



Licensing manually configurable white space devices

Statement

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About this document

'White spaces' are gaps in the radio spectrum in frequency bands, which can be used to offer wireless applications. These can bring benefits to citizens and consumers.

While most white space devices are expected to operate on a licence exempt basis in the future, many do not currently meet Ofcom's requirements for licence exemption and require manual configuration by the user.

This decision means these manually configurable devices can be licensed on a transitional basis, while equipment which meets Ofcom's licence exemption regulations is developed. Ofcom intends to review whether a licensing regime is still required by the end of 2018.

Ofcom's view is that allowing this would enable the deployment of white space devices to begin sooner in the UK and would therefore bring benefits to citizens and consumers earlier than would otherwise be the case.

This work follows a recent statement allowing white space devices that are able to operate automatically and without any manual configuration to operate in the UHF TV band on a licence exempt basis.

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Section 1

Summary

- 1.1 Ofcom has a duty to ensure that the radio spectrum is used in the most efficient way. On 12 February 2015 Ofcom published its TV White Spaces (TVWS) Framework Statement¹ on implementing dynamic spectrum access in the UHF TV band (470 to 790 MHz). The Statement explained how we will allow white space devices (WSDs) to operate in those frequencies, subject to control by databases that are designated by Ofcom.
- 1.2 As set out in our TVWS Framework Statement, we have decided to authorise the deployment of WSDs on a licence exempt basis where they meet certain technical and operational requirements to ensure there is a low probability of harmful interference to other spectrum users.² One key technical characteristic in order to qualify as licence exempt is that a device must not allow any manual configuration of the device parameters by the user or anyone else. This is to reduce the risk that a user could incorrectly configure the device, increasing the probability of harmful interference.
- 1.3 On 27 February 2015, Ofcom published a consultation to explore whether we should authorise devices that are not automatically configured – and instead allow an element of manual configuration by an installer – to operate in the UHF TV band under a licensing regime (the “Consultation”)³. We refer to these devices as manually configurable white space devices (MCWSDs).
- 1.4 The background to the Consultation is that we ran a pilot of the TVWS framework over the course of 2014 and 2015. None of the devices tested during the pilot were able to demonstrate that they could determine their location automatically. As such, they would not be authorised for operation under our proposed licence exemption regulations. In the Consultation we therefore considered whether there may be a need for a complementary licensing regime as a transitional arrangement to allow devices to operate in TVWS while equipment is developed that is capable of meeting our proposed licence exemption regulations.
- 1.5 Having had regard to our statutory duties and having considered the costs and benefits of authorising MCWSDs under a licensing regime, as well as stakeholder responses to the Consultation, we have decided to authorise such devices on a transitional basis. We have decided to conduct a review into whether the licensing regime is still required no later than three years after the introduction of the licensing regime. Our view is that allowing operation of MCWSDs under a transitional licensing regime in this way would enable the deployment of WSDs to begin sooner in the UK and would therefore bring benefits to citizens and consumers earlier than would otherwise be the case.

¹ Implementing TV white spaces: Statement, 12 February 2015,

<http://stakeholders.ofcom.org.uk/consultations/white-space-coexistence/statement>

² We have notified draft exemption regulations to the European Commission under the Technical Standards Directive. The standstill period comes to an end on 28 September 2015 and, subject to any comments under that process, we expect to undertake the statutory consultation on making the regulations later this year.

³ Manually configurable white space devices: Consultation, 27 February 2015, <http://stakeholders.ofcom.org.uk/consultations/manually-configurable-wsds/>

- 1.6 However, we also recognise the need to mitigate the increased probability of MCWSDs causing interference to incumbent users of the UHF TV band. We will do this by introducing licence conditions, both technical and non-technical, which we consider will be appropriate in order to ensure a low probability of MCWSDs causing harmful interference to DTT and PMSE services.
- 1.7 Our current expectation based upon our research and evidence from the trials and pilot remains that most WSDs should be capable of meeting the technical requirements for licence exemption in future. We therefore anticipate that we will be able to stop issuing licences no later than three years after the introduction of the licensing regime. We believe it is less clear whether there is a case for authorising MCWSDs on a longer term basis, but will consider the merits of setting up a separate licensing regime for this purpose when reviewing this regime.

Section 2

Introduction

Background

- 2.1 On 12 February 2015 Ofcom published its Statement⁴ on implementing dynamic spectrum access in the UHF TV band (“TVWS Framework Statement”). This sets out how we will allow WSDs to operate in those frequencies, subject to control by databases that are designated by Ofcom.
- 2.2 Coexistence with existing spectrum users is managed in the TVWS framework by the databases being provided with, or using default values for, a number of device characteristics (“device parameters”), such as the location of a device, and using these to calculate the appropriate power levels and channels for use by the device.⁵ Equipment will have to be able to automatically determine relevant device parameters, including its location, without the need for any manual configuration by a device user or installer, and supply them to the database in order to operate under the licence exemption. We refer to a device that permits or requires the user to enter into the device some or all of the device parameters, or any other technical characteristic of a device which will be communicated to a database or affect the operation of the device in accordance with the instruction of a database, as a “manually configurable” device (or “MCWSD”).
- 2.3 As we explained in our TVWS Framework Statement⁶, we do not consider that it is appropriate to authorise manually configurable WSDs on a licence exempt basis because we consider that there is an increased risk that MCWSDs may cause harmful interference compared to WSDs that automatically determine their device parameters. This is because of the risk that end-users could inaccurately configure a device if they lacked the necessary technical expertise. If incorrect parameters are provided to a database, then the database may calculate parameters for a device which would allow it to operate on channels and/or at powers that may cause interference to DTT viewers or PMSE users. This is particularly a risk with any inaccurate reporting of the device location. We do not consider that it is possible to adequately mitigate that risk under a licence exemption regime.
- 2.4 However, the market for white space devices is currently very immature, as it is a new technology currently only actively in commercial use in the US, where automatic configuration is not required. We are currently not aware of any devices that are fully compliant with the terms of our proposed licence exemption, but several manufacturers have products that would comply with all terms except the requirement that the user should not have access to the device configuration. This requirement precludes the ability for a user or installer to manually input any of the parameters of the device which must be communicated to a database, including location.
- 2.5 Discussions with equipment manufacturers and databases suggest that there are no technical reasons why the vast majority of devices should not meet the requirements

⁴ Implementing TV white spaces: Statement, 12 February 2015, <http://stakeholders.ofcom.org.uk/consultations/white-space-coexistence/statement>

⁵ For a more detailed discussion of the parameters that a device must provide to a database, see our TVWS Framework Statement, paragraphs 5.12 to 5.15

⁶ See paragraphs 5.28 to 5.30.

of the proposed licence exemption regulations in due course, but that for commercial reasons automatic configuration has not been the priority. This is because the UK is the only country in Europe putting a TVWS regulatory framework in place where automatic configuration is a requirement, which will not come into force until towards the end of this year.

- 2.6 In the light of this situation, Ofcom consulted on 27 February 2015 on proposals to allow the use of manually configurable white space devices (the “Consultation”).⁷ The Consultation explored the need to license MCWSDs on a transitional basis, to allow operation in TVWS while equipment capable of meeting our proposed licence exemption regulations is developed.
- 2.7 In the Consultation, we considered two options:
- Allow MCWSDs to operate under a transitional licensing regime, which would be complementary to the licence exemption regime detailed in the TVWS Framework Statement; or
 - Not to authorise use of MCWSDs. The licence exemption regime would remain as per the TVWS Framework Statement.
- 2.8 We considered the costs and benefits of each option. In particular, we recognised the risk of increased interference associated with MCWSDs compared to automatically configured devices and the increased costs of dealing with that risk of interference. We weighed this against the potential benefits to citizens and consumers of authorising use of MCWSDs, in that this could allow operation of TVWS devices under the framework more quickly while equipment compliant with the licence exemption is developed.
- 2.9 Based on this assessment, we proposed to introduce a transitional licensing regime for use of MCWSDs. We proposed that the general technical conditions for operation of MCWSDs should be consistent with the licence-exempt TVWS framework, with the exception of the requirement to preclude manual device configuration by device users. We also proposed that the licence should include a number of technical and operational conditions which were aimed at reducing the risk of interference being caused due to device misconfiguration.
- 2.10 We said that we anticipated that equipment that meets the terms of the licence exemption might be available within three years of the introduction of the regulatory framework. Consequently, we proposed that any licensing regime for MCWSDs should be reviewed within three years of its commencement to assess whether it is still required or should be withdrawn.
- 2.11 We received 21 separate responses to the Consultation, two of them confidential, four of them from individuals from the same company and two from industry bodies. The list of respondents and all non-confidential responses are published on the Ofcom website.
- 2.12 This document presents our conclusions on licensing manually configurable white spaces devices, as follows:
- The rest of this section presents the relevant statutory framework.

⁷ Manually configurable white space devices: Consultation, 27 February 2015, <http://stakeholders.ofcom.org.uk/consultations/manually-configurable-wsds/>

- Section 3 summarises the main points made by stakeholders in their comments on the Consultation, and presents our responses to those. We also set out our final decisions on the various aspects of the policy and our approach to the conditions in the licences.
- Section 4 presents the next steps.
- Annex 1 is the detailed list of stakeholder responses and Ofcom's position on each.
- Annex 2 is a revised draft model of the licence for manually configurable white space devices.

Statutory framework

- 2.13 Ofcom's principal duty under section 3 of the Communications Act 2003 is to further the interests of citizens in relation to communications matters and of consumers in relevant markets, where appropriate by promoting competition. Ofcom takes account of the impact of its decisions upon both citizen and consumer interests in the markets we regulate. In carrying out these duties, we are required, among other things, to secure a number of objectives such as the desirability of promoting competition, investment and innovation. Moreover, in carrying out our general duties, Ofcom is required to secure the optimal use of spectrum for wireless telegraphy and to have regard to the principle under which all regulatory activities should be targeted only at cases in which action is needed.
- 2.14 Under section 8(1) of the WT Act, it is unlawful to establish, install or use wireless telegraphy (WT) equipment in the UK except where such use is authorised either by the issue of an appropriate wireless telegraphy licence or where the use of such equipment is exempted from the need to hold such a licence by regulations (i.e. a statutory instrument) made under section 8(3) of the WT Act.
- 2.15 Under section 8(4) of the WT Act, we are required to make regulations to exempt equipment if the conditions in section 8(5) are met, namely if its installation or use is not likely to:
- involve undue interference with wireless telegraphy;
 - have an adverse effect on technical quality of service;
 - lead to inefficient use of the part of the electromagnetic spectrum available for wireless telegraphy;
 - endanger safety of life;
 - prejudice the promotion of social, regional or territorial cohesion; or
 - prejudice the promotion of cultural and linguistic diversity and media pluralism.
- 2.16 Section 9(1) of the WT Act gives us the power to grant wireless telegraphy licences subject to such terms as we think fit. This broad discretion is, however, subject to the following requirements:

- we must impose only those terms that we are satisfied are objectively justifiable in relation to the networks and services to which they relate, not unduly discriminatory and proportionate and transparent as to what they are intended to achieve (section 9(7));
- in relation to a licence for the establishment, installation or use of wireless telegraphy apparatus or stations for the provision of an electronic communications network or service, the terms of a licence must be of a kind falling within Part B of the Authorisation Directive (section 9(1A)); and
- we can only impose a limitation on the nature of wireless telegraphy equipment or wireless telegraphy apparatus which can be established, installed or used if it is necessary for one of the following purposes:
 - avoiding undue interference with wireless telegraphy;
 - the protection of public health against electromagnetic fields;
 - ensuring technical quality of service;
 - ensuring maximisation of frequency sharing;
 - safeguarding the efficient management and use of the part of the electromagnetic spectrum available for wireless telegraphy; or
 - ensuring the fulfilment of a general interest objective (section 9ZA).

2.17 Section 12 of the WT Act permits Ofcom to charge fees for wireless telegraphy licences, subject to certain specified exemptions relating to licences granted in accordance with auction regulations made under section 14 of the WT Act. Under Article 13 of the Authorisation Directive, any fees imposed for rights of use of radio frequencies must reflect the need to ensure the optimal use of the resources. Such fees must be objectively justifiable, transparent, non-discriminatory and proportionate in relation to their intended purpose and take into account the objectives set out in Article 8 of the Framework Directive.

Impact assessment and equality assessment

2.18 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. This is reflected in section 7 of the Communications Act, which means that generally Ofcom has to carry out impact assessments where its proposals would be likely to have a significant effect on businesses or the general public, or when there is a major change in Ofcom's activities. Our assessment of the impact of our proposals for the licensing regime was set out in our Consultation. This Statement sets out our decision on these proposals, having taken all stakeholder representations into account.

2.19 Ofcom is separately required by statute to assess the potential impact of all our functions, policies, projects and practices on equality. Equality Impact Assessments (EIAs) also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity. As explained in our Consultation, we do not consider the impact of the decisions in this document to be to the detriment of any group within society.

Section 3

Conclusions of the consultation process

- 3.1 This section reviews the consultation proposals, the responses from stakeholders, and sets out Ofcom's decisions with regards to manually configurable WSDs. It is structured as follows:
- First we consider the overall policy proposal to authorise MCWSDs under a licence. We review the main concerns that stakeholders have raised and explain our final decision to go ahead with the new regime.
 - We then review in detail the licence conditions that we proposed in the consultation, and the changes to those arising from the stakeholder representations and from our internal consideration.
 - We explain the additional measures that we plan to put in place in the areas of compliance and enforcement.
 - Finally, we describe how White Space Databases will be involved in the licence regime.

Licensing manually configurable white space devices

- 3.2 As summarised above, in our Consultation we considered the costs and benefits of authorising MCWSDs under a transitional licensing regime and proposed to introduce such a regime.
- 3.3 We said that we expected that most WSDs will be able to meet the requirements for operating under our licence exemption regime in the future and that we consider that licence exemption continues to be the best approach in the long term, but we considered that we should allow the deployment of MCWSDs as a transitional arrangement. We said that doing so increases the likelihood that the benefits from introducing the TVWS framework will be realised over the next few years while manufacturers develop equipment that is capable of meeting our licence exemption regulations.

Main stakeholder comments on the proposal to authorise manually configurable WSDs and Ofcom's response to those comments

- 3.4 Around half of the 21 respondents to the Consultation broadly agreed with the proposal to introduce a transitional licensing regime for MCWSDs. Other respondents either disagreed or had concerns with our proposed approach.
- 3.5 Among respondents that supported the proposals, Cloudnet said that Ofcom should not delay implementing its proposals, noting that communities and industries are on the cusp of utilising and developing this technology. The DSA supported the proposals and thought that the potential benefits of the transitional licensing regime included "improving spectrum utilisation, enabling innovation through light licensing, and improving broadband access throughout the United Kingdom".
- 3.6 We have carefully considered responses to the Consultation including the concerns and potential risks highlighted by respondents. We have also considered

developments in the United States in particular on the issue of users providing incorrect device parameters. The main concerns that stakeholders raised were in relation to:

- the heightened risk of harmful interference to existing users – although Nominet disagreed that this would be the case;
- the potential for undermining incentives for, or delaying, the development of devices which are compliant with the licence exemption; and
- higher than expected costs related to interference management and investigating incorrectly configured equipment.

3.7 We discuss these concerns and risks further below. We also cover in detail the stakeholder responses to the Consultation and our response to these in Annex 1.

Heightened risk of interference

3.8 We acknowledge that there is an increased risk of interference associated with MCWSDs compared to automatically configured devices. However we consider that this risk remains low, and can be effectively mitigated by our proposed licence conditions. In particular, we are requiring licensees to have a Quality Assurance ('QA') process in place, and to provide records to a WSDB for each MCWSD installation. This is further described in paragraphs 3.69 to 3.79.

3.9 In addition, we intend to make some amendments to the proposed licence conditions following our review of consultation responses. In particular, we will be asking WSDBs to carry out checks on the consistency of the installation records with the parameters provided by the device. We explain this in the "Role of the white space database" subsection below.

3.10 We are confident that these measures should be sufficient to mitigate the risk of incorrect manually configured parameters being provided to WSDBs (which could result in interference to existing users if this occurred).

Disincentives to develop licence-exempt equipment

3.11 As set out in the TVWS Framework Statement, our TVWS framework is designed to enable dynamic spectrum access based on automatic geo-location of licence-exempt devices. That remains our clear goal and we expect licence exempt devices which would comply with the terms of the proposed licence exemption to be developed in future. With this in mind, we consider that introducing a licensing regime for MCWSDs on a transitional basis as envisaged presents a low risk of disincentivising manufacturers from developing licence-exempt equipment. This is for a number of reasons:

- We intend to introduce the licensing regime on a transitional basis only, i.e. we plan to issue licences during a limited time window of no more than three years from early 2016 pending the development of equipment which meets the licence exemption, subject to a review which will confirm if there is no longer a need to continue issuing licences. Whilst we recognise that it will take some time for licence-exempt equipment to become widely available, the timescale suggested by equipment manufacturers in the United States suggests that it might, in practice, even be possible to cease issuing new licences in less than three years. In these circumstances we do not consider that licensing use of manually

configurable devices for a short period of time is likely to have a significant impact on the pace of development of licence-exempt devices.

- Manufacturers who wish to introduce mass market⁸ or consumer devices are likely to prefer to develop equipment which is compatible with the terms of the licence exemption regulations as a more commercially viable offering. This is because, in view of the likely administrative burden associated with obtaining and complying with the terms of a licence in the form we propose (which effectively will require the involvement of professional installers with appropriate technical expertise to manually configure the equipment), the licensing regime is unlikely to be suitable for deployment of mass market equipment.
- We understand that some of the existing WSD manufacturers plan to upgrade their equipment with automatic geo-location. We note the communication to the FCC⁹ from four of the largest WSD manufacturers, in collaboration with the National Association of Broadcasters (NAB), calling for the introduction of a requirement for all TV White Space devices to have automatic geo-location or to connect to databases via a device with automatic geo-location.

High costs of investigation and interference management

- 3.12 We recognise that the costs of managing interference could increase substantially if there were large numbers of manually configurable devices in use and if end users were frequently misconfiguring equipment.
- 3.13 In practice however, we consider that this risk is low. Configuring MCWSDs requires technical expertise and it will normally need to be done by a professional installer. This in itself should limit the possibility of accidental misconfiguration. We also intend to put in place licence conditions to further mitigate the probability of harmful interference (including requiring a QA process to be in place). Finally, the fact that MCWSDs are only likely to be suitable for professional use and that we intend to issue licences on a transitional basis only (i.e. for a limited period of time) also means that we would not expect very large numbers of MCWSDs to come into use over the next few years.

Ofcom's conclusions on authorising manually configurable WSDs under a licensing regime

- 3.14 Licensing MCWSDs would allow earlier use of the TVWS framework and earlier access to spectrum than if licence exemption of automatically configured devices remains the only possible authorisation route.
- 3.15 We note that several white space database (WSDB) providers are currently working with Ofcom to qualify their databases so that they can support operational access to TV White Spaces by the end of this year. In addition, a number of companies and organisations have expressed interest in making operational use of existing white space equipment. If we do not authorise use of MCWSDs, WSDB providers and potential white space users would only be able to continue to undertake non-commercial, non-operational trials while waiting on WSD manufacturers to produce equipment that would meet the proposed licence exemption requirements regarding automatic configuration.

⁸ By 'mass market' we refer to devices which are marketed directly to retail consumers.

⁹ <http://apps.fcc.gov/ecfs/comment/view?id=60001093885>

- 3.16 We are concerned that this would delay benefits to citizens and consumers which could otherwise be realised by allowing earlier adoption of white space technology under the framework and disincentivise investment in white space, and could lead to less efficient use of the spectrum. If we do authorise use of MCWSDs, industry would have greater ability to test business plans for the use of white spaces and to better understand the demand for commercial use of white space equipment. It may also enable WSDB providers to start to see an earlier return on the investment they have made to date in contributing to and implementing the TVWS regulatory framework.
- 3.17 We also note that some stakeholders have suggested that there may be an ongoing requirement to use MCWSDs even once WSDs which meet the licence exemption requirements are available. A transitional MCWSD licensing regime could provide us with valuable experience to inform our view on whether there may be a need for a longer term licensing regime.
- 3.18 In summary, we continue to believe that, on balance, the potential benefits of allowing MCWSDs to operate under a transitional regime as proposed outweigh the potential costs and risks. We have therefore decided to proceed with arrangements to implement licensing of MCWSDs on a transitional basis.

Duration of the licensing regime

- 3.19 In our Consultation, we proposed that the licensing regime should be in place for an initial period of three years, after which we proposed to conduct a review to determine whether there was a need to extend the licensing regime. To be clear, the licence regime duration refers to the period during which we are issuing new licences.
- 3.20 Most stakeholders agreed with this approach, though some said that the review period should be shorter. Digital UK suggested that we review the efficacy of the regime and the progress in the development of compliant devices in 18 to 24 months. Arqiva also suggested that a review within 18 to 24 months would allow industry adequate time to work with the regime whilst also giving Ofcom sufficient time prior to the end of the three year period to undertake a thorough review and implement any necessary changes.
- 3.21 In line with our consultation proposals, we intend that the transitional licensing regime should be in place only while it is necessary – i.e. only while it remains the case that licence-exempt equipment for a range of potential white space uses is not generally available, at which point we would expect to stop issuing new licences for use of MCWSDs under this regime.
- 3.22 It is difficult to predict how long this will take. In the Consultation, we explained our view that automatically configurable equipment should become available within three years. This has been broadly accepted by respondents and no arguments have been made for a longer period before reviewing the regime.
- 3.23 However, it was suggested by some stakeholders that three years was too long a period to wait before reviewing the continuing need for a licensing regime. Given the developments in the US, which suggest that there may be a quicker move towards automatic geo-location in equipment than we anticipated, we agree that it may be appropriate to carry out the review earlier than three years after the introduction of the licensing regime. This would depend on how the market for white space devices and take up and use of TV white space develops.

3.24 We therefore intend to conduct a review of the ongoing need for the licensing regime at some point between 18 months¹⁰ and three years from the date of implementation of the regime. We continue to expect, however, that the transitional regime will be in place for no longer than three years and that we would cease to issue new licences following the review if it confirms that it would be appropriate to do so.

Long-term licensing and enhanced operations

3.25 In the Consultation, Ofcom recognised that the objectives for a longer term licensing regime for MCWSDs would likely be different to our objectives when authorising MCWSDs as a transitional measure. We also asked stakeholders for their views on allowing WSDs for enhanced operations (i.e. additional device characteristics would be provided to the WSDB in order to improve white space availability for the device) under a licensing regime.

3.26 Most respondents identified a likely ongoing need for permitting operation of MCWSDs, for example in relation to indoor use where GPS may not work, while several respondents said there would be merit in allowing enhanced operation of MCWSDs through a licensing regime.

3.27 We continue to consider that the licensing regime for MCWSDs as set out in this Statement is not intended to be a permanent solution but rather only a transitional regime pending development of automatically configurable equipment. However, we will revisit these issues with an open mind when we review the licensing regime. If we find there is considerable demand for permanent MCWSD licensing, we would consider afresh whether there may be a need to maintain some form of licensing regime for MCWSDs.

3.28 We would expect that if there is a need to have a more permanent licensing regime for MCWSDs, this is likely to be of a different scope and therefore potentially have different requirements to the transitional regime discussed in this Statement. We may need to set up a new licence product for ongoing MCWSDs use (although an alternative could be to amend the existing transitional regime).

3.29 We would also consider as part of our review the demand for and feasibility of an “enhanced” regime which allows for additional device characteristics to be provided to the WSDB in order to improve white space availability.

Scope of the licence and licence terms and conditions

3.30 We review in this subsection the specific proposals that we made in the Consultation on the terms and conditions of the licence. We also include, in Annex 2, a revised draft licence on which we would welcome further feedback before finalising it. We cover here:

- The high level conditions under which MCWSDs will access the TVWS spectrum
- The categories, types and number of devices that will be allowed to operate under a licence

¹⁰ Ofcom is also committed to a general review of the wider TVWS framework 18 months after the licence exemption regulations come into effect. We will take MCWSDs into account during this wider framework review, although we will not make any definitive decisions on the regime until the specific review of the MCWSDs licence regime.

- The licence term, notice period for revocation and fee
- The quality assurance obligations
- Other licence conditions

General conditions for spectrum access

3.31 Our proposals in the consultation were, at a high level, that:

- **MCWSDs would access spectrum on a non-interference, non-protection basis**

In the Consultation we proposed to issue licences on a non-protection, non-interference basis, i.e. users of MCWSDs may not cause interference to other users and they would have no protection against interference from other authorised users of the radio spectrum. In particular, users of MCWSDs would not have spectrum access rights above users of licence exempt WSDs, and would receive no protection from interference from other authorised users of the band, including other WSDs of any type.

We received no objection from stakeholders to this approach, which we have decided to implement.

- **MCWSDs will operate under the TVWS framework**

We explained that MCWSDs would be part of the framework set out in our TVWS Framework Statement and the operational requirements would be very similar to those in the licence exempt regime. Therefore, the licence will stipulate that the frequencies and powers at which MCWSDs transmit will be specified by a database approved by Ofcom.

3.32 The details of the technical licence conditions (which are set out in the revised draft licence included at Annex 2) are essentially the same as those in the proposed licence exemption, and we therefore only deal with the key areas of difference below.

Device category: master devices and slave devices

3.33 Under the TVWS framework there are two categories of WSD, a master and a slave. A master is a device that is able to communicate with and obtains operational parameters from a designated database, and a slave is a WSD that is only able to operate in TVWS when under the control of a master WSD.

3.34 In the Consultation we proposed to allow both manually configurable masters and slaves to be authorised under the terms of the licence. We explained that this was so as not to unduly restrict the early deployment of WSDs. We also said that the licensing regime is intended to be complementary to the licence exemption, so in principle it should be possible for a licence exempt slave to associate with a licensed master.

3.35 The majority of respondents agreed that the regime should cover master and slave devices and no arguments were made for treating masters and slaves differently in any licensing regime.

3.36 We have therefore decided to proceed with our proposals to permit manually configurable slaves and masters to be authorised under the terms of the licence.

Device type: ‘Mobile’ and ‘Fixed’ devices

- 3.37 In our TVWS Framework Statement we defined two types of WSDs: “Type A” and “Type B”. A Type A WSD is a device that is intended for fixed use only.¹¹ This type of equipment can have integral¹², dedicated¹³ or external¹⁴ antennas. A Type B WSD is a device that is not intended for fixed use and which has an integral antenna or a dedicated antenna. Databases will allocate different operational parameters to Type A and Type B devices.
- 3.38 In the Consultation we proposed that only “Type A” devices would be allowed under the licence regime. We said that we expected all “Type B” devices to be able to automatically geo-locate and communicate with a designated database. This was because we considered that:
- manual configuration of Type B devices would be impractical. Under our proposed licence conditions, users would be required to manually reconfigure the device every time it moved and make a record of what those parameters were, and
 - allowing manual configuration of Type B devices would increase the risk of harmful interference, as it was more likely that the location of the device would be incorrectly determined if the device was in motion.
- 3.39 Respondents were split on this issue. While a number of respondents agreed with our initial approach, others highlighted use cases for nomadic devices, i.e. devices that are technically “mobile” (and therefore “Type B” devices) in the sense that they can be moved from one location to another, but only transmit from fixed locations. An example of this could be a monitoring device that might be put in a variety of locations to measure e.g. rainfall but that can be moved from location to location over time. In these circumstances, the risk of harmful interference would be the same as for fixed devices.
- 3.40 Nominet also noted that ‘mobile’ devices that are capable of automatic geolocation may still require manual configuration of other technical characteristics. One such characteristic could be antenna gain, which is not a device parameter as defined in our TVWS framework but its modification could impact the compliance of the device with the Operational Parameters provided by the database. Therefore, it must be accurate in order to ensure the device’s compliance with the regime should not be manually configurable for a device which would operate under the licence exemption regime.
- 3.41 We recognise that there are circumstances in which a manually configurable Type B device would not give rise to any increased risk of harmful interference to a Type A device. We consider the possible scenarios below:

Nomadic use

- 3.42 A device might be classified as Type B because it is capable of being moved, but it is to be used only from a fixed location. In this case, we do not consider that the use of

¹¹ Fixed use in this context means that the device does not move while being used

¹² “integral antenna” means a permanent, fixed antenna forming part of a white space device

¹³ “dedicated antenna” means a removable antenna which has been designed for use and supplied with a specific type of white space device

¹⁴ “external antenna” means a removable antenna which is not a dedicated antenna

the device whilst stationary would give rise to any greater risk than that posed by any other fixed device.

- 3.43 However, the key parameter for any white space device is location, and it would be important that the location is correctly configured at each location from which the device transmits. We therefore conclude that a device that is 'nomadic' should be treated like a fixed (i.e. Type A) device and that it would be appropriate to permit the use of nomadic Type B devices which have manual configuration of location on the same basis as Type A devices. This means that every time a Type B nomadic device with manual configuration of location is moved, a new installation record would have to be completed for the MCWSD and provided to the serving database(s). A failure to provide a new installation record would be a breach of licence conditions and could result in enforcement action being taken by Ofcom.

Mobile use, master device

- 3.44 A master device must always provide its location to a database in order to get operational parameters. We do not consider that it is possible to accurately manually configure location information for a device that is mobile (i.e. transmits while in motion). No respondents argued in favour of permitting this. We therefore conclude that a Type B master device that transmits whilst mobile must have an automatic geo-location capability.
- 3.45 However, we do not consider that this means that all other device parameters must be automatically configured. All device parameters other than location will not change when a device moves, so they could be manually configured without any additional risk. We have therefore decided to permit the operation of mobile master devices which have some manually configured parameters under the terms of the licence, provided that they have an automatic geolocation capability. By this we mean that they geolocate automatically in a way that does not allow a user to input, configure, reconfigure or alter how the location parameters are determined or communicated to the database.

Mobile use, slave device

- 3.46 A mobile slave using generic operational parameters¹⁵ does not report its location to the database and therefore poses no additional interference risk over a static slave operating on generic operational parameters. We therefore consider that a mobile slave device which can be manually configured may be licensed for use on generic operational parameters.
- 3.47 However, in order for a slave device to transmit using specific operational parameters, a slave device must report its location to a database. A mobile slave device that operates using specific operational parameters therefore presents the same risks described above for a mobile master device. We do not consider that manual configuration of location for mobile slave devices which transmit using specific operational parameters should be permitted. We will therefore allow the

¹⁵ Generic Operational Parameters are the channels and powers that any slave device could use to communicate with the master device without causing interference, in the absence of information about the location and characteristics of the slave device. The database will first calculate the coverage area of the master (based on its location and channel usage), then calculate operational parameters for a slave at each location in the coverage area, and finally select the most restrictive of those operational parameter sets. The database will make certain conservative assumptions about slave devices when making the calculations.

operation of Type B mobile slave devices which have some element of manual configuration to transmit using specific operational parameters only if they have an automatic geo-location capability (as with a mobile master device).

- 3.48 It is obviously important to ensure that licensees comply with these requirements. When a manually configurable device is installed we will require the licensee to provide information about whether the device will be used while mobile or only when fixed, and whether location is manually configured or automatically configured. As an additional check we will require databases to check the installation record of a device before providing operational parameters to ensure that they do not provide master operational parameters or specific operational parameters to a mobile device that does not have automatic geo-location capability. The detail of the installation records is set out in the draft licence in Annex 2, and the new requirements on databases are explained in the “Role of the white space database” subsection below.

Number of devices allowed under a single licence

- 3.49 We proposed in the Consultation to allow licensees to deploy any number of MCWSDs under the terms of their licence, provided that such equipment remained under the ultimate control of the licensee. Most respondents agreed with this approach, although a minority of stakeholders expressed concerns about the potential loss of control for Ofcom associated with allowing multiple devices under a single licence. Other stakeholders were concerned about the costs that Ofcom would incur in managing an unlimited number of devices under a single licence with a fixed licence fee, and suggested capping the number of devices per licence or introducing tiered licence fees depending on the number of devices deployed.
- 3.50 We fully share the view that it is important that Ofcom should have information available on each and every manually configurable white space device that is operated under a licence. We set out in our Consultation our proposal to require licensees to keep accurate records of the configuration of each device. We have developed further our thinking on the record keeping requirement. This includes the requirement to make, keep and provide to any databases to which devices connect, an accurate installation record of each device operated under the licence before requesting operational parameters. Ofcom will have access to the installation records held by databases through a webtool, and will be able to request the installation records held by licensees. We believe that this approach adequately addresses the concerns about control of individual devices.
- 3.51 We explain in paragraphs 3.65 to 3.68 below that there is uncertainty around the actual costs we will incur in administering the licensing regime. In particular, and with regards to the point made about capping the number of devices per licence, it is not clear at this stage whether it would be more cost efficient for us to issue multiple licences to a user that deploys more devices than the cap number, or to issue one single, uncapped licence. We also respond to comments about tiered licence fees in paragraph 3.66 below.
- 3.52 We have therefore decided to go ahead with our proposal to allow any number of MCWSDs under the control of a single licensee. We continue to consider that requiring separate licences for individual devices would be a disproportionate administrative burden on both Ofcom and licensees at this point, and could act as a barrier to spectrum access and therefore be detrimental to innovation.

Licence term and notice period for revocation

- 3.53 In the Consultation we proposed that the licence would have no end date, and would be subject to a five year minimum notice period for revocation for spectrum management reasons. This is consistent with the standard General Licence Conditions for WT Act licences.¹⁶ Many WT Act licences, such as those for business radio, are issued on the same basis.
- 3.54 We noted that the five year minimum notice period should give licensees certainty that, if they acquire equipment to be used under the licence, they would be able to use it for some time even if Ofcom decides to revoke the licence for spectrum management reasons.
- 3.55 Responses to these proposals were mixed. Some respondents from the PMSE sector thought that the licence term should be as short as possible and that the minimum notice period should be 6 months. Digital UK noted that the impact of the proposals on licensing regime duration, licence term and notice period for revocation taken together was that the earliest date for withdrawal of MCWSDs would be 2023, and thought that this was too long. The BBC made a similar point. They suggested that Ofcom should set a minimum licence term with an option to renew later as they thought this would be more consistent with the transitional nature of the regime, or with the timescale for clearance of the 700 MHz band. BAE Systems, Cloudnet IT Solutions, Kings College London and Nominet thought the licence term proposal was reasonable, with BAE Systems and Arqiva noting that this would give organisations the confidence to invest in equipment.
- 3.56 Some respondents supported our proposal of a five year minimum notice period for spectrum management reasons, but others suggested that this notice period should be shorter than five years, and that it should be possible for Ofcom to revoke these licences with shorter notice if necessary. We have carefully considered all of these views.
- 3.57 We continue to believe that it is appropriate that licensees should be able to continue to use the equipment they have invested in, unless it is necessary to revoke the licence for spectrum management reasons (or another reason such as breach of terms of the licence).¹⁷
- 3.58 We also accept however that the transitional nature of the licensing regime and the known changes to the UHF TV band that are scheduled for 2022 (or earlier) argue for Ofcom to have the flexibility to revoke these licences for spectrum management reasons at relatively short notice should it become necessary to do so.
- 3.59 Additionally, in our TVWS Framework Statement¹⁸ we set out our intention to review the TVWS framework when it has been operational for 18 months. It is a possibility that that review might lead us to make significant changes to the TVWS framework. In that context it is important that we have sufficient flexibility to make changes to the MCWSD regime if needed.

¹⁶ <http://ofcom.org.uk/static/businessradio/glc.pdf>

¹⁷ See the revised draft licence included at Annex 2 for details of the other grounds on which Ofcom would have power to revoke. These are consistent with the standard General Licence Conditions for WT Act licences.

¹⁸ Implementing TV white spaces: Statement, 12 February 2015, <http://stakeholders.ofcom.org.uk/consultations/white-space-coexistence/statement>

- 3.60 It is important to note here that we do not currently anticipate any substantial changes to the TVWS framework. However, we recognise that this is the UK's first implementation of dynamic spectrum access and as such we must be able to learn from the development of the market and the application of the coexistence framework in the real world. So while we expect that we will continue to authorise licence exempt use of white space in the UHF TV band all the while the band is used for DTT, we do need to have the flexibility to respond to any significant issues that arise.
- 3.61 We continue to consider that the licences should have no specific end date, i.e. they would be issued for an indeterminate period. We are not currently aware of any reason why devices licensed under this regime could not continue to be operated in accordance with licence conditions alongside licence exempt devices once these become available. In addition we consider that granting a licence with a fixed term may discourage optimal use of the available spectrum by reducing incentives to invest.
- 3.62 However, in order to ensure that Ofcom is able to make changes to the TVWS regime as appropriate over the next few years, we have decided to reduce the minimum notice period for revocation for spectrum management reasons from five years to one year.
- 3.63 We also consider that it is important that any notice period for revocation for spectrum management grounds is sufficient to allow licensees a reasonable return on their investment in equipment. This is particularly an issue at the beginning of the term of the licence. We have therefore decided to include a condition that we would not serve notice revoking licences for spectrum management reasons before the end of three years from the date of issue of the licence. This would mean that there would be an effective "minimum term" of four years after the date of issue before we could revoke a licence for spectrum management reasons.
- 3.64 We emphasise that we would only revoke the licences for spectrum management reasons where we considered it appropriate to do so in order to ensure the efficient use of the spectrum based on the available evidence, and would consult stakeholders prior to taking such a decision.

Licence fee

- 3.65 We proposed an annual licence fee of £1,500, based on our estimates of likely costs of administering and managing interference for a new licence product¹⁹. Responses were split on the proposed fee, with some stakeholders suggesting a tiered fee (with the level of the fee rising in proportion to the number of devices registered) might be more appropriate.
- 3.66 We see merits in a tiered system for the fee. A higher number of devices under a licence could result in more interference cases that Ofcom has to deal with, compared with a licence with fewer devices. A tiered fee would in this case more closely align with Ofcom's costs. However, we consider that it is too early to set up a real cost-based tiered system. This is because there is too much uncertainty around the actual costs we will incur in administering the licensing regime.
- 3.67 On the level of the fee, five respondents said the proposed fee was too high and might discourage development and take-up of MCWSDs, particularly for smaller organisations. We accept that there is a risk that the £1,500 fee could discourage

¹⁹ See paragraphs 5.44 to 5.48 of the Consultation

SMEs and research institutions who would be interested in smaller deployments. It would be possible to adopt a fee below cost if we felt this was important to encourage innovation. However, while we believe that encouraging innovation in the use of TV White Space is important, if we were to set a fee below our expected costs to encourage increased take up of licensed MCWSDs there is a risk that it would have the unintended and undesired effect of dis-incentivising the development of licence-exempt devices. We therefore continue to consider that it is appropriate to set the fee at a level that will allow us to recover an appropriate amount of our costs in administering the licensing regime.

- 3.68 Consequently, we have decided to set the licence fee at £1,500 based on our estimates of the likely costs for administering the licensing regime as proposed in the Consultation. However, if we considered there was a significant misalignment with costs in the future, we would expect to review the fee. We currently anticipate that we would do this as part of the review of the MCWSD licensing regime, should the licensing regime be maintained.

Non-technical conditions for ensuring accurate determination of device parameters and compliance

- 3.69 In the Consultation we proposed putting in place a number of obligations which we considered would be appropriate to ensure that MCWSDs are correctly configured, and Ofcom would have appropriate means of checking compliance:
- An obligation that MCWSDs must be installed correctly, requiring the installer to ensure that the device parameters are accurately determined and communicated successfully to a designated database.
 - An obligation on the licensees to have a Quality Assurance (QA) process in place, to ensure MCWSDs are installed correctly. We proposed to ask licence applicants to provide Ofcom with details of their QA process on application. We explained that we expected a QA process would set down procedures for installers on the following points:
 - Processes for the installer on how to determine the MCWSD's location;
 - Information on what equipment is to be used to determine the MCWSD's location;
 - A 'check process' to allow installers to ensure a MCWSD has been installed correctly and that its device parameters have been accurately determined and communicated to a designated database;
 - Appropriate procedures to ensure the ongoing maintenance of a MCWSD, in particular to ensure that its device parameters remain as first determined and that location data is kept up-to-date; and
 - Information on administrative processes to ensure accurate records of installation, including the parameters determined and communicated to the database are made and stored in an appropriate way.
 - An obligation requiring licensees to keep an accurate record of each configuration or reconfiguration of every MCWSD established, installed or used under the licence in a way that sets out what the device parameters entered on each configuration or reconfiguration were and explains how the device

parameters were accurately determined and communicated to a designated database.

- An obligation requiring licensees to send Ofcom the records made as set out above following every installation or establishment of a MCWSD made under the licence, or every time a change is made to the configuration of the device.

- 3.70 Most respondents agreed with our proposed approach of requiring licensees to have appropriate QA processes and to keep installation records. However Nominet noted that the database would already have a record of the locations of devices as reported by the licensee, and suggested that it would not be proportionate to require licensees to keep records themselves. Some respondents also wanted to see greater clarity and robustness over some of the quality assurance requirements. These comments are dealt with in more detail in Annex 1.
- 3.71 After considering stakeholders responses, we remain of the view that it is appropriate to impose licence obligations in line with our consultation proposals in order to avoid harmful interference which might arise if device parameters for MCWSDs were inaccurately configured. We do not think that they are duplicative or that they present a disproportionate burden on licensees. In particular, we would expect that licensees, as a matter of good business practice, would maintain records of their operations and implement some kind of quality assurance scheme.
- 3.72 We have therefore decided to go ahead with our proposals to include obligations on the licensee to:
- ensure that device parameters are accurately determined and communicated to a designated database;
 - have a QA process in place to ensure MCWSDs are installed correctly; and
 - make and keep accurate records of each configuration or reconfiguration of every MCWSD established.
- 3.73 However, we have given further thought to the proposal to require licensees to provide Ofcom with a copy of their QA processes as part of the licence application. We think that it is sufficient to ensure that licensees have QA processes in place and that they are available for Ofcom to request or inspect, and therefore we no longer intend to ask licence applicants to provide Ofcom with copies of those QA processes as part of the application process.
- 3.74 We have also reconsidered the management of installation records. Rather than requiring licensees to provide these records to Ofcom, we now think that it is more appropriate to require licensees to provide the installation records to the WSDBs that their MCWSDs will connect to. Databases would then be required to make those records available to Ofcom on request where necessary for the purposes of Ofcom's spectrum management and interference management activities. This will build on the web-based system that Ofcom and the WSDB operators have developed to support the interference management processes for licence-exempt white space use.
- 3.75 With regards to what a QA process should cover, we consider that it is not appropriate for Ofcom to be prescriptive as to what a QA procedure should include, and that licensees are likely to be best placed to design a QA process suitable for ensuring that MCWSDs are configured and installed correctly. We therefore remain of the view that any standard setting of appropriate procedures for the installation of

MCWSDs should be industry-led, and that it would be useful if appropriate industry bodies would consider including standards for QA procedures in any relevant codes of practice. Compliance with standards of this sort would help licensees and installers to be confident that their quality assurance processes are appropriate.

- 3.76 However, we agree with respondents that it may be helpful for Ofcom to provide some guidance as to what we would expect a QA process to cover and we will consider with stakeholders whether it would be appropriate and useful to do so.
- 3.77 At this stage, our view of the high level objectives of the QA process is that it should ensure:
- i) that the device behaves in accordance with the licence conditions at all times. In particular, that the information provided to WSDBs for the purposes of calculation of operational parameters for a device is correct over the operating life of the equipment, and that the device radiates in accordance with the operational parameters provided by the WSDB over the operating life of the equipment; and
 - ii) that the records retained by the licensee and provided to the WSDB about the configuration of each MCWSD operating under the licence (the installation records) are correct at all times.
- 3.78 By way of general guidance, we think any QA process should include appropriate procedures covering the following aspects of MCWSD operation:
- i) **Installation:** The QA process should include appropriate procedures or policies for ensuring that:
 - o the device parameters that the MCWSD will communicate to the database are accurate; and
 - o the installation record is accurate and has been supplied to a database before the MCWSD starts operation (i.e. before a MCWSD starts requesting operational parameters from a database).
 - ii) **Normal operation and maintenance:** The QA process should include appropriate procedures or policies for ensuring that the Device Parameters provided to the database for the purpose of obtaining operational parameters are accurate at all times.
 - iii) **Adverse events:** The QA process should include appropriate procedures to deal with inadvertent or unauthorised modification of the device configuration that could result in non-compliance with the licence terms, or in the installation records being inaccurate. In particular, the process should cover monitoring for accidental damage or unauthorised alterations.
 - iv) **Modification:** The QA process should include appropriate procedures to ensure that any changes to the installation of a device (e.g. a change in location) which require a change in the configuration of the device are captured in the installation records, and that the device parameters reported to the database are amended if affected by the changes.
 - v) **Decommissioning:** The QA process should include appropriate procedures to ensure that decommissioning is captured in the licensee's own records, and that the installation record is removed from the WSDB.

- 3.79 We will set out in the licence all the information that must be contained in the installation record - see schedule 4 to the draft licence at Annex 2. Licensees will be required to provide, in the installation record for each device, information about the device itself and details of the configuration of all manually configured parameters. These installation records must be sent to each database that could serve the device before the device begins to operate. Any inconsistency between the installation record and the information provided to the database when a device seeks operational parameters will result in no operational parameters being provided. These records will ensure that Ofcom has access to all the information required to identify a MCWSD, and that Ofcom can check whether it has been correctly configured and is being operated in conformance with the licence conditions.

Other licence conditions

- 3.80 In our Consultation we set out details of other proposed technical and non-technical licence conditions. The majority of stakeholders agreed with, or had no further comment on, the other licence conditions as proposed in the Consultation. We remain of the view that it is appropriate to include these licence conditions. We go through these below. The specific details of the proposed technical conditions are set out in schedule 2 of the draft licence in Annex 2 – we have amended the drafting of these for clarity.

User access restrictions

- 3.81 The technical requirements under the licence exemption impose restrictions on a user's access to the hardware or software settings in a WSD. The reason for the licence regime is precisely to allow the use of devices that require the user, or the installer, to configure the device parameters. Therefore, the licences that we will issue will maintain this relaxation – when compared to the licence exempt regime – as described in the Consultation.
- 3.82 Specifically, the licensee will be allowed to determine the device parameters (with the exception of the UniqueID) – and other configuration parameters which are not defined as device parameters but could still have an impact on the radio behaviour of the device (such as antenna gain).

Method of provision of device parameters to the database

- 3.83 In the Consultation we proposed that device parameters could be provided to a WSDB in two ways:
- The licensee could enter the device parameters (other than the UniqueID), and any other configuration parameter, directly in the device – via a management console for instance. The device would then communicate the parameters to the database.
 - The licensee could provide the device parameters to the database directly – for instance via a webform provided by the database operator or via the licensee's own Operations and Management Centre. The database could then use the UniqueID, which the device always has to provide, to link the device parameters to a specific device.
- 3.84 Only a few stakeholders specifically commented on this. JP Gilliver and Nominet said that both approaches should be permitted. The DSA, however, said that Ofcom should not allow the second approach without clarification that databases would not

be required to provide a special user interface for licensees to provide parameters directly, and that databases would not be responsible for the accuracy of the parameters provided.

- 3.85 On further consideration, although we think both approaches could be acceptable in theory, we have concluded that it would be preferable not to enable device users to submit parameters directly to WSDBs at this stage for a number of reasons. Firstly, there would be considerable additional complexity in interaction between databases and devices. This would bring both risks and costs (both for Ofcom and for databases). Secondly, we have not seen evidence of demand for this mode of operation.
- 3.86 We also accept the DSA concern that it would be inappropriate to require databases to bear this additional cost for a transitional arrangement. It should be noted that, for the same reasons, we will not require databases to support MCWSDs, but we consider that allowing databases to support some MCWSD functionality but not all of it could be confusing for licensees.
- 3.87 Therefore, in the absence of any overt demand from potential users for this functionality we consider that the risks and costs of allowing device parameters to be provided directly to databases by an installer outweigh the likely benefits of doing so. Consequently the licence will only permit device parameters to be entered directly into a device.

Geographical extent of the licence

- 3.88 The geographical extent of the licence must match the geographical scope of the white space availability data that a database is able to calculate. We expect that the database will be able to provide operational parameters for all areas of the UK.
- 3.89 We proposed in the Consultation that the licence should authorise the licensee to establish, install and use the radio equipment in the whole of the UK. Ofcom will specify to WSDBs the map of locations, with a granularity of 100 metre by 100 metre pixels, at which WSDBs can calculate and provide Operational Parameters. This map of locations will be the same for licence exempt and licensed users.

Compliance and Enforcement

- 3.90 A number of respondents made the general comment that the licence regime as set out might be open to abuse. We recognise that there are risks from unlicensed use of manually configurable white space devices and from use of such devices that breaches the terms of the licence. We will treat unlicensed use of MCWSDs in the same way that we treat unlicensed use of any other radio equipment.
- 3.91 We are, however, conscious that the use of white space devices that are manually configurable relies heavily on users getting that configuration right. We expect licensees to treat accurate configuration as a high priority. Failure by a licensee to ensure that MCWSDs are accurately configured would constitute a breach of the terms of the licence and we would consider taking enforcement action as appropriate (which could ultimately include revocation of a licence).
- 3.92 As part of the process for qualifying databases to serve white space devices, they must undergo a series of tests to ensure that they are able to calculate operational parameters correctly and communicate with devices in the way required. For those databases that wish to serve MCWSDs we will also check that they are able to

properly carry out the additional consistency checks set out later in this section as part of that qualification process. In addition, we intend to carry out some proactive compliance checks once real MCWSDs are in use. This is likely to include end to end testing at some operational MCWSD sites.

Role of the white space databases

3.93 As explained above, in line with our consultation proposals, MCWSDs must operate in accordance with operational parameters (i.e. at powers and frequencies) provided by a databases which has been approved by Ofcom. However in the Consultation, we did not elaborate on the role of databases in support of MCWSDs. We have now given some further thought to this. We would note two overarching points:

- First, we do not intend to require databases that have entered into contracts with Ofcom (and have been qualified by Ofcom) to serve licence exempt devices to serve licensed MCWSD devices. It will be a commercial decision for databases whether they wish to serve licensed MCWSDs.
- Second, we will require databases that decide to serve licensed MCWSDs to carry out certain functions in addition to those needed for serving the licence exempt devices.

3.94 We elaborate in more detail our plans on these areas below.

Becoming a designated WSDB for MCWSDs

3.95 The contract between Ofcom and database operators does not require operators to serve any particular white space devices. We consider that is a commercial matter for database operators. Consistent with this position we will not make it a requirement for database operators to provide services to MCWSDs authorised under the licensing regime – it would be their business decision as to whether to do so. In common with our approach in relation to databases providing a service to equipment operating under the licence-exemption, we do not intend to impose controls on how much database providers charge for the service that they provide to users.

3.96 However, we do not intend to enter into contractual arrangements with database operators specifically limited to serving licensed MCWSDs. As noted above, the framework under which licensed MCWSDs will operate is in most part identical to the framework for operation of licence exempt devices. Therefore, where a database operator wishes to serve MCWSDs it must still enter into the standard contract with Ofcom and undertake and successfully complete the general qualification process (following successful completion of which an operator is able to start serving licence exempt devices).

3.97 We are now of the view that databases wishing to serve MCWSDs will have to carry out a number of specific additional functions as explained below. In addition to the general qualification process, operators that wish to provide services to MCWSDs will therefore have to undergo an additional qualification process which will specifically assess whether the database is technically capable of providing the additional MCWSD functionality. This process will not cover aspects that have already been covered by the initial qualification process.

- 3.98 Those WSDBs that pass this process will be listed in our website as approved by Ofcom to serve MCWSDs – in addition to being listed as designated by Ofcom to serve licence exempt devices under the licence exemption regulations.

New database requirements in support of MCWSDs

- 3.99 We explain in paragraph 3.74 that we will rely on databases to store and make available to Ofcom the installation records that the licensees must produce. The MCWSD licence would require the licensee to provide the installation records for every MCWSD that the licensee deploys to each WSDB that a device may contact to request operational parameters. This will have to be done before a device starts operation.
- 3.100 While Ofcom specifies what parameters must be in the installation record and gives guidance on the content (see the revised draft licence in Annex 2), we will not specify the method of communication between the licensee and the database. On the other hand, we will specify how the web-based interference management functions that WSDBs provide to Ofcom will be expanded to cover the installation records.
- 3.101 In addition to this data storage function, we think there is benefit in WSDBs checking the consistency of the requests for operational parameters against the installation records. This should further mitigate the risk of harmful interference being caused due to errors in the configuration of devices.
- 3.102 Specifically, when a licensed MCWSD makes a request for operational parameters, the database will check that the device parameters provided in the request match those on the installation record (which will include details of all manually configured parameters). If they do not, then the databases will return no operational parameters. This will ensure that devices are not provided with operational parameters based on information that does not match the installation record.
- 3.103 To be clear, the licensee remains responsible for ensuring that devices comply with the terms of the licence. The database will not be responsible for verifying whether the information provided to it by the licensee is accurate – only for checking the consistency between the installation record and the device parameters in the request.

Section 4

Next steps

- 4.1 We are inviting views and comments on the revised draft licence in Annex 2 of this Statement. We will publish a finalised draft of the licence in anticipation of the licensing regime being in place for the beginning of 2016, which is around the same time that the licence exemption regulations will come into force.
- 4.2 Alongside this Statement, we will be publishing and notifying a draft Interface Requirement to the Commission. The Commission and other Member States may make comments on the draft during a three month public consultation (and potentially a further three months if any concerns are raised). We will publish the finalised Interface Requirement before the end of the year, taking on board any comments made during the notification period.
- 4.3 As mentioned in paragraph 3.97, qualified databases that wish to also serve MCWSDs will have to undergo further qualification to ensure that they are technically capable providing the additional MCWSD functionality. We are currently in the process of qualifying databases for providing services under the licence exemption regulations. This process is due for completion by this autumn. We plan to conduct the additional MCWSDs qualification tests for the relevant databases also in the upcoming months.
- 4.4 As well as welcoming feedback on the provisions in the draft licence, we are also considering whether it would be helpful and appropriate to issue further guidance in respect of the quality assurance processes. Any comments, in particular from potential licensees, on what areas it should cover would be welcome. Please send any comments on either of these issues to TV.WhiteSpaces@ofcom.org.uk by 13 November 2015.