



Small scale DAB trials

How Ofcom will award licences to broadcast trial
small scale DAB multiplex services

Statement

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About this document

This document is the statement that concludes Ofcom's consultation on how it will license trial small scale DAB multiplex services. This document sets out the conditions of trial Wireless Telegraphy Act licences Ofcom intends to grant, and the process by which Ofcom will assess applications and award licences. The licences are to authorise field trials to test the operability of low cost small scale DAB multiplexes under three different configurations.

The results from these trials will help to inform a wider programme of work Ofcom is carrying out to consider the possibilities for enabling small scale radio services to broadcast on a digital radio platform.

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Section 1

Small scale DAB multiplex trial

Introduction

- 1.1 This statement concludes Ofcom's consultation on our approach to awarding licences for a field trial of small scale digital audio broadcasting (DAB) multiplexes, for a limited period of nine months. It sets out the main points of the responses we received, and Ofcom's response to the issues raised by respondents. We also confirm the trial licensing process and how we expect to conduct and use the trials.
- 1.2 Alongside this statement, we have also published the standard form trial multiplex licence, the Invitation to Apply for a trial DAB multiplex licence, and the application form to be used when applying. The standard form licence has been published for illustrative purposes only and may be subject to change. The deadline for applications for a trial DAB multiplex licence is **3pm on 7 April 2015**.

Background

- 1.3 Ofcom is undertaking a project funded by DCMS to develop a trial of low cost DAB technology. This builds on the preliminary work conducted in Brighton between September 2012 and January 2013.¹ The project aims to assess the technical capability of this approach for small scale radio services, and to consider what form of licensing framework is appropriate for these services. The findings from this project will inform the Government's decision as to whether or not to proceed with licensing small-scale DAB services.
- 1.4 We have conducted some limited trials of the technology, and propose to assess the platform more fully by conducting field trials of this approach, involving stakeholders from the radio industry.
- 1.5 We published a consultation on our proposals for trial licensing on 29 October 2014, which closed on 10 December 2014. We received 30 responses from a range of stakeholders, including members of the public, community radio stations, commercial radio stations, internet radio services, and transmission providers. The non-confidential responses have been published on our website:
<http://stakeholders.ofcom.org.uk/consultations/small-scale-dab/?showResponses=true>
- 1.6 As part of the consultation, we also sought expressions of interest in participating in trials. We received around 40 expressions of interest, from a variety of parties around the country. The contact details of those parties which have made non-confidential expressions of interest are available on our website:
<http://stakeholders.ofcom.org.uk/consultations/small-scale-dab/list-of-expressions-of-interest/>. We have made these details available to help different parties contact each other with a view to forming a trial multiplex.

¹ A report on the Brighton trial 'Small Scale DAB: The potential for lower-cost transmitting stations in support of DAB rollout' is available at <http://stakeholders.ofcom.org.uk/binaries/research/radio-research/Software-DAB-Research.pdf>

- 1.7 We also conducted three demonstration events for interested stakeholders during the consultation period, two at Ofcom's technical facility at Baldock, and one at Ofcom's offices in London. There were around 65 attendees, who provided feedback on our technical work so far, and on our consultation proposals.
- 1.8 This statement concludes our consultation on trial multiplex licensing.

Field trial objectives

- 1.9 In our consultation, we identified three principal objectives that we want to achieve through field trials. These are:
- 1.9.1 To test the function, capability and stability of software-defined DAB multiplex technology, particularly in a Single Frequency Network (SFN) mode²;
 - 1.9.2 To test how well the available technology lends itself to several parties coordinating their services into the multiplex (many small scale radio services do not have experience of using multiplexing technology); and
 - 1.9.3 To give the market an opportunity to learn about the software-defined DAB platform and the potential opportunities the technology affords, particularly for those stakeholders who are not familiar with digital broadcasting.
- 1.10 We proposed these objectives in order to test the two elements that were not demonstrated as part of the Brighton trial, namely the capability and stability of the technology in either SFN mode using multiple co-ordinated transmitters, or when carrying live broadcasts from separate programme service providers on a single transmitter.
- 1.11 We also proposed to include a range of services from across the small scale radio sector. This is because these trials are aimed at geographically small scale services, from across the radio sector which includes community, commercial, internet services and potentially new entrants to the market. It was our objective to include a range of services from across the small scale radio sector. Any programme services carried on a trial multiplex will need to be appropriately licensed.
- 1.12 We sought views from stakeholders on whether we had identified appropriate objectives for the small scale DAB multiplex trial, and whether there were any further questions that the trial should seek to address. Generally respondents agreed that our objectives were appropriate for the trial, although a small number of respondents suggested other matters, set out below, that should form part of the trial objectives.
- 1.13 Several respondents suggested that the project should seek to develop 'low cost' rather than 'small scale' DAB, because in their view the primary obstacle to smaller services accessing DAB is the cost of capacity rather than inappropriate coverage.
- 1.14 Although this project seeks to assess the costs of this approach to broadcasting via DAB, and is seeking to test a low-cost solution, the aim of this project is to contribute to the development of a means for small scale services to have access to DAB, as

² An SFN is where several transmitters carrying the same programme content make use of the same transmission frequency. The ability to operate as an SFN potentially reduces the demand for transmission frequencies.

set out by Government in December 2013 at the GO Digital Conference. While we are seeking to trial a low cost approach, other respondents made the point that a low cost approach may not be appropriate for all multiplexes, even if their coverage is of limited scale. Therefore, while we will continue to monitor costs as part of this project, we will retain our primary focus on small scale services.

- 1.15 Several respondents commented that as part of our technical objectives we should seek to test DAB signal propagation in a variety of terrains, particularly rural as opposed to urban terrains. While we acknowledge the benefits of being able to test a variety of terrains and real life scenarios, we consider that the propagation characteristics of small scale DAB are unlikely to be substantially different to conventional DAB. Therefore, as we also wish to ensure that as wide a range of stakeholders as possible can participate, we do not consider that we should seek, for example, to specify what terrains we wish to test. However, we will assess signal propagation and coverage where relevant as part of our monitoring of each trial. We also intend to commission some receiver testing, to help assess compatibility with receivers.
- 1.16 The Community Media Association suggested that Ofcom should use the trials to 'develop methods of measuring audience size for smaller radio broadcasters. This might be through establishing an agreement with RAJAR or by developing an alternative, yet credible, affordable method of measuring audience size for community radio and small commercial broadcasters.'
- 1.17 Although we recognise the desire, particularly in the community radio sector, for a means of measuring audience for smaller stations reliably, audience measurement is a matter for broadcasters, as it is primarily a commercial tool. It is not a matter for Ofcom, nor does it fall under the scope of this particular project.
- 1.18 One respondent said that Ofcom should not promote the DAB platform any further, because of the enduring popularity of AM/FM receivers compared to DAB receivers. They further asserted that before any trials take place, 'a proper national survey on listening habits of the radio audience' should be carried out. For these reasons, the respondent also argued that the trials do not constitute a good use of public money.
- 1.19 These are points for Government rather than Ofcom to consider, although we note that, according to Ofcom's Communications Market Report 2014, digital radio take-up in 2013 increased to 47.9% of households, and DAB accounted for two-thirds of digital radio listening.

Field trial scenarios

- 1.20 In order to test the objectives set out in paragraph 1.9, we outlined three scenarios we wish to trial:
 - 1.20.1 Trial 1: A single transmitter multiplex carrying multiple services;
 - 1.20.2 Trial 2: An SFN carrying multiple services based on two transmitter sites; and
 - 1.20.3 Trial 3: An SFN carrying multiple services based on two transmitter sites with one of them being an on-channel repeater.
- 1.21 We proposed that we would license one of each of these trials.

- 1.22 We received a number of responses suggesting alternative or additional scenarios that we should include in the trial, the most common of which was that we should trial a single service, single transmitter multiplex.
- 1.23 As we set out in the consultation, DAB is a multiplexing technology which we are confident is capable of functioning with a single service provider. In any eventual licensing framework, we anticipate that provision may be made for single service multiplexes, but this is a question for Government to consider and at this stage we do not consider that there is a compelling need to test this scenario further. In particular, it does not meet our objective of testing how well the available technology lends itself to several parties coordinating their services into the multiplex. We therefore propose not to license single service multiplexes as part of this trial.
- 1.24 One respondent suggested that we should include an SFN using multiple transmitters and an on-channel repeater. In principle we agree that useful lessons could be learned from such a configuration. However, this arrangement is likely to increase the demand for trial equipment significantly, the pressure on available frequencies and make it more difficult for Ofcom to monitor such a large configuration of transmitters. We are also conscious that this trial is aimed at small scale services, and that expanding the number of transmitters in a trial is likely to compromise that aim. Therefore, we will not include such a configuration as part of the trial.
- 1.25 The most frequent comment from respondents was that three trials are not sufficient to constitute a robust evidence base, particularly when there is demand for more among stakeholders. Further, with only three licensees, there is a risk that some may not launch which would further reduce the pool of results.
- 1.26 In light of the responses and interest from stakeholders, we agree that conducting more trials would strengthen the sample size and provide us with more data. We also agree that conducting more trials would help to mitigate the risk that one or more licensed multiplexes may not launch, or cease broadcasting before the end of the trial period. There is also more demand to participate in trials than we initially anticipated.
- 1.27 Therefore, we will issue up to ten trial licences. This is the maximum number of trials we think our resources can reasonably support. We will not necessarily award all ten licences. Decisions on licence awards will be made in accordance with the process set out in Section 4 of this document.
- 1.28 We will aim to license four trials of Type 1 (single transmitter), three trials of Type 2 (SFN) and three of Type 3 (on-channel repeater). However, the amount of equipment and cost that Ofcom is able to provide to trial participants, and the number of applicants for each type of trial, will have an impact on how many of each type of trial we will be able to license. The process by which we will assess applications in respect of equipment provision is set out in Section 4.

Licensing

- 1.29 We proposed that the short term trial multiplex licences would be awarded and issued under the provisions of the Wireless Telegraphy Act 2006 (“the Wireless Telegraphy Act”) only, without a licence under the Broadcasting Act 1996.
- 1.30 The Wireless Telegraphy Act sets out our legal power to grant Wireless Telegraphy Act licences. Our duties in relation to the award of these licences are set out in the

Communications Act 2003 and the Wireless Telegraphy Act, and are derived from the requirements of European Union legislation.

- 1.31 Section 8(1) of the Wireless Telegraphy Act makes it an offence for any person to establish or use any station for wireless telegraphy or to install or use any apparatus for wireless telegraphy except under and in accordance with a licence granted by us under that section (a Wireless Telegraphy Act licence).
- 1.32 Section 9(1) of the Wireless Telegraphy Act gives us the power to grant Wireless Telegraphy Act licences subject to such terms, provisions and limitations as we think fit. This broad discretion is, however, subject to the rule that 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 achieve³.
- 1.33 In addition, our discretion under section 9 must be interpreted in a way that is consistent with the licence conditions permitted under the Authorisation Directive⁴.
- 1.34 We received no responses commenting on this issue. We will therefore proceed to grant these licences only under the Wireless Telegraphy Act. The process and provisions are set out in the rest of this document.

Permanent licensing framework

- 1.35 Although not part of this consultation, we received a range of suggestions for how any eventual licensing framework might work, including: limitations on ownership of multiplexes; multiplexes with profits directed at community broadcasting; controlling the range of services carried on a multiplex; localness as a key priority; and reinterpreting the current DAB multiplex licensing framework.
- 1.36 The framework under which these trials will be licensed is not intended to be a permanent solution for licensing small scale multiplexes on DAB, and should not be taken as being indicative of how any permanent licensing arrangement might operate. We will, however, take these suggestions, along with experience gained from the trials, into account as we take forward our work on advising Government on a potential permanent licensing framework for small scale DAB services.

Structure of this document

- 1.37 The remainder of this document confirms how we will license trial small scale DAB multiplex services, and is structured as follows:
 - 1.37.1 Section 2 sets out the technical requirements for the trials, and the technical licence conditions that will apply to each successful applicant.
 - 1.37.2 Section 3 describes the non-technical terms and conditions that will be contained in the licence for the purpose of delivering the objectives of the trial.

³ Please see section 9(7) of the Wireless Telegraphy Act.

⁴ Directive 2002/20/EC

- 1.37.3 In Section 4 we confirm the assessment and award process that will apply in deciding to whom each small scale DAB trial multiplex licence should be awarded.
- 1.37.4 Section 5 sets out how the trials will conclude, including how we will use the results and data from licensees.

Section 2

Technical licence conditions and requirements

Overview

- 2.1 In this section we set out the technical aspects of the trial, and the technical licence conditions.
- 2.2 Firstly we set out the technical standards and requirements with which successful applicants will have to comply in order to meet the trial objectives. This includes reporting progress, issues and conclusions to Ofcom. Licensees must ensure that their services are compliant with the technical requirements described in this section throughout the duration of the trial.
- 2.3 We also describe some of the technical information that applicants will need to provide to enable us to assess the technical aspects of their proposed service.
- 2.4 We then explain which equipment Ofcom will make available to relevant licensees in order to expedite the process of launching the trial multiplexes.
- 2.5 Respondents were generally positive about our proposals in relation to the technical requirements of the trial, although a number raised specific issues, which are summarised in this section.

Network topography and circuit interconnections

Connectivity requirements

- 2.6 In our consultation we set out the minimum levels of connectivity we expect to be necessary to enable a low-cost multiplex to operate reliably. One respondent suggested that as the majority of the processes are carried out in software, that a low-cost cloud-based system could be used to host that software.
- 2.7 We agree that it is possible for different technical solutions to be adapted to providing low cost DAB multiplexes. It is however likely that some further development and verification would be required to ensure that the software that we have been testing operates reliably on a cloud-based virtual machine. In order to limit the number of variables and development time required, Ofcom will provide equipment that is based upon low-cost computing modules as originally proposed. We would however be happy to consider applications to participate in the trials from stakeholders that propose to adopt a cloud-based approach. Any applicant proposing such an approach would, if granted a trial licence, need to be prepared to test the software and verify its performance in a virtual environment to the satisfaction of Ofcom.

Multiplexer circuit requirements and provision of circuits

- 2.8 In our consultation, we described the circuit capacity required by the multiplex, and proposed that because of the complexity of acquiring and installing circuits, Ofcom would provide the relevant circuits to participants.

- 2.9 One respondent sought clarification as to whether Ofcom would provide the necessary circuits, and also whether Ofcom would cover terminal costs if an IP solution was used.
- 2.10 Ofcom will procure the necessary circuits for trial participants through a competitive tender process. We will pay for the installation of circuits for one year's rental of the circuits which will be sufficient for the duration of the trial. We will aim to cover the cost of all of the circuit connectivity. If demand exceeds the resources we have available, we will provide as a minimum up to three circuits for each licensee: one contribution circuit from the location of up to two separate sound services to the multiplexer and one distribution circuit from the multiplexer to each transmitter.
- 2.11 In terms of terminal equipment, each circuit will be provided with the circuit provider's customer premises equipment.

Technical parameters

- 2.12 We consulted on the range of technical parameters with which trial transmitters must comply. Although most respondents agreed with our proposals, a small number raised specific issues, set out below.

Coverage and transmitter power

- 2.13 The small scale DAB project is aimed at developing a route to DAB for geographically small scale services. This aim is therefore reflected in the extent of coverage and level of transmitter power that we proposed to license through these trials.
- 2.14 Specifically we proposed that applicants for trial multiplexes should define the coverage area they would wish to cover, and that Ofcom would seek to accommodate applicants' requests. However, trial coverage areas should be no greater than 40% of the area served by any local DAB multiplex serving the same area⁵, while transmitters will normally operate at a maximum effective radiated power (ERP) of no more than 100 watts.
- 2.15 Two respondents particularly proposed that the overall limit on coverage of 40% of any local DAB multiplex serving the same area should be retained, but that we should remove the maximum ERP limit we proposed. This is because, in their view, it would allow the use of fewer transmitters to cover the same area, thereby decreasing the cost to the multiplex operator.
- 2.16 In our view, it is not necessarily the case that allowing a higher power will in all cases reduce the number of transmitters needed. This is because it is sometimes terrain that presents an obstruction to the signal's wider propagation and simply operating at higher power will not be able to overcome that. It is also important to note that as the power increases, the reuse distance of the frequency also increases, which could impact our ability to accommodate the trial multiplexes efficiently. It also increases

⁵ The Government has said it is minded to use the same 'threshold' to determine which analogue services would remain on FM in the event of a switchover (see *Connectivity, Content and Consumers*, published by the Department for Culture, Media & Sport in July 2013). We therefore consider it appropriate to use the same threshold in these trials as a way to define what should constitute 'small-scale' DAB coverage.

the likelihood of interference occurring to the reception of other multiplexes and of needing international coordination.

- 2.17 The power limit we set out in our consultation was provided for guidance and it is our intention to choose a power level for each trial that is appropriate to the coverage aspirations of applicants. Therefore, we will retain the overall coverage area limit of 40% of the corresponding local DAB multiplex area, but will seek to meet successful applicants' coverage aspirations at the most appropriate power level. It is likely that the maximum effective radiated power levels will still be of the order of 100 watts for the trials as this represents a convenient and easily implementable level achievable by readily available amplifier and filter equipment. We will, however, keep the choice of power under review as we develop a frequency plan for small scale DAB services alongside the trial period.

Distance between transmitter sites

- 2.18 Two respondents sought clarification of the acceptable distance between transmitter sites used for an SFN.
- 2.19 There is no single answer to the question as much depends upon the specific circumstances of each trial, for example, the terrain, coverage aspirations and site availability of each applicant. However, as guidance, we consider that the coverage areas of each transmitter within an SFN should be contiguous, to enable us to carry out an assessment of how well the SFN synchronisation is operating. As a rule of thumb, a transmitter operating at 100W ERP may achieve a service area of approximately 10 km radius. Therefore, to provide some overlap, we recommend a distance between two trial transmitters of no more than 15 km.

Availability of transmission sites

- 2.20 In the consultation, we set out that it is for applicants to propose the transmission sites they wish to use. This choice will depend upon the area they wish to serve and which transmission sites they are able to procure access to. These do not have to be existing transmission sites, as long as they are capable of satisfying the key technical requirements set out later in this section.
- 2.21 A small number of responses suggested that Ofcom should seek out suitable sites, and one respondent queried whether Ofcom 'would encourage abandonment of the Arqiva rate card' in relation to site access.
- 2.22 Only applicants will have knowledge of the area that they wish to serve and of the presence of suitable sites, which may not be established transmission sites. Ofcom is not able to seek out suitable sites and it is for applicants who wish to take part in the trials to seek consent to use appropriate sites and negotiate the cost of site access.

Spectral mask and adjacent channel interference

- 2.23 We proposed in our consultation that the radiated output of the trial transmitters, when measured downstream of all filtering equipment, must comply with the mask specified for 'transmitters in certain other circumstances' (i.e. the non-critical mask) as specified in Clause 15 of ETSI EN 300 401.⁶ One respondent raised concerns

⁶ ETSI EN 300 401 is available at http://www.etsi.org/deliver/etsi_en/300400_300499/300401/01.04.01_60/en_300401v010401p.pdf

about this proposal, particularly in relation to adjacent channel interference (ACI). The respondent suggested that Ofcom should publish for consultation its proposals for mitigating any problems that may result if adopting the non-critical mask, particularly as the power proposed for the trials will be greater than those used at smaller national and local DAB transmission sites.

- 2.24 A number of other respondents made suggestions on dealing with Adjacent Channel Interference – some suggested using frequencies other than block 11A while one respondent suggested that Ofcom should carry out measurements to gain a better understanding of the real world impacts of ACI.
- 2.25 As part of its consideration of each application, Ofcom will assess the potential impact that the proposed transmitter arrangement might have on reception of the national and local DAB multiplexes. We will take into account both the use of the non-critical mask and the proposed transmitter locations and their attendant parameters (such as frequency block, power and antenna pattern).
- 2.26 We intend to apply the same criteria for judging the acceptability of a trial transmitter as we already use when assessing proposals for adding transmitters to the national and local DAB multiplexes. These are set out in our *Technical Policy Guidance for DAB Multiplex Licensees*⁷ and seek to minimise the impact that new transmitters have on reception of existing multiplexes. As part of this process, we will share our analysis with the Technical Group of the Joint Planning for Radio Group (JPRG). The JPRG is a group comprising members from each of the national and local multiplex licensees as well as their transmission companies, Ofcom and DCMS. Ofcom will ensure that any DAB multiplex operators that might be affected by trial transmitters will be consulted and are content with the proposals before the trial transmitters come into service.
- 2.27 Should we find that a trial transmitter causes an unexpectedly large impact to reception of other multiplexes, Ofcom may require the licensee to take action to mitigate the impact, such as operating the transmitter at a lower power. Ofcom may require the transmitter to be switched off until appropriate mitigating measures can be put in place.

DAB+

- 2.28 Our consultation proposed that it would be for each trial participant to make their own choices in relation to such matters as what constitutes an appropriate bitrate for each service carried, and whether the services are in mono or stereo. However, we also proposed that the trial would be limited to DAB (and therefore the MPEG 1 Layer 2 audio encoding algorithm) excluding DAB+ and DRM.
- 2.29 Several respondents argued that DAB+ in particular should be included in the trials, to provide a comprehensive test of the algorithm, and a comparison with DAB. One respondent also argued for the inclusion of DRM.
- 2.30 We excluded DAB+ primarily on the basis of the issues around intellectual property rights, and because, in our view, its key benefit is increasing the available capacity on a digital multiplex. Taking these issues in turn, DAB+ is a product that cannot be operated on a multiplex without the operator holding the appropriate software licence.

⁷Technical Policy Guidance: http://stakeholders.ofcom.org.uk/binaries/broadcast/guidance/tech-guidance/policy_guidance.pdf

As we are seeking to maintain as low a cost base as possible, we have made the decision to use open-source software wherever possible.

- 2.31 In relation to capacity, we consider it unlikely that all of the capacity on the trial multiplexes will be in use. As there is also only a small base of receivers capable of receiving DAB+, this seems to us to be an unnecessary complication for operators.
- 2.32 DRM sits outside the scope of these trials as the Government has provided Ofcom with funding specifically to take forward work concentrating on the opportunities for carrying small scale FM services on DAB. We will therefore not be able to include DRM in these trials.
- 2.33 However, given the apparent interest from stakeholders in trialling DAB+, should any trial licensee wish to operate DAB+ for some, or all of the services on the multiplex, they may do so, as long as they have the appropriate patent licences for its use in place. Any applicants wishing to do this should note that the equipment that Ofcom will supply will not be capable of supporting DAB+, because of the prevailing intellectual property rights associated with the codec. If any trial participant wishes to restore that functionality in order legally to use DAB+, they may do so by obtaining the appropriate licence.

Continuity of service and service interruptions

- 2.34 We received few comments concerning service continuity, although one respondent expressed the view that the output of trial transmitters should be continuously monitored with adequate telemetry in place to ensure that fault conditions (and potential interference to other multiplexes) can be quickly identified. Another stated that asking a trial participant to switch off their transmitter should be a last resort, in the situation where a trial participant's service appears to be causing interference to another DAB service.
- 2.35 Each trial system will be equipped with a pack of (up to six) source encoders, two audio levellers, single board computers for multiplexing and modulation, software defined radio (SDR), linear RF power amplifier, mask filter, feeder cable and aerial. Software for monitoring, diagnostic and support will also be provided, along with a limited set of spares. External references will be provided with systems for SFN transmitting stations along with an appropriate SDR unit. Encoders, multiplexers, and modulators will be supplied with a standard configuration template which may be modified by the recipient to suit their own requirements. We will also provide monitoring equipment that we envisage being installed for a period of time at each location in order to verify reliable performance of the equipment. We will seek to ensure that such equipment can provide live fault information, although this will depend upon the connectivity available at individual installations.
- 2.36 Should cases of interference occur, Ofcom will act proportionately and will seek to resolve the problem in cooperation with the trial participants. While we will aim to avoid having to instruct participants to switch off their transmitter, we may have to do so in circumstances where significant numbers of listeners to other services are affected.

Frequency availability

- 2.37 In our consultation we proposed that trial multiplexes would use frequency block 11A, which has been cleared for use by the second national commercial DAB multiplex, the licence for which has recently been advertised. We also proposed that we would

seek to use some blocks of spectrum interleaved amongst the other DAB multiplexes that operate in blocks 10B to 12D. We proposed that we would reflect the experimental nature of these licences by including a licence condition allowing Ofcom to revoke the licences for spectrum management reasons with one month's notice if necessary.

- 2.38 A significant number of respondents raised concerns about the proposal to make use of block 11A, for a variety of reasons. Primarily this was due to concerns that the trials would be disrupted or forced to cease before the end of the nine month term if the second national commercial DAB multiplex were to come on air before the anticipated end of the trial. Some were also concerned about the potential for adjacent channel interference to occur in areas where frequency block 11B is in use by another multiplex.
- 2.39 Some respondents also raised concerns about the use of interleaved spectrum because of the increasing difficulty of accommodating services as the spectrum becomes more intensively used. One respondent suggested that we consider the use of lower frequency blocks from 7D to 9C in order to reduce potential ACI effects. Another respondent objected to the use of frequency blocks below 10D, asserting that DAB receivers generally do not automatically scan below this block when retuning.
- 2.40 We have considered our proposals for frequency allocation further and agree with respondents that use of block 11A carries the risk that trials might have to end early or be disrupted through having to change frequency. Therefore, we will avoid the use of block 11A in the trials, unless there is no suitable alternative.
- 2.41 Further, we have also been carrying out work to assess the possibilities of using frequency blocks within the part of the spectrum known as Sub-band 2 of VHF Band III (Blocks 7D, 8A, 8B and 9A, 9B, 9C), which are used by DAB in other countries in Europe, but are currently used by only a small number of business radio licensees in a few areas of the UK. We consider that these frequency blocks offer considerable scope for implementation of small scale DAB multiplexes, although we will need to assess the implications of having to coexist with the remaining business radio licensees.
- 2.42 Although these blocks are below the normal tuning range of some older DAB receivers, the majority of modern receivers should carry out a complete scan for frequencies from 174 MHz (block 5A) upwards as this is a requirement set out in the Government's minimum receiver specification.⁸
- 2.43 Therefore, we will generally expect to accommodate the trial multiplexes within interleaved spectrum, or within the frequencies of Sub-band 2. We hope that this will mitigate the risks of having to curtail or disrupt the trials before the end of the nine-month term.
- 2.44 Whilst Ofcom will seek to find frequencies for trial multiplexes, due to the constraints of frequency availability, it may not always be possible to accommodate trial multiplexes in some locations. Applicants should be aware that there is a risk we will not be able to accommodate their location or the specifics of their proposed coverage

⁸ Minimum specifications for DAB and DAB+ in-vehicle digital radio receivers and adaptors - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/207935/In_Vehicle_Min_Spec_v1.1_revisedJune13_.pdf

area, using the frequencies that are available. We will assess whether there is available frequency to carry out the trial proposed by each applicant in their chosen location once we have assessed which applicants meet the eligibility criteria set out in section 4 below. If we are unable to find available frequency for any of the applicants, we will inform such applicants of the outcome and will not consider their applications further.

- 2.45 Further, given the short term and experimental nature of these trials, we still consider it appropriate to include a licence condition allowing Ofcom to revoke the licence for spectrum management reasons at a month's notice.

Technical requirements for transmission sites

- 2.46 We did not receive detailed comments on our proposals relating to the technical requirements for transmission sites. The key technical requirements therefore remain as we proposed in our consultation and as set out below.

Table 1 – Key technical requirements

Aspect	Requirement
Access to transmission site (s)	Consent from the site landlord that the applicant has permission to access a transmission site where it will be possible to accommodate the radio equipment, including access to a suitable structure upon which the associated antenna and feeder cable may be mounted for the duration of the trial.
Equipment accommodation	Dry, secure accommodation for indoor technical equipment that we expect to be mounted in a standard 19" flight case rack approximately 1m high.
Environmental	The radio equipment is expected to dissipate approximately 400 watts into the room. The room ventilation should be capable of supporting this dissipation and maintain the temperature within the guideline limits set out below to ensure reliable and stable operation: Maximum ambient temperature: 30 °C Minimum ambient temperature: 5 °C As guidance, this is likely to require an airflow of approximately 200m ³ per hour.
Power supply	Single phase 230V. Estimated consumption is around 500VA.
Antenna type and polarisation	Ofcom will specify the antenna type depending upon the coverage aspirations of the applicant. Designs will be as small and simple as possible and are expected to comprise either one collinear, a yagi, a small number of dipoles or panels. Photographs of the

	proposed aerial location (including the immediate surroundings) should be provided.
Separation between receive and transmit antennas (an SFN with an on-channel repeater only)	<p>Applicants will need to state how far apart they propose to mount, receive and transmit antennas and describe whether there is any physical barrier between them that could reduce the amount of transmitted signal entering the receive antennas.</p> <p>On-channel repeater systems require both a good incoming signal from the source transmitter and a high isolation (good spacing or a significant physical barrier such as a building) between the receive and transmit antennas.</p>
Technical architecture	Applicants will need to describe how they intend to configure their transmission arrangement including details of the location of the encoders, multiplexer, and modulator/SDR/amplifier/filter as well as the intended means by which elements in different locations will be connected (such as internet feeds or other links).
Planning permission	Applicants will need to confirm that the equipment (including an antenna and feeder on the structure as necessary) can be accommodated at their proposed transmission site(s) without the need to obtain consent under the relevant planning legislation ⁹ . If in doubt, applicants should take advice from their Local Planning Authority.

Reporting requirements

- 2.47 In the consultation, we set out that Ofcom will need regular reports to enable it to track the progress that licensees make in establishing the trials, and to monitor issues that arise during the subsequent operation of the DAB multiplex service. This information will be used to assess the extent to which the trial is achieving its objectives and also to help draw conclusions.
- 2.48 We proposed to ensure this by including a condition in Schedule 1 of the trial multiplex licence that requires the licensee to provide information specifically in relation to the radio equipment.
- 2.49 The majority of respondents agreed with our approach to reporting requirements, but a number of respondents suggested that Ofcom should provide standard reporting templates, both for ongoing reports and the final reports. They argued that this would help ensure consistency of reporting and comparable information between licensees. One respondent additionally suggested that the administrative burden placed on participants, particularly community radio licensees, should be as light as possible because of the limited resources available to such stations. This respondent further

⁹ Either The Town & Country Planning Act 1990 (for England & Wales), The Town & Country Planning (Scotland) Act 1997 or The Planning (Northern Ireland) Order 1991.

argued that 'participating stations should be able to obtain assistance with reporting from Ofcom as needs dictate.'

2.50 We agree that a standard reporting template will help to ensure consistency of information will provide one to trial participants. However, we also consider that it is likely that the circumstances of each trial will be unique to each participant, and so participants must provide other relevant information as necessary. Although we are happy to discuss the reporting requirements with participants, and to provide clarification where necessary, Ofcom is not able to provide administrative assistance in this respect to participants, nor are we able to offer advice on the content and writing of reports other than that provided in the Invitation to Apply.

2.51 Therefore, we will gather information through a combination of licensee reporting and through our own observations and measurements. Licensees will be expected to report throughout the duration of the trials in the format and timeframe specified by Ofcom. We anticipate that reporting requirements will include, but will not be limited to, the following:

2.51.1 In the **establishment phase** of the multiplex (i.e. before the service is launched) a weekly report (via email) describing progress and challenges in relation to:

- Gaining access to transmission site(s) and accommodation;
- Gaining space on the structure;
- Circuit procurement;
- Procurement of equipment that is not included in the radio equipment but is required to launch the multiplex;
- Installation of the radio equipment; and
- Liaison with other parties contributing to the multiplex.

2.51.2 During the **course of the multiplex's operation** activity reports including:

- Event logs detailing transmission and reception problems, cause (if known), remedy and effect, including any downtime; and
- Fortnightly emails documenting reliability, reception reports/complaints and any issues arising.

2.51.3 A **final report** to be provided not later than 6 weeks from the original termination date of the licence:

- Description of the trial arrangement including summary of the key aspects such as studio and transmitter locations;
- A summary of the services carried and bitrates employed;
- Summary of the issues in establishing the multiplex – both technical and logistic;
- Headline financial information including operating costs and capital costs of additional equipment;
- Any major or on-going technical issues with any element of the radio equipment, including reception issues;
- Any co-ordination issues (transmitters or services); and

- Any additional uses of the multiplex capacity and the costs associated with it.
- 2.52 During the course of the trials, Ofcom intends to carry out **drive tests** to establish the extent and reliability of the multiplex. Ofcom will need to visit the transmission site(s) to check that the equipment is operating satisfactorily before the multiplex service commences broadcasting. We may in addition carry out further site visits during the trial. Licensees will be given one weeks' notice of our intention to carry out a site visit.
- 2.53 We will include a condition in Schedule 1 relating to the provision of information in relation to the radio equipment.

Provision of equipment

- 2.54 In order to expedite the establishment of the trials, we proposed that Ofcom would provide the majority of the equipment necessary to establish the multiplexes and each transmitter. We received a number of responses commenting on this proposal – all were in favour, but a number of respondents suggested alternatives for Ofcom to consider, or commented on the specific elements we proposed.
- 2.55 A small number of respondents argued that applicants should be allowed to use their own equipment, rather than accept Ofcom's. One respondent also suggested that participants should be free to choose between using low-cost equipment based upon a software defined radio approach or more traditional commercially available equipment.
- 2.56 Another respondent suggested that it would be helpful if further information for participants could be made available, possibly extending to partial kits of equipment for sale or rental.
- 2.57 As we proposed in the consultation, Ofcom will provide licensees with the necessary capital equipment where necessary, but participants are welcome to use their own, as long they are prepared to meet the obligations of the licence, which apply irrespective of equipment used. If participants do provide their own equipment, Ofcom will need to carry out additional tests prior to any licensee-provided systems coming on air to confirm that the transmitted signal is compliant with relevant standards.
- 2.58 With regard to making use of commercial equipment, one of the aims of the trial is to test low-cost equipment as there are many examples of DAB multiplexes already in service using commercially available equipment. As we said in the consultation, we plan not to make it a consideration in assessing applications whether applicants wish to use their own equipment or equipment provided by Ofcom. However, as set out in section 4 below, in assessing applications we will consider how well each applicant's proposals would meet the three principal objectives of the trials which include testing the function, capability and stability of software defined DAB multiplex services. Applicants who propose to use commercially available equipment which does not encompass the use of a software defined platform will unlikely meet the first objective of the trials.
- 2.59 As we set out in the consultation, other than making available spare or replacement equipment, Ofcom will bear no responsibility for the maintenance or operation of the equipment over the course of the trial. Licensees are responsible for ensuring that the equipment is installed, kept and used in ways that are safe, legal and likely to keep the equipment in good working order.

2.60 Table 2 below provides a list of the main components required to establish a small scale DAB multiplex service and details which of these Ofcom will make available to licensees. We have also included items that licensees will need to provide – this list is provided as a guide and is not exhaustive.

Table 2 – Equipment to establish a small scale DAB service

	Item	Ofcom provided			Licensee responsibility
		Trial Type 1	Trial Type 2	Trial Type 3	
1	Transmitting antenna and mounting hardware	1	2	2	
2	Feeder cable to connect power amplifier, filter and antenna	100m	200m	200m	
3	Mask filter	1	2	2	
4	Power amplifier	1	2	1	
5	Software defined radio	1	2	1	
6	Low cost computer to implement modulator	1	2	1	
7	Low cost computer to implement multiplexer	1	1	1	
8	Low cost computer to implement encoder plus sound input device for each	up to 6	up to 6	up to 6	
9	Low cost computer to act as a spare for items 6,7 & 8	1	1	1	
10	On-channel repeater	-	-	1	
11	Receiving aerial and 100m coaxial cable	-	-	1	
12	GPS frequency reference plus aerial	-	2	-	
13	Sundry installation materials (e.g. cable ties, feeder cleats)	-	-	-	✓
14	Accommodation & ventilation	-	-	-	✓
15	Installation of equipment and antennas	-	-	-	✓
16	Installation of encoders at sound programme provider premises and connection to source	-	-	-	✓
17	Broadband circuits	✓	✓	✓	

Notes: Items 4, 5, 6, 7 and 12 will be provided installed and pre-connected in a 19" flight case rack. The mask filter is a standalone unit.

- 2.61 In addition to the items indicated above as being for the licensees to provide, licensees will need to provide all other components to install and operate the radio equipment. It will be licensees' responsibility to meet all of the operating and installation costs of the trial.
- 2.62 We will not include the details of the radio equipment we will provide to licensees in the licence. The radio equipment provided will be the subject of a separate agreement between Ofcom and the trial multiplex licensee which will include a provision for recovery of the equipment by Ofcom in the event that the licence is revoked or upon completion of the trial.

Section 3

Non-technical licence conditions and requirements

Overview

- 3.1 In this section we confirm the non-technical conditions that will be included in each of the trial small scale DAB multiplex licences. The other conditions not referred to in this section or Section 2 will remain the same as those in Ofcom's standard-form Wireless Telegraphy Act licences.¹⁰
- 3.2 In our consultation we sought views from stakeholders on our approach to non-technical licence conditions. The majority of responses we received agreed with our proposals, but where we have received specific responses on the matters in this section, they are summarised here.
- 3.3 This section confirms in particular our approach to:
 - 3.3.1 Service obligations relating to the number and type of services to be carried;
 - 3.3.2 The licence term;
 - 3.3.3 The roll out obligation;
 - 3.3.4 Licence fees;
 - 3.3.5 Restrictions on ownership;
 - 3.3.6 Provision of information to Ofcom;
 - 3.3.7 Access and inspection; and
 - 3.3.8 Modification, restriction and closedown.

Provision of services

- 3.4 In our consultation, we proposed that trial multiplexes should carry more than one programme service, and that we would reflect the services carried on the trial multiplexes in Schedule 3 of the licence.
- 3.5 We proposed that all programme services carried must broadcast for a minimum of nine hours per day, with core hours between 9am and 6pm in order to encourage feedback on the trials from the widest possible audience, and for data to be gathered during Ofcom's drive tests.

¹⁰ <http://licensing.ofcom.org.uk/binaries/spectrum/regulations-technical-reference/rules/licensing-procedures2010.pdf> - please see Section 5, Broadcasting

- 3.6 We proposed that any 'spare' capacity, available once the minimum number of services promised in the application were carried, could be used for any lawfully licensed service.
- 3.7 We received no responses commenting specifically on our approach to reflecting programme services in the trial multiplex licences, nor on our proposals around minimum hours or our approach to 'spare' capacity.
- 3.8 Therefore we will list the service name of each programme and additional service in Schedule 3 of the trial multiplex licence, along with the service provider. All services carried on the multiplex must be listed in the multiplex licence, and the core services promised in the application must be carried for the duration of the trial, unless Ofcom consents to vary the licence to remove a service. All programme services must broadcast between the hours of 9am and 6pm as a minimum.
- 3.9 If the minimum number and range of services promised in the application is not provided from the commencement of the multiplex service, Ofcom may revoke the licence.
- 3.10 We received one response seeking clarification as to whether programme service providers would be permitted to advertise the trial by, for example, promoting via an analogue service if a simulcast. Where possible, we would like to be able to include audience feedback in our report to Government on this project; therefore, if any programme service is a simulcast of an analogue service (or indeed, an online service), or a service provider has other broadcasting services, we strongly encourage service providers to use these platforms to promote the trial service.
- 3.11 Any additional capacity not used by the minimum services promised in the application may be used for any lawfully licensed service. **All services** (including those promised in the application) must be appropriately licensed where relevant. In particular, all programme and additional services must be licensed via either a Digital Sound Programme Service (DSPS) licence, or a Digital Additional Service (DAS) licence. Programme services that are simulcasts of analogue services, for example a simulcast of an FM community radio service, will still need to be licensed via a DSPS licence.
- 3.12 We proposed that we would not waive the DSPS or DAS licence fees. We received a small number of responses that argued that these fees should be waived, as well as a small number of responses that agreed that it was reasonable for service providers to pay the fees for these licences.
- 3.13 Since these licences are of an indefinite period, and may be used for carriage on any multiplex, it is not appropriate to waive the fees for them. We do not consider that the licence fees are likely to be prohibitively expensive for those wishing to take part in the trials, particularly given participants will have to bear the operating costs of taking part, which are likely to be more significant than the cost of the licence fees. It would also not be fair to those participants who already hold such licences as part of their normal broadcasting to waive fees in some cases, but not others.
- 3.14 Therefore, we will not waive the DSPS or DAS licence fees.
- 3.15 We received a small number of responses seeking clarification of the process for acquiring and paying for licences of these types. We have set out in the accompanying Invitation to Apply how to apply for a DSPS or DAS licence.

Licence term

- 3.16 We proposed the licence term would be nine months. We received a number of responses commenting that this is not a long enough term, particularly if the trial services are well-received by audiences. Most respondents gave a variety of commercial reasons for wishing to continue the trials if they are 'successful' and 'self-supporting'. One respondent also argued that the trial term should be extended as this, in his view, would allow Ofcom the time to inspect any trials taking place in localities a significant distance from London.
- 3.17 We proposed a nine month term because we consider that this is a long enough period to gather sufficient data to achieve the trial objectives, and coincides with the timeframes of the project, whilst also acknowledging that this is not intended as a permanent licensing regime. While we acknowledge that participants are likely to have commercial objectives in relation to extending coverage and listenership, and we appreciate that broadcasters will not wish to have their services disrupted, we do not think that it is appropriate to give priority to the commercial objectives of broadcasters in a small-scale trial using Government funding.
- 3.18 However, we will include in each licence the provision to extend the licence term should we need to continue the trial for any reason, and are therefore confident that if there is a compelling reason to carry on the trials we will be able to.
- 3.19 Therefore, the trial multiplex licences will have a nine month term, subject to the provisions for revoking the licence set out in the standard form licence.

Licence fees

- 3.20 In the consultation we proposed that we will not charge an annual licence fee for the trial multiplex licence. Respondents either did not comment or agreed with this proposal.
- 3.21 Therefore, we will specify the licence fee in the trial DAB multiplex licence at 'Nil'. We will include a standard condition to allow Ofcom to introduce licence fees in future if Ofcom considers that it is appropriate to do so.

Restrictions on ownership

- 3.22 We proposed that we would mirror the ownership restrictions in the Broadcasting Act 1990, with the exception of advertising agencies (as all content restrictions in relation to advertising would apply in any event via the regulation of content). We received no responses on this issue, therefore the following groups will be disqualified from holding a trial small scale DAB multiplex licence:
- 3.22.1 Local authorities;
 - 3.22.2 Political bodies;
 - 3.22.3 Religious bodies;
 - 3.22.4 Publicly-funded bodies;
 - 3.22.5 Bodies exerting undue influence; and
 - 3.22.6 Broadcasting bodies, specifically the BBC and S4C.

Provision of information to Ofcom

- 3.23 Separately from the detailed reporting conditions set out in Section 2, we also proposed that we would mirror the condition relating to general provision of information to Ofcom that is included in Broadcasting Act licences. This is to ensure that Ofcom can monitor and if necessary enforce compliance with the licence conditions.
- 3.24 We received no responses on this issue; therefore we will include the condition on general provision of information to Ofcom as set out in the draft trial small scale DAB multiplex licence published alongside the consultation.

Access and inspection

- 3.25 In accordance with our standard spectrum licence conditions, we proposed that we would include a condition that reserves to Ofcom the right to access and inspect the licensee's radio equipment. This is so we can check the licensee's compliance with the terms of its licence, should we decide that this is appropriate.
- 3.26 We received no responses on this issue; therefore we will include the condition on access and inspection as set out in the draft trial small scale DAB multiplex licence published alongside the consultation.

Modification, restriction and closedown

- 3.27 In accordance with our standard spectrum licence conditions, we proposed that we would include a condition that reserves to Ofcom the right to require the licensee to modify, restrict or close down the use of its radio equipment, should we have reasonable grounds to believe that the licensee has breached the terms of its licence, or the use of the radio equipment is causing or contributing to undue interference, or we consider this necessary in the event of a national or local state of emergency being declared.
- 3.28 We received one response that hoped that 'Ofcom would work with the applicants to identify and reduce or prevent interference with other services and that the ceasing of transmission would be a last resort.'
- 3.29 We hope that it will be possible to mitigate any interference without requiring a trial multiplex to cease broadcasting, but Ofcom must protect the rights of other broadcasters, particularly those operating on a permanent basis. Therefore, it may not always be possible to resolve such issues without resorting to ceasing transmission. We will include this condition as proposed (see Condition 8 of the final licence published alongside this document).

Section 4

Application and assessment process

Introduction

- 4.1 In this section, we confirm the process by which we will invite and assess applications for the award of the small scale trial multiplex licences.
- 4.2 Broadly, respondents agreed with our proposals. We received a number of responses commenting on specific aspects of our proposals, which we address in this section. The majority of responses focused on the number of trials, which we have addressed in Section 1 of this document.
- 4.3 Full guidance on the application process, including the requirements all applicants will need to meet, is set out in the accompanying Invitation to Apply that has been published alongside this statement. We have also published the application form, although we note that we may ask for further information and clarification in application forms if we consider that the provision of any such further information and clarification would be appropriate and required.

Expressions of interest

- 4.4 As part of the consultation, we sought expressions of interest in participating in trials. We received around 40 expressions of interest from a range of providers. A list of those who non-confidentially expressed interest has been published on our website to assist stakeholders in getting in touch with other interested parties.¹¹

Inviting applications

- 4.5 Alongside this statement we have published an Invitation to Apply for trial small scale DAB multiplex licences, and an application form. These applications are open to all interested parties.
- 4.6 One respondent argued that applications should not be open to all, but only to those invited to apply from among the expressions of interest.
- 4.7 As we specified in the consultation, expressions of interest are not binding, nor will those who have not expressed interest be excluded from applying. In seeking the widest possible range of applicants from the sector, we do not believe that it is appropriate for Ofcom to limit who can apply in this way, nor would it be fair for Ofcom to select applicants on the basis of limited and inconsistent information. Therefore, applications will be open to all eligible parties regardless of whether they have expressed interest or not.
- 4.8 One respondent questioned whether Ofcom would proactively seek out participants if necessary, and other respondents suggested that Ofcom should seek to 'match up' different parties to form applications.

¹¹ <http://stakeholders.ofcom.org.uk/consultations/small-scale-dab/list-of-expressions-of-interest/>

- 4.9 We do not consider it is appropriate in the context of a fair and transparent licensing process for Ofcom to 'pre-select' participants in any way. However, we appreciate that a varied range of stakeholders are interested in this project, hence we have published all the non-confidential responses and expressions of interest we have received, as well as contact details where possible. These are available on our website: <http://stakeholders.ofcom.org.uk/consultations/small-scale-dab/>

Application fees

- 4.10 We proposed that we would not charge an application fee. This is because the cost to Ofcom of this project is being met by funding from Government, and because licences are being awarded for the purposes of Ofcom's trial.
- 4.11 Respondents either did not comment or agreed with our proposal. Therefore, we will not require applicants to submit an application fee for the trial small scale DAB multiplex licences.

Award process

- 4.12 We will award up to ten licences to eligible applicants across the three types of trial. We proposed that applicants would need to specify which type of trial they are applying for, and that we cannot accept contingent applications, or applications proposing multiple scenarios.
- 4.13 We received four responses that argued that Ofcom should decide which applicants carry out which trials, primarily because, in the respondents' views, applicants are unlikely to have the level of technical expertise necessary to determine the appropriate trial for their circumstances.
- 4.14 Whilst we appreciate that not all stakeholders will have the technical expertise to participate in the trials, the objectives of this trial are of technical nature. Regardless of the trial scenario, we will not award licences on the basis of applications that cannot demonstrate the minimum level of technical understanding necessary to establish and operate a multiplex, not least because Ofcom does not have the resources to provide such a high level of technical expertise and support to participants.
- 4.15 Further, particularly in the case of SFN trials¹², the scenarios are contingent on applicants having access to two appropriate transmitter sites. Ofcom is not able to mandate the use of a particular site, for example, and therefore it must necessarily be for applicants to choose which trial they wish to carry out, depending on their resources.
- 4.16 Two respondents argued that applicants should be able to apply for more than one trial licence. As we wish to offer the opportunity for as many stakeholders as possible to be involved in the trials, we think that only allowing applicants to apply for one licence and one type of trial will allow a wider range of stakeholders to be involved.¹³ We also do not wish participants to overstretch themselves to the detriment of the trial overall.

¹² The Type 2 and Type 3 trials

¹³ However, as explained below, applicants for the Type 2 and Type 3 trials who meet the eligibility criteria but cannot participate because they require the equipment will be contacted by us to enquire whether they would be interested in participating in other trial types.

- 4.17 This does not mean that the same DSPS cannot be part of more than one application, as long as the service provider is prepared and able to commit to being carried on those multiplexes.
- 4.18 Therefore, applicants must specify which type of trial they are applying for:
- 4.18.1 A single transmitter multiplex carrying multiple services;
 - 4.18.2 An SFN carrying multiple services based on two transmitter sites; and
 - 4.18.3 An SFN carrying multiple services based on two transmitter sites, with one of them being an on-channel repeater.
- 4.19 Given the increased number of trials, our aim is to have as far as possible an even number of trials of each scenario – four trials of Type 1, and three of Type 2 and Type 3 respectively.
- 4.20 However, by increasing the number of trials, we have less flexibility in the equipment we are able to offer to applicants. Whilst we will be able to provide all successful applicants for the Type 1 trial (the single transmitter trial) with equipment if they require it, we will only be able to provide the necessary equipment to conduct one Type 3 trial (the on-channel repeater trial) and two Type 2 trials (the SFN trials).
- 4.21 Therefore, if we receive more than one eligible application which meets the eligibility criteria set out in paragraph 4.24 below and requires equipment from Ofcom for the Type 3 trial, we will assess the applications in accordance with the criteria set out below, and will offer the equipment to the applicant who in our view best meets our assessment criteria for the Type 3 trial¹⁴. If this applicant does not require our equipment, we will offer the equipment to the next applicant who in our view best meets the assessment criteria. If, however, the first applicant requires the equipment from Ofcom and the remaining eligible applicants do not have their own equipment for the Type 3 trial, we will contact such applicants to ask whether they would be interested in participating in either the Type 1 trial or the Type 2 trial. If any of the applicants are interested in taking part in either the Type 1 trial or the Type 2 trial, we will assess their applications together with other applications which we received for the Type 1 trial or the Type 2 trial respectively in accordance with the criteria set out below. This means that we will assess the applicants interested in the Type 1 trial in the pool with all applicants who applied for the Type 1 trial and the applicants interested in the Type 2 trial in the pool with all applicants who applied for the Type 2 trial.
- 4.22 We will also take this approach with the applications for the Type 2 trial, if we receive more than two applications requiring equipment from Ofcom. In this case, we will offer the necessary equipment to the two applicants who in our view best meet the assessment criteria for the Type 2 trial¹⁵. If these applicants require the equipment from Ofcom and the remaining eligible applicants do not have their own equipment for the Type 2 trial, we will contact the remaining eligible applicants to enquire whether they would be interested in participating in the Type 1 trial. If any of the remaining applicants are interested in the Type 1 trial, we will assess their applications together with other applications which we have received for the Type 1 trial in accordance with the criteria set out in paragraphs 4.32 to 4.49 below.

¹⁴ These criteria are set out in paragraphs 4.55 to 4.60 below.

¹⁵ These criteria are set out in paragraphs 4.50 to 4.54 below.

- 4.23 The remaining eligible applicants may also indicate whether they are interested in the Type 3 trial and if so, whether they have the necessary equipment to conduct this trial and access to two appropriate transmission sites.¹⁶ Whilst this situation may be unlikely, if it is to occur we will take one of the following approaches as appropriate:
- 4.23.1 if we have not received any applications for the Type 3 trial and provided that the applicant meets the eligibility criteria, we will award a licence to that applicant and offer the necessary equipment to him;
 - 4.23.2 if we have received one or more applications for the Type 3 trial and the applicant who in our view best meets the assessment criteria requires the equipment from Ofcom, we will only be able to grant a licence to the applicant who originally applied for the Type 2 trial provided he has the necessary equipment for the Type 3 trial. Whether or not we will be able to grant a licence in such circumstances will depend on the number of applications which we will receive for the Type 3 trial and for the remaining trials. As explained above, our aim is to have as far as possible an even number of trials of each scenario. If there are more applicants who would like to participate in the Type 3 trial and have their own equipment than the number of the Type 3 trials we are able to run, we will assess all of their applications in the same pool in accordance with the assessment criteria set out in paragraphs 4.55 to 4.60 below.

Eligibility criteria for trial licences

- 4.24 In order to be eligible for consideration of the award of a trial licence for any of the three scenarios, we proposed a set of five minimum criteria that an applicant would need to satisfy. We received no responses that disagreed with our minimum eligibility criteria. Therefore, in order to be considered for licence award, an applicant must:
- 4.24.1 Be eligible to hold the licence (as outlined in Section 3 of this document);
 - 4.24.2 Specify which type of trial they wish to apply for;
 - 4.24.3 Demonstrate that they are able to establish the service within 12 weeks of licence award;
 - 4.24.4 Demonstrate that they have access to suitable transmission sites in the areas that they propose to serve;
 - 4.24.5 Provide evidence that they will be able to provide at least two programme services from different providers on the multiplex (such programme services will need to be licensed as local DSPS), each of which will broadcast for a minimum of nine hours per day for the duration of the trial. The multiplex may also carry more than two DSPSs and may also carry DASs; and
 - 4.24.6 Undertake to meet the installation and operating costs of the trial.

¹⁶ However, we consider that it is unlikely that applicants who do not have the necessary equipment for the Type 2 trial would be able to obtain the necessary equipment for the Type 3 trial given that the Type 3 trial is likely to be more technically complex requiring the on channel repeater and access to sites capable of supporting it.

- 4.25 Applications that do not satisfy these minimum criteria will not be considered for the award of a trial multiplex licence.
- 4.26 Once we have assessed which applicants meet the eligibility criteria, we will assess the frequency availability for the locations proposed by eligible applicants. If we are unable to find available frequency for any of the applicants, we will inform such applicants of the outcome and will not consider their applications further.
- 4.27 Subject to frequency availability, if we receive up to ten applications that meet these eligibility criteria, we will award the trial licences to these applicants.

Assessment criteria

- 4.28 We proposed a set of assessment criteria that we will use in the event that we receive more eligible applications than the number of licences we intend to award and therefore have to choose between applicants. These criteria were intended to allow Ofcom to award licences to the applicants it considers are best able or most likely to carry out the trial successfully, and provide the requisite evidence to supplement future decisions and policy-making.
- 4.29 No respondents disagreed with our approach to assessment criteria, and several respondents emphasised that given the challenging timescales involved in this project, it is important for Ofcom to license those applicants with the best chance of producing viable results as quickly as possible.
- 4.30 Some respondents sought clarification in relation to a small number of issues. These clarifications are set out in paragraphs 4.61-4.67.
- 4.31 We confirm that the assessment criteria are as follows:

Trial Type 1: A single transmitter carrying multiple services

Criterion 1: The extent to which an applicant's proposals meet the objectives of the trials

- 4.32 We will assess how well each applicant's proposals would meet the three principal objectives that we want to achieve from further field trials. As we explain in paragraph 1.9 above, these are:
 - 4.32.1 To test the function, capability and stability of software-defined DAB multiplex services, particularly in SFN mode;
 - 4.32.2 To test how well the available technology lends itself to several parties coordinating their services into the multiplex (many small scale radio services do not have experience of using multiplexing technology); and
 - 4.32.3 To give the market an opportunity to learn about the software-defined DAB platform and the potential opportunities it affords, particularly for those stakeholders that are not familiar with digital radio broadcasting.
- 4.33 As part of these technical trials we are seeking to test the capability and stability of the technology when carrying live broadcasts from separate programme service providers on a single transmitter.

Criterion 2: Readiness to establish the service

- 4.34 In demonstrating their ability to establish their proposed service, applicants must provide an outline schedule (by week) of how the service will be established within 12 weeks of licence award, including installation of the radio equipment and completion of any necessary works relating to this in order to meet the service commencement date at the transmitter location.
- 4.35 There are time limits within which all of the trials must be conducted and it is our aim to establish the trial as soon as possible. Ofcom will therefore look favourably on applications that are able to provide evidence of their ability to credibly commence a trial service sooner than 12 weeks from licence award. We will take into account any further information that applicants provide concerning their ability to establish the service such as evidence of past experience and access to people that have a reasonable level of technical competence.
- 4.36 If an applicant fails to launch within 12 weeks, Ofcom may withdraw the licence award and re-award the licence to another eligible applicant.

Criterion 3: Access to a suitable transmission site

- 4.37 In order to demonstrate their eligibility in relation to this criterion, applicants should provide evidence that they have an agreement with the property owner to use the proposed site for DAB transmissions in the area that they propose to serve.
- 4.38 In assessing applicants' proposals we will have regard to:
- 4.38.1 the likely ability of the proposed site to be able to serve population in the target area;
 - 4.38.2 the quality of the evidence provided by the applicant such as written evidence of agreements with the site owner and the likelihood of gaining early access;
 - 4.38.3 the likelihood of the proposed transmission site causing ACI to other services.
- 4.39 When selecting a transmission site, applicants should therefore take into account the proximity to either houses or roads to reduce the risk of interference to either in-home or in-car reception.
- 4.40 Ofcom may require a licensee to cease transmission should there be evidence that the service is causing interference (including ACI) to other services.

Criterion 4: Provision of programme and other services

- 4.41 Our requirement for this trial is for a single transmission configuration which must carry at least two separate services.
- 4.42 This trial is aimed at all small scale services from across the radio sector which includes community, commercial, internet services and potentially new entrants to the market. It is therefore likely that if any small scale DAB multiplex services are permanently licensed in future, a range of different services will need to cooperate to share a multiplex in some areas.

- 4.43 Therefore, we will favour applicants who propose to carry services from providers of different size and scale within the multiplex. An example would be to provide at least one community radio service and one commercial radio service.
- 4.44 Applicants must provide evidence that there are agreements in place with service providers. Evidence can take the form of letters confirming that services will be carried on the multiplex, Heads of Terms, a Memorandum of Understanding or other documents as appropriate. We will look more favourably on applications that are able to provide good quality evidence of commitment from potential service providers, including their readiness to launch a service and to continue to provide it throughout the duration of the trial.
- 4.45 All services must be appropriately licensed by the time that they intend to commence broadcasting. Any services proposed for inclusion should either be a service that is already appropriately licensed, or the proposed provider should give an undertaking that it is prepared to apply for an appropriate licence in good time. Whilst we will endeavour to process applications as quickly as possible, how quickly licences are issued will depend on the number of applications we receive at any given time. As explained in paragraphs 3.4-3.15 above, applicants must provide at least two programme services from different providers on the multiplex and each of those services should be licensed as a DSPS. The multiplex may carry more than two local DSPSs, and may also carry DASs.
- 4.46 Services must be provided for a minimum of nine hours per day between 9am and 6pm. We will favour those services that are able to broadcast for longer periods in excess of the minimum requirement.

Criterion 5: Understanding of the installation and operating costs

- 4.47 Although we will provide sufficient equipment to establish the multiplex to those applicants who require it, we will not provide any support for the installation and operating costs. Therefore all applicants must undertake to meet these costs, as well as any capital costs that fall outside the equipment Ofcom provides.
- 4.48 While we have attempted to provide guidance on the additional equipment and materials that licensees might need to provide, actual costs to establish the trial services may vary depending on the equipment and sites used, and the extent of the coverage.
- 4.49 As part of the application, we ask applicants to provide a breakdown of costs that they anticipate incurring in relation to establishing the trial service and satisfying the technical requirements set out in paragraphs 2.12-2.46 above, including Table 1. Applicants' own assessment will give Ofcom assurance of whether they understand the level of the financial commitment involved in the trial. Applicants must give an undertaking that they will bear these costs for the duration of the trial period.

Trial Type 2: An SFN carrying multiple services based on two transmitter sites

Criterion 1: The extent to which an applicant's proposals meet the objectives of the trials

- 4.50 As for Trial 1, as part of these technical trials we are seeking to test the capability and stability of the technology in SFN mode using multiple co-ordinated transmitters.

Criterion 2: Readiness to establish the service

4.51 As for Trial 1.

Criterion 3: Access to suitable transmission sites

4.52 As for Trial 1, except that applicants will need to provide evidence of permission to access two transmission sites.

Criterion 4: Provision of programme and other services

4.53 As for Trial 1.

Criterion 5: Understanding of the installation and operating costs

4.54 As for Trial 1.

Trial Type 3: An SFN carrying multiple services based on two transmitter sites with one of them an on-channel repeater

Criterion 1: The extent to which an applicant's proposals meet the objectives of the trials

4.55 As for Trial 1, as part of these technical trials we are seeking to test the capability and stability of the technology in SFN mode using an on-channel repeater.

Criterion 2: Readiness to establish the service

4.56 As for Trial 1.

Criterion 3: Access to suitable transmission sites

4.57 As for Trial 1, except that applicants will need to provide evidence of permission to access two transmission sites.

4.58 In assessing applicants' proposals we will have regard to the likelihood of an on-channel repeater being able to function reliably. We will take into account the information provided by the applicant on the practical spacing between receive and transmit antennas and the likely level of isolation between them that will result. Based upon the site locations proposed by the applicant, we will take into account the likelihood of the on-channel repeater receiving a good signal from the parent transmitter.

Criterion 4: Provision of programme and other services

4.59 As for Trial 1.

Criterion 5: Understanding of the installation and operating costs

4.60 As for Trial 1.

Internet services

4.61 Some respondents sought clarification on a small number of matters, particularly whether services that are currently only available via the internet could participate.

- 4.62 It was never our intention to give the impression that internet-only services are excluded from participating in the trials, but they will need to be licensed for broadcast via a DSPS or DAS licence, and abide by the conditions of those licences, for example, compliance with Ofcom's Broadcast Code. This is also true for any service broadcasting via analogue that is not also licensed for a digital platform. Any service provider who already holds a DSPS, but intends to broadcast a service put together specifically for transmission on a trial multiplex, will need to have that service added to the annex of their existing DSPS licence.

The mix of services

- 4.63 In our assessment criteria, we state that we will favour those applications that include a range of services, for example, a mix of community and commercial services. Some stakeholders sought clarification on how we would interpret this, particularly in relation to internet services, which are not licensed by Ofcom as commercial or community services.
- 4.64 DSPS licences make no distinction between commercial and community services. Therefore, for the avoidance of doubt, **in relation to services included in applications for trial small-scale DAB multiplex licences only**, we will apply the following interpretation:
- 4.64.1 The following services will be considered 'community' radio services: any service provided by a licensed community radio broadcaster, whether that is a simulcast or another type of service; and any service provided by a not-for-profit internet-only broadcaster.
- 4.64.2 All other services will be considered 'commercial' services, including: services provided by a licensed commercial broadcaster; and any service provided by an internet-only broadcaster that is profit-distributing.
- 4.65 This interpretation is without prejudice to any interpretations Ofcom may make in relation to community and commercial radio licensing elsewhere.
- 4.66 Any application will need to make clear how the services it is proposing fall into these categories.

Statement of reasons

- 4.67 We received one response which stated that Ofcom should publish an account of its reasons for awarding the trial small scale DAB licences. In accordance with Ofcom's normal practice for competitive licence awards, all decisions and the reasons for those decisions will be published on our website as soon after licence award as practically possible.

Section 5

Concluding the trial

Overview

- 5.1 This section sets out how we anticipate the trial concluding, specifically with regard to the final reporting obligations, the use of the final reports and information gained from the trials, the recovery of equipment, and the potential for extension of the licences.
- 5.2 Generally respondents agreed with our proposals in relation to concluding the trial, but a small number had specific comments on the proposals in this section, which are summarised below.

Final reporting obligations

- 5.3 As set out in Section 2 of this document, participants will be required to provide Ofcom with a final report, not later than six weeks from the original termination date of the trial multiplex licence.
- 5.4 Several respondents said that Ofcom should provide a template for the final report to all participants, to ensure consistency of information, and to reduce the administrative burden on licensees.
- 5.5 We agree that a template for the final report would help ensure that all areas of relevance are covered by all participants. Therefore, Ofcom will provide a final report template, which will cover any material issues arising over the course of the trial, during both its establishment and operation, and the solutions employed. It will also cover the operating costs of the multiplex, the cost apportionment between services (if at all), any commercial arrangements for carriage during the trial period, feedback from participating service providers and listener feedback, if available.
- 5.6 Participants must include any other relevant information which they feel is relevant to Ofcom.

Report publication

- 5.7 We proposed that Ofcom will publish a final report setting out our conclusions in relation to the trials, and the ability of the low-cost software-defined technology in meeting the needs of small stations. We proposed that this report will include an outline of the costs that have been incurred by licensees in establishing and operating these multiplexes, which we will discuss with licensees as we prepare the report.
- 5.8 Alongside Ofcom's own report, we proposed that we would publish the final reports from each licensee in as much detail as possible, although we will consider requests for redactions where relevant, such as in relation to carriage and other costs.
- 5.9 Respondents agreed with our approach to reporting obligations, although a small number suggested that the final report should include a handbook for operators on how to establish and operate a small scale multiplex. Whilst we will make as much information available via our website as possible, we do not consider that it is for Ofcom to instruct the sector on a specific way of establishing a small scale multiplex,

when there are a range of possible options. We also do not have the resource to support multiplex operators technically in the longer-term.

- 5.10 Therefore, we will publish the results of the trials in the formats set out above, but it is not for Ofcom to promote a particular technical arrangement for the sector in the long term. We will take into account the evidence from the trials when considering proposals to Government for a potential permanent licensing system.

Equipment recovery

- 5.11 We set out in the consultation that where Ofcom has provided equipment to licensees, Ofcom will need to recover it at the end of the trial period, and will make arrangements for it to be collected within a month of the end of the trial.
- 5.12 Several respondents suggested that at the end of the trial multiplex operators should be allowed to keep the equipment, or buy it for a nominal sum, particularly if it is still in use.
- 5.13 If the equipment is still in use at the end of the trial period, for example, because a multiplex has been permanently licensed, we see no value to the sector or listeners in recovering the equipment when it is needed, especially when there will be a cost to Ofcom in recovering it. However, we also consider that it is unfair to those who have not taken part in the trials simply to give the equipment away if it still has value. We will therefore either recover the equipment, or we will leave it in situ in exchange for a sum arrived at by calculating the likely depreciation of the equipment after the trial period, minus the cost to Ofcom of recovering and disposing of it.

Extension of trial licence duration

- 5.14 In the consultation, we set out that if we wished to extend the trial period for any of the trial multiplexes for any reason, such as to collect more data, then we would do so by varying the termination date of the licence following the process set out in the Wireless Telegraphy Act.
- 5.15 We also set out that any trial multiplex licence would not be extended if a permanent licensing framework was in place.
- 5.16 Several respondents said that trial multiplex licences should be extended, either to bridge the gap between the trials and any permanent licensing framework, or if they were 'successful' or 'self-supporting'.
- 5.17 As set out in Section 3 in relation to the licence term, although we appreciate the commercial objectives of service providers, it is not for Ofcom to seek to further these through a Government-funded technical trial. We are confident that if there is a compelling reason to extend the trial licences, we will be able to do so.