An approach to DAB coverage planning – interim statement

Summary of responses and update on further work

Statement

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Section 1

Introduction

Context to this interim statement

1.1 In July 2010, the Government published a Digital Radio Action Plan (DRAP) the purpose of which is '*to provide the information to allow for a well-informed decision by Government on whether to proceed with a radio switchover*'. Ofcom has been asked to chair a DAB coverage and spectrum planning group to '*determine the current level of FM coverage and develop a range of options to increase DAB coverage to match FM*'.

1.2 In June 2011, Ofcom published '*An approach to DAB coverage planning*', a consultation which set out our approach to that task. In particular, the document outlined:

- Our approach to defining the areas within which we aim to replicate on DAB, as far as practicable, the editorial coverage of existing FM radio services (we labelled these 'editorial areas');
- The underlying technical assumptions used to predict acceptable levels of FM and DAB coverage for indoor portable and in-vehicle radio reception;
- The extent of existing FM coverage within each editorial area, for indoor portable radios and for in-vehicle radios on major roads; and
- A study investigating the feasibility of different radio switchover scenarios illustrating, from a broadcast network perspective, how increasing levels of coverage can be achieved using increasing numbers of transmitters.

1.3 We were explicit that the document was not a policy consultation on a regulatory decision by Ofcom, given that the decisions that may follow this work are primarily to be taken by multiplex operators and by Government. Rather, we outlined that we were consulting to give a wider public and stakeholder audience the opportunity to express any views on the issues in this document, before we submit a final report to Government.

1.4 The options we proposed do not constitute a definitive or final view on any post-switchover DAB network but will inform the Government's decision about whether to proceed with digital radio switchover. We noted that further technical work on network planning, and public policy decisions by Government on the issues raised, would be necessary.

1.5 We invited responses on consultation questions that we set out, particularly from a technical perspective or with a focus on the consumer experience.

Purpose of this interim statement

1.6 Our consultation represents only the first stage of the planning process, and within the document we committed to undertaking further research and planning to more fully explore certain issues. This further work would include an examination of the implications for DAB coverage and the consumer experience of:

- Varying our technical assumptions, in particular whether road coverage needs to be planned for 99% of the time and for 99% of locations, other technical characteristics of the DAB broadcast, and the differences between FM and DAB as technologies;

- The trade-off between adding more transmitters and the increase in interference within the DAB network that brings;

- The possibility of merging together some areas to make better use of frequencies (this does not mean merging the radio services, just carrying the same local stations over a wider area); and

- Frequency changes further to those we have already proposed.

1.7 The further work we are conducting in this respect is outlined in section 3. This has been informed in part by the consultation responses we have received, alongside issues raised through our ongoing engagement with industry and other stakeholders.

1.8 We stated that this work would be presented to Government in a final report on the matter. We are publishing this interim statement now in order to highlight the points raised by respondents to our consultation, as well as to give a more general overview of the work we are undertaking that will form the basis of our final report.

1.9 The purpose of this interim statement is therefore to:

- provide a summary of consultation responses;

- outline Ofcom's considerations of the issues raised by the submissions (as far as currently practicable);

- provide details of the further work that is being undertaken, with emerging conclusions.

Next steps

1.10 We will complete the work outlined in section 3 by the end of December 2011, and will provide a final report to Government in Q1 2012.

1.11 The funding of any DAB roll-out is not considered by this report and is being separately considered as part of the DRAP.

1.12 Government will consider the final report alongside deliverables from other workstreams outlined in the DRAP in coming to an evidence-based decision on whether to proceed with digital switchover.

1.13 The DRAP provides two routes for stakeholders and consumers to participate in a public debate around DAB switchover more generally.

- The Stakeholder Group, chaired by the DCMS, is open to a wide range of industry and related stakeholders. The principle purpose of this Group will be to inform external stakeholders of progress against the Action Plan and gather views on emerging findings.

- The Consumer Expert Group, established to inform the Digital Television Switchover Programme – and including a wide range of consumer

representatives including RNIB, British Wireless for the Blind Fund, the Voice of the Listener and Viewer and Citizens' Advice – has formally agreed to extend its role to consider the Digital Radio Switchover through a revision to its Terms of Reference.

1.14 Ofcom will continue to lead the Spectrum and Coverage Planning group, and complete work on the other tasks identified in the DRAP.

Section 2

Consultation responses

Introduction and approach

2.1 Our consultation invited comments on the following questions:

1. **Do you agree with our approach of matching DAB to FM within defined editorial areas?** *We stated that we would seek comments on specific editorial boundaries via separate consultations if and when specific changes are proposed.*

2. **Do you agree with our approach todetermining the extent of existing FM coverage, and which of the three field strength levels should be used to define the FM coverage that DAB should match?**

3. **Do you agree with our approach to determining the extent of existing DAB coverage, and its relation to the approach we take for FM?**

   And in particular, as we consider the emerging issues,

4. **Are the assumptions we make about needing to predict DAB in-vehicle coverage for 99% of the time and for 99% of locations the right ones?**

5. **Should the principle of merging editorial areas be explored, as a way of improving coverage?**

6. **Above and beyond the frequency changes proposed in this document, should further changes to frequency allocations be explored, as a way of improving coverage?**

2.2 We noted explicitly that the consultation was not focused on a regulatory decision by Ofcom – and therefore that it did not constitute a consultation on the policy of digital switchover. The decisions that may follow this work are primarily to be taken by multiplex operators and by Government. In particular, it will be for Government to make an evidence based decision on digital switchover, and consult on this decision. Rather, we highlighted that we were consulting to give a wider public and stakeholder audience the opportunity to express any views on the issues in this document, before submitting a final report to Government.

2.3 In total, we received 35 consultation responses – 22 from individuals from organisations and 13 from organisations including broadcasters, transmission providers, consumer groups and others. All but two submissions were non-confidential.

2.4 In this section we present a synopsis of the approach that we put forward in the consultation. We then summarise the views of respondents and set out Ofcom's consideration of these submission.

Defining editorial areas (question 1)

Summary of consultation position

2.5 National FM radio services seek to target the whole of the UK. Each local FM service has its own unique editorial area, determined roughly by its transmitter location and power. In each local area covered by DAB there is a single 'multiplex' which carries a number of local services. Providingthe same level of error protection is used all of the services have identical coverage.

2.6 Because of this, we defined a set of local editorial areas, based on discussions with broadcasters about the areas that stations aim to serve. They take into account both the largest local commercial service and the relevant BBC local or nations' service, to provide a composite editorial area, within which listeners could reasonably expect to be served by one or both of these services.We did not seek to replicate coverage outside these editorial areas (e.g. although BBC Radio Manchester can be heard clearly in parts of Liverpool, the service is not intended for those listeners).

2.7 However, these areas do not cover the whole of the UK and so for planning purposes, we either extended existing areas or created new ones where necessary. These steps were based on discussions we held with the BBC and the larger commercial operators, and took into account existing FM editorial areas as far as possible.

2.8 Our approach meant that every part of the UK was included in at least one local editorial area. In some places there are deliberate overlaps – for example where a particular town may reasonably expect services from two adjacent areas (e.g. Warrington is included in both the Liverpool and Manchester areas).

2.9 We noted that the BBC's nations' services are expected to be carried on all of the local multiplexes in each nation, together covering the whole of the relevant nation.

Summary of responses

2.10 Our consultation asked whether respondents agreed with our approach of matching DAB to FM within defined editorial areas. 23 expressed broad support, while three submissions disagreed with our approach.

2.11 Respondents who supported our approach tended to agree with our rationale that local stations have a target editorial area (i.e. an area within which it targets its listeners and for which it tailors its content) which should be at least replicated – if not enhanced – on DAB. For instance, the Consumer Expert Group (CEG) argued that editorial areas were 'the reasons these [local] stations exist', and that as long as no station areas were diminished on DAB that would be acceptable. They also had concerns that the carriage of additional stations on local multiplexes should not impact quality. A confidential response suggested that specific issues may arise in individual editorial areas, but that this did not invalidate the overall approach.

2.12 Several respondents who expressed agreement with our approach nevertheless raised additional points about the matter. Some key issues are outlined below:

- Both RadioCentre and several individuals highlighted that commercial radio broadcasters may be concerned over the implications of moving from their current unique editorial area, to a larger composite area that they are not geared to serve either in terms of their broadcast content or their sales operation.

Respondents argued that this concern may be due to the potential shift from their existing coverage area to a significantly enlarged area or different geographical focus (or both). RadioCentre noted that this issue was part of a more general concern over a shift in business models for local radio operators, and stressed that any changes of this nature would need to form part of a broader industry settlement on coverage for DAB, once operators have been able to take a more definitive view on the relative importance of matching existing editorial area and improving local DAB coverage overall.

- Arqiva agreed with the approach of matching coverage within editorial areas, but urged Ofcom not to lose sight of any opportunities to provide DAB to areas that do not currently have good FM coverage due to scarcity of suitable frequencies on Band II.

- Bauer Media noted that a composite-coverage approach led to areas which better matched BBC FM coverage, often substantially exceeding commercial FM coverage. The consequence is that more DAB transmitters would be required in any given network than might otherwise be required and, in turn, would reduce commercial viability. Bauer's submission stated that an appropriate funding settlement for local DAB would offset this factor.

- Orion Media expressed a concern that editorial areas of BBC and commercial stations in the same DAB region might be substantially different, and that matching to such a wide composite might lead to multiplexes 'aggressively' overlapping with others (giving the example of the Birmingham mux and the Wolverhampton and Shropshire mux).

2.13 The respondents who disagreed with our proposal all argued that our approach would deny listeners the opportunity to tune into 'out-of-area' stations that they may have previously received (and derived benefits from) on FM. For instance, one individual highlighted that commuters travelling from one area to another would wish to receive local radio services from their destination location, so as to keep updated with any potential travel problems ahead. Similarly, other individuals argued that nearby local BBC stations were still important and of relevance to listeners in neighbouring areas, and that the proposal would limit 'specialist' stations (in particular BBC Cymru) to regional areas, when they would still be of interest to listeners in other parts of the country.

2.14 Orion Media (albeit in responding to another question) estimated that 15-25% of listeners came from outside the served area, reflecting both the impact of commuting and the long propagation characteristics of FM.

2.15 No respondent suggested a different approach to matching DAB to FM.

Ofcom's consideration of responses

2.16 We welcome the fact that the vast majority of respondents expressed broad agreement with our approach.

2.17 We note the concern around the enlargement of editorial areas which local stations may face as a result of our composite-coverage approach. Most large commercial stations areas are similar to the areas of the relevant local BBC service and so there is no issue. Where the BBC area is larger, this is often in rural areas and the funding of such coverage will be a matter for the DRAP. For smaller commercial stations, the plan is for them to remain on FM and so their coverage will not be affected. It is of

course open to such stations to decide whether they wish to seek carriage on DAB and so cover the broader DAB area. As RadioCentre notes, any change in the area of DAB multiplexes is subject to a statutory consultation, and therefore the views of broadcasters will be an important component in determining future roll-out.

2.18 Similarly, Orion Media's concern over the overlaps of local multiplexes will also be an issue that is kept under review throughout the further planning and build-out process.

2.19 We would also highlight that the editorial areas on which the consultation was based on were drawn up on the basis of discussions with existing broadcasters about the areas they attempt to serve.

2.20 We note Arqiva's call for further planning work to also bring DAB to areas where FM is not currently available. As the consultation noted, every part of the UK is included in at least one local editorial area. We would anticipate that build-out plans would be designed to optimise population coverage relative to cost (i.e. by prioritising the launching of transmitters which serve greater populations within a multiplex) and note the potential for this approach to provide DAB coverage to areas where FM is poor or non-existent.

2.21 We agree with Bauer Media that an appropriate funding agreement for extending coverage is a key component of a successful local DAB roll-out.

2.22 In response to those who disagreed with our approach on the grounds that it would prevent listeners being able to receive stations from outside their target areas, we would make the following points.

- Firstly, that the network design concept behind DAB is simply different to that for FM. On a local scale many listeners will have access to a wider range of stations that are explicitly targeting their area. In many cases these will include existing local FM stations from within the editorial area which are currently out of range.

- We would also suggest that attempting to replicate the farthest extent of FM coverage is unlikely to be practicable or cost effective. Such an approach would likely result in particularly large multiplex areas with significant overlaps. Rolling-out to these levels would require a substantial increase in the number of transmitters required, and the larger multiplex areas may reduce the number of frequencies which could be re-used around the country (potentially creating problems for multiplexes which have not yet launched).

- Thirdly, we would highlight that radio is increasingly becoming a sector with a mixed ecology of platforms. Most stations now deliver their services by means of a number of different routes, including online, via mobile or through Freeview, and this means that listeners are likely to be able to access stations from nearby regions (along with many others) even after the implementation of any digital switchover.

- Finally it is worth noting that, as with FM, in practice there will be unplanned overspill of DAB signals beyond the editorial area, although such overspill may not be identical to FM overspill.

Defining FM coverage (question 2)

Summary of consultation position

2.23 Our consultation noted that defining FM coverage is not simple. FM radio signals degrade over distance such that it is still possible to receive some kind of signal that some listeners may regard as acceptable over longer distances.

2.24 The current internationally-agreed method of predicting FM service coverage dates from the 1950s, and is based on an assumption that listeners receive their radio services using a directional rooftop aerial pointing towards the transmitter (like television aerials). These aerials have the effect of boosting the reception of the wanted signal, whilst rejecting unwanted signals (interference) received from other directions.

2.25 Today the vast majority of listeners instead receive their radio services on portable indoor and in-vehicle receivers, which have non-directional aerials. Receiver performance has also evolved and some modern FM receivers are more sensitive than receivers were 50 years ago. They also usually include techniques which conceal reception problems, enabling listeners to listen to weaker signals than used to be the case.

2.26 We commissioned a review of the factors affecting portable reception of FM services, in order to assess whether our computer predictions are representative of the FM coverage actually achieved. This produced what is known as a link budget, modelling every stage in the journey from the signal leaving the transmitter to the sound coming out of the speaker.

2.27 The review concluded that the current assumed level of rooftop field strength (54 dBµV/m) provides a good way of predicting good, indoor mono FM reception on modern portable receivers. However, many receivers will produce what some listeners might regard as an acceptable service at a field strength of 48 dBµV/m, and so this could be used to define variable, indoor portable FM reception. It also supported the view that variable in-vehicle mono reception can be achieved using a lower field strength of 42 dBµV/m. Our consultation invited views as to which of these levels we should use to define the FM coverage that DAB should match.

2.28 Within each local editorial area we then predicted FM coverage of the existing BBC local station (e.g. BBC Radio Manchester); the largest commercial station (e.g. Key 103 in Manchester); and the composite coverage. For UK-wide services, we calculated the BBC and commercial coverage separately. For all, we produced FM coverage maps and household and road coverage figures.

Summary of consultation responses

2.29 We asked respondents whether they agreed with our approach to determining the extent of existing FM coverage. We also asked which of the three field strength levels should be used to define the FM coverage that DAB should match.

2.30 23respondents agreed or broadly agreed with our proposed approach.No response explicitly disagreed, although one individual suggested that DAB coverage should be planned to a level over and above that of FM.

2.31 In relation to the appropriate FM field strength that should be chosen for DAB to match, we received a mixture of responses. Some of these were characterised by

uncertain terminology – for instance, where respondents expressed a desire to match 'robust' FM coverage, some took robust to mean 'the strongest field strength possible', whereas others viewed it as 'the widest reach of FM coverage' (i.e. likely to be the lowest of the field strengths we suggested).

2.32 One respondent suggested that DAB should match the strongest field strength we discussed (54dB) to avoid DAB reception problems. Similarly, another respondent argued for the strongest field strength to be matched, citing the degradation of DAB signals as a factor in this. Ford Motors supported a 54dB value being matched.

2.33 The majority of respondents expressed support for a conservative approach (matching either 48dB or 42dB, in some cases depending on circumstance). Several respondents were of the view that the key issue was that the *consumer experience* of DAB matched that of FM, and that field strengths should be selected on that basis.

2.34 Arqiva stated that the practical difference between using 42dBµV/m and 48dBµV/m is not as great as may be expected, particularly within an editorial area (arguing that, in practice, coverage is affected by interference and terrain at the fringes of coverage). The submission suggested that the conventional threshold of 48dBµV/m should be used in most cases. Bauer Media concurred with this analysis. It noted that a final decision on the field strength should be based on field trials, but recommended 48dB as an appropriate level, given that 42dB listening is likely to account for very few listening hours. The submission added that qualitative judgements should be used in marginal areas.

2.35 Other stakeholders believed that 42dB was the appropriate level against which FM should be matched. Most argued that this was due to the differing qualities in degradation of DAB and FM, and a need for the broadest interpretation of 'usable' FM to be matched as it would likely reflect listener habits.

2.36 CEG welcomed the identification of 'sensible and viable' options as a basis for matching DAB and FM coverage. The submission noted that the listener perception of reception quality relied not only field strength, but also on sound quality and receiver performance. It noted the receiver tests we had conducted (detailed in Annex F of the consultation), and argued that on the basis of serving as many receivers as possible 54dBµV/m would be the preferred signal strength for defining FM service areas, providing a better chance of achieving 48dBµV/mat marginal locations and allowing more receivers to achieve their potential when operated with non-optimum antennas. But the response appeared to develop an argument thatthe FM 42dBµV/m contour should be used for matching DAB service areas as 6 out of 10 receivers in the Ofcom commissioned study could work with this level of signal. RadioCentre argued that the broadest definition of acceptable FM coverage should be used.

Ofcom's consideration of responses

2.37 We welcome the high level of agreement with our proposed approach to defining FM that respondents expressed, and support the suggestion that the consumer experience of FM should be the template for DAB coverage.

2.38 We note the arguments outlined in the submissions in relation to the field strength which should be used to define FM coverage – in particular the support for a more 'conservative' approach of selecting lower field strengths. We will take these views into account along with further work which we are undertaking in forming our final recommendation to Government.

2.39 Some respondents argued for a higher FM field strength to be matched in order to compensate for the reception characteristics of DAB. This analysis appears to be based on a misunderstanding of the matching process. Rather than resulting in higher DAB field strengths it would result in smaller DAB coverage areas, as current FM coverage would be assessed purely on the basis of the central areas where the higher field strength is available. In any case our view is that any concerns around the robustness of DAB signals should be a factor in considering what field strength should be used for planning DAB coverage, rather than a decision on FM coverage.

2.40 In relation to the suggestion of planning DAB over and above existing FM, we would assert that this falls outside of the consideration of our report, as it is essentially a cost-benefit decision. Indeed, we highlighted in our consultation that economic modelling and discussions of value for money were beyond the scope of the document. It is worth noting however that as the local FM matching process is on the basis of the composite superset of BBC and commercial station coverage, the result will be an increase in coverage for many stations.

Defining existing DAB (questions 3 and 4)

Summary of consultation position

2.41 Defining the coverage of DAB radio services raises similar technical questions to FM. Here however the challenge is that, in a particular location at a particular time, either a good digital signal is received or none at all. For our consultation, we commissioned research to establish the planned field strength necessary to provide reliable indoor and in-vehicle reception.

2.42 This was in part based on a predicted level of receiver performance, and so a key part of the work was the testing of existing DAB receivers in the market to determine their sensitivity. These tests found a very wide range of receiver performance but many receivers met the standard assumed in the coverage planning model and so this represents a practically achievable target.

2.43 We expect that the level of receiver sensitivity performance assumed in the planning model will form part of the receiver specifications being developed by the DRAP's Technology and Equipment Group (TEG). There is a clear importance of these specifications having an associated product logo or kite mark to enable consumers to identify receivers that come with an assurance that they will reliably operate in their planned DAB coverage area.

2.44 Given our cautious approach, the field strengths we proposed using to predict indoor reception of DAB are significantly higher than previously used for DAB planning. (The previous value was 58dBµV/m; we used 69dBµV/m for robust indoor reception in most areas, rising to 77dBµV/m in dense urban areas, but to retain 58dBµV/m for in-vehicle reception.) We stated our belief that planning to these field strengths will provide consumers with a better, more robust listening experience than that available at present.

2.45 For in-vehicle reception we continued to plan on the previous basis of services being available for 99% time in 99% of locations. This was a deliberately cautious approach at this stage which, in practice, means we are planning coverage so that a listener would only lose reception in marginal coverage locations if they happened to be sat in stationary traffic during certain propagation conditions. For the majority of time coverage is in practice far more extensive.

2.46 We produced DAB existing coverage maps and household and road coverage figures both for national coverage and for every editorial area within the UK.

2.47 We also noted that the robustness of this approach to DAB planning criteria carries a cost in terms of the number of transmitters that need to be built. Our consultation invited views on our approach to determining the extent of existing DAB coverage, and its relation to the approach we take for FM.

Summary of consultation responses

2.48 Our consultation asked whether respondents agreed with our approach to determining the extent of existing DAB coverage, and its relation to the approach we take for FM.

2.49 The vast majority of submissions expressed agreement with our overall approach to planning DAB, and were also in agreement with our suggested field strengths for DAB planning of 58dB for mobile and 69/77dB for indoor.

2.50 Although Atlantic FM welcomed the proposed approach, its response stated that the new assumptions may still underestimate the field strength needed to provide coverage which is perceived to be as good as FM. In particular, the submission expressed concern that the tendency for DAB reception to degrade rapidly within buildings may not be fully reflected in the field strength assumptions.

2.51 Several respondents again stated that the key issue was that an appropriate field strength was chosen for both indoor and mobile coverage which meant that the consumer experience was the same as for FM.

2.52 We also asked whether the assumptions we make about needing to predict DAB in-vehicle coverage for 99% of the time and for 99% of locations were the right ones.

2.53 There were more mixed views in relation to this question. Although the vast majority of respondents (22) expressed agreement, some submissions suggested alternative approaches

2.54 Bauer Media agreed that, where a numerical equivalence of FM and DAB was required for in-car coverage, predictions should use 99% locations and 99% of time. But the response also suggested that, if appropriate, maps could also show areas of 'Variable FM' down to 42dB and 'Variable DAB' using relaxed %-locations and/or %-time. However, the submission stated that numerical analysis of population and road coverage in these variable areas should be resisted, as these predictions would be made with less confidence.

2.55 RadioCentre commissioned work on the impact of moving away from the 99% coverage planning parameters.

- The submission argued that any decision on whether to relax the parameters would 'essentially be a cost benefit one'.
- It noted that relaxing the parameters slightly in the planning processes would clearly result in coverage plots extending slightly further, and would also have a subsequent financial benefit, as fewer transmitters may need to be built in order to achieve the levels of measured coverage required.

- However the response argued that reducing the parameters to, say, 97% of locations would mean statistically expecting small “holes” in coverage to appear in areas –holes that are unlikely to be countered by time interleaving. Therefore a car receiver at the edge of the coverage area would be more likely to receive a degraded service.

- The report concluded that that if purely technical aspects were being considered then it would not be appropriate to relax these parameters, but if there was a strong desire from the radio industry to increase the area shown as covered on a map for these purposes (and as part of an overall settlement on build-out) then that may justify a relaxation of the main vehicle planning parameters to 98% locations, 98% of the time. Further relaxation was not recommended.

- RadioCentre also discussed an alternative approach of ‘differential’ coverage maps, similar to Bauer Media’s suggestion.

2.56 Arqiva argued that the proposed levels represented a very stringent threshold, and experience suggests that adequate in-vehicle coverage is achieved with a slightly relaxed standard. The submission advocated carrying out further testing to help justify any relaxation of the assumptions.

2.57 One individual believed that the planning parameters should actually match 100% locations / time. Another stated that the underlying model (which assumes a 100x100m grid) was not representative of the experience of a moving vehicle given the characteristics of DAB reception.

Ofcom’s consideration of responses

2.58 We note the strong support for the field strength levels proposed in our consultation, and view this as confirmation that our approach on this matter is appropriate.

2.59 Again, we support the suggestion that the consumer experience of DAB should match that of FM.

2.60 We do however believe that it is unrealistic to use parameters over and above 99% time and 99% locations. Broadcast radio coverage across all platforms varies depending upon on a range of factors, such as weather conditions, receiver sensitivity or the exact location of the receiver. Within this context, the 99% parameters provide a robust level of coverage and reception.

2.61 We welcome the views expressed in relation to the appropriate parameters which should be selected for predicting in-vehicle coverage. We will consider these arguments closely in determining our final report, alongside the further work we have undertaken on this matter (which is detailed in section 3).

Methods of increasing DAB coverage (questions 5 and 6)

Summary of consultation position

2.62 We noted in our consultation that a different DAB frequency block needs to be allocated to each adjacent local DAB multiplex to prevent co-channel inference (the interference between two different transmitter networks using the same DAB channel). With this in mind, we produced a proposal for how local DAB services might be re-planned so as to improve coverage.

2.63 In relation to this coverage re-plan, we identified two potential methods of further increasing coverage:

- We raised the possibility of merging of local multiplexes in some areas to create a larger area using a single frequency rather than smaller areas using two separate frequencies. We noted that this would relax the pressure on the re-use of frequencies. It would not mean merging services, merely carrying a larger number of local services over a greater area, but there would be commercial implications for stations (e.g. possibly increased transmission costs, and loss of local granularity for advertising sales).

- The re-plan attempted to minimise the need to change the frequency of existing DAB services, which in many cases would require the replacement of key items of transmission equipment. However, we highlighted that it may be that possible to consider further frequency changes to increase the level of coverage that may be achieved (although we noted that this is likely to be more expensive and require much more international re-negotiation).

Summary of consultation responses

2.64 Our consultation asked whether the principle of merging editorial areas should be explored as a way of improving coverage.

2.65 We received a mixture of responses in relation to this question. 21submissions supported the further exploration of this principle, although many noted that there may be both benefits and drawbacks with the option.10respondents argued against merging editorial areas.

2.66 Several respondents who agreed that the principle should be examined further were nevertheless cautious in their assessment of the extent to which it should be implemented. For instance, Atlantic FM suggested that mergers should only take place in areas where local identity and the needs of advertisers and listeners would be met by the move, and this view was also echoed by some individual respondents who believed that the 'localness' of an area should not be unduly diminished.

2.67 Bauer Media stated that the issue was more of a commercial than a technical one, believing that such moves should only be considered in circumstances where it is commercially viable, while Orion Media noted that there were both benefits and drawbacks which might stem from certain service providers merging stations as a result. Similarly, RadioCentre stated that on the face of it there were some potential benefits to merging, but stressed that individual cases should be driven by the desires of commercial operators.

2.68 There was some tentative support for the idea from individual respondents who had also expressed concerns over losing reception of nearby stations, in that larger editorial areas would enable them to continue to receive these stations.

2.69 Most individual respondents who disagreed did so on the basis that multiplex areas might become too big to constitute being 'local' any more.

2.70 Other arguments against the measure were also advanced. For instance, Arqiva stated that mergers might act as a possible temporary solution, but that they would be likely to offer commercial radio much less flexibility. Similarly, a confidential respondent stated that there must be a limit to the size of multiplex areas so as to provide for listeners and not to lose the opportunity to sell local advertising.

2.71 UKRD, responding on behalf of itself and 14 other radio groups, disagreed strongly with this suggestion, stating that that it would likely be too burdensome for ultra-local stations to bear the cost of this expansion, as well as noting that many of these operators would not wish to extend their coverage areas.

2.72 We also asked whether, above and beyond the frequency changes proposed in our consultation, further changes to frequency allocations should be explored, as a way of improving coverage.

2.73 There was substantial agreement with this proposal – 21 respondents agreed, and no respondent explicitly disagreed.

2.74 Several individuals, along with Arqiva, stressed the necessity for any frequency changes to be communicated appropriately to the listening public. One respondent highlighted the promotion of television switchover as a good example of this.

2.75 CEG stated that the principle of frequency changes should be explored if there were potential advantages to listeners.

2.76 RadioCentre was not opposed to this proposal, but stressed that any changes should be examined on a case-by-case basis and with full sight of what the funding arrangements would be. Similarly, Bauer Media focused closely on the associated costs, arguing that these should be centrally funded or the frequency changes commercially viable.

Ofcom's consideration of responses

2.77 We acknowledge the mixture of views we have received in relation to multiplex mergers. We agree with those respondents who suggested that the decision on this is essentially a commercial one for operators to take a view on, and that considerations as to the level of localness and benefits for listeners would be of paramount importance in evaluating any request for such a move.

2.78 We also note the arguments against mergers which were put forward, and believe that these arguments would be important considerations in assessing any proposed mergers. As we are required by legislation to consult on any requests we receive from operator to merge multiplexes, the views of listeners, broadcasters and other interested parties would all be taken into account in making a decision.

2.79 Thus far we have had no requests from multiplex operators to merge areas.

2.80 We note the support for the exploration of further frequency changes as a way of improving coverage. Our ongoing planning work will continue to consider this option.

2.81 We agree with respondents who stated that appropriate communication with the public would be necessary for any frequency changes.

2.82 Decisions on the funding of any frequency changes fall outside of the scope of this consultation, and will instead be addressed through the ongoing discussions between industry and Government on a local DAB settlement.

Other issues

2.83 Several respondents raised additional issues relating to the DAB coverage planning. In the section below, we summarise the points made to us and respond accordingly.

2.84 Three respondents suggested that DAB+ could offer a way of increasing coverage, and urged Ofcom to include consideration of this in its planning approach. In a similar vein, CEG stated that, given that DAB+ has been mandated in receivers, the future development of coverage planning implied in the consultation CEG should include some statement regarding the assumptions currently being made about DAB+ services from a technical perspective and the expected impact on coverage.

2.85 DAB+ is a variant of DAB which uses a more advanced audio coding technology and provides greater capacity on digital multiplexes. We note that the capability to receive DAB+ has been included in the approved receiver specifications, and the coverage planning we are currently undertaking would be equally applicable for DAB+ services.

2.86 In a similar vein, one respondent suggested that the potential coverage of DRM should also be investigated as part of this process. However, there are no present plans to license DRM services, and therefore planning on this basis would not appear to be appropriate.

2.87 Two individuals stressed the importance of RDS data in the current FM network, and urged that appropriate consideration of this be included in DAB network planning. Ford Motor Companies also stressed that traffic information remained an important aspect to consider and solve.

2.88 In the technical planning of DAB the functionality of RDS was considered and the DAB system features most of the RDS functions. Within DAB it is possible to do Clock, TA/TP, service linking, programme type and the like, one thing which isn't directly covered is TMC, however, DAB supports the more capable TPEG system of traffic management information.

2.89 One individual called for a different approach to building DAB network - using low-powered transmitters to reduce adjacent channel interference, and ceasing to use higher powered ones (which it was suggested are difficult to receive nearby).

2.90 The existing DAB network has been the subject of significant infrastructure investment, and therefore from a cost-effective point of view, planning for DAB coverage using the existing network as a starting point makes sense. As we outlined in the consultation, by adding to this network it is possible to provide FM equivalent coverage.

2.91 Both the Christian Broadcasting Council (CBC) and the Isle of Man Communications Commission highlighted that no DAB coverage planning for the Isle of Man had been outlined in the consultation. CBC also noted that frequency allocations to the States of Jersey and the States of Guernsey & Dependencies were not mentioned.

2.92 Ofcom is responsible for allocating and administering the spectrum for the Crown Dependencies. Spectrum is available for DAB in these areas. In the case of the Isle of Man, it is for the IoM Communications Commission to plan for any services which wish to operate there. For Jersey and Guernsey, we would of course consider licensing local DAB services if there was sufficient commercial demand. However, we note that these services would serve only small populations, and therefore under the UK Government's proposed digital switchover approach might well be 'small-scale' services that will in the UK remain on FM

2.93 The CBC also noted that 5C was previously allocated for use to cover Jersey, and suggested that, as this frequency had been allocated to the UK, that there maybe

possible additional use of the 5C frequency in other parts of the country to help further improve DAB coverage. The submission drew parallels to the proposed use of the 5A frequency in the plan outlined in the consultation.

2.94 5C is not available for DAB on the UK mainland as it is allocated to Private Mobile Radio services.

2.95 Some respondents provided comments on the extent to which the Digital One network was proposing to roll-out (detailed in an annex to our consultation). In particular, one respondent noted that there were no indications for a roll-out to Northern Ireland, whilst another suggested that the proposed roll-out did not provide sufficient mobile coverage for services.

2.96 There is provision in the Digital Economy Act 2010 for Digital One to request an extension the licence into Northern Ireland, but as yet the operator has not applied for this. Such an application would be subject to consultation. We will continue to discuss with Digital One the options available for increasing coverage throughout the UK.

2.97 RadioCentre stated that further iterations of this plan would also require further technical work, in order to reflect the reality of the balance between multiplex capacity and service providers in some areas, in order to avoid multiplexes only being partially filled. The submission suggested that, to this end, it may also be worth considering the levels of error protection thresholds in place, and queried whether a change in these levels could lead to a lower number of transmitters being required in order to meet the coverage predictions (potentially reducing the overall costs of build out).

2.98 The CEG also mentioned error protection rates, although the submission argued for a reduction in UEP in order to free up more capacity and permit higher bit rates and therefore better audio quality for services. The CEG stated that an appropriate increase in field strength would be necessary to accommodate this.

2.99 We will consider appropriate error protection rates as we continue our planning work, taking note of the implications on both capacity and required field strength, as well as the consequences in terms of coverage.

2.100 The CEG raised a number of additional issues.CEG asserted that no consumer should have worse DAB reception than the FM service it replaces. They also noted that ITU-R BS.412 suggests significantly higher field strength requirements for FM in ‘urban’ and ‘large city’ environments. They went on to say that the assumed FM antenna gain in Annex F seemed low and observed that receiver sensitivity test results were mostly much better than this level of gain would produce. Additionally they noted that analysis of the FM link budget in Annex F was not as detailed as the DAB link budget in Annex L and lacked detail linking audio signal to noise and field strength.

2.101 Although it is highly desirable that no listeners should suffer any degradation in service it is not possible to ensure this in every case. Planners do strive to minimise any degradation but it is not possible to provide an absolute guarantee. Even if FM were to continue it would not be possible to ensure that every listener would continue to have exactly the same level of service, as any modifications to transmission arrangements and launches of new FM services can have adverse effects on reception for some listeners.

2.102 We note the comments on FM receiver performance. This is a complex area that is in part subjective however we agree with the conclusion in Annex F that the FM threshold is a good guide to the point at which FM becomes usable.

2.103 There were other more specific points raised. For instance, one individual respondent asserted that 97% of the population was 'assumed to be a satisfactory criterion for switchover' in our consultation, highlighting that 3% (1.8m people) would be left without service. The submission argued that the availability figure needed to be much higher.

2.104 The consultation does not suggest that 97% of the population should be a criterion for justifying switchover. Such decisions are for Government rather than Ofcom to take.

2.105 Moreover, the DRAP gives the Coverage and Spectrum Planning Group the specific task of 'developing a range of options to support an increase in existing DAB coverage, *with a specific view on matching current FM coverage*' [emphasis added]. FM coverage is not universal, and (depending on the approach to defining FM services, which was discussed in the consultation), 97% of the population may indeed represent equivalence with this coverage.

2.106 UKRD, responding on behalf of itself and 14 other radio groups, stated that the cost of different roll-out options should be included, as 'those extra costs will inevitably be levied upon commercial radio stations by the transmission provider'. The submission went on to suggest that the cost of improving DAB coverage (particularly in places like Cornwall) would be too great for many station owners.

2.107 We would note that the issue of cost is a matter for the Government Radio Policy Group, as set out in task 1.7 of the DRAP.

2.108 Three submissions made reference to the bit-rate used by many DAB services, arguing that it often resulted in a lower audio quality than that experienced on FM

2.109 The decision on what bit-rates services used is a commercial one for operators to take. Although Ofcom has a policy on the minimum bit-rates which should be utilised, it is not for us to determine or mandate above and beyond this.

2.110 We also received comments which were not directly relevant to this consultation.

2.111 Several respondents provided detailed comments on specific editorial areas – suggesting changes to boundaries and localities. We were explicit that our consultation was about the principles of DAB planning and not about the boundaries of editorial areas. Any changes to existing areas can only be made at the request of multiplex operators, and we must publicly consult on each one.

2.112 10 respondents provided comments on the wider question of digital switchover policy, many of which made suggestions as to the appropriate process, or argued against the switchover programme. These included the UKRD submission, which argued at length that there should be a public evaluation of the issue, stating overarching concerns that:

- an independent cost/benefit analysis is undertaken using empirical evidence and verified data concerning the total costs of DAB transmission (including the proposed build-out) versus the existing costs of analogue transmission

- owners of small and ultra-local commercial stations are engaged directly in the evaluation process, so that the particular disadvantages they face are understood and addressed in any future policy decisions about the existing analogue platforms, the DAB radio platform and the proposed digital radio switchover

- the listeners of small and ultra-local commercial stations are consulted as a separate sub-set of the total radio audience, so that their opinions are considered equally alongside users of national, regional and large local broadcasters.

2.113 As we highlighted in the consultation, we were not consulting on a regulatory decision by Ofcom, and that instead, we were consulting to give a wider public and stakeholder audience the opportunity to express any views on the issues in this document, before we submit a final report to Government.

2.114 We would note, however, that the DRAP includes an impact assessment, which will consider the costs and benefits of any intervention. We would also highlight that the DRAP provides two routes for stakeholders and consumers to participate in a public debate around DAB switchover more generally.

- The Stakeholder Group, chaired by the DCMS, is open to a wide range of industry and related stakeholders. The principle purpose of this Group will be to inform external stakeholders of progress against the Action Plan and gather views on emerging findings.

- The Consumer Expert Group, established to inform the Digital Television Switchover Programme – and including a wide range of consumer representatives including RNIB, British Wireless for the Blind Fund, the Voice of the Listener and Viewer and Citizens' Advice – has formally agreed to extend its role to consider the Digital Radio Switchover through a revision to its Terms of Reference.

Section 3

Further work

Work underway and emerging conclusions

3.1 The process of planning DAB build-out within our defined editorial areas identified a number of trade-offs between coverage achieved and other factors. We stated in the consultation that we aimed to conduct further research and planning so that these issues can be more fully explored in our final report to Government.

3.2 The Planning Working Group is continuing examine the implications for DAB coverage and the consumer experience of:

- Varying our technical assumptions, in particular whether road coverage needs to be planned for 99% of the time and for 99% of locations, other technical characteristics of the DAB broadcast signal, and the differences between FM and DAB as technologies (for example whether the way that FM reception deteriorates gradually as the listener moves out of a coverage area rather than more abruptly with DAB fully justifies setting the more robust percentage location and time availability targets for DAB compared with those for FM);

- The trade-off between adding more transmitters and the increase in self interference within the DAB network that brings;

- Changing local editorial areas, in particular by merging together some areas to make better use of frequencies; and

- Frequency changes further to those we have already proposed.

3.3 None of the evidence presented to us in response to the consultation suggests that the 'link budget' we produced(which takes an end-to-end approach to planning, taking into account every stage from the signal leaving the transmitter to the sound coming out of the radio speaker) needs to be revised. Consequently, our work has not focused on this aspect.

3.4 A key objective of all the further work we are undertaking is to better understand the consumer experience for listeners to both FM and DAB services.

3.5 In order to more robustly test our assumptions over both road coverage parameters and other characteristics of the DAB broadcast signal, we have undertaken significant in-car driving tests of DAB reception and signal strength. These tests have been both objective (i.e. using equipment to measure both the mean field strength and standard deviation at regular intervals) and subjective (i.e. noting whether the commercially available in-car radio had adequate reception at regular intervals).

3.6 Additional work has aimed to further test our planning assumptions for indoor reception. We have taken a series of subjective measurements (i.e. noting whether there is adequate reception) using calibrated DAB radios at a variety of homes.

3.7 The results of both of these tests will be compared against coverage prediction maps for the relevant area, and conclusions draw as to the appropriateness of our prediction parameters

3.8 Our initial findings from these tests are that DAB coverage may be more extensive than has previously been predicted. In particular, results indicate that the variability of signals is considerably lower than had been assumed. Initial indications are that this will enable us to improve the accuracy of predictions, and that the coverage estimated in our consultation may actually be greater than previously envisaged.

3.9 Our consultation made use of the previously unallocated frequency block, 5A for planning, proposing to make use of it in several areas where local DAB services have not yet launched (Suffolk, Oxfordshire and Derbyshire).

3.10 We noted that although it is internationally allocated to DAB use, non-broadcast services currently operate within 5A.Consequently, we have commissioned further work to assess the practical coexistence of DAB and other users in the frequency block.

3.11 We have also engaged in discussions with operators over the possibility of amending local editorial areas, merging some multiplexes and frequency changes further to those we have already proposed

Next steps

3.12 We will continue to refine our work, and include the full findings and our conclusions in our final report to Government in Q1 of 2012.