



Small Scale DAB trial

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

Consultation

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About this document

This document is a consultation to seek the views of stakeholders on the conditions of trial Wireless Telegraphy Act licences we propose to grant for digital radio trials being run by Ofcom next year. The licences are to authorise field trials to test the operability of low cost small scale DAB multiplexes under three different DAB multiplex configurations. This document also seeks views on Ofcom's proposed process for awarding these licences.

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 consultation sets out our proposals to award licences in up to three areas for a limited period of nine months to interested parties wishing to participate in digital audio broadcasting (DAB) field trials. These trials are intended to test and aid the development of a low-cost method of delivering DAB multiplex services that together with a new licensing regime will potentially provide small scale radio services with an affordable route onto the DAB platform in the future.

Background and context

- 1.2 There are currently around 350 licensed community and small scale local commercial radio services in the UK that are not currently broadcasting on DAB. This is primarily because either there is no capacity available on a local multiplex, or the cost of carriage is beyond the means of small stations. In addition, the coverage facilitated by the existing local multiplexes is usually significantly greater than the existing analogue coverage areas of smaller radio services. As such, these stations do not currently have a viable means to access the DAB platform, should they wish to do so.
- 1.3 At the *Go Digital* conference in December 2013, the Government announced that it would like to make progress in finding methods that would enable such stations to have a route to broadcasting on DAB. This included providing funding to Ofcom over two years to build on the work of a trial of low cost DAB technology conducted in Brighton¹ between September 2012 and January 2013. The Brighton trial successfully demonstrated an alternative approach to DAB broadcasting, relying on 'software defined' techniques where software running on low-cost and readily-available computer equipment is used instead of using bespoke broadcasting equipment or 'hardware'. Although the equipment used in Brighton was very much in prototype form, it served to prove that the concept of much lower cost DAB transmission is feasible, and this could potentially offer a path to the DAB platform for smaller stations.
- 1.4 Ofcom has now commenced a programme of work to test and develop further the low-cost DAB approach. Our work will primarily inform our assessment of the technical capability of the approach. We also recognise that small scale services may have different requirements from a licensing regime than services at the larger local or national level which are licensed under the existing statutory framework, and we hope that the trials will also provide context for our work on a suitable licensing framework for such smaller scale services. Therefore, the proposed trials are also intended to inform our thinking on the form of licensing regime that would be appropriate for small scale services on DAB. Should any such proposed regime require new legislation, that will of course be a matter for Government and Parliament.

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>

- 1.5 Ofcom hosted two stakeholder workshops in London and Glasgow during June 2014. These events provided an opportunity for Ofcom to set out for stakeholders the work we plan to do over the next two years, and for stakeholders to share their views on how they see small-scale DAB developing.
- 1.6 One of the themes we discussed at the stakeholder events was our intention to conduct further technical field trials to test the practicality of implementing the approach to DAB multiplexing that was used in the Brighton trial.
- 1.7 In order to conduct these trials, we intend awarding licences in up to three areas under the Wireless Telegraphy Act 2006 (“the Wireless Telegraphy Act”) to operate small scale DAB multiplex services.
- 1.8 This consultation seeks stakeholder comments on our proposals for carrying out the trials and awarding the licences, and on the specific terms that we propose to include in the trial licences, as well as their appropriateness for delivering the objectives of the trials. A draft Wireless Telegraphy Act licence is included in this document in Annex 5.

Field trial objectives

- 1.9 The Brighton trial proved the concept of using a software-defined, low power DAB multiplex system with a single transmitter in order to broadcast a number of test streams on the DAB platform in a small area. No stakeholders took part in this trial; instead, for simplicity, the trial used engineering test transmission audio. The trial provided evidence of the possibilities for a less complex and potentially lower cost approach to providing DAB multiplex services than that which is currently widely used.
- 1.10 The software defined system is based upon freely available software that continues to be developed by the open-source community. This is where no part of the coding for the software design and operational processes is hidden from the end user. This enables anyone to modify, maintain, or customise the software, as opposed to a manufacturer being in control of the product life cycle. Ofcom is now carrying out further bench tests of a later development of the software which incorporates additional features, including the ability for several transmitters to operate together on the same transmission frequency without causing interference as part of a ‘single frequency network’ (SFN).
- 1.11 Bench testing will enable us to verify (to a certain extent) the operation and features offered by the developed software, including operation as part of an SFN. Following these tests, the next step in assessing the feasibility of adopting a low cost approach to delivering DAB multiplex services is to conduct field trials in real world conditions.
- 1.12 We have identified three principal objectives that we want to achieve from further field trials. These are:
 - To test the function, capability and stability of software-defined DAB multiplex services, particularly in an SFN mode;²

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.

- 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
 - To give the market an opportunity to learn about the software-defined DAB platform and the potential opportunities it affords, particularly for those stakeholders who are not familiar with digital broadcasting.
- 1.13 As part of these field trials we are seeking 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 an SFN mode using multiple co-ordinated transmitters, or when carrying live broadcasts from separate programme service providers on a single transmitter.
- 1.14 In order to explore these elements further we have identified three different DAB multiplex service types that we wish to trial:
- Trial 1: A single transmitter multiplex carrying multiple services;
 - Trial 2: An SFN carrying multiple services based on at least two transmitter sites; and
 - Trial 3: An SFN carrying multiple services based on at least two transmitter sites with one of them being an on-channel repeater.
- 1.15 We consider that collectively the trials will provide value for money in giving us and stakeholders robust evidence for future DAB licensing policy.

On-channel repeaters

- 1.16 While SFNs potentially offer advantages of more efficient use of spectrum over transmitters, they are more complex to establish than a network operating on separate frequencies. This is because in an SFN it is essential that all of the transmitters are accurately synchronised, both in terms of the frequency upon which each transmitter operates, but also in terms of the timing of the programme feeds to the transmitters. One potential way of reducing the complexity and cost of building an SFN is to use an on-channel repeater.³
- 1.17 Instead of needing an accurately timed programme feed circuit, an on-channel repeater picks up a signal from another transmitter, then amplifies and re-broadcasts it on the same frequency. We also wish to test the potential of on-channel repeaters for extending the coverage area of a multiplex or for filling holes in coverage (e.g. those caused by adjacent channel interference) without the complexity and expense that a full transmitter installation entails.
- 1.18 We therefore propose that one of the trials (Trial 3) tests the possibilities and limitations of deploying an on-channel repeater. Applicants who want to take part in this trial will need to tell us whether they have access to a suitable site to locate the on-channel repeater equipment.

³ On-channel repeater – a device capable of rebroadcasting a DAB signal on the same frequency. This has applications in extending the coverage area of a multiplex, and filling holes in coverage areas, without the need for expensive additional equipment.

Non-technical objectives

- 1.19 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. Therefore it is 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.

Licensing

- 1.20 Ofcom already issues standard test and development licences called 'Non Operational Development Licences' and 'Non Operational Temporary Licences' under the Wireless Telegraphy Act. These licences are issued for the testing of radio equipment only, and cannot authorise the testing of broadcast programme services which are available for general reception.
- 1.21 We consider that in order to fully test the concept of a DAB multiplex platform for small scale radio, it is important that the trials should include testing the process by which programme services, which are available for general reception, are brought together and coordinated into a multiplex.
- 1.22 The Communications Act 2003 (the Communications Act) gave Ofcom the power to operate a simpler and more flexible licensing regime for spectrum carrying broadcast services than has previously been allowed under the Broadcasting Acts of 1990 and 1996. In particular, it is possible for Ofcom to authorise the provision of a multiplex service under the Wireless Telegraphy Act alone, with no accompanying licence under the Broadcasting Act 1996. Where Ofcom considers it appropriate, only a Wireless Telegraphy Act licence is now required (although, as noted in paragraph 1.19, content providers still need to hold the appropriate Broadcasting Act licence).
- 1.23 Given that we are proposing to license trial multiplexes on a short-term basis only, we propose to award licences under the Wireless Telegraphy Act only for the purpose of authorising licensees to transmit a broadcast multiplex service.

Wireless Telegraphy Act licences

- 1.24 The Wireless Telegraphy Act sets out our legal power to grant wireless telegraphy licences. Our duties in relation to the award of these licences are set out in the Communications Act and the Wireless Telegraphy Act, and are derived from the requirements of European Union legislation.
- 1.25 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 licence).
- 1.26 Section 9(1) of the Wireless Telegraphy Act gives us the power to grant wireless telegraphy 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 achieve⁴.

- 1.27 In addition, our discretion under section 9 must be interpreted in a way that is consistent with the licence conditions permitted under the Authorisation Directive⁵.

Granting licences

- 1.28 In accordance with section 10 and Schedule 1 of the Wireless Telegraphy Act, Ofcom may grant licences in accordance with procedures prescribed in regulations made by Ofcom.
- 1.29 Ofcom has made general regulations in relation to licensing procedures (the Wireless Telegraphy (Licensing Procedures) Regulations 2010⁶). Where Ofcom decides to award licences by auction or 'beauty contest', it makes specific regulations for those purposes, in accordance with section 14 of the Wireless Telegraphy Act in relation to auctions, and Schedule 1 of the Wireless Telegraphy Act in relation to 'beauty contests'.
- 1.30 The Wireless Telegraphy (Licensing Procedures) Regulations make provision for Ofcom to grant licences in relation to particular wireless telegraphy stations or apparatus, where an applicant has provided Ofcom with the requisite information set out in Regulation 5.

Our proposals

- 1.31 Subject to the outcome of this consultation, we intend to invite applications from parties that wish to participate in one of the technical trials and operate a small scale DAB multiplex service for a limited period. We will judge applications for eligibility to participate in the trials against a set of minimum criteria. Thereafter, Ofcom will decide between eligible applicants having regard to how far applicants' proposals satisfy the assessment criteria. Further details of the criteria and selection process are set out under 'Award design' below, and in more detail in Section 4 of this consultation document.
- 1.32 Please note that we will only be inviting applications to apply for the trial multiplex licences. Anyone who is interested in providing a programme service on one of the trial multiplex services will need either to apply for the trial multiplex licence, as well as being appropriately licensed under the Broadcasting Act, or to reach agreement with an entity which is proposing to apply for one of the trial multiplex licences.
- 1.33 Successful applicants will be granted a short term licence, issued under the Wireless Telegraphy Act, which will include conditions drafted specifically to facilitate the objectives of these small scale DAB multiplex trials. The licence will include terms relating to the radio equipment to be used, as well as authorisation to use a portion of spectrum to broadcast signals.

⁴ Please see section 9(7) of the Wireless Telegraphy Act.

⁵ Directive 2002/20/EC

⁶ Made under section 10 and Schedule 1 of the Wireless Telegraphy Act 2010.

Constraints

- 1.34 The trials have precise objectives in terms of what Ofcom wishes to achieve and on that basis we recognise that not all stakeholders who are interested in the trials, whether that interest was previously expressed or not, will be able to participate.
- 1.35 The small scale DAB project is scheduled to conclude its feasibility studies and trials by the end of March 2016, and Ofcom is due to report to Government shortly thereafter. The time available to establish and conduct trials is therefore limited, and this is why the field trial aspect of the project will operate for nine months starting in the spring/summer of 2015. As we set out in paragraph 3.10 below, we consider that such period will allow sufficient time for Ofcom to collect the relevant data and report on the findings.
- 1.36 Further, we anticipate that there will be a need for Ofcom's involvement in carrying out measurements and site visits at each location during the course of the trial period. Our resources for carrying out such work are limited, and this has an impact on the number of trials that we could reasonably commission and oversee.

Award design

- 1.37 As a trial limited in scope, we propose to award licences in the quickest and simplest way possible, consistent with our statutory duties. To reflect this approach we propose to set an eight-week application period, and set some eligibility criteria that any applicant must meet in order to be eligible for consideration for licence award. The eligibility criteria we propose to set are that any applicant should:
- Be eligible to hold the licence (as outlined in the ownership requirements set out in Section 3);
 - Be able to establish the service within 12 weeks of licence award;
 - Specify which one of the trial licences they are applying for (i.e. a single transmitter multiplex, an SFN or an SFN incorporating an on-channel repeater). We do not propose to accept applications for more than one of the trial licences;
 - Be able to demonstrate that they have access to suitable transmitter sites in the area that they propose to serve;
 - Provide evidence that they will be able to provide at least two programme services from separate providers for the duration of the trial, ideally from at least one commercial and one community station. Each of the programme services carried in the multiplex should be licensed as a digital sound programme service (DSPS). The multiplex may also carry more than two DSPSs and may also carry Digital Additional Services (DASs)⁷;
 - Undertake to meet the installation and operating costs of the trial.
- 1.38 In considering the eligibility criteria, interested parties will be able to make early informed decisions on their ability to meet the necessary requirements of the trial.

⁷ Details of how to apply for a DSPS licence or a DAS licence can be found at <http://licensing.ofcom.org.uk/radio-broadcast-licensing/digital-radio/dsp/>

This is particularly important because once a trial licence is awarded, we propose to require that successful licensees launch their multiplex service within 12 weeks.

- 1.39 We propose that we would not consider applications from those who do not meet the eligibility criteria. If we receive more than one application for a particular trial licence (Trial 1, Trial 2 or Trial 3) which meet these criteria, we propose to award the licence to the applicant that appears to Ofcom to be best able or most likely to successfully carry out the trial and provide documentary evidence to supplement future decision making, having regard in particular to the following:
- the objectives of the trials which we have identified in paragraphs 1.12 and 1.13 above; and
 - our assessment of how well the applicants meet the following eligibility criteria:
 - readiness to establish the service;
 - access to suitable transmission site(s);
 - provision of services; and
 - understanding of the installation and operating costs.
- 1.40 Guidance in relation to the assessment of the eligibility criteria is set out in Section 4.
- 1.41 To enable us to assess interest and plan our work, we would be grateful to receive expressions of interest from those who are still interested in applying for trial licences. Expressions of interest should comprise no more than the information specified at paragraph 4.6 below.

Impact assessment

- 1.42 The analysis presented in this consultation document constitutes an impact assessment, as defined in section 7 of the Communications Act.
- 1.43 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 we have to carry out impact assessments where our proposals would be likely to have a significant effect on businesses or the general public, or when there is a major change in our activities. However, as a matter of policy we are committed to carrying out impact assessments in relation to the great majority of our policy decisions. For further information about our approach to impact assessments, see the guidelines, “Better policy-making: Ofcom’s approach to impact assessment”, which are on our website.

Equality impact assessment

- 1.44 We are separately required by statute to assess the potential impact of all our functions, policies, projects and practices on race, disability and gender 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.

1.45 Unless we otherwise state in this document, it is not apparent to us that the outcome of our proposals is likely to have any particular impact on race, disability and gender equality. Specifically, we do not envisage the impact of any outcome to be to the detriment of any group of society. Nor are we envisaging any need to carry out separate EIAs in relation to race or gender equality or equality schemes under the Northern Ireland and Disability Equality Schemes. This is because we anticipate that our proposals will not have a differential impact in relation to people of different gender or ethnicity, on consumers in Northern Ireland or on disabled consumers compared to consumers in general. Similarly, we do not consider that our proposals will have a particular impact on consumers in different parts of the United Kingdom or on consumers with low incomes.

Structure of this document

- 1.46 The remainder of this document sets out how we propose to license trial small scale DAB multiplex services, and is structured as follows:
- Section 2 sets out the proposed technical requirements for the trials, and the proposed technical licence conditions that will apply to each successful applicant.
 - Section 3 describes the proposed non-technical terms and conditions that will be contained in the licence for the purpose of delivering the objectives of the trials.
 - In Section 4 we describe the proposed assessment and award process that will apply in deciding to whom each small scale DAB trial multiplex licence should be awarded.
 - Section 5 sets out how we anticipate the trials will conclude, including how we propose to use the results and data from licensees.

Consultation questions

Question 1: Do you agree that we have identified the objectives which the small scale DAB multiplex trial should seek to achieve?

Question 2: Are there any other questions or issues which the small scale DAB multiplex trial should seek to address?

Section 2

Technical licence conditions and requirements

Overview

- 2.1 In this section we describe the technical aspects of the trial.
- 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.

Small scale DAB system

- 2.5 DAB is a broadcasting technology that is based upon the concept of transmitting a 'multiplex' which is where several programme services are blended in digital form and transmitted together through one transmitter occupying one portion of spectrum. This differs from FM or AM broadcasting where each broadcast service is transmitted independently from separate transmitters, each with its own frequency.
- 2.6 If additional transmitters are needed to extend the coverage of an FM radio service, each transmitter will usually need to be allocated an extra frequency. This is necessary because the analogue signals would otherwise interfere with each other. With DAB it is possible to operate many transmitters on the same frequency provided that the programme services are identical and the transmitters are accurately synchronised – this is called a Single Frequency Network or 'SFN'.
- 2.7 Multiplexing and operating as an SFN introduces some additional complexity to the technical infrastructure needed to broadcast DAB services when compared with analogue broadcasting. Traditionally, only professional equipment has been available that is designed specifically for the task. This equipment has been designed with the needs of larger scale and national broadcasters in mind, and is engineered to deliver high levels of reliability, but would be too expensive for small scale broadcasters on a limited budget.
- 2.8 Over the past few years, inexpensive, yet powerful computers have become available. It is now possible to replicate the capability of the professional equipment in software running on low cost computers.
- 2.9 Figure 1 below sets out the main components in a small scale DAB system that employs a single transmitter (as would be required for Trial 1). Figures 2 and 3 illustrate typical arrangements for a two transmitter SFN (Trial 2) and a two transmitter SFN where one of the transmitters is an on-channel repeater (Trial 3).

Figure 1: Typical arrangement for a single transmitter (Trial 1)

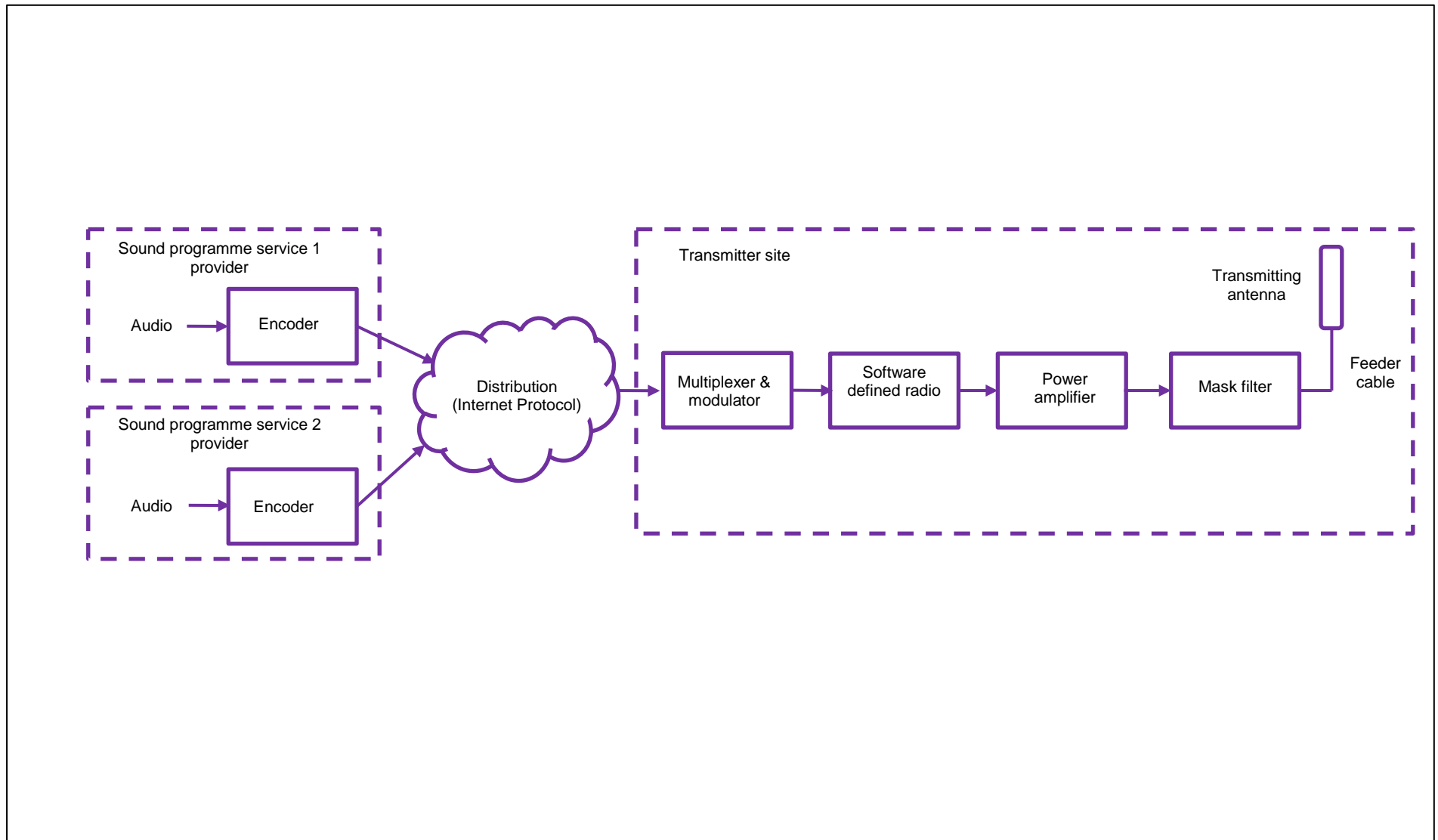


Figure 2: Typical arrangement for a SFN incorporating two transmitters (Trial 2)

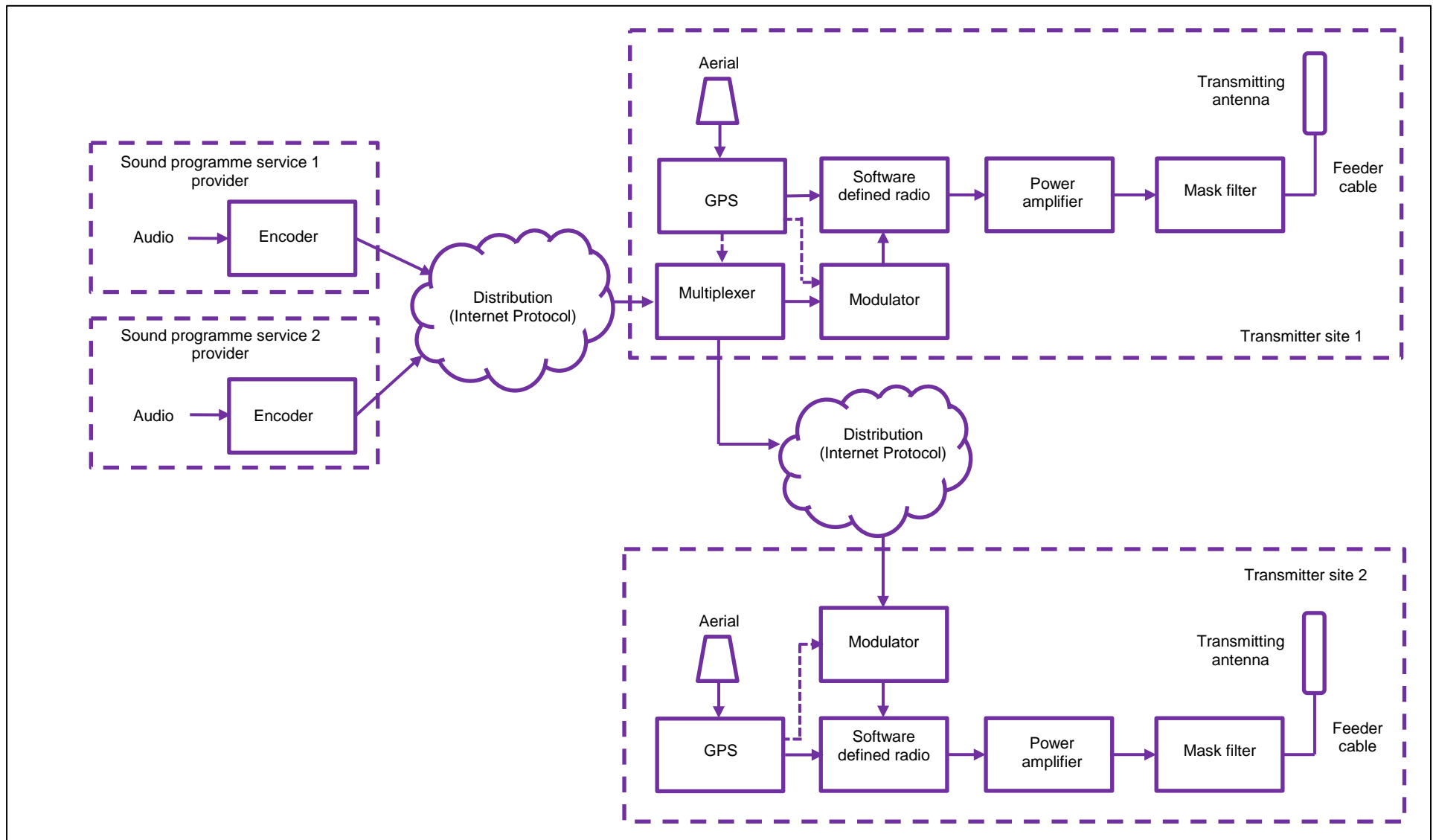
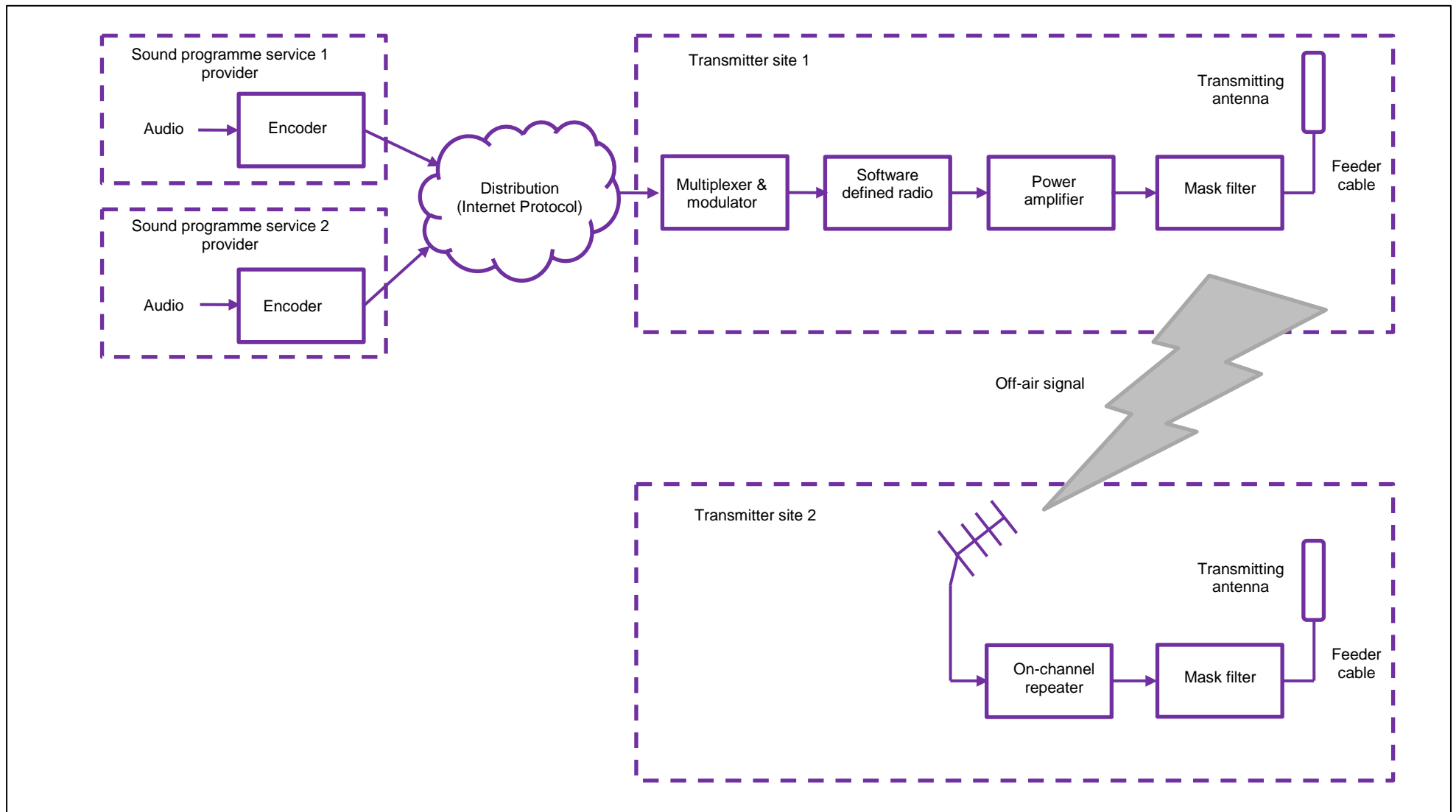


Figure 3: Typical arrangement for a SFN incorporating an on-channel repeater (Trial 3)



Description of components

Sound device and encoder

- 2.10 These modules take source audio from the radio broadcaster in either analogue (unbalanced left and right stereo) or in digital form (for example, SP-DIF coaxial) and convert them into a digital format at a bitrate that is suitable for transmission.

Distribution

- 2.11 Distribution is the mechanism by which the encoded audio signals are passed to the multiplexer. This could be done via the internet where the multiplexer is remote from the audio sources. If one or both audio sources are available where the multiplexer is located, then the multiplexer can also carry out the encoding function, so no additional encoders are required.

Multiplexer and modulator

- 2.12 The multiplexer takes two or more digital audio streams and combines them into a single digital multiplex stream. This function is carried out in a low cost computer. The same unit also carries out the first step in turning the combined digital bitstream into something that can be broadcast on a radio frequency signal.

Software defined radio and COFDM

- 2.13 The output of the multiplexer and I/Q generator is fed to a software defined radio. This unit generates a COFDM⁸ signal on a radio frequency that can be received by a DAB receiver.

Power amplifier

- 2.14 While the software defined radio has produced a DAB signal, it is only at a very low power. A power amplifier is needed to increase the strength of the signal so that it can be transmitted to a reasonably wide area.

Mask filter

- 2.15 A power amplifier will often amplify not only the wanted radio signal, but also put out some unwanted signals on other frequencies. The mask filter is designed to pass just the wanted radio signal and to reduce the level of the unwanted signals to a level at which they do not cause interference to other radio services.

Feeder cable and antenna

- 2.16 The feeder cable takes the amplified DAB signal out of the building and to the antenna which radiates the service to DAB receivers in the intended coverage area.

GPS reference (Trial 2 only)

- 2.17 It is important that the signals from the transmitters operating in an SFN are accurately synchronised, otherwise interference will occur and some listeners in the intended coverage area will not be able to receive the DAB services. The Global

⁸ Coded Orthogonal Frequency Division Multiplexing

Positioning System (GPS) transmits an accurate time reference signal from a network of satellites that can be used to accurately synchronise transmitters. In order for this to work, a small aerial will need to be mounted outside each transmitter building and a cable will need to be run to the software defined radio module inside.

Second transmitter (Trial 2 only)

2.18 For Trial 2, a second transmitter site will be required to supplement the coverage provided by the principal transmitter site. The second site will need to be equipped with a number of the modules listed above (including the modulator, software defined radio, power amplifier, mask filter, feeder and antenna). Multiplexing will be carried out either at the principal transmitter site or at a central location.

On-channel repeater (Trial 3 only)

2.19 As an alternative to the arrangement described for Trial 2, the second transmitter in an SFN could be an on-channel repeater. An on-channel repeater receives a multiplex signal from another transmitter, amplifies and filters it before transmitting it to listeners. It does not therefore need a distribution feed or the encoding or software defined radio elements – this potentially saves on complexity and potentially on cost (for example less equipment and no internet connection is needed).

2.20 On-channel repeaters do however need a receiving aerial to be installed to be able to receive signals from the other transmitter that cannot be mounted close to the transmitting antenna. On-channel repeaters also require a good level of incoming signal from the parent transmitter.

Network topography and circuit interconnections

Connectivity requirements

2.21 Connectivity requirements can vary dramatically depending on the network topology so it is essential that great care is taken to choose an appropriate solution - circuits that have a data transfer cap, high contention ratio or restrictive traffic management are unsuitable. Expert advice should be sought on the subject to ensure the procurement of a suitable solution.

2.22 It is desirable to use a common network for all of the contribution or distribution circuits wherever possible so that the provider can offer the required quality of service and availability. This also helps to ensure that any technical problems would be within the single network, and therefore problems would be easier to identify and resolve.

2.23 The main differences between several broadband technologies and their application are listed below:

	Ethernet first mile (EFM)	Symmetric Digital Subscriber Line (SDSL)	Asymmetric Digital Subscriber Line (ADSL)
Quality of service	High quality of service	Good quality of service	Variable quality of service
Cost	Installation cost can	More expensive than	Low cost

	be significant,	ADSL	
Typical application for small scale DAB	Distribution to SFN transmitters where timing is critical	Programme contribution to multiplexer	Ad-hoc contribution

2.24 Wireless, fibre, cable and Very fast Digital Subscriber Line (VDSL) providers may also offer suitable solutions

Programme origination

2.25 For programme origination to work reliably, a broadband connection will need to be able to support constant streaming (or upload) of the encoded programme feed throughout the provider's network to the multiplexer. Care must also be taken to ensure other applications and devices that might be sharing the broadband connection do not compromise the data stream.

2.26 The gross upload bandwidth required from a broadband circuit is the sum of the transmitted DAB bitrate, plus the protocol overhead (~10%) multiplied by the contention ratio (which is determined by the service provider). It may be acceptable to reduce the gross requirement through the use of buffering at the multiplexer, or through a bespoke arrangement with the service provider.

Multiplexer circuit requirements

2.27 The multiplexer requires sufficient circuit capacity to constantly receive the feeds from each broadcaster. Where the multiplexer is not co-located with the transmitter(s), the circuit will also need to support a constant upload to each transmitter. The multiplexer circuits require very careful planning, as the link is more demanding in both bandwidth and required quality of service and any problems with this feed would affect all broadcasters in the multiplex. For this reason it is highly desirable to co-locate the multiplexer at the transmitter site, or locate it within the network of the circuit provider.

Provision of circuits

2.28 In view of the complexity and relatively limited timescales for the trial, Ofcom proposes to provide suitable circuits for licensees. Applicants should state the locations where they intend locating the multiplexer and also the locations from which programme services will be made available. Not all services may be available in all areas, therefore the applicant should satisfy themselves that suitable connectivity is available.

Technical parameters

2.29 Below we set out the technical requirements with which the trial transmitter must comply. We also describe some of the key technical information that applicants will need to provide to allow Ofcom to assess their application.

2.30 We propose to review the technical conditions that are appropriate for small scale DAB services as part of our process of considering a licensing framework for those services as we set out in paragraph 1.4.

Coverage and transmitter power

- 2.31 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 we will license through these trials.
- 2.32 Applicants will need to specify the geographic area that they intend to serve. Ofcom will determine the appropriate transmitter power based upon that coverage aspiration and the details of transmission site(s) proposed by successful applicants. Coverage areas will be limited so as to ensure that the trial remains consistent with the objectives for small scale DAB services. We therefore propose that trial coverage areas should be no greater than 40% of the area served by any local DAB multiplex serving the same area.⁹
- 2.33 Correspondingly, transmitters will normally operate at a maximum effective radiated power of no more than 100 watts. The normal operating power of each transmitter will be recorded in Schedule 1 of the licence. A draft licence is provided in Annex 5 of this consultation.
- 2.34 Ofcom reserves the right to request temporary variations to the transmitter power or other technical parameters for the purposes of the trial, which we will do in writing and with at least 48 hours' notice.

Spectral mask

- 2.35 We propose 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 300 401.¹⁰

Adjacent channel interference

- 2.36 Adjacent channel interference (ACI) is the mechanism by which a DAB receiver that is tuned to one broadcaster's service is unable to receive that service because it is receiving much stronger signals from another broadcaster's service that is on a different, but nearby, frequency. This sometimes occurs where the services are broadcast from different transmitter sites and usually only affects receivers that are relatively close to one of the broadcast transmission sites.
- 2.37 The small scale trial services may wish to use transmitter sites that are not being used by the other DAB services. There is therefore a risk that the trial service prevents receivers near its transmitter site from receiving other DAB services.
- 2.38 Ofcom will assess the likelihood that a trial transmitter will cause ACI to other services and will seek to minimise the likelihood of any impact on listeners to other DAB services. While measures such as limiting transmitter power or careful design of

⁹ 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.

¹⁰ ETSI EN 300 401 is available at

http://www.etsi.org/deliver/etsi_en/300400_300499/300401/01.04.01_60/en_300401v010401p.pdf

antenna pattern can help reduce the impact of ACI, the choice of transmitter location is one of the key determinants of whether ACI will occur. Transmitters that are close to houses or roads increase the risk that reception in homes or cars will be affected.

- 2.39 If there is evidence that a significant impact has arisen once the small scale DAB trial transmissions have commenced in a particular area, Ofcom reserves the right to modify the licensed parameters of that location (for example) to reduce the operating power or to require that the transmitter is switched off. These powers are provided for in condition 8.1 of the draft form licence attached at Annex 5.
- 2.40 Ofcom will take into account the likelihood of ACI occurring when deciding successful applicants.

Characteristics of the service

- 2.41 DAB+ incorporates a more modern audio encoding algorithm than DAB. This advantage of DAB+ can be employed to reduce the amount of multiplex capacity a service occupies, or to broadcast at a higher quality than DAB for a given bitrate. Availability of capacity within the multiplexes is unlikely to be a constraint for the trial and we therefore propose that trial multiplexes should carry DAB services and not be used to provide DAB+ services. This will minimise the number of variables.
- 2.42 Outside of these stipulations, licensees will be free to make their own choices over matters such as what constitutes an acceptable bitrate for the services in the multiplex and whether services are in mono or stereo.

Continuity of service and service interruptions

- 2.43 Applicants should understand that the small scale DAB trial is being established to carry out a technical test of low cost technology. Although it is Ofcom's intention that the trial will run continuously for the full nine months from when service commences, applicants should be prepared that there are a number of circumstances where transmission may need to be interrupted.
- **Interference complaints:** Ofcom may require a licensee to cease transmission should there be evidence that the service is causing interference (including ACI) to other services.
 - **Equipment upgrades:** Ofcom may require that the transmitter service is interrupted while upgrades to the software or hardware are carried out. Applicants should note that the software upon which the small scale system is based is subject to on-going development. Should Ofcom judge that such developments would bring significant benefits, or yield new information to the trial, we will then provide a copy of the updated software and require that licensees put this into service. We will provide at least two weeks' notice in writing in such circumstances. The details of our approach to software upgrades will be set out in a separate agreement stipulating the terms on which Ofcom will lease equipment to the licensees.¹¹
 - **Equipment failure:** Ofcom will provide a set of core equipment on loan to enable licensees to launch a trial multiplex service as set out in 'Equipment Provision' below. Ofcom will hold a limited stock of spare equipment that it may issue to a

¹¹ Please see paragraphs 2.54 – 2.59 below.

licensee at Ofcom’s discretion should a piece of loan equipment fail in operation. The details relating to the equipment replacement will also be set out in the separate agreement mentioned above.

Frequency availability

- 2.44 We anticipate that the trial multiplexes will use frequency block 11A (centre frequency is 216.928 MHz) which has been cleared for use by the second national DAB multiplex currently being advertised. As we expect that this frequency block will not be required for the national multiplex for the anticipated duration of the trial, this approach is for reasons of simplicity, and limiting the likelihood of the trials causing harmful interference to other services.
- 2.45 We may seek to use some portions of spectrum interleaved amongst the other DAB multiplexes that operate in blocks 10B to 12D (210.880 to 230.000 MHz) to accommodate trial services, depending on location and frequency availability. The operating frequency will be recorded in Schedule 1 of the licence.
- 2.46 Given the experimental nature of these licences, it may be necessary for Ofcom to revoke one or all trial licences for spectrum management reasons. This might happen because the frequency blocks are required prior to the planned conclusion of the trials and there are no suitable alternatives available. Therefore, we propose to include a condition allowing revocation of the licence for spectrum management reasons with one month’s notice (condition 3.1(f) of the draft form licence published alongside this document).

Technical requirements for transmission sites

- 2.47 In Section 1 we explained that we will award licences in order to test three different DAB multiplex configurations:
- i) Trial 1: A single transmitter multiplex carrying multiple services;
 - ii) Trial 2: An SFN carrying multiple services based on at least two transmitter sites; and
 - iii) Trial 3: An SFN carrying multiple services based on at least two transmitter sites with one of them being an on-channel repeater.
- 2.48 For each of the multiplex configurations, applicants will need to demonstrate that they have access to transmission sites in the area that they intend serving – either one transmission site for Trial 1, or two sites for each of Trial 2 or Trial 3.
- 2.49 Each site will need to be able to accommodate and support the radio equipment and Table 1 below sets out some of the key technical requirements of the trial. Applicants will need to provide evidence of their ability to satisfy these requirements. The draft application form in Annex 5 sets out the full range of information that applicants will need to provide.

Table 1 – Key technical requirements

Aspect	Requirement
Access to transmission	Consent from the site landlord that the applicant has permission to access a transmission site where it will

site (s)	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	<p>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:</p> <p>Maximum ambient temperature: 30 °C</p> <p>Minimum ambient temperature: 5 °C</p> <p>As guidance, this is likely to require an airflow of approximately 200m³ per hour.</p>
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 or a small number of dipoles or Band III panels.
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 ¹² . If in doubt, applicants should take advice from their Local Planning Authority.
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Reporting requirements

2.50 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 how the trial is doing in achieving its objectives and also to help draw conclusions.

2.51 We intend to 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:

- In the **establishment phase** of the multiplex 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.
- 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.
- 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;

¹² Either The Town & Country Planning Act 1990 (for England & Wales), The Town & Country Planning (Scotland) Act 1997 or The Planning (Northern Ireland) Order 1991.

- 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 Therefore, we propose to 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, Ofcom will provide licensees of the trial with the majority of the equipment needed to establish the multiplex and each transmitter. This is because:
- the radio equipment is not yet generally available in a form that is loaded with appropriate software, configured and ready to place in service;
 - we want to ensure that small services are not prevented from applying to participate in the trials by the cost of procuring the radio equipment; and
 - we consider that it may assist successful licensees who do not have their own equipment to be ready to commence the trial within the limited time available.
- 2.55 Licensees are not required to use equipment provided by Ofcom if they have equipment of their own that they wish to use. However applicants will be required to specify in their application whether they wish to use the equipment available from Ofcom. Whether an applicant chooses to use Ofcom equipment or to use their own equipment will have no bearing on any award decision.
- 2.56 Other than making available spare or replacement equipment (subject to the limitations in paragraph 2.43 above) Ofcom will bear no responsibility for the maintenance or operation of the equipment over the course of the trial and 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.
- 2.57 Table 2 below provides a list of the main components required to establish a small scale DAB 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 1	Trial 2	Trial 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.

The list of items above is for guidance and is not exhaustive.

2.58 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.

- 2.59 We do not propose to 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 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.

Consultation question

Question 3: Do you agree with our proposed technical licence conditions?

Section 3

Non- technical DAB multiplex licensing conditions

Overview

- 3.1 In this section we set out an overview of some of the non-technical licensing requirements and key conditions specific to the provision of the trial and to which the trial DAB multiplex licensees is proposed to be subject. Other conditions within the trial licence will remain unchanged as per Ofcom's standard form Wireless Telegraphy Act licences.¹³
- 3.2 In particular, in this section we discuss our proposals with regard to:
- service obligations relating to number and type of services to be carried;
 - the licence term;
 - the roll out obligation;
 - licence fees;
 - restrictions on ownership;
 - provision of information to Ofcom;
 - access and inspection; and
 - modification, restriction and closedown.

Provision of services

- 3.3 One of the key objectives of this trial is to test whether a number of programme services can be co-ordinated on a multiplex. Therefore, it is important that the commitment by an applicant to carry specified services in its application is reflected and included as an obligation in the licence.
- 3.4 For each of the trials, we propose to include in Schedule 3 of the licence the name of each programme and additional service, and the service provider. These programme services must broadcast for a minimum of 9 hours per day – with the core hours being between 9am – 6pm. This enables feedback of the trial DAB service from the widest possible audience. In addition, this will enable us to collate data during our drive tests. Each programme service must be carried for the duration of the trial, unless Ofcom consents to vary the licence to remove a service.
- 3.5 Capacity on the trial DAB multiplex may be used for any lawfully licensed service once the minimum obligation to the services promised in the application has been

¹³ <http://licensing.ofcom.org.uk/binaries/spectrum/regulations-technical-reference/rules/licensing-procedures2010.pdf> - please see Section 5, Broadcasting

met. For example, programme services could be added to the multiplex in addition to those included in the minimum commitment. These could be services of shorter duration than the licence term, if the capacity can be contracted for.

- 3.6 All services carried on the multiplex will be listed in Schedule 3 of the licence.
- 3.7 If the minimum number and range of services promised in the application is not provided from the commencement of the multiplex service, we propose that Ofcom has the right to revoke the licence.
- 3.8 **All services** (including those promised in the application) carried on the multiplex service must be appropriately licensed where relevant. In particular, all digital programme and additional services must be appropriately licensed via a Digital Sound Programme Service (DSPS) or Digital Additional Service (DAS) licence.
- 3.9 As DSPS and DAS licences may be used for services carried on any DAB multiplex, and are of an indefinite period, we do not propose to waive application or licence fees for these licences. More information on these licences, including how to apply can be found on the Ofcom website.¹⁴

Licence term

- 3.10 We propose that the licence term will be nine months. We consider that such term will allow sufficient time for Ofcom to collect the relevant data and achieve the trial objectives. Such term will also coincide with the timeframes of the project.

Roll out obligation

- 3.11 We consider that it would be contrary to the aim of the trial if a party were to be awarded a licence and then decided not to deploy the multiplex service. Consequently, we consider that there are positive reasons for including a roll out obligation in the trial licences. Our specific proposal is that the licensee will be required to construct, establish and install the radio equipment and commence providing the service within 12 weeks of any licence award. The precise proposed term will be set out in condition 6 of the licence.

Variation of the licence

- 3.12 We do not generally anticipate that variations of the trial licences will be required as the licence term is for a limited trial period. However, should any variation to the licence be required, we will follow the provisions for variation set out as standard in a Wireless Telegraphy Act licence.

Transferability of the licence

- 3.13 Licences issued under the Wireless Telegraphy Act are not transferable. We consider that in the context of a technical field trial it would not be appropriate for licences to be transferable under the spectrum trading scheme.

¹⁴ <http://licensing.ofcom.org.uk/radio-broadcast-licensing/digital-radio/dsp/>

Licence fees

3.14 As the licences will be issued for the purpose of a technical trial, we do not intend to charge the trial multiplex licensees an annual licence fee. We propose to specify the licence fee in the trial DAB multiplex licence at 'Nil'. However, we propose to include a standard condition which allows Ofcom to introduce licence fees in the future if Ofcom considers that it would be appropriate to do so.

Restrictions on ownership

3.15 The Broadcasting Act 1990¹⁵ sets out certain ownership restrictions to disqualify particular groups from operating a television or radio multiplex including:

- local authorities;
- political bodies;
- religious bodies;
- publicly-funded bodies;
- bodies exerting undue influence;
- broadcasting bodies, specifically the BBC and S4C; and
- advertising agencies.

3.16 The restrictions we propose are similar to those under the Broadcasting Act 1990 but do not extend to advertising agencies (as all content restrictions in relation to advertising would apply in any event via the regulation of content). The details are set out in Schedule 2 of the draft form licence.

Provision of information to Ofcom

3.17 Alongside the specific obligations around reporting for the duration of the trial set out in Section 2, we also propose to mirror the condition relating to general provision of information to Ofcom that is included in Broadcasting Act licences. This condition is to ensure that Ofcom can monitor and if necessary enforce compliance with the licence conditions.

Access and Inspection

3.18 In accordance with our standard spectrum licence conditions, we propose to 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. The requirement is set out in condition 7 of the draft licence published alongside this document.

¹⁵ www.opsi.gov.uk/acts/acts1990/ukpga_19900042_en_1. Subsequently amended by the Broadcasting Act 1996, the Competition Act 1998 and the Enterprise Act 2002.

Modification, restriction and closedown

- 3.19 In accordance with our standard spectrum licence conditions, we propose to 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 (see condition 8 of the draft form licence published alongside this document).

Consultation question

Question 4: Do you agree with our approach to non-technical licence conditions and requirements?

Section 4

Application and assessment process

- 4.1 Our powers and duties relating to the award licences under the Wireless Telegraphy Act are set out in paragraphs 1.24 to 1.27. For reasons already outlined in this document, we propose to award licences for the small scale trial DAB multiplex services in the quickest and simplest way possible. This section therefore sets out our proposed process consistent with achieving this objective, including:
- A request in this consultation document for interested parties to submit an expression of interest in applying for a trial multiplex licence; and
 - A process by which we will invite and then assess applications for the award of the trial multiplex licences.

Expressions of interest

- 4.2 As noted above, we consider that it is important to award the trial multiplex licences as soon as practicable.
- 4.3 While our stakeholder engagement hitherto has received positive feedback, including various stakeholders expressing an interest in taking part in trials, we have not until now been able to provide firm details of what the trials will entail.
- 4.4 Now that we have been able to set out details of the proposed trials, we consider it would be useful to ascertain at the outset, in light of the requirements we propose in this consultation, whether there is stakeholder interest in applying for a trial multiplex licence.
- 4.5 We are therefore inviting stakeholders interested in applying for a small scale DAB multiplex trial licence to submit a short expression of interest, alongside any response to this consultation. As explained in paragraph 1.41, expressions of interest should comprise no more than the information specified in paragraph 4.6 below.
- 4.6 In order for Ofcom to assess the likely interest in trial licences, we are requesting that interested parties provide some detail in their expressions of interest, although these do not need to be extensive. An expression of interest should set out:
- Whether there are a range of organisations and/or service providers involved, and if so, which ones; and
 - The proposed area to be covered, including whether transmission sites have been identified.
- 4.7 We would be grateful if stakeholders who have previously expressed interest in participating in trials would reconfirm their expressions of interest, including the detail outlined in paragraph 4.6 above.
- 4.8 We will not consider expressions of interest to be binding commitments, and will accept applications from those who have not expressed interest.

Submission of applications

- 4.9 Applicants will be required to complete an application form if they wish to be considered for the award of a small scale trial DAB multiplex licence. A draft application form is included with this document at Annex 6.
- 4.10 Applications will be invited once we have published our statement following this consultation. Applicants will be required to comply with all of the requirements set out in the Invitation to Apply document. Failure to do so may render the application liable to disqualification. Notes of Guidance will also be published alongside the application form to assist applicants in completing their applications.
- 4.11 As the cost to Ofcom of this project is being met by funding from Government and given that the licences are being awarded for the purposes of Ofcom's trial, we propose that no fee should be payable on application for the trial DAB multiplex licence.
- 4.12 One electronic copy of the completed application, along with the supporting documentation also in electronic format must be submitted to Ofcom via email to smallscaleDAB@ofcom.org.uk no later than 5pm on the closing date.
- 4.13 Applications received after this time will not normally be accepted. Applicants should bear in mind that email may be unreliable. Applicants are therefore strongly advised to submit applications at least 48 hours in advance of the deadline. Further, applicants should note that files over 10 MB may not be received and should plan their submissions accordingly. We will confirm receipt of applications by email reply.
- 4.14 If there is a difficulty with submitting applications electronically, applicants should contact smallscaleDAB@ofcom.org.uk to enquire about alternative ways of submitting the application, but we would consider these only in exceptional and justified circumstances.

Award process

- 4.15 We propose to award licences to eligible applicants for each type of trial that we propose to conduct. We cannot consider contingent applications, or applications proposing multiple scenarios. Applicants must therefore specify which type of trial they wish to apply for:
- **Trial 1:** A single transmitter multiplex carrying multiple services;
 - **Trial 2:** An SFN carrying multiple services based on two transmitter sites and;
 - **Trial 3:** An SFN carrying multiple services based on two transmitter sites with one of them an on-channel repeater.
- 4.16 Our proposed approach to eligibility for licence award is set out below.

Eligibility criteria for trial licences

- 4.17 In order to be eligible for consideration for a licence award to operate a trial DAB multiplex service under **any** of the required configurations, we propose that an applicant must:

- i) Be eligible to hold the licence (as outlined in the ownership requirements in Section 3 above);
 - ii) Be able to establish the service within 12 weeks of licence award;
 - iii) Demonstrate that they have access to suitable transmission sites in the areas that they propose to serve;
 - iv) 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 DSPSs), each of which will broadcast for a minimum of 9 hours per day for the duration of the trial; and
 - v) Undertake to meet the installation and operating costs of the trial.
- 4.18 Applicants that do not satisfy the eligibility criteria will not be considered further for award of a licence to conduct any of the trials.

Assessment criteria

- 4.19 If we receive more than one application for a particular trial licence (Trial 1, Trial 2 or Trial 3) which meet these criteria, we propose to award the licence to the applicant that appears to Ofcom to be best able or most likely to successfully carry out the trial and provide documentary evidence to supplement future decision making, having regard in particular to the following:
- the objectives of the trials which; and
 - our assessment of how well the applicants meet the eligibility criteria set out below.
- 4.20 The assessment criteria we propose to apply to each of the trial multiplex licences are as follows:

Trial 1: A single transmitter carrying multiple services

Criterion 1: The objectives of the trials

- 4.21 We will assess how well each applicant meets the three principal objectives that we want to achieve from further field trials. As we explain in paragraph 1.12 above, these are:
- To test the function, capability and stability of software-defined DAB multiplex services, particularly in an SFN mode;
 - 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
 - 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 broadcasting.
- 4.22 As part of these technical trials we are seeking to test the capability and stability of the technology in either an SFN mode using multiple co-ordinated transmitters, or

when carrying live broadcasts from separate programme service providers on a single transmitter.

Criterion 2: Readiness to establish the service

- 4.23 In demonstrating their ability in relation to this criterion we propose that 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.
- 4.24 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 propose to 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.
- 4.25 We propose that 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

- 4.26 In order to demonstrate their eligibility in relation to this criterion we propose that 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.
- 4.27 In assessing applicants' proposals we propose to have regard to:
- the likely ability of the proposed site to be able to serve population in the target area;
 - 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;
 - the likelihood of the proposed transmission sites causing ACI to other services.
- 4.28 When selecting transmission sites, 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.
- 4.29 We propose that 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 services

- 4.30 Our requirement for this trial is for a single transmission configuration which must carry at least two separate services.
- 4.31 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.

- 4.32 Therefore, we propose favouring 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.
- 4.33 Applicants must provide evidence of the programme services they intend to carry on the multiplex. 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.
- 4.34 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. As explained in paragraphs 1.37 and 4.17 above, we propose that applicants should be obliged to 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 also carry more than two DSPSs and may also carry DASs.
- 4.35 We propose that services must be provided for a minimum of nine hours per day between 9am and 6pm. We propose to 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

- 4.36 Although we propose to 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 we propose that all applicants must undertake to meet these costs, as well as any capital costs that fall outside the equipment we propose to provide.
- 4.37 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.
- 4.38 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 2.47 to 2.49 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 2: An SFN carrying multiple services based on at least two transmitter sites

Criterion 1: The objectives of the trials

- 4.39 As for Trial 1.

Criterion 2: Readiness to establish the service

4.40 As for Trial 1.

Criterion 3: Access to suitable transmission sites

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

Criterion 4: Provision of services

4.42 As for Trial 1.

Criterion 5: Understanding of the installation and operating costs

4.43 As for Trial 1.

Trial 3: An SFN carrying multiple services based on at least two transmitter sites with one of them an on-channel repeater (OCR)

Criterion 1: The objectives of the trials

4.44 As for Trial 1.

Criterion 2: Readiness to establish the service

4.45 As for Trial 1.

Criterion 3: Access to suitable transmission sites

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

4.47 In assessing applicants' proposals we propose to have regard to the likelihood of an on-channel repeater being able to function reliably. We propose to 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 propose to take into account the likelihood of the on-channel repeater receiving a good signal from the parent transmitter.

Criterion 4: Provision of services

4.48 As for Trial 1.

Criterion 5: Understanding of the installation and operating costs

4.49 As for Trial 1.

Consultation question

Question 5: Do you agree with our proposed approach to awarding trial licences?

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.

Final reporting obligations

- 5.2 As set out in paragraph 2.50 above, we propose to require that participating licensees provide Ofcom with a final report, not later than 6 weeks from the original termination date of the licence.
- 5.3 The report should cover all material issues arising over the course of the trial, both in relation to the establishment and operation of the small scale system equipment and the services carried on the multiplex, as well as any solutions employed. The final report should also detail the costs of operating the multiplex, how these were apportioned between services (if at all), and an overview of any commercial arrangements for carriage concluded during the trial period. We would also welcome the inclusion of feedback from the participating programme service providers, if available.

Report publication

- 5.4 Ofcom proposes to publish a final report setting out our conclusions in relation to how successful the trials have been in meeting our objectives, as well as the extent to which the low-cost software defined technology has proved capable of meeting the needs of small scale services. We will also publish an outline of the kinds of costs that have been incurred by the licensees in establishing and operating these multiplexes as well as the order of costs of the equipment provided by Ofcom. We will discuss the level of detail relating to costs with licensees before the final report is published.
- 5.5 We propose to publish the reports from licensees in as much detail as possible as part of our final report, although we will consider requests for some sections to be redacted for reasons of confidentiality, for example in relation to carriage and other costs.
- 5.6 We will also take the results of the trials into account when considering proposals for a permanent licensing system for small scale multiplexes.

Equipment recovery

- 5.7 Where we have provided equipment to licensees as part of the trial, we will need to recover it once the trials have concluded. Licensees will be required to cease using the equipment at the end of the trial period and to make it ready for collection by Ofcom.
- 5.8 We will make arrangements to recover the equipment within a month of the end of the multiplex service. The terms and conditions under which the equipment will be

made available to licensees will be set out in the separate agreement between Ofcom and the licensees as explained in paragraphs 2.54 – 2.57 above.

Extension of trial licence duration

- 5.9 We may wish to extend the period of any of the trial services beyond the initial nine months, for example, to collect more data from the trial multiplexes. If this is necessary and if the licensee consents, we would vary the termination date in the trial licence following the procedure set out in the Wireless Telegraphy Act.
- 5.10 We propose that Ofcom will continue to provide equipment for the duration of the trial, if it is already on loan to a licensee.
- 5.11 We do not propose that a trial licence term would be extended if a permanent small scale DAB licensing framework is in place.

Consultation question

Question 6: Do you agree with our proposals set out in this section in relation to final reporting obligations, the recovery of the equipment and the extension of trial licence duration?

Annex 1

Responding to this consultation

How to respond

- A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 10 December 2014**.
- A1.2 Ofcom strongly prefers to receive responses using the online web form at <http://stakeholders.ofcom.org.uk/consultations/small-scale-dab/howtorespond/form>, as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 3), to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web form questionnaire.
- A1.3 For larger consultation responses - particularly those with supporting charts, tables or other data - please email smallscaleDAB@ofcom.org.uk attaching your response in Microsoft Word format, together with a consultation response coversheet.
- A1.4 Responses may alternatively be posted to the address below, marked with the title of the consultation.
- Ruth John
Ofcom
Floor 3
Riverside House
2A Southwark Bridge Road
London SE1 9HA
- A1.5 Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.
- A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together at Annex 4. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

Further information

- A1.7 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact Ruth John at smallscaleDAB@ofcom.org.uk

Confidentiality

- A1.8 We believe it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, www.ofcom.org.uk, ideally on receipt. If you think your response should be kept confidential, can you please specify what part or whether all of your response should be kept confidential, and specify why. Please also place such parts in a separate annex.

- A1.9 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website at <http://www.ofcom.org.uk/terms-of-use/>

Next steps

- A1.11 Following the end of the consultation period, Ofcom intends to publish a statement in early 2015.
- A1.12 Please note that you can register to receive free email updates alerting you to the publications of relevant Ofcom documents. For more details please see: <http://www.ofcom.org.uk/email-updates/>

Ofcom's consultation processes

- A1.13 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.
- A1.14 If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at consult@ofcom.org.uk . We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.15 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Graham Howell, Secretary to the Corporation, who is Ofcom's consultation champion:

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

Tel: 020 7981 3601

Email: Graham.Howell@ofcom.org.uk

Annex 2

Ofcom's consultation principles

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

Before the consultation

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

During the consultation

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

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

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

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

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

After the consultation

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

Annex 3

Consultation response cover sheet

- A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, www.ofcom.org.uk.
- A3.2 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.
- A3.4 We strongly prefer to receive responses via the online web form which incorporates the coversheet. If you are responding via email, post or fax you can download an electronic copy of this coversheet in Word or RTF format from the 'Consultations' section of our website at <http://stakeholders.ofcom.org.uk/consultations/consultation-response-coversheet/>.
- A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we don't have to edit your response.

Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

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

Nothing	<input type="checkbox"/>	Name/contact details/job title	<input type="checkbox"/>
Whole response	<input type="checkbox"/>	Organisation	<input type="checkbox"/>
Part of the response	<input type="checkbox"/>	If there is no separate annex, which parts?	

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

DECLARATION

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

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

Name

Signed (if hard copy)

Annex 4

Consultation questions

Section 1 – Small scale DAB multiplex trial

Question 1: Do you agree that we have identified the objectives which the small scale DAB multiplex trial should seek to achieve?

Question 2: Are there any other questions or issues which the small scale DAB multiplex trial should seek to address?

Section 2 – Technical licence conditions and requirements

Question 3: Do you agree with our proposed technical licence conditions?

Section 3 – Non-technical DAB multiplex licensing conditions

Question 4: Do you agree with our approach to non-technical licence conditions and requirements?

Section 4 – Application and assessment process

Question 5: Do you agree with our proposed approach to awarding trial licences?

Section 5 – Concluding the trial

Question 6: Do you agree with our proposals set out in this section in relation to final reporting obligations, the recovery of the equipment and the extension of trial licence duration?

Annex 5

Draft Wireless Telegraphy Act licence

See separate document published alongside this consultation document

Annex 6

Draft Application form

See separate document published alongside this consultation document