DTT in the UK, normally only one channel per multiplex is used at any given location. In other words, the majority of channels are unused for DTT transmission at any given location. This is required because high-power TV broadcasts using the same frequency need geographic separation between their coverage areas to avoid interference.

2.9 The channels that are not used by DTT at any given location can be used by lower-power devices on an opportunistic basis. This opportunistic access to interleaved spectrum is not new. Programme making and special events (PMSE) equipment such as radio microphones and audio devices have been exploiting the interleaved spectrum for a number of years, and Ofcom issues more than 50,000 assignments annually for this type of use.

2.10 We refer to the spectrum that is left over by DTT (including local TV) and PMSE use as TV White Spaces (TVWS). By this we mean the combination of locations and frequencies in the UHF TV band that can be used by new users, operating in accordance with technical parameters that ensure that there is a low probability of harmful interference to DTT reception, PMSE usage or services above and below the band.

Our decision to allow WSDs on a licence exempt basis

2.11 On 12 February 2015 we published the TVWS Statement in which we set out our decision to move ahead with the policy proposal to allow WSDs access to the TV Band under a licence exemption regime, provided that the devices meet a minimum technical specification.

2.12 The TVWS Statement lays out:

- the high level framework for operation of WSDs and its main features;
- the technical conditions that devices will have to comply with in order to operate without a licence and
- the detail of the rules to ensure coexistence of WSDs with existing users of the band, users of neighbouring bands and in neighbouring countries.

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Statutory Notice

2.13 We published the Notice, meeting the statutory requirements set out under sections 122(4) to (6) of the WT Act, on 6 November 2015. The Notice included a copy of the WSD Regulations. The Notice gave any person or party who wished to do so until 7 December 2015 to make representations.

2.14 We received seven non-confidential responses and one part confidential response to the Notice. A summary of these responses along with our response is presented in the next section of this document.

List of databases in the Regulations

2.15 The WSD Regulations require a licence-exempt device to contact a database listed in Schedule 1. In the draft of the WSD Regulations included at Annex 5 of the Notice, we had included in the draft of Schedule 1 the name of the database that had already completed qualification, Nominet UK. In the Notice we said that we were currently working with the six other organisations that we had signed contracts with and that are seeking to be qualified by Ofcom. We said that, subject to those databases satisfactorily completing the qualification process within the required period, we also intended to list these organisations as offering databases from which white space devices may obtain operational parameters in Schedule 1 of the WSD Regulations.

2.16 Since publishing the Notice, three additional organisations with whom we signed contracts have completed qualification: Fairspectrum Oy, Sony Europe Limited and Spectrum Bridge Incorporated.

2.17 The following organisations will therefore be listed in Schedule 1 of the WSD Regulations:

- Fairspectrum Oy;
- Nominet UK;
- Sony Europe Limited, and
- Spectrum Bridge Incorporated.

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Section 4

Responses to the Notice

Introduction

3.1 This section outlines the comments that we received to the Notice and our response to these.

3.2 We received seven non-confidential responses and one part confidential response to the consultation. The responses are published on our website[5]. Most responses either supported the regulations or raised queries or concerns which were not directly related to the drafting of the proposed regulations. Only one respondent made specific drafting suggestions. We discuss the responses in more detail below.

3.3 Following consideration of the responses as outlined below, we have decided to proceed with our proposal to make the regulations with some amendments.

Stakeholders' responses to the Notice and Ofcom's response

3.4 Three respondents to the consultation, Dynamic Spectrum Alliance (DSA), Microsoft and Nominet, wrote to support the adoption of the proposed regulations. The DSA and Microsoft urged Ofcom to adopt the regulations without delay.

3.5 EE Limited made five drafting suggestions on the proposed regulations. Its first suggestion was to specify that the regulations apply in the United Kingdom and Isle of Man. Two other proposed amendments related to clarifying that use of DTT Channel 60 is not permitted. The remaining suggestions were to include a cross-reference to regulation 7(6) in regulation 7(5)(b) of the proposed regulations (these are now regulation 6(5) and regulation 6(6)(b) respectively) and to include a cross-reference to the definition of the 'update period' in regulation 7(6) of the proposed regulations (this is now regulation 6(5) as noted above).

3.6 We do not consider it necessary to expressly state in the WSD Regulations that they will apply in the United Kingdom and Isle of Man as we think this is sufficiently clear from the WSD Regulations as drafted (for example, in respect of the Isle of Man, footnote (a) in the preamble states that section 8(3) has been extended to the Isle of Man by article 2 of the Wireless Telegraphy (Isle of Man) Order 2007). We have clearly explained the relevant specific restrictions on the extent of application in regulation 1(2), which states that the WSD Regulations will not apply to the Channel Islands.

3.7 While we have not adopted EE's suggestions on the drafting of regulation 6 (regulation 7 of the proposed regulations included in the Notice), we have made some amendments to the drafting of regulation 6 to seek to clarify the requirements relating to validity of the master operational parameters. Specifically:

3.7.1 We have re-ordered these requirements for clarity such that:

5 http://stakeholders.ofcom.org.uk/consultations/wireless_telegraphy_white_space_devices_exemption_regulations/?showResponses=true

- Regulation 6(5) (regulation 7(6) in the proposed regulations) provides that after receiving master operational parameters from a database, a master device must communicate with that database every update period for confirmation that the master operational parameters remain valid.

- Regulation 6(6) (regulation 7(5) in the proposed regulations) provides that master operational parameters cease to be valid if: (a) a database communicates an instruction to the master device that those master operational parameters are not valid, or (b) the master device has not received confirmation from a database that the master operational parameters are still valid by the end of an update period.

- Regulation 6(7) (regulation 7(7) in the proposed regulations) provides that if master operational parameters cease to be valid, a master device must instruct all slave devices to which it has communicated slave operational parameters to stop transmitting, and thereafter stop transmitting itself on the basis of those master operational parameters.

3.7.2 We have also made reference to the definition of the 'update period' in regulation 2 (Interpretation) for completeness and to clarify that this term is to be construed in accordance with regulation 6(9). That definition explains that the 'update period' means the time period (in seconds) specified by a database as part of the master operational parameters (see also regulation 10(g)).

3.8 With regard to EE's suggestion that we include wording in the regulations that specifies that use of DTT Channel 60 is not permitted, the Regulations make it clear that devices may only operate on the channels communicated to them by a WSDB. In our February 2015 Statement, we said that we will not be allowing WSDBs to provide availability in Channel 60. This will ensure that in practice devices will not operate in Channel 60. We therefore do not consider that it is necessary to explain in the Regulations that Channel 60 will not be available for use by WSDs. We would also note that there are other channel specific restrictions which were set out in our Statement but are not expressly covered in the Regulations. This is also because they will be implemented through the requirements on databases to calculate TVWS availability taking account of those restrictions.

3.9 BEIRG raised three concerns relating to the TVWS framework. First, they expressed a concern that Ofcom does not require the height at which WSDs are operating to be taken into account by a database. They also suggested that it would be necessary to record the height of PMSE antennas in the licensing database in order to correctly protect some PMSE operations from WSD.

3.10 Their second concern related to the difference in update times between slave and master devices. They noted that master devices only update every 15 minutes, leaving a long lag time in which there is a threat of interference to PMSE.

3.11 Finally BEIRG expressed a concern about dedicated antennas on mobile devices. They suggested that mobile devices should not include antennas with external connectors as this increases the possibility of users connecting a new antenna with a higher gain.

3.12 With regard to WSD height, we would note that, while it is true that a WSD is not required to supply its height to the database, databases are required to take the

height of WSDs into account. If a WSD does not report its height, the database will use conservative default values for the purpose of calculation of operational parameters[6], i.e. it will use height values that would result in operational parameters that are equal or more restrictive than they would be had the device reported its height. With regard to PMSE antenna height, we agree with BEIRG that this may be desirable. While there is an option in the PMSE licence application form for applicants to specify PMSE transmitter height, it is the PMSE receiver height that is relevant when considering potential WSD-PMSE interference, but PMSE receiver height is not currently captured in the PMSE licensing process[7]. We intend to work with the PMSE licensing team to investigate whether there are practical ways to enable PMSE heights to be appropriately captured in the PMSE licensing process going forward.

3.13 On the issue of the 15 minute update cycle for master devices, we would note that the Regulations do not specify the length of the update time for master devices. Rather Ofcom will set the update time value and communicate this to databases. We explained in our February 2015 Statement that we intend an initial update time value of 15 minutes. We consider that this length of time strikes an appropriate balance between the need to be able to act quickly in the event of interference and limiting the practical burden on databases of maintaining frequent communications with potentially large numbers of devices. We may revisit this value in due course if practical experience suggests this is necessary.

3.14 In relation to dedicated antennas on mobile devices, consistent with the ETSI Harmonised Standard[8], the Regulations do not specifically prohibit WSDs from having external connectors, although they do not allow a mobile device to use a removable antenna which is not a dedicated antenna. This means that end users could potentially choose to fit a removable antenna to a mobile device, but it must have been designed for use and supplied with the specific type of device. Moreover, in order to comply with both the licence exemption and the ETSI Standard the device must not allow the user to alter the settings or configuration of the device in a way that would cause the device to operate in a manner which was not in accordance with the operational parameters provided by the database, which include limits on the maximum power at which a device may transmit on particular channels. This would include the addition of an antenna with a higher gain unless the device automatically takes account of that higher gain in its operation such that it is able to stay within the maximum power limits provided as part of the operational parameters. We therefore do not expect that this will be an issue in practice.

3.15 Three respondents provided brief responses and highlighted some technical queries and suggestions. Dr Rajan Chadha, thought that the Regulations were well drafted but suggested that they should be independent of technology or architecture. Daviscomms UK Ltd did not comment on the drafting of the regulations but suggested two additions to the coexistence rules for the TV White Spaces framework. Runcom used their response to ask whether Ofcom would allow master and slave devices to do channel bonding and channel aggregation.

3.16 In response to Dr Chadha's suggestion, we would note that white space devices are a new technology and this is the first time that Ofcom is authorising dynamic access to spectrum under the control of a database and as such, it has been necessary to be more prescriptive in some areas than is necessary under other more established

[6] See paragraph 5.21 of the February 2015 Statement.
[7] If no height is provided, a default height of 5m will be used - see paragraph A8.8 of the February 2015 Statement
[8] http://www.etsi.org/deliver/etsi_en/301500_301599/301598/01.01.01_60/en_301598v010101p.pdf

authorisation approaches. Notwithstanding this we have sought to make the framework as independent of technology and architecture as possible and where appropriate to do so.

3.17 On the technical suggestions from Daviscomms UK Ltd regarding spurious and out of band emissions, we note that these issues were discussed at length in ETSI and the final positions on these issues is reflected in the ETSI Harmonised Standard. Emission limits and other technical parameters are not directly specified in the Regulations. Rather, the Regulations provide that devices must obtain operational parameters from databases that have been qualified by Ofcom. All such databases must apply detailed technical parameters as set out in a contract between Ofcom and databases which implement the co-existence framework set out in our February 2015 Statement.

3.18 Finally, in response to the query from Runcom, we can confirm that channel bonding and aggregation are permitted under the TVWS framework.

Further Editorial Changes to the Proposed Regulations

3.19 When reviewing the proposed regulations, we considered that it would be helpful for clarity to specify in regulation 4 that white space devices must be Type A equipment or Type B equipment (in addition to being master devices or slave devices). We have therefore now included reference to this requirement in regulation 4(2)(c) and have included definitions of Type A equipment and Type B equipment in regulations 4(5) and 4(6) respectively (although for the avoidance of doubt we have not changed the substance of those definitions).

3.20 We also considered that, in order to distinguish from the operational parameters and channel usage parameters the information about the technical characteristics and location of the white space devices which must be communicated to databases in order to receive operational parameters (which we had termed 'device parameters' in the proposed regulations), it would be clearer to define these instead as the 'master device characteristics' and the 'slave device characteristics'. We have therefore updated the relevant terminology (see in particular regulation 2, regulation 6(3) and regulation 7(6)). We have not, however, altered the substance of those parameters, which remain as set out in the TVWS Statement.

3.21 We have also made some minor changes to the drafting of regulation 5(b) (regulation 6(b) of the proposed regulations) which relates to the requirement that white space devices must be automatically configured in order to satisfy the requirements of the exemption. Specifically, we considered that it would be clearer to express this requirement in terms that a device must be configured in such a way that a user is unable to input, reconfigure or alter any technical or operational settings or features of a device in a way which (i) would alter the technical characteristics of the device which are communicated to a database (this includes the master and slave device parameters – which are now termed the master/slave 'device characteristics' as noted above), or (ii) would cause the device to operate other than in accordance with operational parameters.

3.22 We also realised that regulation 9(4) of the proposed regulations (now regulation 8(4))) erroneously omitted to refer to the fact that a master device should also communicate its unique identifier to the database along with the channel usage parameters of the slave devices which have been communicated to it by slave devices using the generic operational parameters that it has broadcast. Therefore we have updated regulation 8(4) to make reference to that requirement.

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3.23 We have also made some changes to the drafting relating to the simultaneous operation power restriction, which is a restriction which will apply where a device transmits in more than one DTT channel simultaneously if indicated in the operational parameters, as described in regulations 10(i) and 11(h) (regulations 11(h) and 12(g) of the proposed regulations). In the proposed regulations we described the requirements relating to this restriction by way of a formula set out in Schedule 3. We have decided that it is clearer to describe this in a different way and have added a new definition in regulation 6(8) of a "simultaneous operation power restriction" which explains that this restriction requires that a device limits its total maximum EIRP across all of the DTT channels on which it transmits simultaneously to no greater than the lowest permitted maximum EIRP for any of those channels. We have also added new wording in regulations 6(2) and 7(2) which explains that a device must apply this restriction if it operates simultaneously in more than one DTT channel and it is indicated in the operational parameters that the restriction should apply. Consequently we have deleted Schedule 3 as it is no longer needed.

3.24 As noted above, we have also updated Schedule 1 to include reference to those database operators who have successfully completed the qualification process by the required deadline for inclusion in the WSD Regulations.

3.25 When reviewing the proposed regulations following stakeholder comments, we also became aware of a number of other typographical and formatting errors and minor drafting improvements that needed to be made to the WSD Regulations. We have not set out the detail of all of these changes here as we do not believe that they change the substance of the Regulations.

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Section 3

Scope of the Regulations

4.1 This section describes the final scope of the WSD Regulations. On 18 December 2015 Ofcom made the WSD Regulations as proposed, subject to the changes described in section 3 above. The Regulations will come into force on 31 December 2015. They are summarised below.

Extent of application

4.2 The WSD Regulations apply to the United Kingdom and the Isle of Man. They do not extend to the Channel Islands.

Final scope of the regulations

4.3 Regulation 1 sets out the date when the WSD Regulations will come into force.

Exemption

4.4 Regulation 2 sets out the meaning of certain defined terms used in the Proposed Regulations.

4.5 Regulation 3 establishes that the use of equipment compliant with the regulation 4 is exempt from the provisions of section 8(1) of the Wireless Telegraphy Act 2006.

White Space Devices

4.6 Regulation 4 exempts "white space devices" ("WSDs") which are defined as equipment that transmits within the frequency band 470 to 790 MHz and are categorised as either master or slave devices and as either Type A equipment or Type B equipment.

4.7 This regulation also defines:

4.7.1 a master device as a device which is capable of communicating with and obtaining operational parameters from a database for the purpose of transmitting within the frequency band 470 MHz to 790 MHz and operates in accordance with regulations 5 to 12;

4.7.2 a slave device as a device which is capable of transmitting within the frequency band 470 MHz to 790 MHz after receiving slave operational parameters from a master device and operates in accordance with regulations 5 to 12;

4.7.3 Type A equipment as equipment which has an integral antenna[9], a dedicated antenna[10] or an external antenna[11] and is intended for fixed location use only; and

[9] A permanent, fixed antenna forming part of a device
[10] A removable antenna which has been designed for use and supplied with a specific type of device
[11] A removable antenna which is not a dedicated antenna

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4.7.4 Type B equipment as equipment which has a dedicated antenna or an integral antenna and is not intended for fixed location use.

General requirements

4.8 Regulation 5 sets out requirements applicable to all WSDs. These are:

4.8.1 WSDs must not be used airborne;

4.8.2 WSDs must be configured in such a way that a user is unable to input, reconfigure or alter any technical or operational settings or features of a device in a way which (i) would alter the technical characteristics of the device which are communicated to a database (this includes the master and slave device characteristics), or (ii) would cause the device to operate other than in accordance with master operational parameters or slave operational parameters, as applicable. An example of (ii) would be the antenna gain. If this parameter is set to be smaller than the actual gain of the antenna, then the device could radiate at a higher level than the limit communicated by the WSDB.

Master device requirements

4.9 Regulation 6 sets requirements specific to master devices. A master device:

4.9.1 must be able to determine its location;

4.9.2 must provide device parameters (defined now as its 'master device characteristics') to a database, in order to obtain operational parameters from the database. The device parameters include the location and the technical characteristics of the device listed below. The operational parameters indicate to the device the channels and power levels that it can use, together with other constraints. The master operational parameters are specified in regulation 10;

4.9.3 must only transmit in the UHF TV band after requesting and receiving operational parameters from, and in accordance with, operational parameters provided by a database;

4.9.4 must apply the simultaneous operation power restriction (described at paragraph 3.23 above), if it operates on more than one DTT channel simultaneously and the master operational parameters indicate that this restriction applies;

4.9.5 must report back to the database the channels and powers that the WSD intends to use – the channel usage parameters – and operate within those channels and powers.

4.10 In addition, where its operational parameters stop being valid, a master device must tell slave devices that are connected to it to stop transmitting and must stop transmitting itself. The operational parameters stop being valid if:

4.10.1 a database instructs the master device that the parameters are not valid; or

4.10.2 a master device cannot verify, according to the update procedure, that the operational parameters are valid.

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4.11 The update procedure, described in regulation 6(5) requires that a master device contacts, at regular intervals, the database from which it has obtained operational parameters, to verify that those parameters are still valid. The frequency of this contact is determined by the "update period" (defined as the 'update period' in regulation 6(9)), which is one of the master operational parameters, and will initially be set by Ofcom to 15 minutes.

4.12 Regulation 6(3) defines the list of mandatory device parameters. The device may wish to communicate other device parameters that are not in the mandatory list. The mandatory parameters are:

- confirmation that the device is a master device;
- the unique identifier for the device;
- whether the device is Type A or Type B ; and
- the location of the device expressed as the longitude and latitude of its antenna, and the uncertainty in the location of its antenna.

Slave device requirements

4.13 Regulation 7 sets requirements applicable to slave devices only. Slave devices must only transmit according to slave operational parameters received from a master device. These parameters can be of two types, as set out in regulation 7(1)(a)(i) and (ii): generic slave operational parameters, which can be used by any slave in the coverage area of the master, and specific slave operational parameters, which can only be used by the slave device for which they have been requested, based on that slave device's particular device parameters (including the slave device's location and the technical characteristics of the slave device).

4.14 Slave devices must also operate according to channel usage parameters. However, in this case these parameters may be determined by the slave device or by the master device on its behalf. If the former, the slave must communicate its channel usage parameters to the master device from which it has obtained slave operational parameters.

4.15 Slave devices that operate in more than one DTT channel simultaneously must also apply a simultaneous operation power restriction if indicated in the slave operational parameters.

4.16 A slave device must stop transmitting if its operational parameters are no longer valid. This happens if:

4.16.1 the master device from which the slave got parameters tells the slave to stop transmitting according to those parameters, or

4.16.2 the slave device has not received the transmissions from the master device for longer than five seconds.

4.17 There are additional requirements for a slave using generic slave operational parameters: a slave device using generic slave operational parameters must communicate its unique identifier to the master device which has communicated those generic slave operational parameters.

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4.18 There are also additional requirements for a slave using specific slave operational parameters: a slave device using specific slave operational parameters must communicate the required slave device parameters (now defined as ‘slave device characteristics’) to the master device from which it is requesting those operational parameters.

4.19 The required device parameters for a slave device are also defined in regulation 7(6). They are the same as those listed in 4.12 above, except that in this case the device must indicate that it is a slave device.

Further requirements for a master device that supports generic slave operational parameters

4.20 Regulation 8 contains requirements applicable to a master device that provides generic operational parameters for use by slave devices located in its coverage area. The master device must obtain the generic operational parameters from a database, and it must provide its device parameters to the database to do so.

4.21 As noted above, slave devices using generic slave operational parameters must communicate their unique identifiers to the master device that has broadcast those operational parameters. The master device is then required to pass this information on to the database, together with its own unique identifier. In addition, the master device must pass on to the database the channel usage parameters of slave devices (which may be determined by the slave device and communicated to the master device or may be determined by the master device).

Further requirements for a master device that supports specific slave operational parameters

4.22 Regulation 9 contains the requirements applicable to a master device that provides specific slave operational parameters (i.e. operational parameters that the database calculates for a particular slave device, based on the precise location and the technical characteristics of the slave device).

4.23 A master device that provides specific slave operational parameters to a slave device must have obtained those slave operational parameters from a database. In order to do so, it must provide the database with the required device parameters of the slave device (defined as ‘slave device characteristics', together with the master device’s unique identifier.

4.24 Once this has happened, the master device must provide the slave device’s channel usage parameters to the database. These parameters may be determined by the master device itself, or by the slave device.

Operational parameters and channel usage parameters

4.25 Regulations 10 to 12 specify the contents of the master operational parameters, the slave operational parameters, and the channel usage parameters.

4.26 Master operational parameters contain the following information:

i) the DTT channels on which the device may transmit, specified as a list of lower and upper frequency boundaries;

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ii) the maximum EIRP in each channel, specified as two limits: EIRP in dBm/100 kHz (this is defined as the EIRP spectral density) and EIRP in dBm/DTT channel;

iii) maximum number of DTT channels and the maximum number of contiguous DTT channels that the device may use at the same time;

iv) the period of time when and the geographical location where the parameters are valid. Geographic validity is expressed as a range in metres from the location reported by the device;

v) the frequency of the update procedure described in paragraph 4.11; and

vi) whether a simultaneous operation power restriction applies. This is a power restriction that would be applicable when a device operates simultaneously on multiple DTT channels. This restriction may be activated by Ofcom and communicated to the device by the databases as one of the operational parameters. It requires a device to restrict its maximum total EIRP across all of the DTT channels on which it transmits simultaneously to no greater than the lowest maximum permitted EIRP for any of those channels. The value for this parameter will be 1 or 0. If the value is 1, then the restriction applies. If the value is 0 then the restriction does not apply.

4.27 The operational parameters for a slave device contain the same information as the master operational parameters, with the exception of v) above.

4.28 The channel usage parameters contain information about the actual DTT channels and EIRP levels that a device intends to use. As above, channels are specified as a list of lower and upper frequency boundaries, and EIRP levels are specified as two values: one in in dBm/100 kHz and another in dBm/DTT channel.

Schedule 1 and Schedule 2 of the Regulations

4.29 Schedule 1 is the list of the organisations that are qualified by Ofcom to provide services to white space devices.

4.30 The following organisations have undertaken and successfully completed the qualification assessment as required under the contract and are listed in Schedule 1:

- Fairspectrum Oy;
- Nominet UK;
- Sony Europe Limited, and
- Spectrum Bridge Incorporated.

4.31 This means that they have demonstrated to Ofcom's satisfaction that they comply with the technical requirements for a WSDB that provides services to WSDs as set out in the contract.

4.32 As noted in the TVWS Statement, we also intend to publish on our website a machine-readable version of that list on a website (https://tvws-databases.ofcom.org.uk/weblist.xml) hosted by Ofcom so that it can be selected by a WSD through a process known as "database discovery". We would expect that list to

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include those database operators which have informed Ofcom that they are ready to start providing services to white space devices.

4.33 Schedule 2 is the list of DTT channels, and the upper and lower boundaries of each channel.

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Annex 1

Respondents

BEIRG

Dr Rajan Chadha

Daviscomms UK Ltd

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