Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title: An Approach to DAB Coverage Planning

To (Ofcom contact): Peter Davies

Name of respondent: Roger Darlington

Representing (self or organisation/s): Consumer Expert Group

Address (if not received by email):

CONFIDENTIALITY

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

Nothing	I	Name/contact details/job title	
Whole response		Organisation	
Part of the response		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If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the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)

CEG response to Ofcom Consultation on FM/DAB coverage

1 Introduction and Summary:

The Consumer Expert Group [CEG], a contributor to the Digital Radio Action Plan [see Appendix 1], welcomes this report as a significant step on the way to preparing for a decision on Digital SwitchOver [DSO] for radio. CEG is appreciative of the amount of effort that has gone into it preparation. The interim status of the report is recognised and it is understood that further studies are needed to refine the findings.

1. Do you agree with our approach of matching DAB to FM within defined editorial areas?

The editorial coverage areas defined for these stations are part of their reasons to exist and that consequently transmission facilities that match the editorial area have been provided for these stations, this correspondence should remain in place after DSO.

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

Given the complexity of the technical issues involved, the identification of sensible and viable options that are available as a basis for matching DAB and FM coverage are welcome. CEG suggests that 54dBµV/M is the preferred FM signal strength for planning robust services; this would provide a better chance of achieving 48dBµV/M at marginal locations for most receivers when non-optimum antennas are used.

It is suggested that the FM 42dBµV/M contour is used for matching DAB service areas.

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?

CEG is in general agreement. The nature of digital methods of transmission demand a worst case assessment and consequential planning rules. Many listeners have had difficulties with DAB reception and have been alienated as a result. For improved take up of DAB better coverage reliability is required.

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?

The uncertainties that still remain in the understanding of the in vehicle reception conditions suggest that a conservative approach is valid for the time being. In dense urban areas the considerable additional field strength proposed [77dBµV/M instead of 58dBµV/M] will also go a long way towards compensating the mobile receiver for the extra losses in that environment.

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

See above [at 1] about the value of the existing editorial areas. The principle should be explored, if only for completeness of the study of options, if there are potential advantages to listeners.

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?

The principle should be explored, if only for completeness of the study of options, if there are potential advantages to listeners.

Consultation:

None of the above changes should be progressed without clear proposals, supported with evidence of advantages and disadvantages, that are part of a well publicised public consultation in all the areas effected.

CEG response to Ofcom Consultation on FM/DAB coverage

2 Response to Questions:

1. Do you agree with our approach of matching DAB to FM within defined editorial areas?

1.1 The consultation describes the methods to be used in arriving at workable rules that will allow DSO to be planned. Given that the current FM and AM stations have been established after much public consultation and that many have achieved a strong degree of listener loyalty it is important that the station identity built over a long period should not be changed adversely in any way. Therefore, insofar as the editorial coverage areas defined for these stations are part of their reasons to exist and that consequently transmission facilities that match the editorial area have been provided for them, this correspondence should remain in place after DSO.

1.2 Some FM stations are already on DAB with, presumably, appropriately matched coverage so there needs to be some clarity about which stations would be placed in this category. It is presumed that this affects only regional or local stations and will affect each one uniquely. The examples given in the consultation are helpful in understanding the issues and their consequences.

1.3 However, the move to DAB will mean unavoidable changes to the editorial reach of the current DAB services as well as those of the FM/AM stations transferred so that all the editorial areas will have to be re-defined. The new DAB reach will be designed to include as a minimum the reach of the largest FM station transferred. If the reach of the FM stations in a locality do not fully overlap then some composite reach will be required that may involve neighbouring DAB services.

1.4 If the result of DSO is to leave the current reach intact but also to extend it in some cases then there is no harm in doing so and indeed some benefit to consumers and broadcasters may accrue in some areas.

1.5 There needs to be clarity about the impact on existing multiplexes of the possible bundling of a number of additional FM services during their re-planning. When this bundling is done additional capacity is implied to accommodate the transferred stations that are not already included in DAB multiplexes. Whether this will be available without reducing the bit rates of existing DAB services is matter of concern.

1.6 One option is to change the UEP mode of transmissions. Changing from UEP3 to UEP4 provides 12-20% more capacity than presently but this leads to a requirement for 1.6dB additional field strength [Annexe 4 Table 6]. Any change in transmission mode requires all receivers to be fully supportive of the DAB specification.

2. Do you agree with our approach to determining 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?

2.1 <u>Background:</u>

2.1.1 Given the complexity of the technical issues involved, the identification of sensible and viable options that are available as a basis for matching DAB and FM coverage are welcome.

2.1.2 As part of this process it is wise to re-consider the basis for FM planning rules in the light of changes in radio technology and in listeners' use of their radio receivers. By ensuring that the process of FM planning is up to date and corresponds with actual current listening environments there is more certainty that the comparison with DAB will be the best like for like that is possible given the significant differences in the technologies' behaviour in the field.

2.1.3 Categorising reception quality according to non-technical descriptions will be more readily understood by consumers and so the categories suggested are welcomed. They distinguish between a basic "usable" domestic service, on the limits of the technical planning rules and would be considered

marginal when defining the service area boundaries, and a better service, "robust", that provides a meaningful margin above the basic limit. A separate category for mobile receivers is welcomed.

2.2 Consumer perspective on reception:

2.2.1 It is well known that the majority of FM radio listening takes place using portable receivers in homes, vehicles and more latterly on personal portable devices. These receivers typically use poor antennas, which, along with the listening environment, often precludes stereo listening, and many of them, particularly the lower priced ones, do not support stereo anyway. The remedy for high quality listening with FM is to install an outdoor antenna of known performance that will serve to provide a well designed HiFi FM receiver with adequate signal. In theory, where it is found inadequate, the same remedy applies to DAB reception.

2.2.2 The listener's perception of reception quality in either FM or DAB is based on three components: (a) radio signal field strength, (b) inherent audio Quality of Sound [QoS] embedded in the transmission and (c) the performance of the receiver in terms of both sensitivity and audio quality. There are significant differences between the first two of these elements in FM and DAB. In FM there is, in theory, a direct and near proportional link between them but in DAB there is none once signal reception is adequately robust. The question is: what field strength is "adequate" for DAB services? No consumer should have worse reception with DAB than the FM service it replaces.

2.3 Antenna Performance:

2.3.1 Perceived FM reception quality is not just a matter of threshold field strength. In practice consumers' experience of FM reception is also limited by the receivers in use and these have been shown in the tests reported in Annexe F to be variable [see Figures 6.3 and 6.4]. The performance of portable receivers is crucially dependent on their antennas. The link budget for a domestic FM receiver [Annexe F section 5.3] assumes an antenna that is very poor [-23dBd] compared to that in a car [-10dBd]. The discrepancy seems large. This poor performance is recognised in section 7.1 but, for practical reasons, caution is advised in dismissing it. The DAB link budget for domestic receivers also assumes an antenna of -10dBd so, even after allowing for the difference in wavelength, this is also a discrepancy in assumption.

2.3.2 However, judging from receiver sensitivity measurements [Annexe F, see below], there is some justification for assuming a low antenna gain although the results are variable and mostly much better than –23dBd would produce. The poorest results could also be in some part attributable to the noise figure of the receiver electronics, assumed to be 10dB in the link budget,

2.4 Assessing FM Coverage:

2.4.1 A minimum FM signal strength at the edge of a service area is required that will at least support the needs of the majority of listeners in non ideal listening environments [ie cars, noisy kitchens, workplaces etc] using currently available portable, mostly mono, receivers [eg see Annexe F Figures 6.2-6.4]. Field strengths are quoted as median values at 10 metres height for 50% of locations and are subject to several dB of variation [the standard deviation] that is comparable to the difference [6dB] between the grades of reception suggested. In other words a planned service at 48dBµV/M could provide several dB more in some locations and less in others in which case service falls near the FM threshold of some receivers. Receiving stereo in these conditions is virtually impossible unless the portable receiver is located very favourably and perhaps equipped with a separate antenna. Tolerable stereo will require an external antenna that will capture an adequate signal from field strengths well below 48dBµV/M but audiophile stereo will require this level to be at least maintained.

2.4.2 The consultation appears to set a practical FM threshold 10 metre field strength at around 48dBµV/M for indoor domestic mono receivers which means about 30dBµV/M at the receiver antenna. . Whilst 48dBµV/M is a useful limit at the edge of coverage it would be exceeded inside the service area where most listeners would be located. However, section 5.3 of Annexe F suggests that 55dBµV/M [for 70% locations, 51dBµV/M for 50%] is required to enable reception "just above threshold". Sections 7.1 and 7.3 also suggest that 55dBµV/M may be appropriate given uncertainties in building loss.

2.4.3 Other references from ITU-R documents cited in Annexe F give variable values of field strength for good FM performance, some of them with imprecise conditions. It is also noted for example that

ITU-R BS.412 Table 1 suggests significantly higher field strength values for "urban" [60dBμV/M mono] and "large city" [70dBμV/M mono] areas to compensate for additional industrial and domestic electrical noise. Whilst the consultation does take into account these different environments for DAB it seems not to do so explicitly for FM although it is mentioned in Annexe F [Figures 4.3 and 4.4].

2.5 Receiver Tests:

2.5.1 The tests reported in Annexe F are not as extensive as those for DAB in Annexe J; for example, they do not explore the gamut of all FM channels in Band II. However they do provide some very useful information.

2.5.2 Some car receivers will not provide any improvement in sound quality [expressed as audio signal to noise ratio] even if field strength is increased above FM threshold [Annexe F Figure 6.2] and so there appears to be no reason to provide signal strengths higher than the threshold value. Given this receiver behaviour 42dBμV/M seems adequate for mono reception in cars but about 20dB more would be required to enable stereo.

2.5.3 However, assuming everyone has a receiver whose audio performance is constrained is not a basis for planning a high quality domestic service that permits those who wish to receive better quality sound to do so. Neither is it appropriate that such listeners should be denied the benefit of a better receiver [ie one capable of benefiting from increased field strength] if they are located at the edge of service. Figure 6.3 of Annexe F shows that the best receiver operating with a good antenna requires 65dBμV/M to reach its asymptotic audio performance.

2.5.4 It is presumed that all these tests were done in mono mode; in practice operational FM stations transmit in stereo, including RDS, with a mono audio signal being extracted by the receiver. These field strengths were measured in test conditions where no building or height losses or location and time allowances are included. These factors require the addition of about 18dB [15dB less for a car] to the measured values to give the strength at 10 metres.

2.6 Matching FM and DAB Coverage:

2.6.1 Matching FM coverage with DAB is recognised as a difficult exercise. A good standard of audio quality is provided in DAB by setting appropriate bit rates for each service in each multiplex. It is arguable therefore that the matching of service quality as perceived by a listener has less to do with audio quality and far more to do with being able to receive a reliable and consistent signal. Although audiophiles have complained about basic audio quality in DAB, one of the most common complaints among ordinary listeners about DAB is the unreliable nature of reception or the lack of coverage in some regions of the UK and even some areas of London need attention. It is encouraging that the BBC's ongoing transmitter building project is helping to improve this situation by extending the reach of the network and is planned to cover the UK to a similar extent to FM by the end of 2011. The commercial stations have difficulties in matching this build programme and this is of some concern.

2.6.2 The majority of FM and DAB receivers do not have the facility to attach an external antenna which means that consumers in difficult locations have no clear means of improving reception. This is a possible failing in the Minimum Receiver Specification produced by TEG. Such consumers will need help in selecting a receiver that is known to have good sensitivity performance. It follows then that improved levels of signal strength is the only remedy available to most consumers who may need to secure better coverage. It follows also that only the most robust service specification will provide satisfactory coverage in almost all difficult areas although this may present economic or technical problems. There is a trade off to be struck among the design parameters that would distribute the service somewhat less reliably but with reduced cost. Given the lack of any information in the consultation concerning the economics of such a trade off it is not easy to arrive at an obvious conclusion but it is accepted that this work is ongoing and will be reported in due course.

2.7 Matching FM and DAB Field Strength Values:

2.7.1 The choice of a suitable FM field strength for DAB to match is determined by matching their service areas as defined by what practical consumer equipment permits. A field strength of 42dBμV/M allows all but 4 out of 10 receivers tested to achieve their FM thresholds with fully deployed antennas but with potential to do much better. Therefore the majority of receivers are able to function at this

strength and so it can be taken to define the edge of a workable service area. It is therefore arguable that this is the service area that should be matched by DAB where a similar majority of DAB receivers are also on the point of failure which will be more abrupt than FM.

2.7.2 A field strength of 48dBμV/M allows none of the 4 poorest FM receivers to reach threshold with non-optimum antennas but those that do function do so with some margin above threshold giving more reliable reception and better sound quality. Matching DAB to this service area will leave many FM receivers still functioning well when DAB has failed and so is not desirable.

2.7.3 The 4 poorly performing receivers [E, G, I and J] seem to be modern small battery portables or 1980/90s vintage receivers where RF performance may be compromised due to age or cost. Extrapolating these results over the whole population and assuming that all receivers are distributed equally implies that 48dBμV/M will only provide 60% cover at service boundaries. These field strengths are subject to variation of several dB so that there is a non-trivial probability that some locations will achieve less than 48dBμV/M.

2.7.4 Even 54dBμV/M is barely enough for 3 receivers [E, G and J] to achieve threshold given location variation. These will not perform well at the service boundary and can only be used well inside it or with a much better antenna. Assuming these are a small proportion of active receivers gives some comfort that consumer experience of them will not be seriously compromised. It is difficult to justify the cost of additional field strength [about another 6dB] to allow a few poorly performing portable receivers to function at the service area boundary.

2.7.5 On the basis of serving as many receivers as possible 54dBμV/M would be the preferred signal strength for defining FM service areas. This would be more robust, providing a better chance of achieving 48dBμV/M at marginal locations [ie an improved location allowance] and allowing more receivers to achieve their potential when operated with non-optimum antennas [see Annexe F Figures 6.3 and 6.4].

2.7.6 Matching the DAB service area to 54dBμV/M will leave almost all FM receivers still functioning outside that area, many of them very well, and so matching this service area is not appropriate for DAB.

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?

3.1 CEG is in general agreement. The nature of digital methods of transmission demand a worst case assessment and consequential planning rules. Experience with DAB has emphasised that many listeners have had difficulties with DAB reception and have been alienated as a result. This is due in part to insufficient coverage but also to indifferent receiver performance. For improved take up of DAB better coverage reliability and better receiver consistency is required. Whether the proposed choice of parameters is correct or not is to some extent a matter of judgement but it is notable that in Clause 8.6 of the consultation OfCom have expressed confidence in the set of parameters described.

3.2 Sensitivity tests [Annexe J] have shown that some current DAB receivers are capable of meeting the value assumed in this consultation [Annexe I Table 4, 34.4dBμV/M for conditions relevant to these tests] however their sensitivities vary [eg with channel number and whether operated on battery or mains]. A considerable number of receivers tested fail to meet 34.4dBμV/M by a significant margin and so will not function well at service area boundaries. As with the FM field strengths [see 2 above] allowing more practical receivers to reach their potential at the service area edge would be in consumers' interests. This would require an increased field strength, or strict adherence to a mandated minimum receiver sensitivity specification involving an improved antenna. Many DAB receivers are already in use and so a mandated specification will not help but the proposed increases in field strength compared to existing planning will. CEG is concerned to ensure that this information is available to consumers in a readily understandable form so that they can make reliable purchasing decisions.

3.3 It is notable that Annexes F [FM] and I [DAB] differ in the extent of their detailed analysis of link budgets. Annexe F covers the extensive literature well but sections 5.1-5.3 and its own Annexe B [admitted to be "tentative" and lacking any consideration of interference] do not provide as complete and intelligible a breakdown as eg Table 9 of Annexe I. The lack of sufficient detail in the calculations

that link audio signal to noise and field strength in sections 5.1-5.3 makes it difficult to appreciate fully sound quality in FM.

3.4 However the reporting of actual performance of some measured receivers, including their antennas, in Annexe F section 6 [FM] and in Annexe J [DAB] is helpful and is welcomed. It is noted that the selectivity of currently available receivers seems adequate and consistent with planning rules.

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?

4.1 The uncertainties that still remain in the understanding of the in vehicle reception conditions suggest that a conservative approach is valid for the time being. The link budget that lists the elements that affect field strength requirements currently assumes the most practical and conservative parameter values and this should remain the case until better evidence has been assembled that may allow some relaxation. A relaxation of these criteria [Location Allowance, LA, and Time allowance, TA] might improve the apparent overall mobile coverage percentages at the expense of reducing its reliability in certain locations inside the nominal coverage area and at certain times of the year.

4.2 Currently the nominal DAB field strength for vehicles is much less demanding than those planned for domestic receivers largely due to the absence of a building penetration allowance for vehicles and to the assumption of a better antenna. These two classes of receivers will operate for much of the time in the same transmission service areas and so it may be assumed that the difference will be to the advantage of reception in vehicles that would require less field strength. When the vehicle operates in open country the assumption of relaxed values of field strength, LA and TA may be sufficient because of the vehicle's mobility. In dense urban areas the considerable additional field strength proposed [77dBμV instead of 58dBμV] will also go a long way towards compensating the mobile receiver for the extra losses in that environment.

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

5.1 See remarks above [at 1] about the value of the existing editorial areas. The principle should be explored, if only for completeness of the study of options, if there are potential advantages to listeners. They should not be changed without clear proposals, supported with evidence of advantages and disadvantages, that are part of an open consultation with affected listeners and broadcasters.

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?

6.1 The principle should be explored, if only for completeness of the study of options, if there are potential advantages to listeners. They should not be changed without clear proposals, supported with evidence of advantages and disadvantages, that are part of an open consultation with affected listeners and broadcasters.

7 Additional Issues: DAB/FM sound quality and the Impact of DAB+:

7.1 DAB does not make any distinction between the QoS of services within each multiplex other than via the allocated bit rates and so, once adequate signal strength is available to a receiver, noise free stereo is available at no additional signal strength penalty over a lower quality mono speech service. It has to be said that many audiophiles are highly critical of DAB audio quality, even if the signal strength is adequate for receivers to function well, and do not consider it to be the equal of FM. The main focus of objection is the lower than adequate bit rate allocated to services that depend more than most on sound quality eg music stations such as Radio 3 and Classic FM. Part of this is due to the age of the compression algorithm used [MPEG 1 Layer 2] which is now well over 20 years old and requires more bit rate [about twice] than more recent and better algorithms such as MPEG4 AAC+ [ie DAB+]. It is also due in part to the number of services that are placed in the limited capacity of the multiplexes caused by the demand among broadcasters for an ability to offer a wide choice of services.

7.2 It is unlikely that the introduction of DAB+, with its reduced bit rate demand, would be used to improve audio quality; it is far more likely to be used to provide room for more services and/or reduce the amount of spectrum used by the existing services. In any transition scenario from DAB to DAB+ capacity will be needed to accommodate new DAB+ services and this must come either from efficiencies in the use of existing allocations, reduced bit rates for existing services or by the supply of additional spectrum. Over a suitable, but necessarily long, period of time DAB could be phased out thus releasing capacity and/or spectrum.

7.3 It is noted that the planning process does not include DAB+ for the good reason that there is as yet no transition strategy for it. When it is introduced networks may need to be replanned and this may have an impact on reception and hence on consumers. Having decided to mandate DAB+ in receivers the coverage should not be any less than that for DAB. In the future development of coverage planning implied in the consultation CEG will be keen to see some statement regarding the assumptions currently being made about DAB+ services from a technical perspective and the expected impact on coverage.

Appendix 1: The Consumer Expert Group [CEG]:

Purpose:

The Digital Television Consumer Expert Group [CEG] was convened by the Government in June 2003 to give Ministers advice on the issues for consumers as the UK switches to digital television. They have since extended their remit to include digital radio and use of the internet.

The following terms of reference have been agreed between CEG members, the Department for Culture Media and Sport and the Department for Business, Innovation and Skills.

Objectives:

- To advise Government on:
  - the issues arising for consumers of the implementation of the Digital Radio Upgrade programme;
  - the ways of communicating the principles and impact of the Digital Radio Upgrade, including the timetable, to consumers
- To write any reports that are deemed necessary to fulfil this remit.
- Government will give due consideration to and respond to the reports and other advice received from the CEG.

Membership:

The CEG includes representatives from Royal National Institute for Blind People, Age UK, Rural Community Councils, British Wireless for the Blind Fund, Voice of the Listener and Viewer, Sense, WaveLength, Royal National Institute for Deaf People, TAG, Citizens' Advice, Which? and Consumer Focus.

Mode of Operation:

1. The CEG meets quarterly.

2. The secretariat is provided by DCMS.