Dated [2015]

(1) THE OFFICE OF COMMUNICATIONS

- and -

(2) [OPERATOR]

__________________________________________

White Space Database Provider (WSDB) Contract

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SCHEDULE 1 COMMERCIAL SENSITIVE INFORMATION

SCHEDULE 2 RULES FOR CALCULATION OF OPERATIONAL PARAMETERS, DEFAULT VALUES AND FILE FORMATS

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SCHEDULE 6  PROVISION OF WSDB SERVICES TO MCWSDS
THIS CONTRACT is made this day of [2015]

BETWEEN:

(1) The Office of Communications, established by the Office of Communications Act 2002, whose principal office is at Riverside House, 2a Southwark Bridge Road, London, SE1 9HA (“Ofcom”); and

(2) [Insert full legal name of Operator] with registered company number [_______] and with its registered office at [________] (“Operator”)

together the “Parties” and separately a “Party”.

WHEREAS

(A) Ofcom has decided to permit White Space Devices (“WSDs”) to transmit in TV White Spaces pursuant to a regulatory framework that Ofcom has developed, as set out in the Statement “Implementing Access to White Spaces” published on 12 February 2015. Ofcom will aim to make available as much White Space as possible consistent with ensuring a low probability of harmful interference to existing spectrum users.

(B) Pursuant to section 8(1) of the Wireless Telegraphy Act 2006 (the “Act”), it is unlawful to establish or use a wireless telegraphy station or to install or use wireless telegraphy apparatus unless Ofcom has granted a licence or has made regulations exempting from the prohibition in section 8(1) of the Act the establishment, installation and use of a station or apparatus.

(C) Ofcom intends to make regulations under section 8(3) of the Act exempting the establishment, installation or use of WSDs from the need to hold a licence, provided that they comply with the terms, limitations and conditions set out in those regulations (the “Licence Exemption Regulations”). Under the Licence Exemption Regulations, a WSD will be required to discover at least one white space database (“WSDB”) that has been qualified by Ofcom to provide services to WSD users and which is listed in those Regulations (a “Designated WSDB”), to communicate specific information to that WSDB and only to operate subject to the specific information received from that Designated WSDB.

(D) In order to admit a WSDB to the list of Designated WSDBs for the purposes of enabling WSDs to operate, Ofcom must be satisfied that a WSDB provider has demonstrated that the WSDB that it has set up is capable of operating in accordance with the Technical Requirements set out in Clauses 6 to 13 of this Contract. Ofcom intends to qualify all WSDB providers that demonstrate that their WSDBs are capable of such operation within the timeframes set by Ofcom for the relevant qualification process to take place.

(E) On [DATE], Ofcom confirmed to the Operator that it had demonstrated to Ofcom’s satisfaction that it had passed the pre-contract checks that are the checks that must be satisfied in order for a potential WSDB provider to enter into a White Space Database
Provider contract with Ofcom (the “Pre-contract Checks”).

(F) By the terms of this Contract, Ofcom will carry out an assessment of the Operator’s WSDB to determine whether the systems that the Operator has developed to provide WSDB Services are capable of operating in compliance with the Technical Requirements. That assessment will be conducted by reference to the Qualification Assessment.

(G) By the terms of this Contract, in return for the Operator satisfactorily demonstrating that it has met the Qualification Assessment and complying with the Technical Requirements, Ofcom will provide White Space Data to the Operator and will undertake all relevant steps in order to enable the Operator’s WSDB to be added to the list of Designated WSDBs that will appear in the Licence Exemption Regulations and to the Discoverable List of Designated WSDBs on Ofcom’s website (following notification by the Operator that it is ready to start providing WSDB Services and wishes its WSDB to be added to that list- for the avoidance of doubt, the Operator shall not start providing WSDB Services until it has been added to the Discoverable List of Designated WSDBs), after which the Operator will be permitted to start providing WSDB Services. For the avoidance of doubt, however, the inclusion of the Operator’s WSDB in the list of Designated WSDBs in the Licence Exemption Regulations will depend on the completion of the relevant processes which must be undertaken in order for Ofcom to make or amend the Licence Exemption Regulations. Also for the avoidance of doubt, an Operator is under no obligation under the terms of this Contract to commence providing WSDB Services by virtue of the fact that it has successfully completed the Qualification Assessment and has been added to the list of Designated WSDBs in the Licence Exemption Regulations.

The Parties agree as follows:

1. DEFINITIONS AND INTERPRETATION

1.1 In this Contract (except where the context otherwise requires) the following words shall have the following meanings:

“Adverse Event” has the meaning given to it in Clause 14.1;

“Agreed Change Control Note” means a notice of variation capable of being signed by each Party on agreement of any Operator-requested change in accordance with Clause 19.4;

“All Other Operators” means operators of WSDBs other than the Operator who have entered into a White Space Database Provider Contract with Ofcom;

“altitude” means height above sea level;
“Applicable Anti-Bribery Law” has the meaning given to it in Clause 28 (Anti-Bribery and Corruption);

“Associated Persons” has the meaning given to it in Clause 28 (Anti-Bribery and Corruption);

“Cease Transmissions Instruction” has the meaning given to it in Clause 13.17;

“Change Control Note” shall be in the form specified by Ofcom from time to time and notified to the Operator and All Other Operators;

“Change Management Procedure” means the procedure described in Clause 19 (Change Management Procedure);

“Channel Usage Parameters” mean the parameters that are reported by a WSD to inform a WSDB of the radio resources that it intends to use and that are defined in Clause 7.18;

“Commencement Date” has the meaning given to it in Clause 2.1;

“Commercially Sensitive Information” means the information listed in Schedule 1 (Commercially Sensitive Information) comprising the information of a commercially sensitive nature relating to the Operator, its IPR or its business or which the Operator has indicated to Ofcom that, if disclosed by Ofcom, would cause the Operator significant commercial disadvantage or material financial loss;

“Completed Pre-Contract Checks” means the completed and authorised form, titled, “Pre-contract checks for potential WSDB providers”, which completed and authorised form is incorporated into this Contract by reference;

“Confidential Information” in this Contract:-

(a) “Confidential Information” owned by Ofcom shall mean any and all information or materials in whatever form (including all data, results, know-how, show-how, software in source code or object code form, algorithms, mathematical formulae, inventions, designs, trade secrets, plans, forecasts, analyses, evaluations, research,
reports, technical information, operational information, financial information, strategies, contact lists, models, prototypes, semiconductor mask works, database material, diagrams or other information or physical items) disclosed by or on behalf of Ofcom (and whether owned by Ofcom or licensed to or otherwise in the control of Ofcom unless provided to Ofcom by the Operator) to the Operator in connection with TVWS whether before or after the Commencement Date; and

(b) “Confidential Information” owned by the Operator shall mean any and all information or materials in whatever form (including all data, results, know-how, show-how, software in source code or object code form, algorithms, mathematical formulae, inventions, designs, trade secrets, plans, forecasts, analyses, evaluations, research, reports, technical information, operational information, financial information, strategies, contact lists, models, prototypes, semiconductor mask works, database material, diagrams or other information and physical items) disclosed by the Operator (whether owned by the Operator or licensed to or otherwise in the control of the Operator unless provided to the Operator by Ofcom) to Ofcom in connection with TVWS whether before or after the Commencement Date;

“Contract” means this contract and any schedules to it;

“Correction Plan” means a plan to remedy an Adverse Event, whether under Clause 14 (Adverse Events) or otherwise;

“Data Controller” has the meaning set out in the EU Data Protection Directive 95/46/EC;

“Data Protection Legislation” means the EU Data Protection Directive 95/46/EC, the EU Directive on Privacy and Electronic Communications 2002/58/EC (and any equivalent replacement legislation), Commission decisions and guidance and all national implementing legislation, and all other applicable laws and regulations relating to data protection
and privacy in any jurisdiction in which the Operator's obligations are being performed or Personal Data is being processed and any jurisdiction from which the Operator performs any of its obligations under this Contract;

“Default values dataset” has the meaning given to it in Clause 6.7(e);

“Designated WSDB” means a WSDB that has been Qualified by Ofcom to provide WSDB Services and which has been listed in the Licence Exemption Regulations and in the Discoverable List of Designated WSDBs;

“Device Parameters” means the technical characteristics and the location of an individual WSD and includes Master Device Parameters and Slave Device Parameters;

“Digital terrestrial television” or “DTT” means the terrestrial platform for the delivery of TV content via broadcasting in the UHF TV band;

“Discoverable List of Designated WSDBs” means the list of Designated WSDBs that will be hosted on a domain that is under the control of Ofcom and that will be discoverable by WSDs via an internet connection;

“DTT co-existence dataset” has the meaning given to it in Clause 6.7(a);

“EIRP” means equivalent isotropic radiated power;

“Environmental Information Regulations” means the Environmental Information Regulations 2004 together with any guidance and/or codes of practice issued by the Information Commissioner or relevant Government department in relation to such regulations;

“FOIA” the Freedom of Information Act 2000, and any subordinate legislation made under the Act from time to time, together with any guidance and/or codes of practice issued by the Information Commissioner or relevant government department in relation to such legislation;

“Generic Operational Parameters” means the Operational Parameters generated by a WSDB that any Slave WSD within the
coverage area of a given Master WSD may use for its transmissions in the TVWS;

“height” means height above ground level;

“Holding Party” has the meaning given to it in Clause 23.1;

“Intellectual Property Rights” or “IPR” means patents, any extensions of the exclusivity granted in connection with patents, petty patents, utility models, registered designs, trademarks, service marks, applications for any of the foregoing (including continuations, continuations-in-part and divisional applications), the right to apply for any of the foregoing, copyright, design rights, database rights, semi-conductor chip protection, semi-conductor topography rights, rights in trade names, business names, brand names, get-up and logos, (including rights to prevent passing off and unfair competition), rights in domain names and URLs, moral rights, publication rights, rights in know-how, trade secrets and confidential information and all other forms of intellectual property right having equivalent or similar effect to any of the foregoing which may exist anywhere in the world;

“Interference Management Activities” has the meaning given to it in Clause 13.1;

“Interference Management Processes” has the meaning given to it in Clause 13.3;

“Interference Management Team” has the meaning given to it in Clause 13.5;

“Law” means any Act of Parliament or subordinate legislation within the meaning of section 21(1) of the Interpretation Act 1978 and any enforceable European Union legislation;

“Licence Exemption Regulations” means the regulations which Ofcom intends to make under section 8(3) of the Wireless Telegraphy Act 2006 which will exempt the use of White Space Devices from the need to hold a wireless telegraphy licence;

“Location validity (L_{Val})” means the radius of the circle (in metres) that
limits the geographic validity of the Operational Parameters;

"Manually Configurable White Space Device" or "MCWSD" means a White Space Device that allows a user of the Device to input, configure, reconfigure or alter any technical or operational settings or features of the Device in a way which would affect the Device Parameters or any other technical characteristics of the Device which are communicated to a White Space Database, or its operation in accordance with Operational Parameters;

"Master Device Parameters" means the Device Parameters for a Master WSD and shall include the Device Parameters set out in Clause 7.6;

"Master Operational Parameters" means the Operational Parameters that a Master WSD may use for its transmissions in the TVWS;

"Master WSD" means a WSD that is able to communicate with and obtain Operational Parameters from a WSDB;

"MHz" means megahertz;

"Normal Office Hours" means 9am to 5pm UK time on any Working Days;

"NGR" means the National Grid Reference;

"Ofcom Premises" means any land or buildings or premises owned or occupied by Ofcom and such other premises (including premises owned or occupied by a sub-contractor or agent of Ofcom) as Ofcom may communicate to the Operator;

"Ofcom Property" means any items or materials issued or otherwise furnished in connection with this Contract by or on behalf of Ofcom including equipment, samples, patterns, specifications, plans, drawings, or other documents, papers and/or materials;

"Ofcom Purposes" means each and every purpose for which Ofcom was established as amended from time to time to enable Ofcom to carry out additional
“Operational Parameters” means the technical parameters generated by a WSDB that contains the characteristics, such as frequencies and powers, that a specific WSD shall use for its transmissions in the TVWS. The term is also used as an umbrella to cover the Master Operational Parameters, the Slave Operational Parameters, the Generic Operational Parameters and the Specific Operational Parameters;

“Operational Parameters Information System” has the meaning given to in Clause 11.1;

“Operational Parameters Restriction” has the meaning given to it in Clause 13.10;

“Operator Representative” has the meaning given to it in Clause 18.1;

“Owing Party” has the meaning given to it in Clause 23.1;

“Parameters” means Device Parameters, Operational Parameters and Channel Usage Parameters;

“Personal Data” has the meaning set out in the EU Data Protection Directive 95/46/EC;

“Personnel” means all persons employed, contracted or otherwise engaged by the Operator to help it fulfil its obligations under this Contract;

“Pixel” means a 100m x 100m square in the UK or the Isle of Man, using the NGR as a reference;

“Pre-contract Checks” means the checks that must be satisfied in order for a potential WSDB provider to enter into a White Space Database Provider Contract with Ofcom;

“PMSE” means programme making and special events;

“PMSE assignments dataset” has the meaning given to it in Clause 6.7(b);

“PMSE venues dataset” has the meaning given to it in Clause 6.7(c);

“Qualification”, “Qualify”, means Ofcom’s written confirmation that a
WSDB has passed the Qualification Assessment that may, at Ofcom’s sole and absolute discretion, be withheld, delayed or withdrawn;

“Qualification Assessment” mean the qualification assessment process, including various tests, that the Operator must pass in order to qualify to provide WSDB Services;

“Qualification Period” means the time period specified by Ofcom for completing the Qualification Assessment;

“Qualification White Space Data” means the White Space Data that Ofcom will provide to the Operator for the purposes of undertaking the Qualification Assessment;

“Restricted WSD List” has the meaning given in Clause 13.23;

“Self-declaration Statement” means the statement in the form specified by Ofcom and signed by a director of the Operator which sets out the information for which self-declaration is required in order to demonstrate compliance with each of the relevant Technical Requirements in accordance with Clause 5 (Qualification);

“Shared Data” has the meaning given to it in Clause 24.4;

“Slave Device Parameters” means the Device Parameters for a Slave WSD and shall include the Device Parameters set out in Clause 7.7;

“Slave WSD” means a WSD that is only able to transmit when under the direction of a Master WSD;

“Specific Operational Parameters” means the Operational Parameters generated by a WSDB that are specific to a particular Slave WSD;

“spectral density” means power versus frequency and, when integrated across a given bandwidth, the function represents the mean power in such a bandwidth;

“Stored Data” has the meaning given to it in Clause 10.1;

“Technical Requirements” means the requirements imposed by Ofcom on the Operator regarding the functional and technical operation of its WSDB set out in
“Time validity” means the time period during which the Operational Parameters returned from the WSDB are valid;

“Time validity end” or “T_{ValEnd}” means the time when the Operational Parameters stop being valid;

“Time validity start” or “T_{ValStart}” means the time when the Operational Parameters start being valid;

“Type A WSD” means a WSD intended for fixed use only and which may have an integral, dedicated or external antenna;

“Type B WSD” means a WSD not intended for fixed use and which has an integral antenna or a dedicated antenna;

“TV White Spaces” or “TVWS” means unused frequencies within the UHF TV band;

“Update Timer” or “T_{update}” means the timer that indicates the time period (in seconds) within which and frequency with which the Master WSD shall check with the WSDB that the Operational Parameters are still valid; the value for T_{update} will be specified by Ofcom from time to time;

“UHF TV band” means the frequency band 470-790 MHz (DTT channels 21-60);

“URL” means uniform resource locator and is also known as a web address;

“White Space Algorithms and Methodologies” has the meaning given in Clause 6.6;

“White Space Data” has the meaning given in Clause 6.7;

“White Space Device” or “WSD” means a wireless telegraphy station or wireless telegraphy apparatus which is able to operate in TV White Spaces;
“White Space Database” or “WSDB” means a database system which can provide WSDB Services to WSDs;

“White Space Devices Information System” has the meaning given to it in Clause 12 (White Space Devices Information System);

“White Spaces Information Platform” or “WSIP” means the information systems which the Operator shall be required to make available to Ofcom in accordance with Clauses 11, 12 and 13 and as further described in Schedule 4;

“White Space Use Data” has the meaning given to it in Clause 12.1;

“Working Day” means any day (other than a Saturday or Sunday) on which banks in London are open for business;

“WSDB Services” means the provision of Operational Parameters in response to requests for them from WSDs in accordance with contractual arrangements between the Operator and its commercial counterparties for access to its WSDB by WSDs.

1.2 The interpretation and construction of this Contract shall be subject to the following provisions:

(a) the headings in this Contract are for ease of reference only and shall not affect the interpretation or construction of the Contract;

(b) a reference to any statute, enactment, order, regulation or similar instrument shall be construed as a reference to the statute, enactment, order, regulation or instrument as subsequently amended or re-enacted;

(c) references to “person”, where the context allows, includes an individual, firm, company corporation or an unincorporated association;

(d) any phrase introduced by the terms “including”, “include”, “in particular” or any similar expression shall be construed as illustrative and shall not limit the sense of the words preceding those terms;

(e) any reference to a Clause or Schedule is to the relevant clause or schedule of this Contract;

(f) a reference to writing does not include email (unless expressly specified); and

(g) if a period of time is specified from a given day, or the day of an act or event, it shall be calculated exclusive of that day and if a Party must do something on a given day, it must do it by 5.00pm on that day (unless expressly stated
otherwise) otherwise it will be treated as not having done it on that day. A reference to a time of day is a reference to London time.

1.3 If there is any conflict between the clauses and schedules and/or any appendices to the schedules and/or any other documents referred in this Contract, the conflict shall be resolved in accordance with the following order of precedence:

(a) the clauses of this Contract;

(b) the Schedules to this Contract; and

(c) any other document referred to in this Contract or any other document attached to this Contract.

2. TERM

2.1 This Contract shall commence on the date of the last signature (the “Commencement Date”) and shall continue unless it is terminated in accordance with the terms of this Contract.

3. WSDB PRINCIPLES

3.1 Subject to Clause 4.1, the Operator shall provide WSDB Services in accordance with the WSDB principles set out below.

3.2 The WSDB principles are that:

(a) the Operator has, and has committed, sufficient resources to provide WSDB Services;

(b) the Operator shall work pro-actively with Ofcom to address any harmful interference in, or in the vicinity of, any locations in which it is serving WSDs, where necessary on an urgent basis; and

(c) the Operator recognises Ofcom’s spectrum management duties and that the requirements imposed on it in this Contract represent an important means by which Ofcom is able to give effect to its spectrum management duties and acknowledges that, to that end, it may be necessary for Ofcom to make changes to the Contract (that will also apply to all Contracts with All Other Operators) in accordance with the Change Management Procedure, where Ofcom considers this to be appropriate for the purposes of its functions and duties with respect to the management of spectrum.

3.3 However, for the avoidance of doubt, an Operator is under no obligation under the terms of this Contract to commence providing WSDB Services by virtue of the fact that it has successfully completed the Qualification Assessment and has been added to the list of Designated WSDBs in the Licence Exemption Regulations and the Discoverable List of Designated WSDBs pursuant to Clause 4.1.
4. **PROVISION OF WSDB SERVICES**

4.1 The Operator shall not be entitled to and shall not provide any WSDB Services unless and until it has been notified by Ofcom in writing that:

(a) its WSDB has passed the Qualification Assessment in accordance with Clause 5 (Qualification);

(b) Ofcom has completed the relevant legal, regulatory and other processes which must be undertaken in order for Ofcom to make or amend the Licence Exemption Regulations, the Operator's WSDB has been included in the list of Designated WSDBs in the Licence Exemption Regulations and the Licence Exemption Regulations (or amendments to those Regulations) have come into force; and

(c) the Operator's WSDB has been listed in the Discoverable List of Designated WSDBs.

4.2 A breach of the obligation in Clause 4.1 may, at Ofcom's sole and absolute discretion, result in termination of this Contract on notice by Ofcom with immediate effect.

4.3 In exercising its discretion pursuant to Clause 4.2, Ofcom shall, where it appears to Ofcom to be reasonably practicable, give notice to the Operator specifying that it considers the Operator to be in breach of Clause 4.1 and that it proposes to terminate the Contract in accordance with Clause 4.2; and shall allow the Operator to provide Ofcom with comments on the proposed termination within no more than two (2) Working Days of receipt of such a notice or such other period as Ofcom may consider justified which Ofcom notifies to the Operator. Ofcom undertakes to consider such comments in deciding whether to proceed to terminate the Contract by notice in accordance with Clause 4.2.

4.4 The Operator acknowledges that all White Space Database Contracts with Ofcom shall be on the same terms (save for Operator-specific details). The Qualifying by Ofcom of the Operator to be eligible to receive and use White Space Data and White Space Algorithms and Methodologies and to enable the provision of the WSDB Services is not exclusive to the Operator and nothing in this Contract shall confer on the Operator any exclusive right to receive or use White Space Data and White Space Algorithms and Methodologies or to provide WSDB Services or any other services. Ofcom may itself carry out services that are the same as or similar to all or any part of the WSDB Services, or provide to any one or more third parties the White Space Data and White Space Algorithms and Methodologies.

4.5 The Operator:

(a) shall take all steps necessary to put itself in a position to be able fully and properly to provide the WSDB Services, including having in place appropriate contractual arrangements for access to its WSDB by WSDs to facilitate the operation of WSDs lawfully and in accordance with the provisions of this Contract; and
acknowledges that it is a matter for the Operator to ensure the accuracy, quality, performance, fitness for purpose and functionality of its WSDB and the WSDB Services that it provides, including in any arrangements for access to its WSDB by WSDs.

4.6 The Operator shall perform its obligations under this Contract at all times:

(a) in compliance with all applicable Laws, guidance and consents, including but not limited to Data Protection Legislation, and so as not to prejudice renewal of any consents or put Ofcom in breach of any Law, guidance or consents;

(b) in accordance with the relevant Technical Requirements set out in Clauses 6 to 13;

(c) so as not to bring Ofcom into disrepute or damage Ofcom's operations, standing, public image, reputation or goodwill and so as not to attract adverse publicity to Ofcom; and

(d) where, in relation to a matter, there is no express obligation or standard imposed on the Operator under this Contract, and insofar as to do so does not conflict with any express provision of this Contract, with all due skill, care and diligence.

4.7 The Operator shall be solely responsible for performing its obligations under this Contract. No requirement to liaise or otherwise communicate between the Parties or between the Operator and any third party (including any of its agents), and no act or omission of Ofcom or any of its employees, sub-contractors, or agents, shall release the Operator from having to perform those obligations.

4.8 Notwithstanding that Ofcom may Qualify something under or in connection with this Contract, the Operator shall be responsible at all times for ensuring that its WSDB, facilities and systems are suitable for the delivery of the WSDB Services and for ensuring that the WSDB Services are provided in accordance with this Contract. No rights of estoppel or waiver will arise as a result of Ofcom Qualifying anything under or in connection with this Contract.

4.9 Schedule 6 applies where an Operator provides WSDB Services to Manually Configurable White Space Devices. For the avoidance of doubt, the Operator is not entitled to provide WSDB Services to Manually Configurable White Space Devices unless and until it has been Qualified by Ofcom to provide WSDB Services to Manually Configurable White Space Devices in accordance with Schedule 6.

5. QUALIFICATION

5.1 The Operator shall undertake and complete the Qualification Assessment within the Qualification Period. However, in accordance with Clause 5.9, Ofcom may, at its sole and absolute discretion extend the Qualification Period or grant the Operator permission to undertake the Qualification Assessment within a further Qualification Period which Ofcom notifies the Operator and All Other Operators shall take place at a
5.2 For the purposes of the Qualification Assessment, Ofcom shall provide to the Operator at no charge:

(a) Qualification White Space Data; and

(b) at Ofcom’s discretion, additional datasets and reference materials for the purposes of the Qualification Assessment on such terms as shall be notified to the Operator by Ofcom from time to time.

Accordingly, Ofcom hereby grants to the Operator a licence to use the Qualification White Space Data in accordance with and subject to Clauses 6.1 to 6.5 inclusive (for these purposes Qualification White Space Data shall be treated in the same way as White Space Data) and the White Space Algorithms and Methodologies and any such data, licensee data, manuals, guidance, algorithms, calculations, calculation methodologies, instructions, procedures and any updates to any of these that Ofcom may decide to provide to the Operator for the purposes of the Qualification Assessment, except that the Operator shall only be licensed to use the Qualification White Space Data and the White Space Algorithms and Methodologies for the purposes of the Qualification Assessment or research and development purposes or other activities in preparation for providing WSDB Services, including the publication of Operational Parameters or alternative presentation of TV White Space availability in accordance with Clause 8, but not for the purposes of providing WSDB Services as part of its commercial operation. For the avoidance of doubt, and subject only to Clause 23 (Confidentiality), the Qualification White Space Data and reference materials referred to in this Clause 5.2 are Ofcom’s Confidential Information.

5.3 For the purposes of the Qualification Assessment, the Operator shall at no charge to Ofcom:

(a) complete and provide to Ofcom a Self-declaration Statement in the form which Ofcom will specify following the Commencement Date to verify compliance with specific Technical Requirements;

(b) run a set of test cases which will be specified by Ofcom and which are designed to verify compliance with specific Technical Requirements using the Qualification White Space Data and the White Space Algorithms and Methodologies (the “Offline Tests”), and provide to Ofcom the output of the Offline Tests;

(c) allow Ofcom, or a third party authorised to act on behalf of Ofcom, to access its WSDB interfaces listed at Clause 5.3(d) below, and provide to Ofcom or the third party all reasonable co-operation and information as may be requested by Ofcom, in order for Ofcom to conduct tests to verify compliance with specific Technical Requirements (the “Simulated Tests”), which will require the Operator:
i. to use the Qualification White Space Data and the White Space Algorithms and Methodologies to provide WSDB Services to a WSD or virtual WSD (which shall be made available to Ofcom in accordance with Clause 5.3(d)); and

ii. to carry out Interference Management Activities in accordance with Clause 13;

(d) make available to Ofcom:

i. a White Space Device or a virtual White Space Device which can access the Operator’s White Space Database using the same protocols as those which will be used by the WSDs to which the Operator would provide WSDB Services following Qualification;

ii. the Operational Parameters Information System (as described in Clause 11 and Schedule 4);

iii. the White Space Devices Information System (as described in Clause 12 and Schedule 4);

iv. the interface for Operational Parameters Restriction requests (as described in Clause 13.15 and Schedule 4);

v. the interface for Cease Transmissions Instruction requests (as described in Clause 13.21 and Schedule 4);

vi. the Restricted WSD List interface (as described in Clause 13.25 and Schedule 4);

vii. the interface for requests for the removal of restrictions on WSDs (as described in Clause 13.28 and Schedule 4); and

viii. the interface for querying the White Space Data files implemented by a WSDB (as described in Clause 13.31 and Schedule 4).

5.4 The Operator shall demonstrate to Ofcom that it has satisfied the Qualification Assessment:

(a) in the case of the Technical Requirements for which a Self-declaration Statement is required, by providing a statement in the form specified by Ofcom and signed by a Director in relation to each Technical Requirement for which a self-declaration is required;

(b) in the case of the Technical Requirements which will be tested by reference to the Offline Tests, by providing the WSDB’s output having run the test cases; and

(c) in the case of the Technical Requirements which will be tested by reference to the Simulated Tests:

i. by using the Qualification White Space Data and the White Space Algorithms and Methodologies to provide WSDB Services to a WSD or
virtual WSD (which shall be made available to Ofcom in accordance with Clause 5.3(d)(i)) in accordance with Ofcom’s instructions; and

ii. by carrying out Interference Management Activities as required by Ofcom in accordance with Clause 13.

5.5 Where the Operator has demonstrated to the reasonable satisfaction of Ofcom that it has passed the Qualification Assessment within the Qualification Period, Ofcom shall:

(a) notify the Operator that it has passed the Qualification Assessment;

(b) take all relevant steps in order to enable the Operator’s WSD to be added to the list of Designated WSDBs that will appear in the Licence Exemption Regulations. For the avoidance of doubt, however, the inclusion of the Operator’s WSD in the list of Designated WSDBs in the Licence Exemption Regulations will depend on the completion of the relevant processes which must be undertaken in order for Ofcom to make or amend the Licence Exemption Regulations;

(c) after the Operator’s WSD has been added to the list of Designated WSDBs that will appear in the Licence Exemption Regulations, and following notification by the Operator that it is ready to start providing WSD Services and wishes its WSD to be added to the Discoverable List of Designated WSDBs, take the necessary steps to add the URL for the Operator’s WSD to that list; and

(d) provide to the Operator the White Space Data in accordance with Clause 6.10.

5.6 The Parties acknowledge that the Qualification Assessment may be an iterative process and that Ofcom may ask the Operator to provide further information or clarifications as part of demonstrating that it satisfies the Qualification Assessment for the purposes of Clause 5.4. For the avoidance of doubt, such requests for further information or clarifications shall not constitute a re-run of the Qualification Assessment within the meaning of Clause 5.7.

5.7 Where, following completion of the Qualification Assessment, the Operator has not demonstrated to the reasonable satisfaction of Ofcom that it has passed any elements of the Qualification Assessment, Ofcom may, in its sole and absolute discretion:

(a) give the Operator a specified period of time in which to make specified corrections; and

(b) at the end of the specified period of time for making the specified corrections, repeat some or all of the Qualification Assessment.

5.8 Where Ofcom agrees to repeat some or all of the Qualification Assessment in accordance with Clause 5.7(b), it shall specify:
SUBJECT TO CONTRACT – NOT COMPLETE

(a) which of the steps specified in Clauses 5.3 and 5.4 the Operator shall undertake; and

(b) the deadline for undertaking those steps.

5.9 Where the Operator has not successfully completed the Qualification Assessment within the Qualification Period, Ofcom may, in its sole and absolute discretion:

(a) extend the Qualification Period; or

(b) grant the Operator permission to undertake the Qualification Assessment within a further Qualification Period which Ofcom notifies the Operator and All Other Operators shall take place at a later date; or

(c) terminate this Contract on notice to the Operator with immediate effect.

6. USE OF WHITE SPACE ALGORITHMS AND METHODOLOGIES AND WHITE SPACE DATA

Licence

6.1 Ofcom hereby grants the Operator, for the duration of this Contract only, a non-exclusive, non-assignable, revocable and royalty-free licence (but with no right to sub-license) to use, for the purposes of providing WSDB Services, the White Space Data and the White Space Algorithms and Methodologies and any such data, licensee data, manuals, guidance, algorithms, calculations, calculation methodologies, instructions, procedures and any updates to any of these that Ofcom may decide to provide to the Operator for the purposes of providing WSDB Services and any activities in preparation for providing WSDB Services or ancillary services or activities (including research and development) relating to the provision of WSDB Services, including the publication of Operational Parameters or alternative presentation of TV White Space availability in accordance with Clause 8. For the avoidance of doubt, and subject only to Clause 23 (Confidentiality), the White Space Data referred to in Clause 6.7 and other data referred to in this Clause 6 are Ofcom’s Confidential Information.

6.2 To the maximum extent permissible under law, the Operator shall not, and shall ensure that any person to whom it is permitted to disclose White Space Data in accordance with this Contract shall not, reverse engineer, decompile or disassemble the White Space Data or each of the White Space Data referred to in Clause 6.7.

6.3 The White Space Data and White Space Algorithms and Methodologies are not error or defect free or free of viruses and they are made available by Ofcom and accepted by the Operator on an “as is” basis, without Ofcom giving any warranty of any kind, and all warranties, conditions, terms and undertakings, express or implied, statutory or otherwise, in respect of the White Space Data and White Space Algorithms and Methodologies and any Intellectual Property Rights in or in relation to the White Space Data and White Space Algorithms and Methodologies are hereby excluded so far as permitted by law. Further, Ofcom notes and the Operator acknowledges that:
(a) White Space Data and White Space Algorithms and Methodologies are also obtained, to a greater or lesser extent, from underlying spectrum planning models and methods, which are necessarily based on assumptions developed to reflect the purposes of the planning tool or tools being used, and which may be inaccurate or otherwise inadequate in real conditions or for a different or adapted purpose; and

(b) in order to provide WSDB Services, the Operator will need to have in place, or to the extent that they do not have in place to obtain, licences from third parties in addition to the licence granted under Clause 6.1; and that Ofcom has informed the Operator of some types of third party licences that may be relevant to the proper utilisation of the White Space Data and White Space Algorithms and Methodologies.

6.4 The Operator shall use the White Space Data and White Space Algorithms and Methodologies without modification (except for the avoidance of doubt where modification is permitted as part of the calculation of Operational Parameters in accordance with this Contract).

6.5 Where required by a notice from Ofcom, the Operator will irrevocably destroy the White Space Data that it has received from Ofcom within the period of time specified by Ofcom for these purposes. Where the Operator cannot reasonably destroy the White Space Data within the period of time specified by Ofcom, it shall destroy the White Space Data within such other period of time as shall be agreed between the Parties acting reasonably, which period shall in any event be no longer than one (1) month. Where it is not possible to destroy specific White Space Data, the Operator undertakes to cease to use the specific White Space Data after the date specified by Ofcom for these purposes. The Operator will provide a certificate signed by a Director to confirm that it has destroyed the White Space Data or, where it is not possible to destroy the data, that it will cease to use the data following the specified date.

6.6 The White Space Algorithms and Methodologies are the algorithms and methodologies specified by Ofcom in Schedule 2 that the Operator is obliged to use for the purposes of providing WSDB Services.

6.7 The White Space Data are:

(a) the dataset which provides the maximum EIRP in a 8 MHz channel at which a WSD can radiate in order to ensure a low probability of harmful interference to DTT and other services with the exception of location-specific PMSE which will be provided for each combination of the following:

i. each Pixel in the geographic area for which Ofcom is providing data;

ii. each 8 MHz DTT channel available for WSDs;

iii. each WSD emission class, as defined in the WSD specification ETSI EN 301 598;
iv. the following heights H above ground level: 1.5, 5, 10, 15, 20 or 30 metres and D height

(together the “DTT co-existence dataset”), the format of which is set out in Section 9 of Schedule 2;

(b) data on PMSE use of the UHF TV band which will contain all the PMSE assignments active at the time that the dataset is generated and all the assignments that will become active in the next 96 hours (the “PMSE assignments dataset”), the format of which is set out in Section 9 of Schedule 2;

(c) data on PMSE venues (the “PMSE venues dataset”) which will contain information about the physical shape of PMSE venues, the format of which is set out in Section 9 of Schedule 2;

(d) unscheduled adjustments to the maximum power at which WSDs can operate (the “unscheduled adjustments dataset”), the format of which is set out in Section 9 of Schedule 2; and

(e) data on the default values to be used in the White Space Algorithms and Methodologies (the “default values dataset”), the format of which is set out in Section 9 of Schedule 2.

6.8 The Operator accepts that Ofcom may be unable to provide or may cease to provide White Space Data to the Operator for any reason, including:

(a) in the event that Ofcom identifies a problem with the White Space Data such as that all or part of the White Space Data are found to be inaccurate; or

(b) to the extent that the provision of White Space Data is dependent on third party inputs and such third party inputs are not available to Ofcom; or

(c) if Ofcom becomes aware of any claim or potential claim that the use of the White Space Data may infringe third party Intellectual Property Rights or be in breach of any duty of confidence or contractual obligation.

6.9 Where Ofcom is unable to provide or has ceased to provide any White Space Data for whatever reason, Ofcom shall inform the Operator whether, and if so, when the White Space Data are or are likely to be made available.

Delivery of White Space Data and updates

6.10 Following successful completion of the Qualification Assessment by the Operator, Ofcom shall make available the initial DTT co-existence dataset, the initial PMSE assignments dataset, the initial PMSE venues dataset and the initial default values dataset using the delivery method specified in Schedule 3.

6.11 Ofcom shall deliver updates to the White Space Data as follows:
(a) updates to the whole or part of the DTT co-existence dataset may be made available by Ofcom from time to time;
(b) updates to the PMSE venues dataset, default values dataset, or in the form of an unscheduled adjustments dataset, may be made available by Ofcom from time to time; and
(c) updates to the PMSE assignments dataset shall be made available at 5 minute intervals,

in each case using the delivery methods specified in Schedule 3.

Validity of White Space Data

6.12 The Operator shall only be permitted to use the White Space Data to calculate Operational Parameters if the White Space Data are valid. For the purpose of this Clause 6.12, subject to Clauses 6.15 and 6.16 below, White Space Data is valid if it constitutes the most recent version made available by Ofcom of the DTT co-existence dataset, PMSE assignments dataset, PMSE venues dataset, default values dataset and unscheduled adjustments dataset, including any updates to the relevant dataset(s) which the Operator must incorporate within the time limits set out in Clause 6.13. For the avoidance of doubt, once an update is made available by Ofcom, the current version of the relevant dataset remains valid up until the expiry of the time period for implementing the update as set out in Clause 6.13.

6.13 The Operator shall ensure that its WSDB takes account of any updates to the White Space Data that Ofcom makes available in its calculations of Operational Parameters:

(a) no later than 4 minutes after Ofcom has made available an update to the PMSE assignments dataset;
(b) at the time and date specified by Ofcom when delivering an update to the DTT co-existence dataset;
(c) no later than 15 minutes after Ofcom has made available an update to the PMSE venues data;
(d) no later than 15 minutes after Ofcom has made available an update to the default values dataset; and
(e) no later than 15 minutes after Ofcom has made available an unscheduled adjustments dataset.

6.14 Within $T_{\text{Update}}$ of the Operator’s WSDB having incorporated any update to the White Space Data in accordance with Clause 6.13, the Operator shall ensure that its WSDB:

(a) communicates to any active WSD that is operating on the basis of Operational Parameters that were calculated prior to that update and that are no longer valid as a result of that update a requirement for that WSD to cease transmitting on the basis of those Operational Parameters; and
(b) responds to any request for Operational Parameters from a WSD that has ceased transmissions pursuant to Clause 6.14(a) that the Operator is willing or able to meet by providing a set of Operational Parameters that have been calculated taking into account that update.

6.15 Clause 6.16 shall apply in the event that:

(a) the Operator becomes aware that there appear to be errors in any part of or any update to the DTT co-existence dataset, the PMSE assignments dataset, the PMSE venues dataset, default values dataset or an unscheduled adjustments dataset;

(b) the Operator becomes aware that it has received an update to the DTT co-existence dataset, PMSE assignments dataset, PMSE venues dataset, default values dataset or an unscheduled adjustments dataset that is contained in a file whose integrity cannot be confirmed; or

(c) the Operator has been unable, or becomes aware that it is potentially going to be unable, to download or implement an update to the DTT co-existence dataset, the PMSE assignments dataset, the PMSE venues dataset, default values dataset or an unscheduled adjustments dataset in accordance with Clause 6.13 due to circumstances beyond its reasonable control, including, without limitation, due to network latency or unavailability of Ofcom’s server.

6.16 In the circumstances set out in Clause 6.15 above, the Operator:

(a) shall inform Ofcom as soon as possible of the circumstances arising under Clause 6.15;

(b) shall use all reasonable endeavours to mitigate the effect of the circumstances arising under Clause 6.15 on the performance of its obligations under the Contract, including, where appropriate, by continuing to seek to download and/or implement the relevant update;

(c) is entitled to treat the most recent previous version of the relevant dataset or update to that dataset made available by Ofcom as valid unless and until it receives further instruction from Ofcom or until a further update to the dataset is made available in accordance with Clause 6.11, in which case the Operator shall implement that update in accordance with Clause 6.13; and

(d) shall comply with any instructions given by Ofcom.

7. CALCULATION AND PROVISION OF OPERATIONAL PARAMETERS TO WSDS

7.1 The Operator shall ensure that its WSDB calculates Operational Parameters correctly in accordance with the White Space Algorithms and Methodologies.

7.2 The Operator may when providing WSDB Services in accordance with Clause 4.1 provide Operational Parameters in response to a valid request from a WSD, but it is not obliged under the terms of this Contract to meet any given request for Operational
Parameters. For the purposes of this Clause 7.2, a valid request is a request which meets the requirements set out in Clauses 7.4 to 7.9 below.

7.3 If the Operator is not willing to meet a request for Operational Parameters from a WSD, it shall respond to the request with a message indicating that the request will not be met. For the avoidance of doubt, the Operator is not required to respond with a message indicating that a request for Operational Parameters shall not be met if it considers that the request is not a genuine request for Operational Parameters from a WSD.

7.4 The Operator shall ensure that its WSDB does not provide Operational Parameters in response to a request from a WSD for a location in a geographic area which does not fall within a Pixel for which Ofcom has provided White Space Data.

7.4A Ofcom may inform the Operator that a specified WSD, specified WSDs or a specified model of WSD are Manually Configurable White Space Devices. In such a case, the Operator must ensure that its WSDB only provides Operational Parameters to the specified WSD(s), or to WSDs which are of the model identified by Ofcom, in accordance with Schedule 6. For the avoidance of doubt, if the Operator has not been Qualified by Ofcom to provide WSDB Services to Manually Configurable White Space Devices in accordance with Schedule 6, the Operator must ensure that its WSDB does not provide Operational Parameters in response to a request from the specified WSD(s) or to WSDs which are of the model identified by Ofcom.

7.5 The Operator shall ensure that its WSDB does not provide any Master Operational Parameters or Specific Operational Parameters to a WSD unless it has received:

(a) a complete set of Master Device Parameters for the purposes of calculating Master Operational Parameters; or

(b) a complete set of Slave Device Parameters for the purposes of calculating Specific Operational Parameters, as well as the unique device identifier of the serving Master WSD.

7.6 For the purposes of Clause 7.5, the Operator’s WSDB shall only treat a set of Master Device Parameters as being complete if it includes:

(a) The following mandatory values:

i. Antenna horizontal location, i.e. longitude and latitude coordinates of the Master WSD antenna;

ii. Uncertainty in the antenna horizontal location corresponding to a confidence level of ninety-five per cent or higher;

iii. Device type, i.e. Type A or Type B;

iv. Device category, i.e. Master WSD in this case; and

v. Unique device identifier of the Master WSD; and
(b) The following values which will be provided by the WSD or, in the event that the WSD does not provide the values, the Operator shall ensure that its WSDB uses the default values included in the default values dataset:

i. Technology identifier;

ii. Device emission class; and

iii. Master WSD antenna height and uncertainty in antenna height or Master WSD antenna altitude and uncertainty in antenna altitude.

7.7 For the purposes of Clause 7.5, the Operator shall ensure that its WSDB only treats a set of Slave Device Parameters as being complete if it includes:

(a) The following mandatory values:

i. Antenna horizontal location, i.e. longitude and latitude coordinates of the Slave WSD antenna;

ii. Uncertainty in the antenna horizontal location of the Slave WSD corresponding to a confidence level of ninety-five per cent or higher;

iii. Device type, i.e. Type A or Type B of the Slave WSD;

iv. Device category, i.e. Slave WSD in this case; and

v. Unique device identifier of the Slave WSD.

(b) The following values which will be provided by the Master WSD serving the Slave WSD or, in the event that the Master WSD does not provide the values on behalf of the Slave WSD, the Operator shall ensure that its WSDB uses the default values included in the default values dataset:

i. Technology identifier of the Slave WSD;

ii. Device emission class of the Slave WSD; and

iii. Slave WSD antenna height and uncertainty in antenna height or Slave WSD antenna altitude and uncertainty in antenna altitude.

7.8 The Operator shall ensure that its WSDB does not provide Generic Operational Parameters to a Master WSD unless it has received the following inputs from the Master WSD requesting the Generic Operational Parameters:

(a) The following mandatory values:

i. The unique device identifier of the Master WSD;

ii. Horizontal antenna location, i.e. longitude and latitude coordinates of the Master WSD antenna;

iii. Uncertainty in the horizontal location of the Master WSD antenna corresponding to a confidence level of ninety-five per cent or higher; and
iv. Device type, i.e. Type A or Type B of the Master WSD; and

(b) The following values which will be provided by the Master WSD or, in the event that the Master WSD does not provide the values, the Operator shall ensure that its WSDB uses the default values included in the default values dataset:

i. Technology identifier of the Master WSD;

ii. Master WSD antenna height and uncertainty in antenna height or Master WSD antenna altitude and uncertainty in antenna altitude; and

iii. Device emission class of the Master WSD.

7.9 Where the Master Device Parameters, the Slave Device Parameters or the inputs provided by the Master WSDs requesting Generic Operational Parameters are incomplete or the Operator identifies an inaccuracy in them, its WSDB shall not process the request for Operational Parameters unless the missing or inaccurate Device Parameters or input are ones for which a default value has been provided in the default values dataset, in which case the Operator may substitute that default value in its calculation of Operational Parameters.

Calculation of Master Operational Parameters

7.10 The Operator shall ensure that its WSDB provides the following Master Operational Parameters in response to any request from a Master WSD that the Operator is willing to meet:

(a) List of available DTT channels;

(b) Maximum permitted in-block EIRP spectral density in each DTT channel;

(c) Maximum permitted in-block EIRP in each DTT channel;

(d) Maximum nominal channel bandwidth;

(e) Maximum total bandwidth;

(f) Time validity start (T_{ValStart});

(g) Time validity end (T_{ValEnd});

(h) Location validity (L_{Val}); and

(i) Update timer (T_{Update}).

7.11 In providing the Master Operational Parameters specified in Clause 7.10, the Operator shall ensure that its WSDB:
(a) calculates Master Operational Parameters (a), (b), (c), (f) and (g) in accordance with the methodology set out in Schedule 2 to this Contract; and

(b) uses the values provided by Ofcom from time to time for Master Operational Parameters (d), (e), (h) and (i),

subject to any Operational Parameters Restrictions required in accordance with Clause 13.10 or any Cease Transmissions Instructions required in accordance with Clause 13.17, which shall take precedence.

Calculation of Generic Operational Parameters for Slave WSDs

7.12 The Operator shall ensure that its WSDB provides the following Generic Operational Parameters in response to any request from a Master WSD on behalf of its Slave WSDs that the Operator is willing to meet:

(a) List of available DTT channels;

(b) Maximum permitted in-block EIRP spectral density in each DTT channel;

(c) Maximum permitted in-block EIRP in each DTT channel;

(d) Maximum nominal channel bandwidth;

(e) Maximum total bandwidth;

(f) Time validity start \((T_{\text{ValidStart}})\); and

(g) Time validity end \((T_{\text{ValidEnd}})\).

7.13 In providing the Generic Operational Parameters specified in Clause 7.12, the Operator shall ensure that its WSDB:

(a) calculates Generic Operational Parameters (a), (b), (c), (f) and (g) in accordance with the methodology set out in Schedule 2 to this Contract; and

(b) uses the values provided by Ofcom from time to time for Generic Operational Parameters (d) and (e),

subject to any Operational Parameters Restrictions on the Master WSD required in accordance with Clause 13.10 or any Cease Transmissions Instructions required in accordance with Clause 13.17, which shall take precedence.

Calculation of Specific Operational Parameters for Slave WSDs

7.14 The Operator shall ensure that its WSDB provides the following Specific Operational Parameters in response to any request from a Master WSD on behalf of its Slave WSDs that the Operator is willing to meet:
(a) List of available DTT channels;
(b) Maximum permitted in-block EIRP spectral density in each DTT channel;
(c) Maximum permitted in-block EIRP in each DTT channel;
(d) Maximum nominal channel bandwidth;
(e) Maximum total bandwidth;
(f) Time validity start ($T_{\text{ValStart}}$);
(g) Time validity end ($T_{\text{ValEnd}}$); and
(h) Location validity ($L_{\text{Val}}$).

7.15 In providing the Specific Operational Parameters specified in Clause 7.14, the Operator shall ensure that its WSDB:

(a) calculates Specific Operational Parameters (a), (b), (c), (f) and (g) in accordance with the methodology set out in Schedule 2 to this Contract; and

(b) uses the values provided by Ofcom from time to time for Specific Operational Parameters (d), (e) and (h), subject to any Operational Parameters Restrictions required in accordance with Clause 13.10 or any Cease Transmissions Instructions required in accordance with Clause 13.17, which shall take precedence.

Verification of Operational Parameters by the Operator

7.16 Where a WSD provides its Channel Usage Parameters to the WSDB, the Operator shall ensure that its WSDB checks that the Channel Usage Parameters do not exceed the corresponding Operational Parameters that the WSDB communicated to the Master WSD. If the Channel Usage Parameters do exceed the corresponding Operational Parameters, the Operator shall ensure that its WSDB communicates an instruction to the relevant WSD or, where a Slave WSD, the Master WSD serving the relevant WSD, to stop transmitting within $T_{\text{Update}}$.

7.17 If a WSD fails to provide its Channel Usage Parameters to the WSDB, the Operator shall ensure that its WSDB communicates an instruction to the relevant WSD or, where a Slave WSD, the Master WSD serving the relevant WSD, to stop transmitting within $T_{\text{Update}}$.

7.18 For the purposes of Clauses 7.16 and 7.17, Channel Usage Parameters are the following:

(a) List of DTT channels within which a WSD intends to transmit;
(b) In-block EIRP spectral density which a WSD intends to use within each DTT channel; and
8. PUBLICATION OF OPERATIONAL PARAMETERS BY THE OPERATOR

8.1 Subject to Clause 8.2, the Operator may publish or otherwise make available through a publicly available website:

(a) the Operational Parameters that the Operator would hypothetically provide to a WSD of a specified type in response to a hypothetical request by that WSD for Operational Parameters in order to transmit at a specified location; or

(b) any alternative presentation of TV White Space availability that is based on the Operational Parameters referred to in Clause 8.1(a), such alternative presentation may include the number of channels at any given power level that a specified type of WSD could hypothetically transmit at in any given location or the percentage of locations at which a certain number of channels are available for the hypothetical transmission by a specified type of WSD at a given power level.

8.2 In publishing or otherwise making available through a publicly available website the Operational Parameters or alternative presentation referred to in Clause 8.1, the Operator shall:

(a) calculate all Operational Parameters in accordance with Clause 7 (Calculation and Provision of Operational Parameters to WSDs) except that the Operator’s WSDB is entitled to:

   i. treat a set of Master Device Parameters as being complete even in the absence of the mandatory value specified in Clause 7.6(a); and

   ii. treat a set of Slave Device Parameters as being complete even in the absence of the mandatory value specified in Clause 7.7(a); and

(b) ensure that all publications of Operational Parameters or such alternative presentations shall be accompanied by a specification of the Device Parameters of the type of WSD to which the Operational Parameters or alternative presentation relates.

9. COMMUNICATIONS BETWEEN WSDBs AND WSDs

9.1 The Operator shall ensure that the communications between its WSDB and the Master WSD for the purpose of exchanging Parameters is through a protocol that provides reliable communications.

9.2 For the purposes of satisfying the requirement for a protocol that provides reliable communications in Clause 9.1, the Operator shall ensure that the protocol that it uses includes the following security features:

(a) Integrity: the messages shall be protected against accidental or malicious changes during transit;
(b) Authentication: the Master WSD shall be able to verify the identity of the Operator and the authenticity of messages it receives;

(c) Privacy: the messages containing location information about any WSD or the unique device identifier of any WSD shall only be readable by the Operator, and not any third party; and

(d) Encryption: the messages shall be encrypted using strong encryption.

10. STORED DATA

10.1 The Operator shall keep a record of the following information for each WSD to which it provides WSDB Services (the “Stored Data”):

(a) the WSD’s Device Parameters, to the extent they are provided by the WSD;

(b) each set of Operational Parameters provided by the WSDB to that WSD;

(c) each set of Channel Usage Parameters provided to the WSDB by the WSD; and

(d) for each Slave WSD, the unique device identifier of the Master WSD serving that Slave WSD.

10.2 The Operator shall keep the Stored Data throughout the period of validity of the set of Operational Parameters (T_{Update}) and, after the validity has expired, for a period of no less than one month.

10.3 The Operator shall comply with any request by Ofcom for provision to it of a copy of any Stored Data.

10.4 The Operator shall implement appropriate security measures to prevent unauthorised access to the Stored Data and unauthorised data input or alteration of the Stored Data.

11. OPERATIONAL PARAMETERS INFORMATION SYSTEM

11.1 The Operator shall make available to Ofcom an information system (the “Operational Parameters Information System”), as described in Schedule 4, that provides Operational Parameters for a simulated WSD, the Device Parameters for which will be input into that system by Ofcom.

11.2 Ofcom may use the Operational Parameters Information System for the purposes of:

(a) the Qualification Assessment of the Operator;

(b) monitoring compliance by the Operator with its obligations under this Contract; and

(c) work undertaken by Ofcom in relation to its spectrum management functions, in particular relating to development of Ofcom’s TV White Spaces regulatory framework.
11.3 Ofcom will inform the Operator of the specifications for the Operational Parameters Information System, the protocol specifications of the form of any request using the Operational Parameters Information System and the form of the acknowledgment of any request from Ofcom.

11.4 The Service Level Arrangements for the availability of the Operational Parameters Information System are as specified in Schedule 5.

11.5 The Operator shall implement appropriate security measures to prevent unauthorised access to the Operational Parameters Information System.

12. WHITE SPACE DEVICES INFORMATION SYSTEM

12.1 The Operator shall make available to Ofcom an information system (the “White Space Devices Information System”) that provides to Ofcom data on the use by WSDs of TV White Spaces in a particular location and for a particular period of time, as described in Schedule 4 (“White Space Use Data”).

12.2 Ofcom may use the White Space Devices Information System and White Space Use Data for the purposes of:

(a) conducting interference management activities, including providing advice and assistance to persons complaining of interference (in particular, but not limited to, carrying out an initial triage of interference management cases);

(b) monitoring compliance by the Operator with its obligations under this Contract; and

(c) work undertaken by Ofcom in connection with Ofcom’s statutory duties and functions, in particular in relation to its spectrum management functions and the development of Ofcom’s TV White Spaces regulatory framework.

12.3 Ofcom will inform the Operator of the specifications for the White Space Devices Information System, the protocol specifications of the form of any request for White Space Use Data using the White Space Devices Information System and the form of the acknowledgment of any request from Ofcom.

12.4 The Service Level Arrangements for the availability of the White Space Devices Information System are as specified in Schedule 5.

12.5 The Operator shall implement appropriate security measures to prevent unauthorised access to the White Space Devices Information System.

13. INTERFERENCE MANAGEMENT

13.1 Where requested by Ofcom, the Operator shall at no charge to Ofcom undertake activities and put in place systems that support Ofcom’s interference management and spectrum management functions, including the activities specified in this Clause 13 (the “Interference Management Activities”). For the avoidance of doubt, with the exception of those activities required in accordance with Clause 5 (Qualification) or
where otherwise expressly required under the Contract, the Operator shall only be required to undertake Interference Management Activities in accordance with this Clause 13 from the date on which it commences providing WSDB Services. Unless the Operator notifies Ofcom otherwise, for the purposes of this Clause 13, the Operator shall be presumed to commence providing WSDB Services from the date on which its WSDB is added to the Discoverable List of Designated WSDBs.

13.2 In respect of the provision of the web services interfaces to be provided as part of the Interference Management Activities outlined in this Clause 13, the Service Level Arrangements for the availability of those systems are as specified in Schedule 5, which shall apply from the date on which the Operator commences providing WSDB Services.

Communications for interference management purposes

13.3 The Operator shall at its own cost and expense comply with the set of processes and protocols to be used when undertaking interference management activities ("Interference Management Processes") which will be provided by Ofcom from time to time.

13.4 The Operator shall use the unique reference number that Ofcom has assigned to the Operator’s WSDB in all communications with Ofcom for interference management purposes by email, phone or otherwise.

13.5 The Operator shall ensure that it shall have in place one or more employees, subcontractors or consultants working for the Operator having appropriate knowledge and experience about the Operator’s WSDB systems to support Ofcom with its interference management and spectrum management functions, and nominated by the Operator as the appropriate point of contact to address any matter raised by Ofcom under Clause 13 (Interference Management) (the “Interference Management Team”). The Operator shall notify Ofcom of the contact details for the Interference Management Team and of any changes to those contact details from time to time.

13.6 The Operator shall ensure that:

(a) at least one member of staff from its Interference Management Team is contactable by Ofcom by telephone and/or by email at all times during Normal Office Hours; and

(b) outside of Normal Office Hours, Ofcom can log a request for information or assistance with the Interference Management Team by telephone and/or by email, although the Parties acknowledge that members of the Interference Management Team may not be immediately contactable outside of Normal Office Hours and that it may not be possible for the Interference Management Team to respond to such a request until Normal Office Hours the following day. However, the Operator shall, on receiving such a request outside of Normal Office Hours, as a minimum, ensure an acknowledgement of receipt of the request is given to Ofcom which indicates the anticipated response time (which may be a standard target response time as agreed with Ofcom).
Information requests relating to Interference Management Activities

13.7 Ofcom may at any time, for the purposes providing advice and assistance to persons complaining of interference (in particular, but not limited to, carrying out an initial triage of interference management cases), request White Space Use Data using the White Space Devices Information System.

13.8 Ofcom may at any time, request that the Operator provides White Space Use Data using the White Space Devices Information System, or information derived from the White Space Use Data in a form to be specified by Ofcom, to third parties active in DTT interference management activities for the purposes of facilitating those third parties in carrying out their interference management activities.

13.9 In addition to requests for White Space Use Data using the White Space Devices Information System, Ofcom may at any time request that the Operator provide information to assist it in the carrying out of its interference management and spectrum management functions. Such requests shall be made to the Interference Management Team except where agreed in advance with the Operator. Except in exceptional circumstances, such requests will be communicated during Normal Office Hours. Where reasonably practicable given the nature and scope of the request, the Interference Management Team shall respond to the request within two Normal Office Hours of the request being made. Where it is not reasonably practicable for the Operator to provide the requested information within two Normal Office Hours of the request being made, the Operator shall notify Ofcom promptly, and in any event within two Normal Office Hours of the request being made, giving details as to why it cannot provide the requested information within the two hour time frame, and the Parties acting reasonably shall agree an appropriate period of time for the Operator to provide the requested information.

Requirements for restrictions to Operational Parameters

13.10 The Operator shall, at Ofcom’s request (which may be made at any time), communicate to a specified WSD or specified WSDs (or in the case of specified Slave WSDs, the Master WSDs serving those Slave WSDs) a restriction to one or more of the Operational Parameters set out in Clause 13.11 under which the relevant WSD(s) may operate (an “Operational Parameters Restriction”).

13.11 An Operational Parameters Restriction may be:

(a) a change to the update timer value ($T_{\text{Update}}$); or

(b) a change to the maximum permitted in-block EIRP spectral density value in any DTT channel; or

(c) a change to the maximum permitted in-block EIRP value in any DTT channel.

13.12 An Operational Parameters Restriction may be applicable (i) for a specified period of time or (ii) until Ofcom gives the Operator an instruction in accordance with Clause 13.27 that the restriction should no longer apply.
13.13 Where Ofcom sends a request for an Operational Parameters Restriction to the Operator in circumstances where the Operator’s WSDB is not currently serving the specified WSD or specified WSDs, the Operator’s WSDB shall ensure that, if the specified WSD or specified WSDs request Operational Parameters from it within the specified period of time, the Operational Parameters that it provides to the specified WSD or WSDs incorporate the Operational Parameters Restriction.

13.14 Subject to Clause 13.13, the Operator shall ensure that its WSDB communicates the Operational Parameters Restriction to the specified WSD or specified WSDs within $T_{\text{Update}}$ of receiving the request from Ofcom.

13.15 The interface system required for dealing with a request for an Operational Parameters Restriction is described at Schedule 4. Ofcom will inform the Operator of the specifications for this interface, the protocol specifications of the form of any request for an Operational Parameters Restriction and the form of the acknowledgment of any request from Ofcom.

13.16 The Operator shall implement appropriate security measures to prevent unauthorised access to the interface for Operational Parameters Restriction requests.

Requirements to cease transmissions

13.17 The Operator shall, at Ofcom’s request (which may be made at any time), communicate to a specified WSD or specified WSDs (or in the case of specified Slave WSDs, the Master WSDs serving those specified Slave WSDs), a requirement for the specified WSD or WSDs to cease transmissions for a specified period of time (a “Cease Transmissions Instruction”).

13.18 A Cease Transmissions Instruction may be applicable for (i) a specified period of time or (ii) until Ofcom gives the Operator an instruction in accordance with Clause 13.27 that the restriction should no longer apply.

13.19 Where Ofcom sends a Cease Transmissions Instruction to the Operator in circumstances where the Operator’s WSDB is not currently serving the specified WSD or specified WSDs, the Operator’s WSDB shall ensure that, if the specified WSD or specified WSDs contact it within the specified period of time, it does not provide it or them with any Operational Parameters.

13.20 Subject to Clause 13.19, the Operator shall ensure that its WSDB communicates the requirement to cease transmissions to the specified WSD or specified WSDs within $T_{\text{Update}}$ of receiving the Cease Transmissions Instruction from Ofcom.

13.21 The interface system required for dealing with a request for a Cease Transmissions Instruction is described at Schedule 4. Ofcom will inform the Operator of the specifications for this interface, the protocol specifications of the form of any request for a Cease Transmissions Instruction and the form of the acknowledgment of any request from Ofcom.

13.22 The Operator shall implement appropriate security measures to prevent unauthorised
access to the interface for Cease Transmission Instruction requests.

**Restricted WSD List**

13.23 The Operator shall maintain a list of all of the specified WSDs for which an Operational Parameters Restriction or a Cease Transmissions Instruction is active to which Ofcom shall have access (the “**Restricted WSD List**”).

13.24 The Operator shall, at Ofcom’s request (which may be made at any time), provide to Ofcom the contents of the Restricted WSD List.

13.25 The interface system required for dealing with a request for a copy of the Restricted WSD List is described at Schedule 4. Ofcom will inform the Operator of the specifications for this interface, the protocol specifications of the form of any request for the Restricted WSD list and the form of the acknowledgment of any request from Ofcom are set out in Schedule 4.

13.26 The Operator shall implement appropriate security measures to prevent unauthorised access to the interface for requests for the Restricted WSD List.

**Removal of restrictions on WSDs**

13.27 The Operator shall, at Ofcom’s request (which may be made at any time), remove an Operational Parameters Restriction or a Cease Transmissions Instruction for a specified WSD or specified WSDs on the Restricted WSD List.

13.28 The interface system required for dealing with a request for the removal of an Operational Parameters Restriction or a Cease Transmissions Instruction is described at Schedule 4. Ofcom will inform the Operator of the specifications for this interface, the protocol specifications of the form of any request and the form of the acknowledgment of any request from Ofcom.

13.29 The Operator shall implement appropriate security measures to prevent unauthorised access to the interface for requests for the removal of restrictions on WSDs.

**Dataset request**

13.30 The Operator shall, at Ofcom’s request (which may be made at any time), provide Ofcom with information of the White Space Data files its WSDB is currently using for the purpose of calculating Operational Parameters. The information will include the file names and the timestamp of when the file was successfully incorporated to the database.

13.31 The interface system required for dealing with a request for a dataset request is described at Schedule 4. Ofcom will inform the Operator of the specifications for this interface, the protocol specifications of the form of a dataset request and the form of the acknowledgment of any request from Ofcom.

13.32 The Operator shall implement appropriate security measures to prevent unauthorised access to the interface for dataset requests.
14. ADVERSE EVENTS

14.1 For the purposes of this Clause 14, an Adverse Event includes:

(a) any matter that could:
   i. cause interference within the meaning of section 115(3) of the Wireless Telegraphy Act 2006, including where it appears likely that a WSD is non-compliant with the Licence Exemption Regulations or any other relevant Laws or regulation;
   ii. adversely affect the performance of this Contract in compliance with any applicable Laws; or
   iii. cause or be likely to cause a failure by the Operator to perform the Contract in accordance with its terms;

(b) any inaccuracy or fault in White Space Data or White Space Algorithms and Methodologies;

(c) any interference caused or likely to be caused by WSDs;

(d) any breach of contract;

(e) the provision by the Operator to Ofcom of information, which the Operator is required to provide in accordance with its obligations under the Contract or which the Operator has provided to Ofcom as part of the Completed Pre-Contract Checks, that is inaccurate or misleading in a material particular;

(f) a material change in connection with the information supplied by the Operator to Ofcom as part of the Completed Pre-Contract Checks;

(g) the theft, loss, unauthorised use, unauthorised copying, unauthorised modification or unauthorised disclosure of any White Space Data, Shared Data or Confidential Information.

14.2 If the Operator believes that there is, will be, or is likely to be an Adverse Event, it shall:

(a) inform Ofcom without delay; and

(b) register the Adverse Event in a log maintained by the Operator, which shall be available for inspection by Ofcom at any time.

14.3 Without prejudice to any other rights or remedies that Ofcom may have under this Contract, or at law or in equity, with effect from the Commencement Date, as soon as Ofcom becomes aware of any Adverse Event, either having been informed by the Operator or otherwise, and at any point thereafter until Ofcom determines that it has been satisfactorily demonstrated that the Adverse Event has been remedied, Ofcom may in its sole and absolute discretion require the Operator to do any one or more of the following which it considers to be appropriate and proportionate in the circumstances:
(a) to undertake any of the Interference Management Activities or comply with any of the instructions specified in Clause 13 (Interference Management);

(b) to respond promptly to any request for information regarding the Adverse Event. Except in exceptional circumstances, such requests will be communicated during Normal Office Hours;

(c) to comply with a Correction Plan;

(d) to undertake any actions required under Clause 5 (Qualification), to undertake any testing which may be required in accordance with Clause 16.1(c) and allow Ofcom or any third party acting on behalf of Ofcom to undertake testing in accordance with Clause 16.1(d);

(e) to allow Ofcom or any third party acting on behalf of Ofcom to undertake an audit in accordance with Clause 16.3; or

(f) to cease providing, with effect from the time specified by Ofcom, some or all WSDB Services to the extent required by Ofcom and, where instructed by Ofcom, to ensure that its WSDB communicates within $T_{\text{Update}}$ to any active WSD that is operating on the basis of Operational Parameters that were calculated prior to the requirement to cease providing some or all WSDB Services a requirement for that WSD to cease transmitting on the basis of those Operational Parameters.

14.4 If Ofcom requires a Correction Plan the Operator shall:

(a) ensure that any Correction Plan identifies the issues arising out of the relevant Adverse Event as well as the steps that the Operator proposes to take to remedy the Adverse Event and to seek to ensure that it does not recur;

(b) implement and comply with each Correction Plan within the time specified in that Plan, where appropriate;

(c) provide updates to Ofcom on its progress in implementing the Correction Plan at appropriate intervals; and

(d) inform Ofcom when it has fully implemented and complied with the Correction Plan.

14.5 Ofcom shall, unless the nature of the Adverse Event is such that doing so is not practicable, consult with the Operator in relation to the steps required to address the Adverse Event in accordance with this Clause 14.

14.6 In the event that Ofcom considers in its sole and absolute discretion that it is appropriate and proportionate to do so in the circumstances, in addition to requiring the Operator to cease providing WSDB Services in accordance with Clause 14.3(f), Ofcom may suspend the Operator’s WSDB from the Discoverable List of Designated WSDBs, and shall inform the Operator of the date on which it has removed its WSDB from that List.
14.7 If Ofcom suspends the Operator from the Discoverable List of Designated WSDBs:

(a) from the date on which the Operator is given notice that its WSDB has been removed from the Discoverable List of Designated WSDBs, the Operator shall not be entitled to provide the WSDB Services unless and until Ofcom reinstates the Operator’s WSDB to the Discoverable List of Designated WSDBs;

(b) Ofcom may require the Operator to comply with a Correction Plan, as part of which Ofcom may require the Operator to complete an amended Qualification process, in which case Clause 5 (Qualification) shall apply to the Operator with any necessary adjustment in such a case; and

(c) if Ofcom determines, in its sole and absolute discretion, that it has been satisfactorily demonstrated that the Adverse Event has been remedied, Ofcom shall reinstate the Operator’s WSDB to the Discoverable List of Designated WSDBs.

14.8 Without prejudice to any other rights or remedies that Ofcom may have under this Contract, or at law or in equity, in the event that (i) Ofcom has required the Operator to implement and comply with a Correction Plan but the Operator has failed to remedy the Adverse Event in accordance with the relevant Correction Plan or (ii) Ofcom considers that the Adverse Event is not capable of remedy, in addition to requiring the Operator to cease providing WSDB Services in accordance with Clause 14.3(f), Ofcom may, at its sole and absolute discretion, where it considers it to be appropriate and proportionate to do so in the circumstances:

(a) terminate this Contract on notice to the Operator with immediate effect; and

(b) remove the Operator’s WSDB from the list of Designated WSDBs included in the Licence Exemption Regulations and the Discoverable List of Designated WSDBs.

14.9 Where Ofcom takes the steps outlined in Clause 14.8, Ofcom shall notify the Operator of the date on which it has removed its WSDB from the list of Designated WSDBs included in the Licence Exemption Regulations and the Discoverable List of Designated WSDBs. From the date on which the Operator is informed that its WSDB has been removed from those Lists, the Operator shall no longer be Qualified and shall not be entitled to provide the WSDB Services.

14.10 Failure by the Operator to cease providing WSDB Services when required in accordance with the provisions of this Clause 14 shall constitute a material breach of the Contract for the purposes of Clause 25 (Termination) and, without prejudice to any other rights, relief or remedy, entitles Ofcom, at its sole and absolute discretion, to terminate this Contract on notice to the Operator with immediate effect.

15. RECORDS AND REPORTING

15.1 The Operator shall keep complete and accurate records of, and supporting
documentation for and in respect of its performance of its obligations under this Contract, which records and documentation it shall ensure are available for a period of six (6) months after termination or expiry of this Contract. However, the records and documentation required to be kept for the purpose of this clause shall not include the Stored Data, which shall be retained in accordance with Clause 10.2.

15.2 The Operator shall be required to provide Ofcom for the purposes of facilitating Ofcom with its spectrum management functions with quarterly reports and annual data returns relating to the provision of the WSDB Services under the terms of this Contract, including such information and in such format as may be reasonably required by Ofcom from time to time.

15.3 Within fifteen (15) Working Days of a request being made by Ofcom, the Operator shall prepare and submit to Ofcom such information relating to the provision of the WSDB Services as Ofcom may reasonably request. If the Operator reasonably believes that it will take longer than fifteen (15) Working Days to respond, it shall inform Ofcom and the Parties shall discuss in good faith a revised deadline for responding to the request.

16. ONGOING COMPLIANCE AND AUDIT

16.1 In order to verify ongoing compliance with the Technical Requirements set out in Clauses 6 to 13, Ofcom may do one or more of the following:

(a) request White Space Use Data using the White Space Devices Information System;

(b) use the Operational Parameters Information System;

(c) at any time request the Operator to run any tests to be specified by Ofcom and to provide Ofcom with the results of those tests; or

(d) require the Operator to allow Ofcom, or a third party authorised to act on behalf of Ofcom, upon reasonable request, to access to its WSDB systems and/or its premises in order for Ofcom or that third party to conduct tests relating to compliance with the Technical Requirements and to provide to Ofcom all reasonable co-operation and information in order to facilitate Ofcom or the third party carrying out those tests.

16.2 The Operator shall notify Ofcom of any material changes it proposes to make to the WSDB where the Operator considers that such change or changes may have an impact on the calculation by the Operator’s WSDB of Operational Parameters and shall, if requested by Ofcom, provide such detail of any change as it considers sufficient to enable Ofcom to determine if any re-testing is appropriate in order to verify whether it is still appropriate for the Operator to be Qualified. If having considered the notification and the information provided, Ofcom considers that re-testing may be appropriate, Ofcom shall notify the Operator accordingly and shall provide in such notification an outline description of those areas that need to be subject to an amended Qualification process, in which case Clause 5 (Qualification) shall apply to the Operator with any necessary adjustment.
16.3 Ofcom, or a third party authorised to act on behalf of Ofcom, may at any time when the Contract is in force and for a period of no more than six (6) months thereafter commence (and subsequently conduct) an audit, where Ofcom considers that it is necessary, reasonable and proportionate to do so in the circumstances, for the following purposes:

(a) to verify the accuracy and completeness of any information provided by the Operator:
   i. as part of the Pre-contract Checks process; or
   ii. a Self-Declaration Statement made by the Operator in accordance with Clause 5.3(a);

(b) to verify the accuracy and completeness of any information delivered or required by this Contract;

(c) to assess the Operator’s compliance with the terms of Clause 24 (Data Protection);

(d) to assess the security measures that the Operator has put in place in accordance with the its obligations under Clauses 9, 10.4, 11.5, 12.5, 13.16, 13.22, 13.26, 13.29, 13.32 and/or 23.4; and

(e) otherwise as required by any regulator or auditor having jurisdiction over Ofcom.

16.4 Ofcom shall ensure that it limits the number of audits conducted to the minimum necessary within any calendar year, the scope of any audit is limited to what it considers to be necessary, reasonable and proportionate to address the issues concerned and shall use its reasonable endeavours to ensure that the conduct of each audit does not unreasonably disrupt the Operator.

16.5 The Operator shall on demand provide Ofcom and any relevant regulatory body (and/or their agents or representatives) with all reasonable co-operation and assistance in relation to each audit, including:

(a) all information requested within the scope of the audit;

(b) reasonable access to any premises controlled by the Operator and to any equipment used and controlled by the Operator (whether exclusively or non-exclusively) in the performance of the WSDB Services; and

(c) access to the Personnel.

16.6 Ofcom shall endeavour to provide as much advance notice as reasonably practicable of its intention to conduct an audit and at least twenty (20) Working Days’ notice of its intention to conduct an audit, but is not obliged to do so where it is not reasonably practicable.
16.7 The Parties agree that they shall bear their own respective costs and expenses incurred in respect of compliance with their obligations under this Clause 16.

17. INTELLECTUAL PROPERTY RIGHTS

17.1 Except as expressly set out in this Contract, nothing in this Contract shall operate to transfer any right, title or interest in or to any Intellectual Property Rights, including any Intellectual Property Rights existing at or prior to the Commencement Date.

17.2 The Operator hereby grants to Ofcom a non-exclusive, irrevocable, transferable, perpetual, royalty-free right and licence to use, adapt, copy, sub-license and otherwise deal with any Stored Data, White Space Use Data and any other data required to be provided by the Operator to Ofcom under or in accordance with this Contract in connection with Ofcom's statutory duties and any development or analysis in connection with TVWS, the use of TVWS, and to exercise its rights and/or perform its obligations under this Contract, with full power in Ofcom's absolute discretion to assign its rights under this Clause 17.2 to Ofcom’s assigns and successors in title and to any department, office, or agency of the Crown. For the avoidance of doubt, such right and licence shall not include any right or licence under any patents owned, controlled or licensable by Operator.

17.3 Except as expressly provided under this Contract, neither Party shall be entitled to use any trade marks, names, logos, or brands of the other Party, including in any literature, documentation, advertising, or publicity material, without the owning Party's prior written consent and subject, in any event, to the Party entering into a licence with the owning Party on terms specified by the owning Party.

18. OPERATOR REPRESENTATIVE

18.1 The Operator shall ensure that during and at all times this Contract is in force it shall have an Operator Representative who shall be one senior and competent member of its staff, having suitable experience and being duly empowered by the Operator, who shall be the Operator’s single point of contact for the overall governance, review and management of this Contract.

18.2 As at the Commencement Date, the Operator Representative and his/her respective contact details are:

[ ]

18.3 The Operator shall notify Ofcom in writing as far in advance as possible of any proposed change to the name or contact details of the Operator Representative.

19. CHANGE MANAGEMENT PROCEDURE

19.1 Save as otherwise expressly provided in this Contract or in this Clause 19, any requirement for a change to this Contract shall be subject to the Change Management Procedure.

19.2 In addition to the process for updates to the White Space Data in Clause 6.11, Ofcom
may at any time make a change to the White Space Algorithms and Methodologies specified in this Contract and to any other provision in this Contract if, at Ofcom’s absolute discretion, this should become necessary. Such changes shall, subject to Clause 19.3, be made in accordance with the following process:

(a) Ofcom shall give as much notice as it considers reasonably possible to the Operator and to All Other Operators of any proposed change and which it considers to be appropriate and proportionate in light of the nature and scope of the proposed change;

(b) The Operator shall, within no more than two (2) Working Days of receipt of such a notice or such other period as Ofcom may consider justified which Ofcom notifies to the Operator, provide Ofcom with comments on the change, which Ofcom shall consider (together with comments received from All Other Operators); and

(c) Ofcom shall issue a Change Control Note setting out the change, which note shall provide for the date on which that change shall take effect and the Operator hereby irrevocably agrees to be bound by any such Change Control Note issued hereunder.

19.3 Where Ofcom considers that an urgent change is needed to this Contract, Ofcom may make such change by issuing a Change Control Note to the Operator and to All Other Operators and without following the process set out in Clause 19.2 above. The Operator hereby irrevocably agrees to be bound by any such urgent change related Change Control Note issued hereunder. Where Ofcom issues a Change Control Note in accordance with this Clause 19.3, where it appears to Ofcom to be reasonably practicable to do so, Ofcom would, at the same time as or as soon as reasonably possible following the issue of the Change Control Note, inform the Operator of the reasons for the change, provide the Operator with the opportunity to comment on the change within such period as Ofcom may consider justified and consider any comments received and whether any subsequent amendments should be made.

19.4 The Operator may propose changes to any Operator-specific information set out in this Contract by issuing a notice setting out the proposed change to Ofcom: Ofcom may request further information from the Operator regarding such change and if so, the Operator shall provide all such information within a reasonable time from such request. Where Ofcom agrees to such change, the change shall take effect on signature of an Agreed Change Control Note by each Party.
20. CONSIDERATION AND COSTS

20.1 The Parties acknowledge that this Contract provides mutual benefit on the basis that it entitles the Operator to receive a licence to use the White Space Data and White Space Algorithms and Methodologies and to provide WSDB Services and assists Ofcom in meeting its duties to secure the optimal use of the electro-magnetic spectrum, and that the mutual promises and obligations under this Contract are sufficient consideration.

20.2 Save as expressly provided in this Contract, each Party shall bear all its own costs under this Contract and neither Party is entitled to levy any charges from the other Party.

20.3 Ofcom notes that Ofcom itself does not levy charges for the making available of licensing information and data and is not charging the Operator for the White Space Data. Accordingly, Ofcom requires that the Operator shall not, where it plans to charge for WSDB Services, include in such charges any amount attributable to the making available of such data.

21. GENERAL WARRANTIES

21.1 The Operator warrants, represents and undertakes that:

(a) it has all necessary rights, power and authority to enter into and perform its obligations under this Contract;

(b) it shall exercise all due skill, care and diligence, in a timely and expedient manner;

(c) the Operator Representative and Interference Management Team are suitably qualified and skilled taking account of the obligations of the Operator under this Contract;

(d) it will obtain and maintain all necessary licences, authorisations and permits required by applicable legislation and regulation, and comply with all applicable Laws, regulatory requirements and codes of practice in relation to the performance of its obligations under this Contract (including in relation to non-discrimination, equality, data protection and health and safety) and not do or permit anything to be done which might cause or otherwise result in a breach by Ofcom of the same; and

(e) it will not enter into any contract or accept any obligation inconsistent or incompatible with its obligations under this Contract.

22. LIMITATION OF LIABILITY

22.1 Nothing in this Contract shall limit or exclude either Party's liability to the other for: (i) death or personal injury resulting from its negligence; (ii) fraud or fraudulent misrepresentation; (iii) any other liability that cannot legally be excluded or limited; (iv) wilful default by the Operator; (v) for breach by the Operator of any obligations of
confidentiality or in respect of Personal Data contained in this Contract including those set out at Clause 23 (Confidentiality) and Clause 24 (Data Protection).

22.2 Subject to Clauses 22.1 and 22.3, neither Party will be liable, in contract, tort (including negligence) or for breach of statutory duty or in any other way for any indirect or consequential losses, or any direct or indirect loss of profit, goodwill or business suffered or incurred arising out of or in connection with any matter under this Contract.

22.3 Other than those losses which are unlimited as set out in Clause 22.1, each Party’s total aggregate liability to the other for losses or damages suffered in respect of all claims arising out of or in connection with this Contract (however arising and whether in contract, tort, including negligence, or otherwise) that arise from a single event (or a series of connected events arising from the same circumstance) shall be £50,000 (fifty thousand pounds sterling).

22.4 Nothing in this Contract shall impose any liability on any member of the staff of either Party or its representatives in their personal capacity.

23. CONFIDENTIALITY

23.1 Each Party (the “Holding Party”) shall treat all Confidential Information owned by the other Party (the “Owning Party”) as secret and confidential and shall not use, copy or disclose to any third party any Confidential Information owned by the Owning Party, except that the Holding Party may:

(a) use, copy and disclose Confidential Information owned by the Owning Party to the extent necessary to enable the Holding Party to exploit the rights granted under this Contract and perform its obligations under this Contract provided that the Holding Party shall: (i) only disclose Confidential Information owned by the Owning Party to third parties that have entered into appropriate and legally binding confidentiality and non-use obligations in respect of the Confidential Information disclosed that are no less onerous than those set out under this Contract; and (ii) procure that such third parties do not further disclose or use such Confidential Information;

(b) disclose Confidential Information owned by the Owning Party to those of its officers, employees, sub-contractors and consultants to whom such disclosure is strictly necessary (and only disclose that part of the Confidential Information owned by the Owning Party which is necessary) to enable the Holding Party to exploit the rights granted under this Contract and perform its obligations under this Contract and provided that the Holding Party shall remain responsible for procuring that its officers, employees, sub-contractors and consultants do not further disclose and/or use the Confidential Information owned by the Owning Party for any other purpose;

(c) after giving notice to the Owning Party, disclose any part of the Confidential Information owned by the Owning Party solely to the extent that it is legally required to do so pursuant to an order of a court of competent jurisdiction or governmental authority provided that the Holding Party shall use its
reasonable endeavours to limit such disclosure and to provide the Owning Party with an opportunity to make representations to the relevant court or governmental authority;

(d) where the Holding Party is Ofcom, Ofcom may use, copy and disclose Confidential Information owned by the Owning Party without restriction to the extent necessary in Ofcom’s opinion in order to fulfil the Ofcom Purposes and/or comply with its statutory obligations or duties (including pursuant to Clause 24 (Data Protection) and Clause 29 (Freedom of Information)) and Ofcom shall have no liability to the Operator with respect to any such use, copying or disclosure; and/or

(e) where the Holding Party is the Operator, it shall ensure that any consultant or sub-contractor to whom it considers it necessary to disclose Confidential Information has entered into non-disclosure arrangements equivalent to those in this Clause 23.

23.2 The following information shall not be treated as “Confidential Information”: information that:

(a) is or becomes public knowledge through no improper conduct on the part of the Holding Party;

(b) is already lawfully possessed by the Holding Party without any obligations of confidentiality or restrictions on use prior to the Holding Party first receiving it from the Owning Party provided that this provision shall not apply to any Confidential Information which was created or developed by or on behalf of the Operator for Ofcom pursuant to this Contract;

(c) is created or developed by or on behalf of the Holding Party by individuals that prior to such creation or development did not have access to or knowledge of the Confidential Information concerned provided that, in the case of Confidential Information that was created or developed by or on behalf of the Operator for Ofcom pursuant to this Contract, this provision shall only apply to any information and materials that are created by or on behalf of the Operator after the Confidential Information concerned has been disclosed to Ofcom; and/or

(d) is obtained subsequently by the Holding Party from a third party without any obligations of confidentiality and such third party is in lawful possession of such information or materials and not in violation of any contractual or legal obligation to maintain it or it becomes public knowledge (otherwise than by breach of this Contract).

23.3 Subject to Clause 6.2, to the extent that data from the White Space Data are included, or otherwise readily accessible, in any Operational Parameters calculated in accordance with Clause 7 or Clause 8 or in any alternative presentation calculated in accordance with Clause 8, this inclusion shall not be a breach of this Clause 23.
23.4 The Holding Party shall at all times maintain all Confidential Information of the Owning Party (including items in electronic form) and any copies thereof in a secure fashion by taking reasonable measures to protect them from theft and unauthorised copying, disclosure and without prejudice to the foregoing shall exercise at least the same degree of care to prevent unauthorised disclosure and/or use of the Confidential Information as it exercises in respect of its own Confidential Information of like importance.

23.5 The Holding Party shall notify the Owning Party as soon as reasonably practicable if the Holding Party becomes aware of any unauthorised use or disclosure of, or any unauthorised access to or of any theft or loss of any copies of any Confidential Information of the Owning Party.

23.6 The Operator shall not handle or examine or use or remove from Ofcom Premises any Ofcom Property and/or any document, material or item in any form which relates to Ofcom’s functions or activities and/or contains or embodies any Confidential Information owned by Ofcom without the prior written consent of Ofcom.

24. DATA PROTECTION

24.1 The Parties acknowledge that performance of their obligations under this Contract may involve the collection and other processing of Personal Data by either or both Parties. Accordingly, each Party agrees to comply with all applicable requirements of the Data Protection Legislation.

24.2 Each Party shall refrain from any act or omission which would put the other Party in breach of the Data Protection Legislation.

24.3 Prior to collecting any information which may include Personal Data in relation to its WSDB, the Operator shall conduct a privacy impact assessment in accordance with the then-current version of the ICO’s Privacy Impact Assessment Code of Practice and/or the Operator’s standard processes designed to assess compliance with applicable legal requirements relating to data privacy.

24.4 As set out in this Contract, the Operator is obligated to make certain information available to Ofcom which may contain Personal Data including (but not limited to) the Stored Data, the White Space Use Data and the Restricted WSD List (the “Shared Data”). Ofcom’s purposes in obtaining the Shared Data are as follows:

(a) to conduct interference management activities including providing advice and assistance to persons complaining of interference (in particular, but not limited to, carrying out an initial triage of interference management cases);

(b) to monitor compliance by the Operator with its obligations under the Contract; and

(c) to undertake other work in connection with Ofcom's statutory duties and functions, in particular in relation to its spectrum management functions and the development of the White Spaces regulatory framework.
24.5 The Operator shall, except where not reasonably practicable, inform WSD users about the disclosure of the Shared Data to Ofcom, including the purposes for which the Shared Data will be processed by Ofcom. The Operator shall also provide reasonable assistance to Ofcom in meeting its obligations under the Data Protection Legislation, in particular as regards informing, and making information available to, WSD users.

24.6 The parties shall co-operate with each other to agree measures to reduce any privacy impact in respect of the Shared Data, which should include the use of pseudonymisation and/or anonymisation to the extent possible without impacting on the Parties’ purposes in processing the Shared Data.

24.7 Each Party shall inform the other Party as soon as possible in the circumstances, and in any event within 5 Working Days, of becoming aware of any accidental, unauthorised, or unlawful destruction, loss, alteration, disclosure of, or access to, the Shared Data.

25. TERMINATION

25.1 Ofcom may terminate this Contract on notice to the Operator in the event that the Operator commits a material breach of any of its obligations under this Contract and does not remedy the same (if capable of being remedied) within twenty (20) Working Days (or such longer period as Ofcom may agree in writing) of receipt of notice from Ofcom specifying the breach or failure and calling for the same to be remedied.

25.2 Ofcom may terminate this Contract on notice to the Operator with immediate effect pursuant to Clauses 4.2 (Provision of WSDB Services), 5.9 (Qualification), 14.8 and 14.10 (Adverse Events), 27.2(b) and 27.3 (Conflicts of Interest) and 28.4 (Anti-Bribery and Corruption).

25.3 Ofcom may terminate this Contract on notice to the Operator in the event that:

(a) the Operator suspends, or threatens to suspend, payment of its debts or is unable to pay its debts as they fall due or admits inability to pay its debts or (being a company) is deemed unable to pay its debts within the meaning of section 123 of the Insolvency Act 1986 or (being an individual) is deemed either unable to pay its debts or as having no reasonable prospect of so doing, in either case, within the meaning of section 268 of the Insolvency Act 1986 or (being a partnership) has any partner to whom any of the foregoing apply; or

(b) the Operator commences negotiations with all or any class of its creditors with a view to rescheduling any of its debts, or makes a proposal for or enters into any compromise or arrangement with its creditors other than (being a company) for the sole purpose of a scheme for a solvent amalgamation of the Operator with one or more other companies or the solvent reconstruction of the Operator; or

(c) a petition is filed, a notice is given, a resolution is passed, or an order is made, for or in connection with the winding up of the Operator (being a company)
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other than for the sole purpose of a scheme for a solvent amalgamation of the Operator with one or more other companies or the solvent reconstruction of the Operator; or

(d) an application is made to court, or an order is made, for the appointment of an administrator, or if a notice of intention to appoint an administrator is given or if an administrator is appointed, over the Operator (being a company); or

(e) the holder of a qualifying floating charge over the assets of the Operator (being a company) has become entitled to appoint or has appointed an administrative receiver; or

(f) a person becomes entitled to appoint a receiver over the assets of the Operator or a receiver is appointed over the assets of the Operator; or

(g) the Operator (being an individual) is the subject of a bankruptcy petition or order; or

(h) a creditor or encumbrancer of the Operator attaches or takes possession of, or a distress, execution, sequestration or other such process is levied or enforced on or sued against, the whole or any part of the Operator’s assets and such attachment or process is not discharged within ten (10) Working Days; or

(i) any event occurs, or proceeding is taken, with respect to the Operator in any jurisdiction to which it is subject that has an effect equivalent or similar to any of the events mentioned in Clause 25.3(a) to Clause 25.3(h) (inclusive); or

(j) the Operator suspends or ceases, or threatens to suspend or cease, carrying on all or a substantial part of its business; or

(k) there is a change of control of the Operator (within the meaning of section 1124 of the Corporation Tax Act 2010).

25.4 The Operator shall forthwith give notice to Ofcom of any event within Clause 25.3 (or any analogous event in any jurisdiction throughout the world) which occurs while this Contract is in force and which would entitle Ofcom to terminate this Contract.

25.5 Ofcom may, in its sole and absolute discretion, terminate this Contract within twenty (20) Working Days (or such longer period as Ofcom may agree in writing) of receipt of notice from Ofcom to the Operator in the event that there is any legislative change or change in policy relevant to the regulatory framework applicable to this Contract or for reasons relating to Ofcom’s management of the radio spectrum that, in Ofcom’s sole view, alters the operation of this Contract or the ability of either party to meet its obligations under this Contract. Ofcom shall, where it appears to Ofcom to be reasonably practicable to do so:

(a) endeavour to give as much notice as it considers reasonably possible to the Operator and to All Other Operators where it becomes aware of any legislative change or change in policy which Ofcom considers is likely to give
rise to Ofcom exercising its rights to terminate the Contract in accordance with this Clause 25.5;

(b) give the Operator and All Other Operators a reasonable opportunity to comment on the proposed impact of legislative change or change in policy; and

(c) consider any comments received before deciding whether to exercise its rights to terminate the Contract in accordance with this Clause 25.5.

25.6 The Operator may terminate this Contract on twenty (20) Working Days’ notice to Ofcom.

26. CONSEQUENCES OF TERMINATION

26.1 On termination or expiry of this Contract howsoever caused:

(a) to the extent that it has not already done so, the Operator shall promptly cease to provide any WSDB Services and, where instructed by Ofcom, ensure that its WSDB communicates within $T_{\text{Update}}$ to any active WSD that is operating on the basis of Operational Parameters that were calculated prior to the termination of the Contract an instruction for that WSD to cease transmitting on the basis of those Operational Parameters;

(b) the Operator shall promptly cease using all Qualification White Space Data, all White Space Data and the White Space Algorithms and Methodologies and return to Ofcom the DTT Co-existence dataset, the PMSE assignments dataset, the PMSE venues dataset, the default values dataset and any unscheduled adjustments datasets, as well as any updates to those datasets and any copies;

(c) the Operator shall at Ofcom’s option return to Ofcom or destroy some or all of Ofcom’s Confidential Information and at Ofcom’s request confirm in writing that it has complied with its obligations under this Clause 26.1(c);

(d) Ofcom shall take the necessary steps to remove the Operator from the list of Designated WSDBs in the Licence Exemption Regulations and the Discoverable List of Designated WSDBs; and

(e) the following Clauses shall survive and continue in full force and effect: Clause 1 (Definitions and Interpretation), Clause 15.1 (Records), Clauses 16.3 to 16.7 (Audit), Clause 17 (Intellectual Property Rights), Clause 22 (Limitation of Liability), Clause 23 (Confidentiality), Clause 26 (Consequences of Termination), Clause 29 (Freedom of Information) and Clause 30 (Notices and Communications under this Contract) together with any other Clauses the survival of which is necessary for the interpretation or enforcement of this Contract.

26.2 Termination or expiry of this Contract, however caused, shall not affect any rights or remedies of either Party in respect of any breach of this Contract occurring prior to
27. CONFLICT OF INTEREST

27.1 The Operator shall ensure that there is no conflict of interest which is likely to prejudice its ability to comply with its obligations under this Contract and undertakes that upon becoming aware of any such conflict of interest during the performance of this Contract (whether the conflict existed before the award of the Contract or arises during its performance) it shall immediately notify Ofcom of the same, giving particulars of its nature and the circumstances in which it exists or arises and shall furnish such further information as Ofcom may reasonably require.

27.2 Where Ofcom is of the opinion that the conflict of interest notified to it under Clause 27.1 is capable of being avoided or removed, Ofcom may require the Operator to take such steps as will, in its opinion, avoid, or as the case may be, remove the conflict and:

(a) if the Operator fails to comply with Ofcom requirements in this respect; or

(b) if, in the opinion of Ofcom, compliance does not avoid or remove the conflict, Ofcom may terminate this Contract by notice to the Operator and recover from the Operator the amount of any loss resulting from such termination.

27.3 Notwithstanding Clause 27.2, where Ofcom is of the opinion that the conflict of interest existed at the time of the award of the Contract, could have been discovered with the application by the Operator of due diligence and ought to have been disclosed as required by the Completed Pre-Contract Checks, Ofcom may terminate this Contract by notice to the Operator for irremediable material breach of this Contract with immediate effect and, without prejudice to any other rights, relief or remedy.

28. ANTI-BRIBERY AND CORRUPTION

28.1 The Operator shall not violate any bribery, fraud, kickback, or other similar anti-corruption law or regulation of any country, including the Bribery Act 2010 and the US Foreign Corrupt Practices Act 1977 (the “Applicable Anti-Bribery Law”).

28.2 The Operator represents, warrants and undertakes that it has in place and will at all times keep in place and implement adequate procedures designed to prevent it or any person who (by reference to all the relevant circumstances) performs services for or on behalf of it in any capacity and including employees, agents, subsidiaries, representatives and sub-contractor (“Associated Persons”) from engaging in any activity which would constitute an offence under the Bribery Act 2010 if it were carried out in the UK, or violate any Applicable Anti-Bribery Law.

28.3 The Operator warrants and represents that, in connection with this Contract, no financial or other advantage has been, will be or is agreed to be given to any person (whether working for or engaged by it or any third party) by or on behalf of the Operator or any Associated Persons.

28.4 Breach of any of the provisions in this Clause 28 or of any Applicable Anti-Bribery Law is an irremediable material breach of this Contract for the purposes of Clause 25.
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(Termination) and, without prejudice to any other rights, relief or remedy, entitles Ofcom to terminate this Contract immediately.

29. FREEDOM OF INFORMATION

29.1 Ofcom is obliged to meet its statutory obligations relating to the disclosure of information including (but not limited to) FOIA and the Environmental Information Regulations. All information provided to Ofcom under this Contract may need to be disclosed by Ofcom in order to meet its statutory obligations. Nothing in this Contract shall prevent Ofcom from complying with its statutory obligations and Ofcom shall have no liability to the Operator with respect to any disclosure or publication made in accordance with those obligations.

29.2 Ofcom shall so far as is practicable promptly provide the Operator with reasonable notice regarding a demand for disclosure or publication and shall take account of any representations made by the Operator in respect of that disclosure or publication.

29.3 The Operator acknowledges that the Commercially Sensitive Information listed in Schedule 1 (Commercially Sensitive Information) is of indicative value only and that Ofcom may be obliged to disclose it in accordance with Clause 29.1.

29.4 The Operator shall, where it holds information on behalf of Ofcom, reasonably assist Ofcom in meeting its statutory obligations including, but not limited to, providing Ofcom with that information in a timely manner at Ofcom’s request.

30. NOTICES AND COMMUNICATIONS UNDER THIS CONTRACT

30.1 Where a Clause specifies that either Party must or can give notice or otherwise notify the other Party, Clauses 30.2 to 30.3 shall apply; for all other means of communication between the Parties, Clause 30.4 shall apply.

30.2 All notices to be given by one Party to the other Party shall be made in writing by hand-delivered or recorded first class letter or recorded international post or courier (as applicable), with a copy to be sent by email. In all such cases, the letter shall be hand-delivered at or sent by first class post or recorded international post or courier to the address and email address set out below or to such other address as a Party may specify to the other Party for such purpose by notice:

(a) Office of Communications:

at the address aforesaid

Tel: 020 7981 3000
Email: TVWSManager@ofcom.org.uk

For the attention of the TV White Spaces Manager
(b) The Operator:

at the address aforesaid

Tel: [_______]
Email: [_______]

For the attention of the Operator Representative – [_______]

30.3 A notice shall be deemed to be duly given or made in the case of a hand-delivered letter on delivery, in the case of a letter sent by recorded first class mail or courier, the next Working Day after posting, and in the case of a letter sent by recorded international mail or by courier abroad, the second Working Day after posting.

30.4 Ofcom shall establish specific means of communications for the Operator and Other Operators for specified Clauses or matters, which may include specified individuals as points of contact for particular matters, notices or communications by email or some other electronic means, and any requirements for authentication and security if Ofcom considers this to be necessary. Ofcom shall inform the Operator and All Other Operators accordingly.

31. GENERAL

31.1 All rights in and to the Ofcom Property shall (as between the Parties) remain vested in Ofcom.

31.2 As between Ofcom and the Operator, each member of the Personnel will at all times remain an employee or contractor of the Operator and the Operator will be responsible for any employment benefits (including remuneration) to which such member may be entitled from time to time.

31.3 Nothing in this Contract shall have the effect of making the Operator the agent or employee of Ofcom. Nothing in this Contract shall be construed as constituting a partnership between or joint venture by the Parties and neither shall be, or hold itself out to be, the agent of the other. Nothing in this Contract shall delegate to the Operator any of Ofcom’s functions.

31.4 The Operator hereby undertakes and covenants, at its own cost, to do all such further acts and execute or procure the execution of all such further documents and instruments as Ofcom may require from time to time to vest or further assure to Ofcom (and all of its licensees, assigns and successors in title) the full benefit of the rights expressed to be assigned and granted to Ofcom under this Contract.

31.5 It is not intended that this Contract, either expressly or by implication, confers any benefit on any person who is not a Party to this Contract and accordingly the Contracts (Rights of Third Parties) Act 1999 shall not apply and a person who is not a Party to this Contract has no right under the Contracts (Rights of Third Parties) Act 1999 to rely upon or enforce any term of this Contract.

31.6 Amendments or variations to the terms of this Contract shall only be valid where made
in accordance with Clause 19 (Change Management Procedure).

31.7 The Operator shall not give, bargain, sell, deal, charge, transfer, assign, sub-contract, delegate or otherwise dispose of this Contract, any part thereof or any of its rights or obligations under it (or purport to do any of the foregoing) without the previous consent in writing of Ofcom.

31.8 The Operator shall be responsible for the acts and omissions of any sub-contractors as if they were its own.

31.9 Any decision, act or thing which Ofcom is required or authorised to take or do under this Contract may be taken or done by any person so authorised, either generally or specifically, by Ofcom.

31.10 No failure or delay by either Party to exercise any right or remedy provided under this Contract or by law shall constitute a waiver of that or any other right or remedy, nor shall it preclude or restrict the further exercise of that or any other right or remedy. No waiver shall be effective unless it is communicated to the other Party in writing. No single or partial exercise of such right or remedy shall preclude or restrict the further exercise of that or any other right or remedy and a waiver of any right or remedy arising from a breach of this Contract shall not constitute a waiver of any right or remedy arising from any other breach of this Contract.

31.11 This Contract represents the entire Contract between the Parties relating to the subject matter of this Contract and shall be legally binding and shall supersede and replace all prior oral and written understandings regarding the subject matter. Nothing in this Clause shall operate to limit or exclude any liability for fraud.

31.12 If any provision of this Contract is determined to be invalid or unenforceable in whole or in part, such invalidity or unenforceability shall attach only to such provision and everything else in this Contract shall continue in full force and effect.

31.13 This Contract and any non-contractual disputes and/or claims arising out of or in connection with it shall be governed by, and will be construed in accordance with, the laws of England. Save to the extent provided otherwise in this Contract, the Parties submit to the exclusive jurisdiction of the courts of England and Wales over any claim, dispute or other matter (including non-contractual claims and/or disputes) arising under or in connection with this Contract.
The Parties agree to the terms of this Contract:

Signed by
duly authorised for and on behalf of
Office of Communications

Name

Signature

Title

Date

Signed by
duly authorised for and on behalf of
[OPERATOR]

Name

Signature

Title

Date
SCHEDULE 1
COMMERCIAL SENSITIVE INFORMATION

[TO INCLUDE DETAILS OF ANY OPERATOR COMMERCIAL SENSITIVE INFORMATION]
SCHEDULE 2

RULES FOR CALCULATION OF OPERATIONAL PARAMETERS, DEFAULT VALUES AND FILE FORMATS

SECTION 1: INTRODUCTION

This schedule contains the calculation procedures for Operational Parameters and additional information. The schedule is structured in the following sections:

1. THIS INTRODUCTION
2. CALCULATION OF MASTER OPERATIONAL PARAMETERS
3. CALCULATION OF GENERIC OPERATIONAL PARAMETERS FOR SLAVE WSDs
4. CALCULATION OF SPECIFIC OPERATIONAL PARAMETERS FOR SLAVE WSDs
5. CALCULATION OF MAXIMUM IN-BLOCK EIRP SPECTRAL DENSITY TO ENSURE A LOW PROBABILITY OF HARMFUL INTERFERENCE TO PMSE
6. CALCULATION OF MAXIMUM IN-BLOCK EIRP SPECTRAL DENSITY TO ENSURE A LOW PROBABILITY OF HARMFUL INTERFERENCE TO PMSE
7. CALCULATION OF WSD ANTENNA HEIGHT ABOVE GROUND LEVEL \( h_{WSD} \)
8. PARAMETERS FOR WHICH OFCOM PROVIDES DEFAULT VALUES
9. FILE FORMATS AND DATA DEFINITIONS FOR WHITE SPACE DATA
SECTION 2

CALCULATION OF MASTER OPERATIONAL PARAMETERS

1. The Master Operational Parameters shall be calculated using the methodology set out in this Section. Specific protocol implementations may use different terminology to refer to these parameters.

2. The WSDB shall use the OSTN02 (ETRS89 - OSGB36 horizontal planar) and OSGM02 (ETRS89 – ODN orthometric height) models for conversion of a location specified using the WGS84 coordinate reference systems into a location specified using the OSGB36 coordinate reference system, or vice versa. These models are available at: http://www.ordnancesurvey.co.uk/business-and-government/help-and-support/navigation-technology/os-net/formats-for-developers.html

3. Location conversion accuracy will be specified by Ofcom. The reference is the Ordnance Survey online tool at: http://www.ordnancesurvey.co.uk/gps/transformation

List of available DTT channels

4. These represent the indexes of all DTT channels in the UHF TV band, i.e. channels 21 to 60, that the Master WSD may use. Where Ofcom decides that certain channels are not available for use by WSDs, these will be excluded from the list. Furthermore, a WSDB may choose not to provide Operational Parameters for a certain subset of DTT channels, in which case these may also be excluded from the list of available DTT channels.

Maximum permitted in-block EIRP $P_1$ in dBm/(8 MHz) in each DTT channel

5. This limit is calculated to ensure a low probability of harmful interference to DTT and other services with the exception of location-specific PMSE, on the basis of the reported horizontal location $(x,y)$ and location uncertainty $(\Delta x, \Delta y)$ reported by the Master WSD (as well as other Device Parameters).

6. The WSDB shall use the reported horizontal location and location uncertainty of the Master WSD to define a geographical area within which the Master WSD might be located (the area of potential locations).

7. The 100 metres x 100 metres Pixels which totally or partially overlap with the area of potential locations will be designated as WSD candidate pixels. This is shown in the figure below:
Figure 2.1: Candidate pixels for calculation of the maximum permitted in-block EIRP for a Master WSD

8. For each candidate pixel, *i*, and each channel, *F*, in the list of available DTT channels, the WSDB shall look up the *P*<sub>DTT</sub> value in the DTT co-existence datasets provided by Ofcom. The following parameters will also be used for the look up:

- The Master WSD emission class reported by the device.
- The height above ground level or above sea level reported by the device.

9. If the candidate pixel is not included in the DTT co-existence datasets, i.e. the pixel is outside the geographical area provided by Ofcom, then the *P*<sub>DTT</sub> value for that pixel is 0 mW in all DTT channels.

10. If the WSD does not report its device emissions class, the WSDB shall use the default emissions class specified in Table 8.1 in Section 8 for the look up.

11. If the Master WSD is a Type A device, the look up process shall use the emission class and antenna height above ground as follows:

- Where a Type A WSD reports its height, the antenna height above ground *h*<sub>WSD</sub> shall be calculated first in accordance with Section 7. The WSDB shall then look up *P*<sub>DTT</sub> in the dataset that corresponds to the value of H which is closest to *h*<sub>WSD</sub>. If *h*<sub>WSD</sub> is exactly between two values of H, the dataset for the larger H shall be used.
- Where a Type A WSD does not report its height, WSDBs shall use the dataset for height D.

12. Examples for a Type A device:
If a Type A class-3 WSD reports a $h_{\text{WSD}}$ of 7.5 metres, WSDBs shall use the dataset for CL = 3 and H = 10.

If a Type A class-2 WSD reports a $h_{\text{WSD}}$ of 7.1 metres, WSDBs shall use the dataset for CL = 2 and H = 5.

If a Type A class-4 WSD does not report its height, WSDBs shall use the dataset for CL = 4 and H = D.

13. If the Master WSD is a Type B device, the look up process shall use the emission class and antenna height above ground as follows:

- Where a Type B WSD reports its height, the antenna height above ground $h_{\text{WSD}}$ shall be calculated first in accordance with Section 7. The WSDB shall then look up $P_{\text{DTT}}$ in the dataset that corresponds to the value of H which is closest to $h_{\text{WSD}}$. If $h_{\text{WSD}}$ is exactly between two values of H, the dataset for the larger H shall be used. If $h_{\text{WSD}} > 2$ metres, WSDBs shall add 7 dB to the $P_{\text{DTT}}$ value obtained in the look up to account for a wall loss $L_{W,\text{SECTION2}}$ of 7 dB (WSD is assumed to be indoor).

- Where a Type B WSD does not report its height, WSDBs shall use the dataset for default type B Master WSD specified in Table 8.1 in Section 8.

14. In addition, if the Master WSD is a Type B device, the WSDB shall add 0 dB to the $P_{\text{DTT}}$ value to account for body gain ($G_{B,\text{SECTION2}}$).

15. Examples for a Type B device:

- If a Type B class-3 WSD reports a $h_{\text{WSD}}$ of 2.9 metres, WSDBs shall use the dataset for CL = 3 and H = 1.5, and add 7 dB to the WSD emission limits.

- If a Type B class-4 WSD reports a $h_{\text{WSD}}$ of 2.2 metres, WSDBs shall use the dataset for CL = 4 and H = 1.5, and add 7 dB to the WSD emission limits.

- If a Type B class-4 WSD reports a $h_{\text{WSD}}$ of 1.2 metres, WSDBs shall use the dataset for CL = 4 and H = 1.5.

- If a Type B class-4 WSD does not report its height, WSDBs shall use the dataset for CL = 4 and H = 1.5.

16. See Section 9 for the different heights for which Ofcom shall provide datasets.

17. Repeating the above for each candidate pixel and each available channel, the result will be a number of EIRP values $P_{\text{DTT}}(i,F)$.

18. For an available channel $F_0$, $P_{\text{DTT}}(F_0)$ will be the smallest of the $P_{\text{DTT}}(i,F_0)$ values over the candidate WSD pixels.

19. The WSDB shall next calculate $P_1(F_0)$ as the minimum of:

- 36 dBm
- $P_{\text{DTT}}(F_0)$ as calculated above
• $P_{LA}(F_0)$, the location agnostic limit for that channel. $P_{LA}(F_0)$ accounts for protection of spectrum use above and below the TV band, and for protection of PMSE use in channel 38. The limit is a function of the emission class of the device, the type of the device and the channel. The WSDB shall look up $P_{LA}(F_0)$ from Table 8.3 in Section 8.

20. If the location reported by the Master WSD is within any of the unscheduled adjustment regions provided by Ofcom, then $P_{1}(F_0) = P_{UA}(F_0)$, where $P_{UA}(F_0)$ is the limit in the unscheduled adjustment file for that region for that channel. If the location reported by the Master WSD is within more than one unscheduled adjustment regions, then $P_{UA}(F_0)$ is the minimum of the values in each region.

Maximum permitted in-block EIRP spectral density $P_0$ in dBm/(100 kHz) in each DTT channel

21. The value of $P_0$ at a specific DTT channel is calculated by the WSDB as the minimum of two values, one for protection of DTT derived from $P_{1}$ above, and one for protection of PMSE, $P_{WSD-PMSE}$, calculated as described in the following paragraphs.

22. As above, the WSDB shall use the reported horizontal location and location uncertainty of the Master WSD to define a geographical area within which the WSD might be located (the area of potential locations).

23. The WSDB shall evaluate $P_{WSD-PMSE}$ at a set of candidate locations. The candidate locations shall correspond to those grid points whose squares totally or partially overlap with the area of potential locations of a WSD. The grid itself shall be aligned with the NGR grid and shall have a resolution $D_{GRID}$ of 10 metres. This shown in the figure below:
Figure 2.2: Candidate locations for calculation of the Maximum permitted in-block EIRP spectral density to ensure a low probability of harmful interference to PMSE, $P_{WSD-PMSE}$

24. For each PMSE assignment which is active at any point in time between the Time validity start ($T_{ValStart}$) time and the time validity end ($T_{ValEnd}$) time (for the avoidance of doubt, $T_{ValStart}$ and $T_{ValEnd}$ are the start and end times of validity of the operational parameters):

25. For each candidate location, $i$, and each channel, $F_i$, in the list of available DTT channels, the WSDB shall calculate the maximum permitted in-block EIRP spectral density according to the procedure in Section 5. The following parameters shall also be used for the calculations in Section 5:

- The Master WSD emission class; and
- Master WSD antenna height above ground level, calculated according to Section 7.

26. If the WSDB does not receive the emission class of the WSD, it shall use the default emissions class specified in Table 8.1 in Section 8. If the WSDB does not receive the antenna height, it shall use the height value from Table 8.1 in Section 8 that corresponds to the type of the Master WSD.

27. Repeating the procedure in Section 5 for each candidate Master WSD location and each available channel, the result will be a number of EIRP spectral density values $P_{WSD-PMSE}(i,F_i)$ for protection of a specific PMSE assignment.

28. For an available channel, $F_0$, the WSDB shall then derive the maximum permitted EIRP spectral density $P_{WSD-PMSE}(F_0)$ as the smallest of the $P_{WSD-PMSE}(i,F_0)$ values, over the candidate WSD locations and over the different PMSE assignments.
29. For each PMSE assignment, it may be possible to identify $P_{WSD-PMSE}(F_0)$ without having to exhaustively calculate $P_{WSD-PMSE}(i,F_0)$ at all candidate locations – for instance by evaluating $P_{WSD-PMSE}(i,F_0)$ at a limited number of candidate locations that are geographically closest to the PMSE victims. The WSDB may optimize its processes in this way provided that the $P_{WSD-PMSE}(F_0)$ obtained is equal to the value obtained through the exhaustive procedure.

30. It may also be possible to identify the PMSE assignments which are close enough to the WSD to be relevant for the calculations in Section 5, and hence limit the PMSE assignments that are evaluated against.

31. Finally, the EIRP spectral density $P_0(F_0)$ in dBm/(100 kHz) included in the WSD Operational Parameters will be the minimum of the following two values:
   
i) $P_{WSD-PMSE}(F_0)$ as calculated above, and
   
ii) $P_1(F_0) – 19.03$, where $P_1(F_0)$ is the maximum permitted in-block EIRP calculated above.

**Maximum permitted nominal channel bandwidth and total bandwidth**

32. The WSDB shall use the default values communicated by Ofcom, unless the reported location of the device is within an unscheduled adjustment region provided by Ofcom in which case the Max_nominal_ch_BW and the Max_total_BW values for the region should be used. If the location reported by the Master WSD is within more than one unscheduled adjustment regions, then Max_nominal_ch_BW is the minimum of the values in each region and Max_total_BW is the minimum of the values in each region too.

**Time validity start (T_{ValStart}) and time validity end (T_{ValEnd})**

33. The time validity of the Operational Parameters will normally be defined by changes in the PMSE usage. The WSDB may decide on the start and end times of the validity of a particular Operational Parameters set. However the WSDB shall ensure that all PMSE assignments that are active during the time interval defined by $T_{ValStart}$ and $T_{ValEnd}$ are accounted for and protected.

**Location validity (L_{Val})**

34. The WSDB shall use the default value communicated by Ofcom, unless the reported location of the device is within an unscheduled adjustment region provided by Ofcom in which case the Location_validity value for the region should be used. If the location reported by the Master WSD is within more than one unscheduled adjustment regions, then the minimum of the Location_validity values for each region should be used.

35. This parameter is not relevant for Type A WSDs (which are fixed).

**Update timer (T_{Update})**

36. The WSDB shall use the default value for $T_{Update}$ communicated by Ofcom, unless the reported location of the device is within an unscheduled adjustment region provided by Ofcom in which case the $T_{Update}$ value for the region should be used. If the location reported by the Master WSD is within more than one unscheduled adjustment regions, then the minimum of the $T_{Update}$ values for each region should be used.
37. Depending on the protocol implementation, the Update Timer information may not be provided as a separate parameter and may be incorporated to the Time validity information.

Simultaneous channel operation power restriction

38. Can take values of 0 or 1. A value of 1 indicates the device that the power restriction as indicated in clause 4.2.3.2 of ETSI EN 301 598 applies, a value of 0 indicates that the power restriction does not apply.

39. The WSDB shall use the value communicated by Ofcom, unless the reported location of the device is within an unscheduled adjustment region provided by Ofcom in which case the Simultaneous_channel value for the region should be used. If the location reported by the Master WSD is within more than one unscheduled adjustment regions, then the maximum of the Simultaneous_channel values for each region should be used.
SECTION 3

CALCULATION OF GENERIC OPERATIONAL PARAMETERS FOR SLAVE WSDs

1. The Generic Operational Parameters shall be calculated using the methodology set out in this Section.

2. The WSDB shall use the OSTN02 (ETRS89 - OSGB36 horizontal planar) and OSGM02 (ETRS89 – ODN orthometric height) models for conversion of a location specified using the WGS84 coordinate reference systems into a location specified using the OSGB36 coordinate reference system, or vice versa. These models are available at: http://www.ordnancesurvey.co.uk/business-and-government/help-and-support/navigation-technology/os-net/formats-for-developers.html

3. Location conversion accuracy will be specified by Ofcom. The reference is the Ordnance Survey online tool at: http://www.ordnancesurvey.co.uk/gps/transformation

List of available DTT channels

4. These represent the indexes of all DTT channels in the UHF TV band, i.e. channels 21 to 60, that Slave WSDs may use. Where Ofcom decides that certain channels are not available for use by WSDs, these shall be excluded from the list. Furthermore, a WSDB may choose not to provide Operational Parameters for a certain subset of DTT channels, in which case these may also be excluded from the list of available DTT channels

Maximum permitted in-block EIRP $P_1$ in dBm/(8 MHz) in each DTT channel

5. This limit is calculated to ensure a low probability of harmful interference to DTT and other services with the exception of location-specific PMSE.

6. The WSDB shall use the reported horizontal location, the location uncertainty and the coverage range of the Master WSD to identify the geographical area within which the Slave WSDs might be located. This is the area of potential locations, and is calculated according to Section 6.

7. The 100 metres x 100 metres pixels which totally or partially overlap with this area of potential locations will be designated as WSD candidate pixels. These are the grey pixels in the figure below:
Figure 3.1: Candidate pixels for calculation of the maximum permitted in-block EIRP for Generic Operational Parameters for a Slave WSD

8. For each candidate pixel, $i$, and each channel, $F$, in the list of available DTT channels, the WSDB shall look up the $P_{\text{DTT}}$ value in the DTT co-existence datasets provided by Ofcom. The following parameters shall also be used for the look up:

- Emission class of a generic Slave WSD, – this will be the default emission class specified in Table 8.1 in Section 8.
- The height of a generic Slave WSD specified in Table 8.1 in Section 8.

9. If a candidate pixel is not included in the DTT co-existence datasets, i.e. the pixel is outside the geographical area provided by Ofcom, then the $P_{\text{DTT}}$ value for that pixel is 0 mW in all DTT channels.

10. In addition the WSDB shall add 0 dB to the $P_{\text{DTT}}$ value to account for body gain ($G_B$).

11. Repeating the above for each candidate pixel and each available channel, the result will be a number of EIRP values $P_{\text{DTT}}(i, F)$.

12. For an available channel $F_0$, $P_{\text{DTT}}(F_0)$ will be the smallest of the $P_{\text{DTT}}(i, F_0)$ values over the candidate WSD pixels in the coverage area of the serving Master WSD.

13. The WSDB shall next calculate $P_1(F_0)$ as the minimum of:

- 36 dBm
- $P_{\text{DTT}}(F_0)$, as calculated above
- $P_{\text{LA}}(F_0)$, the location agnostic limit for that channel. $P_{\text{LA}}(F_0)$ accounts for protection of spectrum use above and below the TV band, and for protection of PMSE use in channel 38. The WSDB shall look up $P_{\text{LA}}(F_0)$ from Table 8.3 in
Section 8, with the assumption that the emission class of the device is 5 and that device is Type B.

14. If the location reported by the serving Master WSD is within any of the unscheduled adjustment regions provided by Ofcom, then \( P_1(F_0) = P_{UA}(F_0) \), where \( P_{UA}(F_0) \) is the limit in the unscheduled adjustment file for that region for that channel. If the location reported by the serving Master WSD is within more than one unscheduled adjustment regions, then \( P_{UA}(F_0) \) is the minimum of the values in each region.

**Maximum permitted in-block EIRP spectral density \( P_0 \) in dBm/(100 kHz) in each DTT channel**

15. The value of \( P_0 \) at a specific DTT channel shall be calculated by the WSDB as the minimum of two values, one for protection of DTT derived from \( P_1 \) above, and one for protection of PMSE, \( P_{WSD-PMSE} \), calculated as described in the following paragraphs.

16. The WSDB shall use the reported horizontal location, location uncertainty, and coverage radius of the serving Master WSD to define a geographical area within which the Slave WSDs might be located. This is the area of potential locations calculated according to Section 6.

17. The WSDB shall evaluate \( P_{WSD-PMSE} \) at a set of candidate locations. The candidate locations will correspond to those of grid points whose squares totally or partially overlap with the area of potential locations of a WSD. The grid itself will be aligned with the NGR grid and will have a resolution, \( D_{GRID} \), of 10 metres. This shown in the figure below:
18. For each PMSE assignment which is active at any point in time between the Time validity start \((T_{\text{ValStart}})\) time and the time validity end \((T_{\text{ValEnd}})\) time (for the avoidance of doubt, \(T_{\text{ValStart}}\) and \(T_{\text{ValEnd}}\) are the start and end times of validity of the operational parameters):

19. For each candidate location, \(i\), in the area of potential locations, and each channel, \(F\), in the list of available DTT channels, the WSDB shall calculate the maximum permitted in-block EIRP spectral density in \(\text{dBm}/(100\ \text{kHz})\) according to the procedure in Section 5. The following parameters will also be used for the calculations:

- Emission class of a generic Slave WSD – this will be the default emissions class specified in Table 8.1 in Section 8.

- The height of a generic Slave WSD specified in Table 8.1 in Section 8.

20. Repeating the above for each candidate location and each available channel, the result will be a number of EIRP spectral density values \(P_{\text{WSD,PMSE}}(i,F)\) in \(\text{dBm}/(100\ \text{kHz})\) for protection of a specific PMSE assignment.

21. For an available channel, \(F_0\), the WSDB shall then derive the maximum permitted EIRP \(P_{\text{WSD,PMSE}}(F_0)\). This will be the smallest of the \(P_{\text{WSD,PMSE}}(i,F_0)\) values, over the candidate locations in coverage area of the serving Master WSD and over the different PMSE assignments.

22. For each PMSE assignment, it may be possible to identify \(P_{\text{WSD,PMSE}}(F_0)\) without having to exhaustively calculate \(P_{\text{WSD,PMSE}}(i,F_0)\) at all candidate locations – for instance by evaluating \(P_{\text{WSD,PMSE}}(i,F_0)\) at a limited number of candidate locations that are geographically closest to the PMSE victims. The WSDB may optimize its processes in...
this way provided that the $P_{\text{WSD-PMSE}}(F_0)$ obtained is equal to the value obtained through the exhaustive procedure.

23. It may also be possible to identify the PMSE assignments which are close enough to the WSD to be relevant for the calculations in Section 5, and hence limit the PMSE assignments that are evaluated against.

24. Finally, the EIRP spectral density $P_0(F_0)$ in dBm/(100 kHz) included in the WSD Operational Parameters will be minimum of:

i) $P_{\text{WSD-PMSE}}(F_0)$ as calculated above

ii) $P_1(F_0) - 19.03$, where $P_1(F_0)$ is the Maximum permitted in-block EIRP in the DTT channel calculated above

**Maximum permitted nominal channel bandwidth and total bandwidth**

25. The WSDB shall use the default values communicated by Ofcom, unless the reported location of the serving Master WSD is within an unscheduled adjustment region provided by Ofcom in which case the Max_nominal_ch_BW and the Max_total_BW values for the region should be used. If the location reported by the serving Master WSD is within more than one unscheduled adjustment regions, then Max_nominal_ch_BW is the minimum of the values in each region and Max_total_BW is the minimum of the values in each region too.

**Time validity start (T\text{ValStart}) and time validity end (T\text{ValEnd})**

26. The time validity of the parameters will normally be limited by changes in the PMSE usage. The WSDB may decide on the start and end times of the validity of a particular Generic Operational Parameters set. However the WSDB shall ensure that all PMSE assignments that are active during the time interval defined by $T_{\text{ValStart}}$ and $T_{\text{ValEnd}}$ are accounted for and protected.

**Simultaneous channel operation power restriction**

27. Can take values of 0 or 1. A value of 1 indicates the device that the power restriction as indicated in clause 4.2.3.2 of ETSI EN 301 598 applies, a value of 0 indicates that the power restriction does not apply.

28. The WSDB shall use the value communicated by Ofcom, unless the reported location of the serving Master WSD is within an unscheduled adjustment region provided by Ofcom in which case the Simultaneous_channe value for the region should be used. If the location reported by the serving Master WSD is within more than one unscheduled adjustment regions, then the maximum of the Simultaneous_channe values for each region should be used.
SECTION 4

CALCULATION OF SPECIFIC OPERATIONAL PARAMETERS FOR SLAVE WSDs

1. The Specific Operational Parameters shall be calculated using the methodology set out in this Section. Note that these calculations are the same as those required for the Operational Parameters of a Master WSD.

2. The WSDB shall use the OSTN02 (ETRS89 - OSGB36 horizontal planar) and OSGM02 (ETRS89 – ODN orthometric height) models for conversion of a location specified using the WGS84 coordinate reference systems into a location specified using the OSGB36 coordinate reference system, or vice versa. These models are available at:

3. Location conversion accuracy will be specified by Ofcom. The reference is the Ordnance Survey online tool at:
   http://www.ordnancesurvey.co.uk/gps/transformation

List of available DTT channels

4. These represent the indexes of all DTT channels in the UHF TV band, i.e. channels 21 to 60, that the Slave WSD may use. Where Ofcom decides certain channels are not available for use by WSDs, these may be excluded from the list. Furthermore, a WSDB may choose not to provide Operational Parameters for a certain subset of DTT channels, in which case these may also be excluded from the list of available DTT channels.

Maximum permitted in-block EIRP $P_1$ in dBm/(8 MHz) in each DTT channel

5. This limit is calculated to ensure a low probability of harmful interference to DTT and other services with the exception of location-specific PMSE, and given the reported horizontal location and location uncertainty of the Slave WSD (as well as other Device Parameters).

6. The WSDB shall use the reported horizontal location $(x,y)$ and location uncertainty $(\Delta x, \Delta y)$ of the Slave WSD to define a geographical area within which the Slave WSD might be located (the area of potential locations).

7. The 100 metres x 100 metres pixels which totally or partially overlap with this area of potential locations will be designated as WSD candidate pixels. This is shown in figure below:
For each candidate pixel, \( i \), and each channel, \( F \), in the list of available DTT channels, the WSDB shall look up the \( P_{\text{DTT}} \) value in the DTT co-existence datasets provided by Ofcom. The following parameters will also be used for the look up:

- The Slave WSD emission class reported by the device.
- The height above ground level or above sea level reported by the device.

9. If the a candidate pixel is not included in the DTT co-existence datasets, i.e. the pixel is outside the geographical area provided by Ofcom, then the \( P_{\text{DTT}} \) value for that pixel is 0 mW in all DTT channels.

10. If the WSD does not report its device emissions class, the WSDB shall use the default emissions class specified in Table 8.1 in Section 8 for the look up.

11. If the Slave WSD is a Type A device, the look up process shall use the emission class and antenna height above ground as follows:

- Where a Type A WSD reports its height, the antenna height above ground \( h_{\text{WSD}} \) shall be calculated first in accordance with Section 7. The WSDB shall then look up \( P_{\text{DTT}} \) in the dataset that corresponds to the value of \( H \) which is closest to \( h_{\text{WSD}} \). If \( h_{\text{WSD}} \) is exactly between two values of \( H \), the dataset for the larger \( H \) shall be used.

- Where a Type A WSD does not report its height, WSDBs shall use the dataset for height D.
12. If the Slave WSD is a Type B device, the look up process shall use the emission class and antenna height above ground as follows:

- Where a Type B WSD reports its height, the antenna height above ground \( h_{WSD} \) shall be calculated first in accordance with Section 7. The WSDB shall then look up \( P_{DTT} \) in the dataset that corresponds to the value of H which is closest to \( h_{WSD} \). If \( h_{WSD} \) is exactly between two values of H, the dataset for the larger H shall be used. If \( h_{WSD} \) > 2 metres, WSDBs shall add 7 dB to the \( P_{DTT} \) value obtained in the look up to account for a wall loss \( L_W \), Section 4.

- Where a Type B Slave WSD does not report its height, WSDBs shall use the dataset default Type B Slave WSD specified in Table 8.1 in Section 8.

13. In addition, if the Slave WSD is a Type B device, the WSDB shall add 0 dB to the \( P_{DTT} \) value to account for body gain \( (G_B) \), Section 4.

14. Repeating the above for each candidate pixel and each available channel, the result will be a number of EIRP values \( P_{DTT}(i,F) \).

15. For an available channel \( F_0 \), \( P_{DTT}(F_0) \) will be the smallest of the \( P_{DTT}(i,F_0) \) values over the candidate WSD pixels.

16. The WSDB shall next calculate \( P_1(F_0) \) as the minimum of:

- 36 dBm
- \( P_{DTT}(F_0) \), as calculated above
- \( P_L(A)(F_0) \), the location agnostic limit for that channel. \( P_L(A)(F_0) \) accounts for protection of spectrum use above and below the TV band, and for protection of PMSE use in channel 38. The limit is a function of the emission class of the device, the type of the device and the channel. The WSDB shall look up \( P_L(A)(F_0) \) from Table 8.3 in Section 8.

17. If the location reported by the Slave WSD is within any of the unscheduled adjustment regions provided by Ofcom, then \( P_1(F_0) = P_{UA}(F_0) \), where \( P_{UA}(F_0) \) is the limit in the unscheduled adjustment file for that region for that channel. If the location reported by the Slave WSD is within more than one unscheduled adjustment regions, then \( P_{UA}(F_0) \) is the minimum of the values in each region.

**Maximum permitted in-block EIRP spectral density \( P_0 \) in dBm/(100 kHz) in each DTT channel**

18. The value of \( P_0 \) at a specific DTT channel is calculated by the WSDB as the minimum of two values, one for protection of DTT derived from \( P_1 \) above, and one for protection of PMSE, \( P_{WSD-PMSE} \), calculated as described in the following paragraphs.

19. As above, the WSDB shall use the reported horizontal location and location uncertainty of the Slave WSD to define a geographical area within which the Slave WSD might be located (the area of potential locations).

20. The WSDB shall evaluate \( P_{WSD-PMSE} \) at a set of candidate locations. The candidate locations will correspond to those of grid points whose squares totally or partially overlap with the area of potential locations of a WSD. The grid itself will be aligned with
the NGR grid and will have a resolution $D_{\text{GRID}}$ of 10 metres. This shown in the figure below:

![Diagram showing the NGR grid with a resolution of 10 metres](image)

**Figure 4.2: Candidate locations for calculation of the Maximum permitted in-block EIRP spectral density to ensure a low probability of harmful interference to PMSE, $P_{\text{WSD-PMSE}}$**

21. For each PMSE assignment which is active at any point in time between the Time validity start ($T_{\text{ValStart}}$) time and the time validity end ($T_{\text{ValEnd}}$) time (for the avoidance of doubt, $T_{\text{ValStart}}$ and $T_{\text{ValEnd}}$ are the start and end times of validity of the operational parameters):

22. For each candidate location, $i$, and each channel, $F$, in the list of available DTT channels, the WSDB will calculate the maximum permitted in-block EIRP spectral density in dBm/(100 kHz) according to the procedure in Section 5. The following parameters shall also be used for the calculations:

- Slave WSD emission class; and
- Slave WSD antenna height above ground level, which shall be calculated in accordance with Section 7.

23. If the WSDB does not receive the emission class of the WSD, it shall use the default emissions class specified in Table 8.1 in Section 8. If the WSDB does not receive the antenna height, it shall use the height value from Table 8.1 in Section 8 that corresponds to the type of the Slave WSD.

24. Repeating the procedure in Section 5 for each candidate Slave WSD location and each available channel, the result will be a number of EIRP spectral density values $P_{\text{WSD-PMSE}} (i,F)$ for protection of a specific PMSE assignment.
25. For an available channel, $F_0$, the WSDB shall then derive the maximum permitted EIRP spectral density $P_{WSD-PMSE}(F_0)$ as the smallest of the $P_{WSD-PMSE}(i,F_0)$ values, over candidate WSD locations and over the different PMSE assignments.

26. For each PMSE assignment, it may be possible to identify $P_{WSD-PMSE}(F_0)$ without having to exhaustively calculate $P_{WSD-PMSE}(i,F_0)$ at all candidate locations – for instance by evaluating $P_{WSD-PMSE}(i,F_0)$ at a limited number of candidate locations that are geographically closest to the PMSE victims. The WSDB may optimize its processes in this way provided that the $P_{WSD-PMSE}(F_0)$ obtained is equal to the value obtained through the exhaustive procedure.

27. It may also be possible to identify the PMSE assignments which are close enough to the WSD to be relevant for the calculations in Section 5, and hence limit the PMSE assignments that are evaluated against.

28. Finally, the EIRP spectral density $P_0(F_0)$ in dBm/(100 kHz) included in the WSD Operational Parameters will be the minimum of the following two values

   i) $P_{WSD-PMSE}(F_0)$ as calculated above, and

   ii) $P_1(F_0) – 19.03$, where $P_1(F_0)$ is the maximum permitted in-block EIRP calculated above.

**Maximum permitted nominal channel bandwidth and total bandwidth**

29. The WSDB shall use the default values communicated by Ofcom, unless the reported location of the device is within an unscheduled adjustment region provided by Ofcom in which case the Max_nominal_ch_BW and the Max_total_BW values for the region should be used. If the location reported by the Slave WSD is within more than one unscheduled adjustment regions, then Max_nominal_ch_BW is the minimum of the values in each region and Max_total_BW is the minimum of the values in each region too.

**Time validity start ($T_{ValStart}$) and time validity end ($T_{ValEnd}$)**

30. The time validity of the Specific Operational Parameters will normally be defined by changes in the PMSE usage. The WSDB may decide on the duration of the validity of a particular Specific Operational Parameters set. However the WSDB shall ensure that all PMSE assignments that are active during the time interval defined by $T_{ValStart}$ and $T_{ValEnd}$ are accounted for and protected.

**Location validity ($L_{Val}$)**

31. The WSDB shall use the default value communicated by Ofcom, unless the reported location of the device is within an unscheduled adjustment region provided by Ofcom in which case the Location_validity value for the region should be used. If the location reported by the Slave WSD is within more than one unscheduled adjustment regions, then the minimum of the Location_validity values for each region should be used.

32. This parameter is not relevant for Type A WSDs (which are fixed).
Simultaneous channel operation power restriction

33. Can take values of 0 or 1. A value of 1 indicates the device that the power restriction as indicated in clause 4.2.3.2 of ETSI EN 301 598 applies, a value of 0 indicates that the power restriction does not apply.

34. The WSDB shall use the value communicated by Ofcom, unless the reported location of the device is within an unscheduled adjustment region provided by Ofcom in which case the Simultaneous_channel value for the region should be used. If the location reported by the Slave WSD is within more than one unscheduled adjustment regions, then the maximum of the Simultaneous_channel values for each region should be used.
SECTION 5

CALCULATION OF MAXIMUM IN-BLOCK EIRP SPECTRAL DENSITY TO ENSURE A LOW PROBABILITY OF HARMFUL INTERFERENCE TO PMSE

1. This section specifies the WSDB calculations for deriving the maximum permitted WSD in-block EIRP spectral density, $P_{\text{WSD-PMSE}}$ in dBm/(100 kHz), to ensure a low probability of harmful interference to a specific PMSE assignment.

2. $P_{\text{WSD-PMSE}}$ is limited to avoid “direct” interference from the WSD to the PMSE receiver. This is illustrated in Figure 5.1. $P_{\text{WSD-PMSE}}$ is also limited to avoid intermodulation interference caused by a PMSE transmitter into a second PMSE receiver in the presence of a WSD signal. This is illustrated in Figure 5.2, where PMSE transmit intermodulation interference from the PMSE transmitter (2) has the potential to cause co-channel interference to reception of signals from another PMSE transmitter (1).

Figure 5.1: Illustration of interference from a WSD to a PMSE receiver
Figure 5.2: Illustration of reverse intermodulation interference from a PMSE transmitter to a PMSE receiver in response to interference from a WSD.

EXPRESSION FOR THE MAXIMUM PERMITTED WSD EIRP SPECTRAL DENSITY

3. The maximum permitted EIRP spectral density, $P_{\text{WSD-PMSE}}$, in dBm/(100 kHz), is the minimum of the following limits:
   - $P_{\text{WSD-PR-PMSE}}$ in dBm/(100 kHz), an EIRP spectral density limit to ensure a low probability of "direct" transmissions from the WSD to the PMSE receiver causing harmful interference; and
   - $P_{\text{WSD-PMSE-PMSE}}$ in dBm/(100 kHz), an EIRP spectral density limit to ensure a low probability of "PMSE transmit intermodulation" interference (generated in response to interference from the WSD) causing harmful interference; and
   - a 36 dBm/8 MHz cap i.e. 16.97 dBm/100 kHz.

4. Therefore, the maximum permitted EIRP spectral density, $P_{\text{WSD-PMSE}}$, shall be calculated according to:

   $$P_{\text{WSD-PMSE}}(\text{dBm}/(100\text{kHz})) = \min\{P_{\text{WSD-PR-PMSE}}, P_{\text{WSD-PMSE-PMSE}}, 16.97\} \quad (5.1)$$

5. $P_{\text{WSD-PR-PMSE}}$ in a specific DTT channel and at a specific WSD candidate location shall be calculated according to:

   $$P_{\text{WSD-PR-PMSE}} = P_{S,0} (\text{dBm}/B) - r(\Delta F)_{(\text{dB})} - m_{G1}(\text{dB}) - \gamma(\text{dB}) - 19.03 \quad (5.2)$$

   where
   - $P_{S,0}$ is the wanted PMSE received signal power (over bandwidth $B$),
   - $B$ is the nominal channel bandwidth of the PMSE device,
   - $m_{G1}$ is the WSD-to-PMSE median coupling gain,
\( r(\Delta F) \) is the WSD-to-PMSE protection ratio defined as the ratio of PMSE received wanted signal power (in dBm/(B kHz)) over WSD received unwanted signal power (in dBm/(8 MHz)) at the point of PMSE receiver failure.

\( \Delta F \) is the WSD-to-PMSE DTT channel separation (in units of 8 MHz),

\( \gamma \) is a margin \( (\geq 0 \text{ dB}) \),

19.03 is \( 10 \log_{10}(80) \) and converts the calculated EIRP from a bandwidth of 8 MHz to a bandwidth of 100 kHz.

6. \( P_{\text{WSD-PMSE}} \) in dBm/(100 kHz), shall be calculated according to:

\[
P_{\text{WSD-PMSE}} = P_{I,T} \text{ (dBm/B)} - m_{G2} \text{ (dB)} - m_{G3} \text{ (dB)} - C_{\text{IM1}} - 19.03
\]

where

\( P_{I,T} \) is the target received interference at PMSE (over bandwidth 200 kHz),

\( m_{G2} \) is the median coupling gain between WSD and the PMSE transmitter which is generating the PMSE transmit intermodulation interference,

\( m_{G3} \) is the median coupling gain between PMSE transmitter which is generating the PMSE transmit intermodulation interference and the victim PMSE receiver,

\( C_{\text{IM1}} \) is an adjustable parameter for intermodulation product.

19.03 is \( 10 \log_{10}(80) \) and converts the calculated EIRP from a bandwidth of 8 MHz to a bandwidth of 100 kHz.

7. The values for the various parameters to be used in Equations 5.1 to 5.3 are presented next.

**PARAMETER VALUES AND PARAMETER CALCULATION**

**PMSE wanted signal power \( (P_{S,0}) \) and nominal channel bandwidth of the PMSE device \( (B) \)**

8. The values of wanted PMSE received signal power \( P_{S,0} \) and of channel bandwidth described in Table 5.1 below shall be used in Equation 5.2. These are given for various PMSE use cases.

**Table 5.1: \( P_{S,0} \) and \( B \) for each PMSE use case**

<table>
<thead>
<tr>
<th>PMSE use case</th>
<th>( P_{S,0} ) (dBm/B)</th>
<th>Nominal PMSE channel bandwidth, ( B )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless microphones</td>
<td>-78</td>
<td>200 kHz</td>
</tr>
<tr>
<td>In-ear monitors</td>
<td>-78</td>
<td>200 kHz</td>
</tr>
<tr>
<td>Talkback</td>
<td>-78</td>
<td>200 kHz</td>
</tr>
<tr>
<td>Programme audio links</td>
<td>-78</td>
<td>200 kHz</td>
</tr>
<tr>
<td>Data links</td>
<td>-78</td>
<td>200 kHz</td>
</tr>
<tr>
<td>Programme video links</td>
<td>-65</td>
<td>8 MHz</td>
</tr>
</tbody>
</table>
9. If the PMSE equipment type identifier provided in the PMSE assignment information does not correspond to any of the types in Table 5.1 then the value of $P_{S,0}$ and $B$ for wireless microphones shall be used.

Margin ($\gamma$)

10. A value of $\gamma = 0$ dB will be used for the margin in Equation 5.2.

Target received interference at PMSE ($P_{I,T}$)

11. The default value is -104 dBm/(200 kHz)

Adjustable parameter ($C_{IM1}$)

12. The default value for $C_{IM1}$ in equation (2.3) is -40 dB.

Median coupling gains ($m_{G1}, m_{G2}, m_{G3}$)

13. The median coupling gains between the WSD and PMSE receiver shall be calculated according to:

$$m_{G1}(dB) = m_p(dB) + G_{W}(dB) + G_{A,PMSE}(dB) + G_{B1,WSD}(dB), \quad (5.4)$$

$$m_{G2}(dB) = m_p(dB) + G_{W}(dB) + G_{B2,WSD}(dB) \quad (5.5)$$

$$m_{G3}(dB) = 27.56 - 20\log_{10}(d_{PMSE-WSD}) - 20\log_{10}(f) + G_{B,PMSE}(dB) + G_{A,PMSE}(dB), \quad (5.6)$$

where:

$m_p$ is the median path gain between WSD and both PMSE transmitter and receiver ($< 0$ dB),

$G_{W}$ is the building penetration (wall) gain ($\leq 0$ dB), and

$G_{A,PMSE}$ is the PMSE receiver antenna gain,

$G_{B1,WSD}$ is the default WSD body gain used in Equation 5.4,

$G_{B2,WSD}$ is the default WSD body gain used in Equation 5.5,

$G_{B,PMSE}$ is the default PMSE body gain of the PMSE transmitter creating the PMSE transmit intermodulation interference.

$d_{PMSE-WSD}$ is the assumed separation between the PMSE intermodulation product generating transmitter and the victim PSME receiver (metres), and

$f$ is the centre frequency of the DTT channel used by the PMSE assignment.

14. Note that the median path gain used in Equation 5.4 is the same as the median path gain used in Equation 5.5. For the purposes of calculation of the median path gain in Equation 5.5 it is assumed that the PMSE transmitter generating the PMSE transmit intermodulation interference is at the same location as the PMSE receiver. This means that for a particular PMSE-WSD pair, the values of $m_p(dB)$ in Equations 5.4 and 5.5 are the same.

15. The values described in Table 5.2 below shall be used in Equations 5.4 to 5.6.
Table 5.2: Parameters for the median coupling gain calculations

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$m_P$</td>
<td>Median path gain. For terrestrial PMSE services (those categorised as indoor or outdoor), the median path gain will be based on the SEAMCAT Extended Hata path loss model. For airborne services, the free space path loss model will be used. Note that path gain is the negative of path loss (both in dB).</td>
</tr>
<tr>
<td>$G_W$</td>
<td>Building penetration gain. We propose to use one of three values dependent upon the rules given below: 0 dB (no wall) -7 dB (one wall) -14 dB (two walls)</td>
</tr>
</tbody>
</table>

If the horizontal separation between the WSD and PMSE receiver antenna is less than or equal to $d_{DEF}$ metres then a building penetration gain of 0 dB applies.

If the PMSE-WSD horizontal separation is greater than $d_{DEF}$ metres, the building penetration gain will be applied as follows:

- 0 dB for outdoor PMSE assignments / outdoor WSD,
- -7 dB for indoor PMSE assignments / outdoor WSD,
- -7 dB for outdoor PMSE assignments / indoor WSD, and
- -14 dB for indoor PMSE assignments / indoor WSD.

The indoor (“internal”)/outdoor (“external”) situation of the PMSE assignment is provided in the PMSE data.

Airborne PMSE assignments are assumed to be outdoor.

For calculation of Operational Parameters for a Master WSD or Specific Operational Parameters for a Slave WSD, the indoor/outdoor characteristic of the WSD is determined as follows:

- Type A WSDs will be assumed to be outdoors.
- Type B WSDs will be assumed to be outdoors, unless they report a height that is greater than 2 metres (AGL) in which case they will be assumed to

---


2 For airborne PMSE, the slant distance between the WSD and PMSE antennas should be used and the median path gain is given by $m_P = -32.4 + 60 - 20\log_{10}(f) - 10\log_{10} \left[ \frac{d_{WSD-PMSE}^2 + (h_{PMSE} - h_{WSD})^2}{\lambda^2} \right]$. Parameters are as defined in Table 5.3 and the addition of 60 accounts for horizontal separation and antenna heights being expressed in metres.
For calculation of Generic Operational Parameters for a Slave WSD according to Section 3 then the Slave WSD will be assumed to be outdoor.

The definition of horizontal separation is in Table 5.3.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$G_{A,PMSE}$</td>
<td>PMSE antenna gain. 0 dBi for all PMSE usage types.</td>
</tr>
<tr>
<td>$G_{B1,WSD}$</td>
<td>WSD body gain for use in Equation 5.4.</td>
</tr>
<tr>
<td></td>
<td>• For Type A WSDs, a default body gain of 0 dB applies.</td>
</tr>
<tr>
<td></td>
<td>• For Type B WSDs, a default body gain of 0 dB applies.</td>
</tr>
<tr>
<td>$G_{B2,WSD}$</td>
<td>WSD body gain for use in Equation 5.5.</td>
</tr>
<tr>
<td></td>
<td>• For Type A WSDs, a default body gain of 0 dB applies.</td>
</tr>
<tr>
<td></td>
<td>• For Type B WSDs, a default body gain of 0 dB applies.</td>
</tr>
<tr>
<td>$G_{B,PMSE}$</td>
<td>PMSE body gain for use in Equation 5.6</td>
</tr>
<tr>
<td></td>
<td>• A default body gain of 0 dB applies in all cases.</td>
</tr>
<tr>
<td>$d_{PMSE-PMSE}$</td>
<td>The assumed separation between the PMSE transmitter which is generating the intermodulation interference and the victim PMSE receiver (metres). Currently $d_{PMSE-PMSE} = 5$ metres.</td>
</tr>
<tr>
<td>$d_{DEF}$</td>
<td>A default separation used in the determination of building penetration gain. Currently $d_{DEF} = 10$ metres.</td>
</tr>
</tbody>
</table>

16. The median path gain $m_p$ is a function of WSD transmitter antenna height $h_{WSD}$, PMSE receiver antenna height $h_{PMSE}$, horizontal separation $d$ between WSD transmitter and PMSE receiver antennas, frequency $f$, and clutter type (for SEAMCAT Extended Hata). Table 5.3 below lists the values for calculation of median path gain.
Table 5.3: Parameters for the median path gain calculation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$h_{\text{WSD}}$</td>
<td>Height of WSD antenna above ground level, determined as specified in Section 2, Section 3 or Section 4 (metres).</td>
</tr>
<tr>
<td>$h_{\text{PMSE}}$</td>
<td>Height of PMSE receiver antenna above ground level (metres). This will be provided as part of the PMSE assignment data. A default value $h_{\text{PMSE-default}}$ of 5 metres will be assumed in the absence of this information.</td>
</tr>
<tr>
<td>$d_{\text{WSD-PMSE}}$</td>
<td>Horizontal separation between the candidate location of the WSD and the location of the PMSE assignment (metres). See below for how to determine this parameter.</td>
</tr>
<tr>
<td>$f$</td>
<td>Centre frequency of the DTT channel used by PMSE (MHz). This will be derived from the frequency of the PMSE assignment as provided by Ofcom to the WSDBs.</td>
</tr>
<tr>
<td></td>
<td>In the case that the PMSE assignment extends over more than one DTT channel, the WSDB shall use the DTT channel which contains the centre frequency of the PMSE assignment. If the PMSE centre frequency sits exactly at the boundary between two DTT channels, then the lower DTT channel shall be used.</td>
</tr>
<tr>
<td>Clutter type</td>
<td>This is the clutter type at the location of the PMSE assignment.</td>
</tr>
<tr>
<td></td>
<td>If a PMSE assignment has a venue boundary, the clutter type should be established by using the eastings and northings (X_Coord and Y_Coord) in the PMSE assignment data file. This applies regardless of the size of the area over which the venue extends.</td>
</tr>
</tbody>
</table>
|                 | The WSDB shall use clutter information from the CORINE Landcover 2006 Raster dataset with 100 metres resolution.  
3  http://www.eea.europa.eu/publications/COR0-landcover,  
|                 | The clutter information from the dataset will be mapped on to urban, and suburban clutter designations. The CORINE dataset contains various land cover classes, including the “Continuous urban fabric” class which should be treated as Urban and all other classes treated as Suburban. |
|                 | If clutter information is not available for the location of the PMSE assignment, then the WSDB shall use clutter type “suburban”.                                                                                                                                          |
HORIZONTAL SEPARATION BETWEEN WSD CANDIDATE LOCATION AND PMSE ASSIGNMENT ($d_{WSD-PMSE}$)

17. If the PMSE assignment does not include a venue identifier, or includes a venue identifier but there is no polygon corresponding to that identifier, then $d_{WSD-PMSE}$ is the horizontal separation between the candidate WSD location and the location of the PMSE assignment.

18. If the PMSE assignment includes a venue identifier and there is a polygon corresponding to that identifier, then the following applies:

   a. If the calculation of $P_{WSD-PMSE}$ is for a Master Operational Parameters or for Specific Operational Parameters for a Slave WSD, and the candidate WSD location falls outside the polygon that corresponds to the venue identifier, then $d_{WSD-PMSE}$ is the horizontal separation between the candidate WSD location and the closest point of the polygon.

   b. If the calculation of $P_{WSD-PMSE}$ is for a Master Operational Parameters or for Specific Operational Parameters for a Slave WSD, and the candidate WSD location falls inside the polygon or on the boundary of the polygon that corresponds to the venue identifier, then $P_{WSD-PMSE}$ is 0 mW in all DTT channels.

   c. If the calculation of $P_{WSD-PMSE}$ is for Generic Operational Parameters and the candidate WSD location falls outside the polygon that corresponds to the venue identifier, then $d_{WSD-PMSE}$ is the horizontal separation between the candidate WSD location and the closest point of the polygon.

   d. If the calculation of $P_{WSD-PMSE}$ is for Generic Operational Parameters and the candidate WSD location falls inside the polygon or on the boundary of the polygon that corresponds to the venue identifier, then $d_{WSD-PMSE}$ is equal to $d_{MIN}$.

19. If $d_{WSD-PMSE}$ calculated in paragraph 17 or paragraph 18 is smaller than $d_{MIN}$, then $d_{WSD-PMSE} = d_{MIN}$.

20. $d_{MIN} = 10$ metres.

Clutter

21. Note that the CORINE data is projected using a system which is appropriate to the whole of Europe and not the British national grid. This implies that the planar coordinates of pixels must be transformed, or that the dataset must be re-projected to the British national grid system. We recommend that this data is re-projected to the British grid system.

22. The SEAMCAT Extended Hata model with the parameters in Table 5.3 shall be used for the median path gain calculation between WSD and PMSE receiver.

23. Note that in accordance with specification of the SEAMCAT Extended Hata model, the parameters $H_b$ and $H_m$ within that model are defined as follows:

$$H_b = \max(h_{WSD}, h_{PMSE})$$  \hspace{1cm} (5.7)

$$H_m = \max(1, \min(h_{WSD}, h_{PMSE})$$  \hspace{1cm} (5.8)
Protection ratios, ( \( r(\Delta F) \) )

24. The values of protection ratio \( r(\Delta F) \) described in Tables 5.5 to 5.7 below shall be used in Equation 5.2. These are given for various PMSE use cases and WSD emission classes. Note that the protection ratios in the tables are for a wanted signal in 200 kHz and an unwanted signal in 8 MHz.

25. Determination of the DTT channel for a particular PMSE assignment is made using the centre frequency of the PMSE assignment (Frequency_MHz) and the bandwidth of the PMSE assignment (Bandwidth_MHz), both as given in the PMSE assignment data (input #2) and as described in Table 9.1 of Section 9. Specifically, a PMSE assignment is assumed to use a particular DTT channel \( K \) if the frequency range \( \text{Frequency}_\text{MHz} - \text{Bandwidth}_\text{MHz}/2 \) to \( \text{Frequency}_\text{MHz} + \text{Bandwidth}_\text{MHz}/2 \) extends over or partially extends over DTT channel \( K \). For the avoidance of doubt, the bandwidth of the assignment to be used here must be Bandwidth_MHz, not the nominal PMSE channel bandwidth, \( B \), as given in Table 5.1.

26. A PMSE assignment may use more than one DTT channel. If a PMSE device is using DTT channels \( K = K_{\min} \ldots K_{\max} \), the relevant protection ratio for a particular DTT channel \( F \), is that given by the channel separation \( \Delta F \) with the smallest absolute value, where \( \Delta F = (F - K) \). If the PMSE assignment extends over more than one DTT channel, all DTT channels over which the PMSE assignment extends shall be protected as co-channel, i.e. the protection ratio for \( \Delta F = 0 \) applies.

27. If a PMSE assignment uses more than one DTT channel, the frequency \( f \) for the median path gain calculation is as defined in Table 5.3 and is the same for all channel separations \( \Delta F \).

Table 5.5: WSD-PMSE protection ratios: Wireless microphones

<table>
<thead>
<tr>
<th>( r(\Delta F) ) (dB)</th>
<th>Wireless microphones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency Adjacency (DTT channels)</strong></td>
<td><strong>WSD Class 1</strong></td>
</tr>
<tr>
<td>( \Delta F = 0 )</td>
<td></td>
</tr>
<tr>
<td>( \Delta F = \pm 1 )</td>
<td>-44</td>
</tr>
<tr>
<td>( \Delta F = \pm 2 )</td>
<td>-49</td>
</tr>
<tr>
<td>( \Delta F = \pm 3 )</td>
<td>-53</td>
</tr>
<tr>
<td>( \Delta F = \pm 4 )</td>
<td>-59</td>
</tr>
<tr>
<td>( \Delta F = \pm 5 )</td>
<td>-62</td>
</tr>
<tr>
<td>( \Delta F = \pm 6 )</td>
<td>-65</td>
</tr>
<tr>
<td>( \Delta F = \pm 7 )</td>
<td>-66</td>
</tr>
</tbody>
</table>

\( K_{\min} \) and \( K_{\max} \) can be calculated as follows:

\[
K_{\min} = \text{floor}(f_{\min} - 470)/8) + 21 \\
K_{\max} = \text{ceiling}(f_{\max} - 470)/8) + 20
\]

where \( f_{\min} = \text{Frequency}_\text{MHz} - (\text{Bandwidth}_\text{MHz}/2) \) and \( f_{\max} = \text{Frequency}_\text{MHz} + (\text{Bandwidth}_\text{MHz}/2) \). The function floor(\( x \)) gives the largest integer not greater than \( x \) and the function ceiling(\( x \)) gives the smallest integer not less than \( x \).
Table 5.6: WSD-PMSE protection ratios: In-ear monitors

<table>
<thead>
<tr>
<th>Frequency Adjacency (DTT channels)</th>
<th>WSD Class 1 (dB)</th>
<th>WSD Class 2 (dB)</th>
<th>WSD Class 3 (dB)</th>
<th>WSD Class 4 (dB)</th>
<th>WSD Class 5 (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔF = ±9</td>
<td>-68</td>
<td>-68</td>
<td>-68</td>
<td>-68</td>
<td>-68</td>
</tr>
<tr>
<td>ΔF = ±10</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
</tr>
<tr>
<td>ΔF = ±11</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
</tr>
<tr>
<td>ΔF = ±12</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
</tr>
<tr>
<td>ΔF = ±13</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
</tr>
<tr>
<td>ΔF = ±14</td>
<td>-71</td>
<td>-71</td>
<td>-71</td>
<td>-71</td>
<td>-71</td>
</tr>
<tr>
<td>ΔF = ±15</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
</tr>
<tr>
<td>ΔF = ±16</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
</tr>
<tr>
<td>ΔF = ±17</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
</tr>
<tr>
<td>ΔF = ±18</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
</tr>
<tr>
<td>ΔF = ±19</td>
<td>-74</td>
<td>-74</td>
<td>-74</td>
<td>-74</td>
<td>-74</td>
</tr>
<tr>
<td></td>
<td>ΔF</td>
<td>≥ 20</td>
<td>-74</td>
<td>-74</td>
<td>-74</td>
</tr>
</tbody>
</table>

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Table 5.7: WSD-PMSE protection ratios: Talkback

<table>
<thead>
<tr>
<th>Frequency Adjacency (DTT channels)</th>
<th>WSD Class 1</th>
<th>WSD Class 2</th>
<th>WSD Class 3</th>
<th>WSD Class 4</th>
<th>WSD Class 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta F = 0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>$\Delta F = \pm 1$</td>
<td>-44</td>
<td>-44</td>
<td>-35</td>
<td>-25</td>
<td>-14</td>
</tr>
<tr>
<td>$\Delta F = \pm 2$</td>
<td>-49</td>
<td>-45</td>
<td>-45</td>
<td>-35</td>
<td>-24</td>
</tr>
<tr>
<td>$\Delta F = \pm 3$</td>
<td>-53</td>
<td>-45</td>
<td>-53</td>
<td>-45</td>
<td>-35</td>
</tr>
<tr>
<td>$\Delta F = \pm 4$</td>
<td>-59</td>
<td>-54</td>
<td>-59</td>
<td>-54</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 5$</td>
<td>-62</td>
<td>-61</td>
<td>-62</td>
<td>-61</td>
<td>-54</td>
</tr>
<tr>
<td>$\Delta F = \pm 6$</td>
<td>-65</td>
<td>-64</td>
<td>-65</td>
<td>-64</td>
<td>-62</td>
</tr>
<tr>
<td>$\Delta F = \pm 7$</td>
<td>-66</td>
<td>-66</td>
<td>-66</td>
<td>-66</td>
<td>-65</td>
</tr>
<tr>
<td>$\Delta F = \pm 8$</td>
<td>-67</td>
<td>-67</td>
<td>-67</td>
<td>-67</td>
<td>-67</td>
</tr>
<tr>
<td>$\Delta F = \pm 9$</td>
<td>-68</td>
<td>-68</td>
<td>-68</td>
<td>-68</td>
<td>-68</td>
</tr>
<tr>
<td>$\Delta F = \pm 10$</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
</tr>
<tr>
<td>$\Delta F = \pm 11$</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
<td>-69</td>
</tr>
<tr>
<td>$\Delta F = \pm 12$</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
</tr>
<tr>
<td>$\Delta F = \pm 13$</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
<td>-70</td>
</tr>
<tr>
<td>$\Delta F = \pm 14$</td>
<td>-71</td>
<td>-71</td>
<td>-71</td>
<td>-71</td>
<td>-71</td>
</tr>
<tr>
<td>$\Delta F = \pm 15$</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
</tr>
<tr>
<td>$\Delta F = \pm 16$</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
<td>-72</td>
</tr>
<tr>
<td>$\Delta F = \pm 17$</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
</tr>
<tr>
<td>$\Delta F = \pm 18$</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
<td>-73</td>
</tr>
<tr>
<td>$\Delta F = \pm 19$</td>
<td>-74</td>
<td>-74</td>
<td>-74</td>
<td>-74</td>
<td>-74</td>
</tr>
<tr>
<td>$</td>
<td>\Delta F</td>
<td>\geq 20$</td>
<td>-74</td>
<td>-74</td>
<td>-74</td>
</tr>
</tbody>
</table>

Table 5.8: WSD-PMSE protection ratios: Programme audio links

<table>
<thead>
<tr>
<th>Frequency Adjacency (DTT channels)</th>
<th>WSD Class 1</th>
<th>WSD Class 2</th>
<th>WSD Class 3</th>
<th>WSD Class 4</th>
<th>WSD Class 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta F = 0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>$\Delta F = \pm 1$</td>
<td>-44</td>
<td>-44</td>
<td>-35</td>
<td>-25</td>
<td>-14</td>
</tr>
<tr>
<td>$\Delta F = \pm 2$</td>
<td>-49</td>
<td>-45</td>
<td>-45</td>
<td>-35</td>
<td>-24</td>
</tr>
<tr>
<td>$\Delta F = \pm 3$</td>
<td>-53</td>
<td>-45</td>
<td>-53</td>
<td>-45</td>
<td>-35</td>
</tr>
<tr>
<td>$\Delta F = \pm 4$</td>
<td>-59</td>
<td>-54</td>
<td>-59</td>
<td>-54</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 5$</td>
<td>-62</td>
<td>-61</td>
<td>-62</td>
<td>-61</td>
<td>-54</td>
</tr>
<tr>
<td>$\Delta F = \pm 6$</td>
<td>-65</td>
<td>-64</td>
<td>-65</td>
<td>-64</td>
<td>-62</td>
</tr>
<tr>
<td>$\Delta F = \pm 7$</td>
<td>-66</td>
<td>-66</td>
<td>-66</td>
<td>-66</td>
<td>-65</td>
</tr>
</tbody>
</table>
Table 5.9: WSD-PMSE protection ratios: data links

<table>
<thead>
<tr>
<th>$\Delta F$ (dB)</th>
<th>Data links</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WSD Class 1</td>
</tr>
<tr>
<td>$\Delta F = \pm 8$</td>
<td>-67</td>
</tr>
<tr>
<td>$\Delta F = \pm 9$</td>
<td>-68</td>
</tr>
<tr>
<td>$\Delta F = \pm 10$</td>
<td>-69</td>
</tr>
<tr>
<td>$\Delta F = \pm 11$</td>
<td>-69</td>
</tr>
<tr>
<td>$\Delta F = \pm 12$</td>
<td>-70</td>
</tr>
<tr>
<td>$\Delta F = \pm 13$</td>
<td>-70</td>
</tr>
<tr>
<td>$\Delta F = \pm 14$</td>
<td>-71</td>
</tr>
<tr>
<td>$\Delta F = \pm 15$</td>
<td>-72</td>
</tr>
<tr>
<td>$\Delta F = \pm 16$</td>
<td>-72</td>
</tr>
<tr>
<td>$\Delta F = \pm 17$</td>
<td>-73</td>
</tr>
<tr>
<td>$\Delta F = \pm 18$</td>
<td>-73</td>
</tr>
<tr>
<td>$\Delta F = \pm 19$</td>
<td>-74</td>
</tr>
<tr>
<td>$</td>
<td>\Delta F</td>
</tr>
</tbody>
</table>
Table 5.10: WSD-PMSE protection ratios: Programme video links

<table>
<thead>
<tr>
<th>Frequency Adjacency (DTT channels)</th>
<th>Programme video links</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WSD Class 1</td>
</tr>
<tr>
<td>$\Delta F = 0$</td>
<td></td>
</tr>
<tr>
<td>$\Delta F = \pm 1$</td>
<td>-22</td>
</tr>
<tr>
<td>$\Delta F = \pm 2$</td>
<td>-33</td>
</tr>
<tr>
<td>$\Delta F = \pm 3$</td>
<td>-37</td>
</tr>
<tr>
<td>$\Delta F = \pm 4$</td>
<td>-38</td>
</tr>
<tr>
<td>$\Delta F = \pm 5$</td>
<td>-39</td>
</tr>
<tr>
<td>$\Delta F = \pm 6$</td>
<td>-41</td>
</tr>
<tr>
<td>$\Delta F = \pm 7$</td>
<td>-42</td>
</tr>
<tr>
<td>$\Delta F = \pm 8$</td>
<td>-44</td>
</tr>
<tr>
<td>$\Delta F = \pm 9$</td>
<td>-43</td>
</tr>
<tr>
<td>$\Delta F = \pm 10$</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 11$</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 12$</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 13$</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 14$</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 15$</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 16$</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 17$</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 18$</td>
<td>-45</td>
</tr>
<tr>
<td>$\Delta F = \pm 19$</td>
<td>-45</td>
</tr>
<tr>
<td>$</td>
<td>\Delta F</td>
</tr>
</tbody>
</table>

28. Note: the values for the protection ratios for wireless microphones are also used for talkback, programme audio links and data link equipment.

29. If the PMSE equipment type identifier provided in the PMSE assignment information does not correspond to any of the types identified in Tables 5.5 to 5.10 the protection ratios for wireless microphones shall be used.
SECTION 6

CALCULATION OF THE COVERAGE AREA OF A MASTER WSD

1. The WSDB calculations for deriving the coverage area of a Master WSD whose location is uncertain are set out in this Section. This coverage area is used to calculate Generic Operational Parameters for Slave WSDs, as an indication of the possible locations of Slave WSDs that could be served by the Master WSD.

2. This area is based on the location uncertainty and the coverage range of a Master WSD. For a Master WSD that reported nominal horizontal coordinates (x, y), and reported horizontal location uncertainties (±Δx, ±Δy), the coverage area will be modelled as a circle centred on (x, y), and with radius $d_0 + \sqrt{(\Delta x^2 + \Delta y^2)}$. Here, $d_0$ is the coverage range of the Master WSD. In short, the area of potential locations for Slave WSDs is the area of potential locations for the Master WSD, extended by $d_0$.

Figure 6.1: Coverage area of Master WSD

3. A WSDB shall calculate the coverage range, $d_0$, of a Master WSD by first estimating the minimum coupling gain between the Master WSD and its Slave WSDs, and then using a path loss model to estimate the range. These calculations are specified in this Section.

MINIMUM COUPLING GAIN

4. A WSDB shall calculate the minimum coupling gain, $m_{G,\text{min}}$, as

$$m_{G,\text{min}(dB)} = P_{\text{REFSENS}} (\text{dBm/100 kHz}) - P (\text{dBm/100 kHz}) + C_{\text{PL1}} \quad (6.1)$$

where

- $P$ is the EIRP spectral density of the Master WSD,
- $P_{\text{REFSENS}}$ is the minimum receiver (reference) sensitivity at the antenna connector of the Slave WSD, defined by the equipment technology specifications.
5. We next present the proposed values for the various parameters to be used in Equation 6.1.

**EIRP spectral density of the Master WSD (P) and frequency of the Master WSD broadcasts (f₀)**

6. Note: the frequency of the Master WSD broadcasts is used in table 6.2 below.

7. If the Master WSD reports one channel only in its Channel Usage Parameters, or if it reports explicitly the channel and power used for broadcasting generic operational parameter information, then P is equal to the EIRP spectral density reported, and f₀ is the centre frequency of the reported channel.

8. Else if the Master WSD reports more than one channel in its Channel Usage Parameters then let \( p_{0,CUP}(F) \) be the reported EIRP spectral density in DTT channel \( F \), and let \( f_{chF,CUP} \) be the centre frequency of the DTT channel \( F \). \( P \) is equal to the value of the EIRP spectral density \( p_{0,CUP}(F) \) that corresponds to the maximum value of

\[
p_{0,CUP}(F) - 20 \log_{10}(f_{chF,CUP})
\]  

(6.2)

i.e., that which results in the largest coverage range accounting for a square-law frequency dependence of radio propagation. \( f₀ \) is equal to the \( f_{chF,CUP} \) of the channel where the maximum value occurs.

9. Else if the Master WSD has not yet reported its Channel Usage Parameters when it makes the request for Generic Operational Parameters, then the WSDB shall first calculate Master Operational Parameters according to Section 2. It will then use the calculated Operational Parameters as follows: let \( p_{0,OP}(F) \) be the EIRP spectral density calculated in DTT channel \( F \), and let \( f_{chF,OP} \) be the centre frequency of the DTT channel \( F \). \( P \) is equal to the value of the EIRP spectral density \( p_{0,OP}(F) \) that corresponds to the maximum value of

\[
p_{0,OP}(F) - 20 \log_{10}(f_{chF,OP})
\]  

(6.3)

i.e., that which results in the largest coverage range accounting for a square-law frequency dependence of radio propagation. \( f₀ \) is equal to the \( f_{chF,OP} \) of the channel where the maximum value occurs.

**Slave WSD reference sensitivity**

10. The WSDB shall use the reference sensitivity level of the Slave WSD as quoted in the specifications of the WSD technology. Where multiple reference sensitivity levels are quoted for different modulation and coding schemes, the WSDB shall select the minimum value quoted. The WSDB shall identify the WSD technology through the reported technology ID of the Master WSD. If the technology ID of the Master WSD is not available, the WSDB shall use the default reference sensitivity value in Table 8.1 in Section 8 for the Slave WSD reference sensitivity.
MEDIAN PATH GAIN

11. The WSDB shall use the minimum coupling gain \( m_{G,\text{min}} \) found above, and an assumption about the antenna gain of the Slave WSD to calculate the median path gain \( m_p(d_0) \). It shall then use the SEAMCAT Extended Hata propagation model to find the separation distance \( d_0 \) that corresponds to the calculated median path gain.

12. The median path gain between the Master WSD and Slave WSD shall be calculated according to

\[
m_p(d_0) = m_{G,\text{min}} - G_{A,\text{Slave}} - G_{B,\text{Slave}} - G_W \tag{6.2}
\]

where

- \( m_{G,\text{min}} \) is the minimum coupling gain from Equation (6.1), and
- \( m_p(d_0) \) is the median path gain (< 0 dB), and
- \( G_{A,\text{Slave}} \) is the Slave WSD receiver antenna gain (\( \geq 0 \) dB).
- \( G_{B,\text{Slave}} \) is the body gain of the Slave WSD
- \( G_W \) is the building penetration gain

13. The values described in Table 6.1 below will be used in Equation 6.2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( m_p )</td>
<td>Median path gain Path gain is the negative of path loss (both in dB).</td>
</tr>
<tr>
<td>( G_{A,\text{Slave}} )</td>
<td>Slave WSD antenna gain</td>
</tr>
<tr>
<td></td>
<td>WSDBs shall use the following value:</td>
</tr>
<tr>
<td></td>
<td>( G_{A,\text{Slave}} = 0 ) dBi if the Master WSD is Type A,</td>
</tr>
<tr>
<td></td>
<td>( G_{A,\text{Slave}} = 0 ) dBi if the Master WSD is Type B</td>
</tr>
<tr>
<td>( G_{B,\text{Slave}} )</td>
<td>Body gain of the Slave WSD: -6 dBm</td>
</tr>
<tr>
<td>( G_W )</td>
<td>Building penetration gain</td>
</tr>
<tr>
<td></td>
<td>If the Master WSD is Type B and its antenna height is above 2 metres, then ( G_W = -7 ) dBm</td>
</tr>
<tr>
<td></td>
<td>else ( G_W = 0 ) dBm</td>
</tr>
</tbody>
</table>

14. The coverage range, \( d_0 \), is calculated applying the inverse of the SEAMCAT Extended Hata model\(^5\) to the value of \( m_p(d_0) \) that results from equation 6.2. The parameters in table 6.2 below shall be used in the inversed SEAMCAT Extended Hata.

Table 6.2: Parameters for the SEAMCAT Extended Hata model

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$h_{\text{Master}}$</td>
<td>Height of the Master WSD above ground level, which shall be calculated in accordance with Section 7. If the height is not reported or cannot be calculated, then WSDBs will use the default values from Table 8.1 in Section 8.</td>
</tr>
<tr>
<td>$h_{\text{Slave}}$</td>
<td>Height of the Slave WSD. The height of a generic slave WSD in Table 8.1 in Section 8 shall be used.</td>
</tr>
<tr>
<td>$d_0$</td>
<td>Horizontal separation between transmitter at the master WSD and receiver at the slave WSD. This is the unknown to be determined.</td>
</tr>
<tr>
<td>$f_0$</td>
<td>Frequency of the Master WSD broadcasts as specified in paragraphs 7 and 8.</td>
</tr>
<tr>
<td>Clutter type</td>
<td>This is the clutter type at the reported location of the Master WSD (location uncertainty shall not be taken into account). The WSDB shall use clutter information from the CORINE Landcover 2006 Raster dataset with 100 metres resolution(^6) for the Hata model calculation. The clutter information from the dataset shall be mapped onto urban, and suburban clutter designations. The CORINE dataset contains various land cover classes, including the “Continuous urban fabric” class which should be treated as Urban and all other classes treated as Suburban. If clutter information is not available for the location of the Master WSD, then the WSDB shall use clutter type “suburban”.</td>
</tr>
</tbody>
</table>

15. If the value of $m_p(d_0)$ that results from equation 6.2 is greater than the path gain given by the SEAMCAT Extended Hata model for a distance $d=1$ metre and the parameters in Table 6.2, then $d_0 = 0$ (See note\(^7\)).

16. Note that the extended Hata model shall be used so that the Master WSD is the base station and the Slave WSD is the terminal.

---


\(^7\) This situation may appear if the EIRP of the master is very low. In this case, a slave WSD will have to be very close to the master to receive its transmissions.
17. Note also that although the Hata model recommends using clutter at the terminal end, this section requires using it at the base station end. The clutter classes shall be mapped to clutter categories urban and suburban for use in the SEAMCAT Extended Hata propagation model using the mapping defined in Table 6.3.

18. The radius of the Master WSD coverage area is $d_0$. 
SECTION 7

CALCULATION OF WSD ANTENNA HEIGHT ABOVE GROUND LEVEL $h_{WSD}$

1. A WSD may report height above ground level $h_{WSD}$ directly to a WSDB. Alternatively, if it is the altitude, $h$, that is reported, then $h_{WSD}$ will be calculated as:

$$h_{WSD} = \max(h - h_T, 1.5) \text{ metres}$$

2. where $h_T$ is the local terrain height at the reported horizontal location of the WSD. WSDBs shall calculate the local terrain height by using the bi-linear interpolation method described in Rec. ITU-R P.1144\(^8\).

3. The local terrain height should be sought from the Ordnance Survey OS Terrain 50 product for locations in the United Kingdom, from the 50m Digital Terrain Model for Northern Ireland and from the Ordnance Survey Panorama product for locations in the Isle of Man. Ofcom will give guidance as to the edition of each product that should be used, which should normally be the most up-to-date version available. We recommend that this data is re-projected to the British grid system where appropriate. Note that when

   a. the WSD reports altitude, and
   b. there is uncertainty in the horizontal location of a WSD, i.e. the WSD reports horizontal location $(x,y)$ and location uncertainty $(\Delta x, \Delta y)$

then the WSDB shall evaluate $h_{WSD}$ only once, using the value of $h_T$ at the reported horizontal location $(x,y)$

4. The device altitude is specified in ETSI EN 301 598 as the WGS84 ellipsoidal height, but this must be transformed to be referenced to the local datum height using OSGM02 (ETRS89 – ODN orthometric height) in order to allow comparison with the terrain model. See http://www.ordnancesurvey.co.uk/business-and-government/help-and-support/navigation-technology/os-net/formats-for-developers.html

\(^8\) http://www.itu.int/rec/R-REC-P.1144/en
## SECTION 8

### PARAMETERS FOR WHICH OFCOM PROVIDES DEFAULT VALUES

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Parameter short name</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Device Emissions Class</td>
<td>EmissionClass</td>
<td>Class 5 according to EN 301 598</td>
</tr>
<tr>
<td>Height of Type A Master WSD</td>
<td>HeightMasterTypeA</td>
<td>20 metres</td>
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<tr>
<td>Height of Type B Master WSD</td>
<td>HeightMasterTypeB</td>
<td>1.5 metres</td>
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<tr>
<td>Height of a Type A Slave WSD</td>
<td>HeightSlaveTypeA</td>
<td>5 metres</td>
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<tr>
<td>Height of a Type B Slave WSD</td>
<td>HeightSlaveTypeB</td>
<td>1.5 metres</td>
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<tr>
<td>Height of a generic Slave WSD</td>
<td>HeightGenericSlave</td>
<td>1.5 metres</td>
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<tr>
<td>Height uncertainty</td>
<td>HeightUncertainty</td>
<td>0 metres, i.e. no uncertainty</td>
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<td>Technology Identifier</td>
<td>TechID</td>
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<td>Reference sensitivity of a Slave WSD</td>
<td>REFSENS</td>
<td>-114 dBm/100kHz</td>
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<tr>
<th>Parameter</th>
<th>Parameter short name</th>
<th>Value</th>
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<td>Maximum permitted nominal channel bandwidth</td>
<td>MaxNominalChBW</td>
<td>8 MHz</td>
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<td>Maximum permitted total bandwidth</td>
<td>MaxTotalChBW</td>
<td>8 MHz</td>
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<td>Location validity (L_Va)</td>
<td>Lval</td>
<td>50 metres</td>
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<td>Update timer (T_Update)</td>
<td>Tupdate</td>
<td>15 minutes</td>
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<td>Simultaneous channel operation power restriction</td>
<td>SimChRestrict</td>
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**Table 8.1: Default values for Device Parameters**

**Table 8.2: Default values for Operational Parameters**
Table 8.3: $P_{LA}$ limits

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<th>Channel</th>
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<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Channel 57</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Channel 58</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Channel 59</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Channel 60</td>
<td>-999</td>
<td>-999</td>
<td>-999</td>
<td>-999</td>
<td>-999</td>
<td>-999</td>
<td>-999</td>
<td>-999</td>
<td>-999</td>
<td></td>
</tr>
</tbody>
</table>

Note: $P_{LA}$ limits are in dBm/8MHz and can take values between 36 and -100. A value of -999 indicates that the channel is not available.
SECTION 9

FILE FORMATS AND DATA DEFINITIONS FOR WHITE SPACE DATA

1. This section describes the various files and formats. For each file delivered (or zipped archive of files) Ofcom will create an MD5 checksum file, so that the files integrity can be verified by comparing the checksum with a local checksum digest. The tool used to generate the checksum will be the Microsoft FCIV tool (https://www.microsoft.com/en-gb/download/confirmation.aspx?id=11533), with the checksum contained in an XML database file. The XML file shall share the same filename with an .xml extension. For example, if the data file PmseWsdData_yyyy-mm-ddThhmm.csv would have a corresponding file of PmseWsdData_yyyy-mm-ddThhmm.csv.xml.

PMSE assignment data

2. The PMSE assignment data will be made available in files with the CSV format. The file name will follow the convention:

   PmseWsdData_yyyy-mm-ddThhmm.csv

3. where yyyy is the year, mm, is the month, dd is the day, hh is the hour and mm is the minutes when the file was generated.

4. The contents of the file are described in Table 9.1.

5. All timing data shall be referenced to UK local time (i.e. not UTC/Zulu).

<table>
<thead>
<tr>
<th>Information element</th>
<th>Description</th>
<th>Range / values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment_ID</td>
<td>Unique identifier for the assignment</td>
<td>Integer, not bound</td>
</tr>
<tr>
<td>Equipment_Type_ID</td>
<td>Type of equipment used in the assignment.</td>
<td>Predefined values:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 – Talkback</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 – Wireless microphone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 – Programme link (audio)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 – Programme link (video)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(rare)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 – Data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>64 – In ear monitor</td>
</tr>
<tr>
<td>Venue_ID</td>
<td>References the polygon data defining the venue boundary for the assignment as provided in input #7. If empty no venue boundary is available for the assignment.</td>
<td>0 to 9999999</td>
</tr>
<tr>
<td>X_Coord</td>
<td>Eastings of the PMSE receiver antenna (expressed to a precision of one metre) referenced to the Ordnance Survey National Grid</td>
<td>-50,000 to 750,000</td>
</tr>
</tbody>
</table>
DTT co-existence data

6. The Operator shall use the datasets provided by Ofcom which correspond to each of the following parameter combinations:

- WSD height above ground: \( H = 1.5, 5, 10, 15, 20, 30, \) and “\( D \)” metres, where “\( D \)” represents a default height (a mixture of 10 and 30 metres) for Type A WSDs.

- WSD emission class: \( CL = 1, 2, 3, 4, 5. \)

7. There will be 35 of such datasets (7 height values for each 5 class value). Each dataset will be split in 20 files, each file corresponding to a different geographical area in the UK and the Isle of Man. Table 9.2 below lists the 20 files and the corresponding geographical areas:
Table 9.2: Dataset files and corresponding geographical areas

<table>
<thead>
<tr>
<th>Area</th>
<th>File code</th>
<th>SW corner(m)</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Eastings(m)</td>
<td>Northings(m)</td>
</tr>
<tr>
<td>01</td>
<td>UK_01</td>
<td>200000</td>
<td>900000</td>
</tr>
<tr>
<td>02</td>
<td>UK_02</td>
<td>0</td>
<td>600000</td>
</tr>
<tr>
<td>03</td>
<td>UK_03</td>
<td>0</td>
<td>500000</td>
</tr>
<tr>
<td>04</td>
<td>UK_04</td>
<td>400000</td>
<td>300000</td>
</tr>
<tr>
<td>05</td>
<td>UK_05</td>
<td>400000</td>
<td>400000</td>
</tr>
<tr>
<td>06</td>
<td>UK_06</td>
<td>0</td>
<td>400000</td>
</tr>
<tr>
<td>07</td>
<td>UK_07</td>
<td>200000</td>
<td>300000</td>
</tr>
<tr>
<td>08</td>
<td>UK_08</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>09</td>
<td>UK_09</td>
<td>100000</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>UK_10</td>
<td>300000</td>
<td>100000</td>
</tr>
<tr>
<td>11</td>
<td>UK_11</td>
<td>300000</td>
<td>200000</td>
</tr>
<tr>
<td>12</td>
<td>UK_12</td>
<td>300000</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>UK_13</td>
<td>500000</td>
<td>200000</td>
</tr>
<tr>
<td>14</td>
<td>UK_14</td>
<td>500000</td>
<td>100000</td>
</tr>
<tr>
<td>15</td>
<td>UK_15</td>
<td>500000</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>UK_16</td>
<td>0</td>
<td>900000</td>
</tr>
<tr>
<td>17</td>
<td>UK_17</td>
<td>0</td>
<td>700000</td>
</tr>
<tr>
<td>18</td>
<td>UK_18</td>
<td>300000</td>
<td>700000</td>
</tr>
<tr>
<td>19</td>
<td>UK_19</td>
<td>400000</td>
<td>1000000</td>
</tr>
<tr>
<td>20</td>
<td>UK_20</td>
<td>300000</td>
<td>900000</td>
</tr>
</tbody>
</table>

8. The following naming convention will be used to uniquely identify each file:

   UK_{aa}_{p}_{hhhh}_{ddmmyy}.csv, where:

   - **aa** is a two digit code corresponding to the area according to the first column of Table 9.2 above;
   - **p** is a one digit code corresponding the device emissions class and can take the values 1, 2, 3, 4, 5;
   - **hhhh** is a four digit code corresponding the height in centimetres and can take the values in table 9.3:
### Table 9.3: Height datasets for DTT protection

<table>
<thead>
<tr>
<th>Height</th>
<th>Four digits code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 metres</td>
<td>0150</td>
</tr>
<tr>
<td>5 metres</td>
<td>0500</td>
</tr>
<tr>
<td>10 metres</td>
<td>1000</td>
</tr>
<tr>
<td>15 metres</td>
<td>1500</td>
</tr>
<tr>
<td>20 metres</td>
<td>2000</td>
</tr>
<tr>
<td>30 metres</td>
<td>3000</td>
</tr>
<tr>
<td>Default</td>
<td>DDDD</td>
</tr>
</tbody>
</table>

- dd is a two digit code corresponding to the day of the date the file was generated;  
- mm is a two digit code corresponding to the month of the date the file was generated; and  
- yyyy is a four digit code corresponding to the year of the date the file was generated.  
- csv is the format of the files.

### 9. Examples

- UK_01_3_0150_21092013.csv describing UK Area 1, Protection Ratio class 3, Height 1.5 m, and date 21/09/2013.  
- UK_14_4_2000_25092013.csv describing UK Area 14, Protection Ratio class 4, Height 20 m and date 25/09/2013.

### 10. Each file will have 42 columns and a large number of rows. Each row will contain the information in Table 9.4 below. The first row will be the header and will list the information element names.

#### Table 9.4: Fields in the DTT protection files

<table>
<thead>
<tr>
<th>Information element name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easting</td>
<td>Eastings coordinate of the lower-left corner of a 100m x 100m pixel. This is in metres</td>
</tr>
<tr>
<td>Northing</td>
<td>Northings coordinate of the lower-left corner of a 100m x 100m pixel. This is in metres</td>
</tr>
<tr>
<td>CH21</td>
<td>Maximum permitted WSD in-block EIRP in Channel 21 in dBm/(8 MHz) and may take integer values between -60 and +36</td>
</tr>
<tr>
<td>....</td>
<td>Maximum permitted WSD in-block EIRP in Channel 60 in dBm/(8 MHz) and may take integer values between -60 and +36</td>
</tr>
</tbody>
</table>

### 11. A value -999 for the maximum permitted WSD in-block EIRP in any channel indicates that the channel is not available
Unscheduled adjustments to maximum WSD power

12. Ofcom will provide the unscheduled adjustments in a CSV file. The file name will follow the convention:

```
UnscheduledAdjustment_yyyy-mm-ddThhmm.csv
```

13. where yyyy is the year, mm, is the month, dd is the day, hh is the hour and mm is the minutes when the file was generated.

14. with a number of rows, each row corresponding to an unscheduled adjustment region specified by southwest corner, a northings size and an eastings size. The parameters in each adjustment are described below.

<table>
<thead>
<tr>
<th>Information element</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastings</td>
<td>Eastings coordinate of the lower-left corner of a unscheduled adjustment tile. This is in metres</td>
</tr>
<tr>
<td>Northings</td>
<td>Northings coordinate of the lower-left corner of a unscheduled adjustments tile. This is in metres</td>
</tr>
<tr>
<td>Eastings_size</td>
<td>Size of the tile in the Eastings dimension in metres</td>
</tr>
<tr>
<td>Northings_size</td>
<td>Size of the tile in the Northings dimension in metres</td>
</tr>
<tr>
<td>T_update</td>
<td>Update timer $T_{update}$ value to be included in the operational parameters for devices whose reported location is in the geographical area of the adjustment, in seconds. No change if empty</td>
</tr>
<tr>
<td>Location_validity</td>
<td>$L_{val}$ value to be included in the operational parameters for devices whose reported location is in the geographical area of the adjustment, in metres. No change if empty</td>
</tr>
<tr>
<td>Max_nominal_ch_BW</td>
<td>Maximum permitted nominal channel bandwidth to be included in the operational parameters for devices whose reported location is in the geographical area of the adjustment, in Hz. No change if empty</td>
</tr>
<tr>
<td>Max_total_BW</td>
<td>Maximum permitted total bandwidth to be included in the operational parameters for devices whose reported location is in the geographical area of the adjustment, in Hz. No change if empty</td>
</tr>
<tr>
<td>Simultaneous_channel</td>
<td>Simultaneous channel operation power restriction to be included in the operational parameters for devices whose reported location is in the geographical area of the adjustment, takes value 0 or 1. No change if empty</td>
</tr>
<tr>
<td>Channel21_Adj</td>
<td>Adjustment for $P_1$ in dBm for channel 21 to be included in the operational parameters for devices whose reported location is in the geographical area of the adjustment. No adjustment if empty</td>
</tr>
<tr>
<td>Channel60_Adj</td>
<td>Adjustment for $P_1$ in dBm for channel 60 to be included in the operational parameters for devices whose reported location is in the geographical area of the adjustment. No adjustment if empty</td>
</tr>
<tr>
<td>Remarks</td>
<td>Comments field, free text</td>
</tr>
</tbody>
</table>

15. A $P_1$ adjustment value of -999 means that the channel is not available for WSD emissions.

16. The maximum value of the $P_1$ adjustment is 36 dBm.
Venue boundary data

17. Ofcom will provide the venue boundary polygon data in ESRI ArcInfo shapefile format (comprising several files containing vertex and other data)). The file names will follow the convention:

   PMSEVenues_yyyy-mm-ddThhmm

18. where yyyy is the year, mm, is the month, dd is the day, hh is the hour and mm is the minutes when the file was generated.

19. Each polygon shall contain a unique identifier in the column named Venue_ID in the allied dBase table. The Venue_ID corresponds with that for a particular PMSE assignment in the PMSE assignment data file.

20. The venue boundary file shall contain all venues.

21. The polygons shall be expressed in the OSGB36 planar coordinate reference system.

Default values

22. The default values dataset comprises the default values for device parameters (Table 8.1), the default values for operational parameters (Table 8.2) and the location agnostic limits (Table 8.3).

23. Ofcom will provide the default values in Tables 8.1 and 8.2 in a CSV file. The file name will follow the convention:

   DefaultValues_yyyy-mm-ddThhmm.csv

24. where yyyy is the year, mm, is the month, dd is the day, hh is the hour and mm is the minutes when the file was generated.

---

25. The CSV file will contain a column with the parameter short names as in Table 8.1 and 8.2, a second column with the parameter values and a third column with the units of the parameters. This is shown below with example values:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EmissionClass</td>
<td>Class 5</td>
<td></td>
</tr>
<tr>
<td>HeightMasterTypeA</td>
<td>20</td>
<td>metres</td>
</tr>
<tr>
<td>HeightMasterTypeB</td>
<td>1.5</td>
<td>metres</td>
</tr>
<tr>
<td>HeightSlaveTypeA</td>
<td>5</td>
<td>metres</td>
</tr>
<tr>
<td>HeightSlaveTypeB</td>
<td>1.5</td>
<td>metres</td>
</tr>
<tr>
<td>HeightGenericSlave</td>
<td>1.5</td>
<td>metres</td>
</tr>
<tr>
<td>HeightUncertainty</td>
<td>0</td>
<td>metres</td>
</tr>
<tr>
<td>TechID</td>
<td>Generic</td>
<td></td>
</tr>
<tr>
<td>REFSENS</td>
<td>-114</td>
<td>dBm/100kHz</td>
</tr>
<tr>
<td>MaxNominalChBW</td>
<td>8</td>
<td>MHz</td>
</tr>
<tr>
<td>MaxTotalChBW</td>
<td>8</td>
<td>MHz</td>
</tr>
<tr>
<td>Lval</td>
<td>50</td>
<td>metres</td>
</tr>
<tr>
<td>Tupdate</td>
<td>15</td>
<td>minutes</td>
</tr>
<tr>
<td>SimChRestrict</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

26. Ofcom will provide the location agnostic files in Table 8.3 in a CSV file. The file name will follow the convention:

LALimits_yyyymm-ddThhmm.csv

27. where yyyy is the year, mm, is the month, dd is the day, hh is the hour and mm is the minutes when the file was generated.

28. The format of the CSV file will be as in Table 8.3, i.e. a header row, a header column, and the actual numeric values.
SCHEDULE 3
DATA TRANSFER SPECIFICATION

General

1. Ofcom will put in place a file transfer service, accessible over the internet, to provide the Operator with the White Space Data specified in Clause 6. The White Space Data consists of:

   (a) the DTT co-existence dataset
   (b) the PMSE assignments dataset
   (c) the unscheduled adjustments dataset
   (d) the PMSE venues dataset; and
   (e) the default values dataset.

2. Ofcom will provide the Operator with a user account so that the Operator can access the file transfer service as soon as reasonably practicable following the Commencement Date. The user account will consist of a set of credentials: username and password.

3. The file transfer service will be accessible by any of the following protocols: HTTPS, SFTP

4. The web address for the service will be: MFT.ofcom.org.uk

5. There will be a folder for the operational White Space Data (the main White Space Data folder).

6. Ofcom will allow the Operator access to the operational White Space Data folder and its subfolders as soon as reasonably practicable following successful completion of the Qualification Assessment by the Operator.

DTT co-existence dataset

7. Ofcom will make available a DTT co-existence data file for each combination of the following:

   (a) 20 UK and Isle of Man geographical areas as specified in Section 9 in Schedule 2;
   (b) 5 device emission classes; and
   (c) 7 device height values.

8. The file name convention and the format of the contents for the DTT co-existence dataset files is specified in Section 9 in Schedule 2.

9. The files will be compressed in the 7z format. There will be a 7z file for each UK and Isle of Man geographical area. The 7z file will contain all the DTT co-existence files for the combinations of device emission class and height for that UK geographical area. This
means that Ofcom will make available 20 7z files each one containing 35 DTT-coexistence files.

10. The following naming convention will be used for the 7z files:

   UK_aa_ddmmyyyy.7z, where:

   - aa is a two digit code corresponding to the geographical area described in Schedule 2 Section 9
   - dd is a two digit code corresponding to the day of the date the file was generated;
   - mm is a two digit code corresponding to the month of the date the file was generated; and
   - yyyy is a four digit code corresponding to the year of the date the file was generated.

11. Together with each zip file, Ofcom will make available a hash of the contents of the zip file.

12. All 20 zip files will be located in the DTT co-existence subfolder, within the main White Space Data folder.

**Initial provision of the DTT co-existence dataset**

13. Ofcom will allow access to the operational DTT co-existence dataset as soon as reasonably practicable following successful completion of the Qualification Assessment by the Operator.

14. The Operator will have to download the zip files for the UK and Isle of Man geographical regions for which it wants to provide WSDB Services.

**Update of the DTT co-existence dataset**

15. Ofcom may, from time to time, need to update one or more of the DTT co-existence files. In this event, Ofcom will remove one or more of the zip files and replace them with an updated version of that file.

16. Ofcom will inform the Operator by email:

   (a) that a new zip file is available. It will also inform the Operator by email which of the DTT co-existence files inside the zip container has been updated. The file name of the DTT co-existence file includes a timestamp (see Schedule 2) which will show the new date; and

   (b) the time and date by which the Operator must take the updated DTT co-existence file(s) into account in its calculations of Operational Parameters.

**PMSE assignments dataset**

17. Ofcom will make available every 5 minutes an updated dataset with all the PMSE assignments active at the time that the dataset is generated and all the assignments that will become active in the next 96 hours.
18. The file name convention and the format of the contents for the PMSE assignments dataset is specified in Section 9 in Schedule 2.

19. The PMSE assignments dataset subfolder will be located in a dedicated subfolder within the main White Space Data folder.

20. Ofcom will remove expired PMSE assignments dataset files, i.e. those that were generated more than 5 minutes previously, at the same time it makes available a new update.

21. Given the short time interval between updates, it may be that the contents of an update are the same as the contents of the previous update. For the avoidance of doubt, Ofcom will still generate a new update file, with the correct filename, even if the contents do not change.

22. Together with the update file, Ofcom will make available a hash of the contents of the file. For the purposes of Clause 6.13 of this Contract, the Operator may choose to download each update file that Ofcom makes available, or to download the update only if its hash checksum is different from the checksum of previous update that the Operator has already downloaded.

**Unscheduled adjustments dataset**

23. Ofcom may make available from time to time an unscheduled adjustments dataset file. Ofcom will only make available a new unscheduled adjustments dataset file when it needs to introduce a change in the existing unscheduled adjustments. A change could be the addition of a new adjustment, or the removal or modification of an existing adjustment. As a result, the contents of an unscheduled adjustments dataset file will always differ from the previous unscheduled adjustment.

24. A new unscheduled adjustments dataset replaces the previous unscheduled adjustment dataset, i.e. they do not stack one on top of the other.

25. Ofcom will remove expired files at the same time it makes available a new unscheduled adjustments dataset file.

26. For any locations that are not explicitly included in an unscheduled adjustments dataset file, then there is no adjustment for any parameter. For instance, Ofcom may send an unscheduled adjustment that does not contain any pixel, just the file headers. This would allow Ofcom to clear the previous adjustments from all pixels.

27. Together with the file, Ofcom will make available a hash of the contents of the file.

28. The file name convention and the format of the contents for the unscheduled adjustments dataset file is specified in Section 9 in Schedule 2.

29. The unscheduled adjustments dataset will be located in a dedicated subfolder within the main White Space Data folder.
PMSE venues dataset

30. Ofcom will allow access to the initial PMSE venues dataset as soon as reasonably practicable following successful completion of the Qualification Assessment by the Operator.

31. Ofcom may make available from time to time an update to the PMSE venues dataset. An update of the dataset replaces the previous PMSE venues dataset entirely.

32. Ofcom will remove expired files at the same time it makes available a new update.

33. Together with the update file, Ofcom will make available a hash of the contents of the file.

34. The file name convention and the format of the contents for the PMSE venues dataset file is specified in Section 9 in Schedule 2.

35. The PMSE venues dataset will be located in a dedicated subfolder within the main folder.

Default values dataset

36. Ofcom will allow access to the file with the default values dataset as soon as reasonably practicable following successful completion of the Qualification Assessment by the Operator.

37. The default values dataset will be in a two CSV files. The first CSV file contains the parameters and their default values, and the second CSV file the location agnostic limits.

38. The default values dataset will be located in a dedicated subfolder within the main folder.

39. Ofcom may, from time to time, need to change one or more of default values or location agnostic limits. An update of the default values file replaces the previous file entirely. Similarly, an update of the location agnostic limits file replaces the previous file entirely. Ofcom will remove expired files at the same time it makes available a new update.

40. Together with the files, Ofcom will make available a hash of the contents of the files.

41. The file name convention and the format of the contents for the default values and location agnostic limits files are specified in Section 9 in Schedule 2.
SCHEDULE 4
INFORMATION AND INTERFERENCE MANAGEMENT SYSTEMS TO BE PROVIDED TO OFCOM AS PART OF THE WHITE SPACE INFORMATION PLATFORM (WSIP)

1. In accordance with the terms of Clause 11, Clause 12 and Clause 13 of this Contract the Operator must make available to Ofcom a number of web services interface systems. This schedule provides a high level overview of those systems, which shall form part of the White Space Information Platform (WSIP), and the response that Ofcom expects from the Operator to Ofcom requests using those systems, including, where relevant, an outline of the information to be provided in response. The detailed protocol and functional specification of these systems will be set out in the latest version of the White Space Information Platform (WSIP) Interface specification (“WSIP Specification”), which is a living document that will be updated by Ofcom from time to time following discussions with the Operator and All Other Operators.

2. The Operator must make available to Ofcom the following systems:

The White Space Devices Information System (WSDIS)

3. The White Space Devices Information System as required under Clause 12 shall support two functions:

The White Space Devices Information System (WSDIS) function

4. This function provides Ofcom with the list of WSDs that meet certain criteria, and certain information about those WSDs.

5. Specifically, Ofcom will generate a request that contains the following criteria: geographical area, time period and frequency range.

6. The Operator’s system shall respond with the list of devices that meet the criteria, and provide for each device: the Device Parameters reported by the device\(^\text{10}\), some of the Operational Parameters communicated by the Operator to the device, and the Channel Usage Parameters reported by the device.

The availability parameters function

7. This function provides Ofcom with the list of WSDs that meet certain criteria, the characteristics of those WSDs and the full set of Operational Parameters that the WSDB has provided to those WSDs.

8. Ofcom will generate a request that contains the following criteria: geographical area, time period and frequency range.

\(^\text{10}\) Note that, for the purposes of this request, the Unique_ID of the WSDs shall not include the unique serial number of a WSD as provided by a device manufacturer, but instead shall be an anonymised string of characters to be used for the purposes of identifying a specific device in response to Ofcom’s request.
9. The Operator’s system shall respond with the list of devices that meet the criteria, and provide for each device: the Device Parameters reported by the device\textsuperscript{11}, the full set of Operational Parameters communicated by the Operator to the device, and the Channel Usage Parameters reported by the device.

white space use data

10. Collectively, the information which is reported by an Operator about a device in response to a request by Ofcom using the White Space Devices Information System is “\textbf{White Space Use Data}” as defined in Clause 12.1. A full specification of the information required in response to a request from Ofcom using these interfaces will be set out in the WSIP Specification.

interference management tools

11. The Operator shall put in place a system that implements the following functions in support of the interference management requirements in Clause 13 of this Contract:

\textbf{Restrict transmissions function}

12. This function allows Ofcom to request the Operator to restrict the channels available to a device(s), the powers at which a device(s) can operate, or the T\_update parameter for a device(s) (i.e. an Operational Parameters Restriction).

13. Ofcom will send a request to the Operator’s system containing the UniqueID of the device(s), and the period of time when the restrictions shall be in place.

14. The Operator’s system shall respond with an acknowledgement of the request, and communicate the restrictions to the device(s).

\textbf{Cease transmissions function}

15. This function allows Ofcom to request the Operator to instruct a WSD or WSDs to cease transmission (i.e. a Cease Transmissions Instruction).

16. The restrict transmissions function will be used for the purposes of requesting or responding to a request for a Cease Transmissions Instruction. This will take the form of a restriction to the effect that no power is available to the applicable WSD or WSDs in any DTT channel.

\textbf{The restricted list function}

17. This function allows Ofcom to query the WSDB for the list of devices that are subject to an Operational Parameters Restriction or a Cease Transmissions Instruction (i.e. the Restricted WSD List).

18. Ofcom will send a message to the Operator’s system requesting the list.

\textsuperscript{11} Note that, for the purposes of this request, the response shall not include the unique serial number of a WSD as provided by a device manufacturer, but instead this parameter shall be reported in response as ‘0000’ for each device included within the request.
19. The Operator’s system shall respond with the list of devices subject to restrictions, and the
details of the restriction.

Re-enable device function

20. This function allows Ofcom to request the Operator to remove a Cease Transmissions
Instruction or an Operational Parameters Restriction imposed on a device.

21. Ofcom will send a request to the Operator’s system with the UniqueID of the device to be
re-enabled.

22. The Operator’s system shall remove the device from the Restricted WSD List, and confirm
to Ofcom that it has done so.

The dataset request function

23. This function allows Ofcom to request the Operator provide a list of dataset files that it is
currently using in its calculations of Operational Parameters for devices.

24. Ofcom will send a request message to the Operator’s system requesting the list.

25. The Operator's system shall respond with the list of White Space Data files that it is using
for the calculation of Operational Parameters, and the time when each file was
incorporated to the calculations.

The Operational Parameters Information System

26. The Operational Parameters Information System referred to in Clause 11 shall support one
function, the operational parameters function. This function allows Ofcom to request the
Operator’s system for Operational Parameters for a simulated device.

27. Ofcom will send the Operator’s system a request including the Device Parameters of one
or more simulated devices, an indication of whether the request is for generic or specific
Operational Parameters, and additional parameters required in the case of a generic
calculation

28. The Operator’s system shall respond with the Operational Parameters for each device in
the request.
SCHEDULE 5

SERVICE LEVEL ARRANGEMENTS (SLAs) FOR THE WEB SERVICES INTERFACES

1. These Service Level Arrangements apply to the provision by the Operator of the following web services functionalities as part of the WSIP (each being a “Service” and collectively “the Services”):

   (a) the Operational Parameters Information System (as described in Clause 11 and Schedule 4);

   (b) the White Space Devices Information System (as described in Clause 12 and Schedule 4);

   (c) the interface for Operational Parameters Restriction requests (as described in Clause 13.15 and Schedule 4);

   (d) the interface for Cease Transmissions Instruction requests (as described in Clause 13.21 and Schedule 4);

   (e) the Restricted WSD List interface (as described in Clause 13.25 and Schedule 4);

   (f) the interface for requests for the removal of restrictions on WSDs (as described in Clause 13.28 and Schedule 4); and

   (g) the interface for querying the White Space Data files implemented by a WSDB (as described in Clause 13.31 and Schedule 4).

2. The Operator shall ensure that the Services are generally available at all times, except in cases of scheduled maintenance or downtime which shall be notified to Ofcom in accordance with paragraph 5 below, or where the unavailability is due to circumstances beyond the Operator’s reasonable control.

3. The Parties agree that the Operator will be considered to be providing an acceptable level of availability for the Services, provided that the Operator meets at least a 99.5% uptime service availability level in respect of each of the Services at the end of each calendar month following commencement of the provision of WSDB Services. This shall be calculated as follows:

   (a) The uptime service availability level shall be the total actual uptime minutes divided by total possible uptime minutes in the month, as calculated at the end of each calendar month x 100. So that (Actual Uptime/Potential Uptime) x 100 = Uptime Service Availability percentage

   (b) Scheduled maintenance which has been notified to Ofcom in advance in accordance with paragraph 5 shall not be counted as downtime, but any maintenance which has not been notified to Ofcom in advance in accordance with paragraph 5 shall be counted as downtime.

   So, if in January the possible total uptime = X, and the total scheduled maintenance in January = Y, then for the calculation in paragraph 3(a) “Potential Uptime” = (X-Y).
4. The Operator shall maintain records for the purposes of demonstrating whether the uptime service availability target has been met and shall provide these to Ofcom on request.

5. Scheduled maintenance or downtime shall take place at times or in accordance with a schedule agreed between the Operator and Ofcom, and, wherever practicable, shall be scheduled during the hours of 00:00 to 15:59 UK time on Working Days (i.e. wherever practicable, it should not be scheduled during the hours of 16:00 to 23:59 UK time or on non-Working Days). The Operator shall consult Ofcom as far in advance as reasonably practicable of any scheduled maintenance or downtime which will result in the unavailability of a Service and no less than 24 hours in advance of the maintenance or downtime where possible. Ofcom may request that the Operator reschedules maintenance or downtime and the Operator shall use all reasonable endeavours to comply with such a request.

6. The Operator shall at all times use all reasonable endeavours to keep any service interruptions to a minimum.

7. Where it is not reasonably practicable for the Operator to give Ofcom advance notice of downtime of a Service, the Operator shall inform Ofcom as soon as possible after becoming aware that the Service is unavailable and shall wherever possible give Ofcom its best estimate as to when it is expected that the Service will be available again.

8. Where a Service becomes unavailable for reasons other than scheduled maintenance or downtime, the Operator shall use all reasonable endeavours to seek to resolve the issue and make the system available to Ofcom as soon as reasonably practicable.

9. In the case of the downtime of a Service (whether for scheduled maintenance or otherwise), Ofcom may make a request for assistance to the Interference Management Team in the place of querying the WSIP. In such a case, where reasonably practicable given the nature and scope of the request, the Interference Management Team shall provide the requested assistance within two hours of the request being made. Where it is not reasonably practicable for the Operator to provide the requested assistance within that time period (for example, due to the request for assistance being made outside of Normal Office Hours), the Parties shall agree an appropriate period of time for the Operator to provide the requested assistance (which may be a standard target response time agreed in advance).
**SCHEDULE 6**

**PROVISION OF WSDB SERVICES TO MCWSDs**

1. This Schedule 6 applies where an Operator provides WSDB Services to MCWSDs. For the avoidance of doubt, no Operator shall be required to provide WSDB Services to MCWSDs; the choice of whether or not to do so is at the Operator’s discretion.

**Interpretation**

2. For the purposes of this Schedule, the following words shall have the following meanings:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Antenna Location Parameters”</td>
<td>means the antenna horizontal location of a WSD, i.e. longitude and latitude coordinates of the Master WSD antenna, which is part of the Device Parameters for a WSD;</td>
</tr>
<tr>
<td>“Automatic Geo-Location Capability”</td>
<td>means, in respect of a White Space Device, the ability of that Device to determine the latitude and longitude coordinates of its antenna and the geo-location uncertainty in those latitude and longitude coordinates: a) without the need for a user of the Device to access its hardware or software settings; and b) in a way which does not allow a user to input, configure, reconfigure or alter how those location parameters are determined or communicated to a White Space Database;</td>
</tr>
<tr>
<td>“Automatically Configured Device Parameter”</td>
<td>means a Device Parameter which is not a Manually Configured Device Parameter;</td>
</tr>
<tr>
<td>“Discoverable List of MCWSD Databases”</td>
<td>means the list of Designated WSDBs which are Qualified to provide WSDB Services to MCWSDs that will be hosted on a domain that is under the control of Ofcom and that will be discoverable to MCWSDs via an internet connection;</td>
</tr>
<tr>
<td>“Installation Record”</td>
<td>means a record providing the details about the installation of an MCWSD, as specified in Table 1 below, which is to be provided to the Operator by a MCWSD Licensee (or its authorised representative) in respect of each of the MCWSDs operated by the MCWSD Licensee to which the Operator’s WSDB may provide Operational Parameters, and which is to be updated from time to time by the MCWSD Licensee where the information included in the record changes;</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>“Fixed”</td>
<td>means that a device will only transmit at a fixed location;</td>
</tr>
<tr>
<td>“LicenceID”</td>
<td>means the licence number of the licence issued by Ofcom under which the MCWSD is authorised to operate;</td>
</tr>
<tr>
<td>“Location Uncertainty Parameters”</td>
<td>means the uncertainty in the antenna horizontal location corresponding to a ninety-five per cent confidence level, which is part of the Device Parameters for a WSD;</td>
</tr>
<tr>
<td>“Manually Configurable White Space Device” or “MCWSD”</td>
<td>means a White Space Device that allows a user of the Device to input, configure, reconfigure or alter any technical or operational settings or features of the Device in a way which would affect the Device Parameters or any other technical characteristics of the Device which are communicated to a White Space Database, or its operation in accordance with Operational Parameters;</td>
</tr>
<tr>
<td>“Manually Configured Device Parameter”, “Manually Configured Master Device Parameters”, “Manually Configured Slave Device Parameters”</td>
<td>means a Device Parameter which is listed as <code>Manually Configured</code> in the Configuration field of the Installation Record for a MCWSD as set out in Table 1 below. For these purposes, a Device Parameter is <code>Manually Configured</code> if the information about the relevant technical characteristic of the White Space Device is input into the hardware or software settings of the White Space Device by the MCWSD Licensee or a person duly authorised by the MCWSD Licensee;</td>
</tr>
<tr>
<td>“MCWSD Licensee”</td>
<td>means a person who is licensed by Ofcom to establish, install or use MCWSDs in the UHF TV band;</td>
</tr>
<tr>
<td>“MCWSD Licensee Request”</td>
<td>has the meaning given to it in paragraph 19 of this Schedule;</td>
</tr>
<tr>
<td>“MCWSD Services Qualification Assessment”</td>
<td>means the qualification assessment process, including various tests, that the Operator must pass in order to qualify to provide WSDB Services to MCWSDs;</td>
</tr>
<tr>
<td>“Mobile”</td>
<td>means that a device may transmit while in motion.</td>
</tr>
</tbody>
</table>

**Qualification requirements for providing WSDB Services to MCWSDs**

3. An Operator shall not be entitled to and shall not provide any WSDB Services to MCWSDs until it has been notified by Ofcom in writing that its WSDB has passed the MCWSD Services Qualification Assessment, details of which are set out in paragraph 4 below.

4. The MCWSD Services Qualification Assessment will consist of tests carried out by Ofcom, or a third party authorised to act on behalf of Ofcom, to verify compliance with the specific requirements in this Schedule outlined at paragraphs 7 to 24 below (the “Simulated
Tests”). For the purposes of the MCWSD Services Qualification Assessment, the Operator shall, at no charge to Ofcom:

(a) make available to Ofcom:

i) a Manually Configurable White Space Device or a virtual Manually Configurable White Space Device which can access the Operator’s White Space Database using the same protocols as those which will be used by the MCWSDs to which the Operator would provide WSDB Services following Qualification;

ii) the interfaces for the functions described in paragraphs 12 to 24 below;

iii) the Operational Parameters Information System (as described in Clause 10 and Schedule 4), the White Space Devices Information System (as described in Clause 12 and Schedule 4) and the interfaces for the functions described in Clause 13 and Schedule 4; and

iv) any interface that it intends to put in place for the purpose of allowing MCWSD Licensees to submit Installation Records to the WSDB; and

(b) provide Ofcom or its authorised third party all reasonable co-operation and information as may be requested by Ofcom, in order for Ofcom to conduct the Simulated Tests.

5. Clause 5 shall apply to the MCWSD Services Qualification Assessment with any necessary adjustment. In particular, where an Operator has demonstrated to the reasonable satisfaction of Ofcom that it has passed the MCWSD Services Qualification Assessment within the Qualification Period, Ofcom shall:

(a) notify the Operator that it has passed the MCWSD Services Qualification Assessment; and

(b) following notification by the Operator that it is ready to start providing WSDB Services to MCWSDs and wishes its WSDB to be added to the Discoverable List of MCWSD Databases, take the necessary steps to add the URL to that list.

Provision of services to MCWSDs

6. Before providing WSDB Services to the MCWSDs operated by a MCWSD Licensee, an Operator must obtain from the Licensee details of:

(a) the Licensee’s full name and contact details; and

(b) the Licensee’s LicenceID.

7. Operators must maintain and keep up to date copies of the Installation Records submitted to it by MCWSD Licensees for each of the MCWSDs to which it provides WSDB Services until one month after:
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(a) it has been notified by the MCWSD Licensee that the relevant MCWSD has been decommissioned and is no longer in service; or

(b) the Operator stops providing WSDB Services to the MCWSD Licensee in respect of the relevant MCWSDs.

For the avoidance of doubt, the method by which the Licensee provides Installation Records to the WSDB shall be agreed between the Operator and the Licensee.

Identification of a MCWSD

8. An Operator shall ensure that its WSDB treats a request for Operational Parameters as having been made by a MCWSD if the UniqueID of the WSD making the request for Operational Parameters matches the UniqueID of a WSD for which it holds an Installation Record. Conversely, if the Operator does not hold an Installation Record in respect of the WSD making a request for Operational Parameters, subject to any instruction from Ofcom in accordance with Clause 7.4A specifying that a particular model of WSD should be treated as an MCWSD, it may treat the request as from an automatically configured WSD operating under the terms of the Licence Exemption Regulations.

Provision of Operational Parameters to MCWSDs

9. In addition to the requirements set out in Clauses 7.4 to 7.9, if the Operator has identified that a request for Operational Parameters corresponds to a MCWSD in accordance with paragraph 8 of this Schedule, the Operator may provide Operational Parameters to that MCWSD only where the following conditions are met:

(a) where the request is for Master Operational Parameters or Generic Operational Parameters:

   i. if the Master Device Parameters that it has received from the Master MCWSD when requesting the Master Operational Parameters or Generic Operational Parameters match any Manually Configured Master Device Parameters listed in the Installation Record for that Master MCWSD; and

   ii. if the Installation Record states that the Master MCWSD is a ‘Fixed’ device, or, where it states that is a ‘Mobile’ device, it also states that it has an Automatic Geo-Location Capability.

(b) where the request is for Specific Operational Parameters:

   i. if the Slave Device Parameters that it has received from the serving Master WSD when requesting the Specific Operational Parameters match any Manually Configured Slave Device Parameters listed in the Installation Record for that Slave MCWSD; and

   ii. if the Installation Record states that the Slave MCWSD is a ‘Fixed’ device, or, where it states that is a ‘Mobile’ device, it also states that it has an Automatic Geo-Location Capability.
10. For the purposes of paragraphs 9(a)(i) and (b)(i) of this Schedule, the Device Parameters received from a WSD match the Manually Configured Device Parameters in an Installation Record if all parameters in an Installation Record that:

i. are marked as Device Parameters in Table 1; and

ii. are recorded as Manually Configured in the Configuration field,

have the same value as the corresponding Device Parameter in the request for Operational Parameters from the MCWSD.

11. For the purposes of paragraphs 9(a)(ii) and (b)(ii) of this Schedule, an Installation Record shall be deemed to state that the MCWSD has an Automatic Geo-Location Capability if the Configuration field (as described in Table 1 below) for all the following Device Parameters states they are “Automatically Configured”:

(a) Antenna location: longitude;

(b) Antenna location: latitude;

(c) Uncertainty in antenna location: longitude; and

(d) Uncertainty in antenna location: latitude.

Additional WSIP functionality to be provided with regard to MCWSDs

12. The Operator shall make available to Ofcom the functions described in paragraphs 12 to 24 below for the purposes of:

(a) conducting interference management activities, including providing advice and assistance to persons complaining of interference (in particular, but not limited to, carrying out an initial triage of interference management cases);

(b) monitoring compliance by the Operator with its obligations under this Contract;

(c) verifying compliance by an MCWSD Licensee with its obligations under its licence; and

(d) any other work undertaken by Ofcom in connection with Ofcom’s statutory duties and functions, in particular in relation to its spectrum management functions and the development of Ofcom’s TV White Spaces regulatory framework.

Request for Installation Records

13. The Operator shall provide Ofcom with a copy of a specified Installation Record or specified Installation Records upon request (which may be made at any time).

14. The interface system required for dealing with a request for an Installation Record is described in paragraphs 16 to 18 below. Ofcom will inform the Operator of the specifications for this interface, the protocol specifications of the form of any request for an Installation Record and the form of acknowledgement of any request from Ofcom. This
functionality shall be treated as part of the White Space Information Platform (WSIP) as described at Schedule 4.

15. The Operator shall implement appropriate security measures to prevent unauthorised access to the interface for Installation Records requests.

*Installation Record request function*

16. This function allows Ofcom to obtain the Installation Record of a specific MCWSD.

17. Ofcom will send the Operator’s system a request with the UniqueID of the MCWSD for which the Installation Record must be provided.

18. The Operator’s system shall respond with the contents of the Installation Record for the specified MCWSD.

*Request for MCWSD Licensee information*

19. The Operator shall, at Ofcom’s request (which may be made at any time), provide Ofcom with a list of all MCWSDs in relation to which it holds an Installation Record associated with a specified LicenceID (an “MCWSD Licensee Request”).

20. The interface system required for dealing with an MCWSD Licensee Request is described in paragraphs 22 to 24 below. Ofcom will inform the Operator of the specifications for this interface, the protocol specifications of the form of any request for an Installation Record and the form of acknowledgement of any request from Ofcom. This functionality shall be treated as part of the White Space Information (WSIP) Platform as described at Schedule 4.

21. The Operator shall implement appropriate security measures to prevent unauthorised access to the interface for MCWSD Licensee Requests.

*MCWSD Licensee Request function*

22. This function allows Ofcom to obtain the list of MCWSDs deployed by a specific MCWSD Licensee.

23. Ofcom will send the Operator’s system a request with a LicenceID.

24. The Operator’s system shall respond with the list of MCWSDs for which it holds Installation Records containing the specified LicenceID.

*Use of the White Space Devices Information System in respect of MCWSDs*

25. For the avoidance of doubt, in relation to the provision of WSDB Services to MCWSDs, the purposes for which Ofcom may use the White Space Devices Information System and White Space Use Data in accordance with Clause 12.2 of the Contract include verification of compliance by a MCWSD Licensee with its obligations under its licence.
Table 1 - Device Installation Record

<table>
<thead>
<tr>
<th>Installation Parameter</th>
<th>Description</th>
<th>Configuration is:</th>
<th>Value</th>
<th>Comments</th>
<th>Device Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>LicenceID</td>
<td>Licence number of the licensee who controls the device</td>
<td>N/A</td>
<td></td>
<td>An MCWSD Licensee must ensure that the Installation Record for each MCWSD includes all parameters listed in this Table. The Configuration field must be provided for each parameter, the Value field may be empty.</td>
<td></td>
</tr>
<tr>
<td>Unique Identifier</td>
<td>Manufacturer identifier, Model identifier, Serial number</td>
<td>N/A</td>
<td></td>
<td>The MCWSD Licensee must always provide the UniqueID. Please note that the UniqueID of a device may not be Manually Configured.</td>
<td>Yes</td>
</tr>
<tr>
<td>Manufacurer name</td>
<td></td>
<td>N/A</td>
<td></td>
<td>The full name of the manufacturer</td>
<td></td>
</tr>
<tr>
<td>Model name</td>
<td></td>
<td>N/A</td>
<td></td>
<td>The full model name</td>
<td></td>
</tr>
<tr>
<td>Device Category</td>
<td>Master or Slave</td>
<td>Manually Configured / Automatically Configured / Not Applicable</td>
<td>Master / Slave</td>
<td>The MCWSD Licensee must state whether this parameter is Manually Configured or Automatically Configured. If Manually Configured, the MCWSD Licensee must identify whether the device is a ‘Slave’ or ‘Master’ in the ‘value’ column.</td>
<td>Yes</td>
</tr>
<tr>
<td>Device Type</td>
<td>Type A or Type B</td>
<td>Manually Configured / Automatically Configured / Not Applicable</td>
<td>Type A / Type B</td>
<td>The manufacturer of the equipment will declare whether the device is Type A or Type B.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

1 This is used to indicate that the Device Parameter is not provided to a WSDB. Some Device Parameters do not need to be provided by Slave WSDs which will only transmit using Generic Operational Parameters, or do not need to be reported to databases because they are non-mandatory Device Parameters.
If Manually Configured, the MCWSD Licensee must enter the Type declared by the manufacturer.

| Fixed use or mobile use | Fixed (device will only transmit at a fixed location) Mobile (device may transmit while in motion) | N/A | Fixed / Mobile | The MCWSD Licensee must state whether the device will (i) only transmit at a fixed location or (ii) may transmit while in motion. If a device can be moved, but is intended to transmit from a fixed location only, it should be recorded as ‘Fixed (even if Type B).

A device which may transmit while in motion should be recorded as ‘Mobile’.

Please note that the MCWSD Licensee is required to submit a new Installation Record each time a Fixed device is moved to a new location. |

| Antenna location: (a) latitude and (b) longitude | in WGS84 format | Manually Configured / Automatically Configured / Not Applicable | The MCWSD Licensee must state whether these parameters are Manually Configured, Automatically Configured or Not Applicable.

If the device is a Slave WSD that only uses Generic Operational Parameters then the MCWSD Licensee must indicate Not Applicable (N/A) in the Configuration field.

The location values themselves must be provided only if Manually Configured.

Please note that:
(i) a Master Device which is intended to transmit while mobile is not permitted to have manual configuration of location (i.e. it must have an Automatic Geo-location Capability);
(ii) if a Slave WSD is intended to transmit while mobile using Specific Operational Parameters it must have Automatic Geo-location Capability; and
(iii) a Slave WSD which is intended to transmit... | Yes |
<table>
<thead>
<tr>
<th>Uncertainty in antenna location: (a) latitude and (b) longitude</th>
<th>in metres,</th>
<th>Manually Configured / Automatically Configured / Not Applicable</th>
<th>while mobile but without Automatic Geo-location Capability may only use Generic Operational Parameters.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location determination method</td>
<td>Method of determining the longitude/latitude, including the device/technology used if relevant</td>
<td>N/A</td>
<td>The MCWSD Licensee must state whether these parameters are Manually Configured, Automatically Configured or Not Applicable.</td>
</tr>
<tr>
<td>Antenna</td>
<td>in metres.</td>
<td>Manually Configured /</td>
<td>If the device is a Slave WSD that only uses Generic Operational Parameters then the MCWSD Licensee must indicate Not Applicable (N/A) in the Configuration field.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>/</td>
<td>The location uncertainty values themselves must be provided only if these parameters are Manually Configured.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Please note that:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(i) a Master WSD which is intended to transmit while mobile is not permitted to have manual configuration of location (i.e. it must have an Automatic Geo-location Capability);</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ii) if a Slave WSD is intended to transmit while mobile using Specific Operational Parameters it must have Automatic Geo-location Capability; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(iii) a Slave WSD which is intended to transmit while mobile but without Automatic Geo-location Capability may only use Generic Operational Parameters.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If location is Manually Configured, the MCWSD Licensee must explain the method by which the location is determined (including any equipment used in establishing the location of a device), and must also indicate whether the device is to be used indoor or outdoor.</td>
</tr>
</tbody>
</table>

Note that this is not a mandatory Device Parameter Yes
<table>
<thead>
<tr>
<th>Height</th>
<th>Automatically Configured / Not Applicable</th>
<th>and does not need to be communicated to a WSDB when a device requests Operational Parameters. If it is not provided to a WSDB, the MCWSD Licensee must indicate ‘Not Applicable’ in the Configuration field. The value itself must be provided only if this parameter is Manually Configured. If this parameter is not communicated to the WSDB by a device, the WSDB will apply a default value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncertainty in antenna height</td>
<td>in metres</td>
<td>Manually Configured / Automatically Configured / Not Applicable</td>
</tr>
<tr>
<td>Height reference</td>
<td>Antenna height above ground level (AGL) or antenna height above sea level (ASL)</td>
<td>Manually Configured / Automatically Configured / Not Applicable</td>
</tr>
<tr>
<td>Antenna type</td>
<td>Integral, Dedicated, External</td>
<td>N/A</td>
</tr>
<tr>
<td>Technology</td>
<td>A set of characters</td>
<td>Manually Configured /</td>
</tr>
</tbody>
</table>
### SUBJECT TO CONTRACT – NOT COMPLETE

<table>
<thead>
<tr>
<th>identifier</th>
<th>representing the technology</th>
<th>Automatically Configured / Not Applicable</th>
<th>and does not need to be communicated to a WSDB when a device requests Operational Parameters. If it is not provided to a WSDB, the MCWSD Licensee must record ‘Not Applicable’ in the Configuration field. The value itself must be provided only if this parameter is Manually Configured, in which case the MCWSD Licensee must enter the technology identifier provided by the device manufacturer. If this parameter is not communicated to the WSDB by a device, the WSDB will apply a default value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Emission class</td>
<td>Class 1, Class 2, Class 3, Class 4 or Class 5</td>
<td>Manually Configured / Automatically Configured / Not Applicable</td>
<td>Class 1 / Class 2 / Class 3 / Class 4 / Class 5 Note that this is not a mandatory Device Parameter and does not need to be communicated to a WSDB when a device requests Operational Parameters. If it is not provided to a WSDB, the MCWSD Licensee must record ‘Not Applicable’ in the Configuration field. The value itself must be provided only if this parameter is Manually Configured, in which case the MCWSD Licensee must enter the emission class provided by the device manufacturer. If this parameter is not communicated to the WSDB by a device, the WSDB will apply a default value. Yes</td>
</tr>
<tr>
<td>Maximum EIRP</td>
<td>in dBm</td>
<td>N/A</td>
<td>The MCWSD Licensee must state the maximum EIRP</td>
</tr>
<tr>
<td>Application description</td>
<td>Text description of the intended use of this particular device, e.g. the operating times</td>
<td>N/A</td>
<td>The MCWSD Licensee must provide information here about what the device is to be used for and how it is to be used (such as information about when/how often the device is likely to be used and whether it will be used indoor/outdoor).</td>
</tr>
</tbody>
</table>