



Digital Dividend Review

British Entertainment Industry Radio Group (BEIRG)

Submission to Ofcom on the future of channel 69¹

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¹ This document has been written and approved by the BEIRG Steering Committee in conjunction with Ranelagh International (BEIRG's political consultants). It has also been sent to the BEIRG membership as well as other interested parties in a consultation phase. Every response from those consulted strongly supported the document.

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Summary

In the original DDR consultation, Ofcom proposed to deregulate channel 69 (i.e. allowing use of PMSE – Programme Making and Special Events - equipment on a licence-exempt basis) and to sell off all of the digital interleaved spectrum.

Recognising that such proposals, if implemented, would lead to market failure for the PMSE industry, BEIRG has argued strongly over the past two years that the digital interleaved spectrum should be reserved for PMSE and that channel 69 should continue to be available to the PMSE sector on a licensed basis.

Recognising the threat to the PMSE sector, Ofcom later decided to award channel 69 and most of the digital interleaved spectrum to a band manager with obligations to PMSE. This was a welcome decision.

In respect of channel 69, Ofcom stated the following in the DDR statement of 13th December 2007: *'In relation to channel 69, this is heavily used by PMSE users because its availability across the UK allows travelling productions to use the same equipment and the same frequency plan at all venues. We also recognise the importance that PMSE users attach to the higher quality product that can be provided through licensing. We have decided that use of channel 69 should continue on a licensed basis. We will include channel 69 with the rights to be awarded to the band manager.'*²

Following the DDR statement, we reasonably believed that, in the context of the band manager award, channel 69 had been secured for the PMSE sector. However, due to developments at a European level that were out of our control, the future use of channel 69 by the PMSE community has been cast into serious doubt. Therefore, there has been considerable debate on what the best way forward for the PMSE community should be. At the World Radiocommunication Conference in 2007, channel 69 was included in the allocation for Europe-wide mobile use. The European Commission has also mandated CEPT to develop a plan for a pan-European band for mobile use that includes channel 69. Following this, the French Government has decided to award the 790-862 MHz band for mobile use; while the decision is not mandatory, other Governments are now under immense pressure to follow suit.

For obvious reasons, the plans for a Europe-wide harmonised band for mobile have dramatically increased what the mobile companies are prepared to pay for channels 61-69. It is crucial here to highlight the difference in the value of channels 61-69 as opposed to 63-68; it has been indicated that the value of the upper cleared spectrum increases by at least a factor of 10 if channels 61, 62 and 69 are included.

The dramatic increase in the value of channel 69 has implications for the PMSE sector. Ofcom have stated that the band manager will be charged to use the spectrum it is awarded and that

² <http://www.ofcom.org.uk/consult/condocs/ddr/statement/statement.pdf> section 7.82

these charges will reach the full market value over time. The full market value of channel 69 is now likely to be over £100 million and potentially into billions of pounds. This is a sum that the PMSE sector could never afford to pay in licence fees. As the band manager would have no chance of being able to recoup what it would pay Ofcom for channel 69 by licensing it to PMSE, it would either have to licence it for other uses (and breach its obligations to PMSE), increase PMSE licence fees across the board (probably leading to prices that no PMSE users could afford to pay) or, most likely, return channel 69 to Ofcom. In short, if channel 69 is awarded to the band manager, the PMSE sector will be priced out of channel 69; a slow and painful death by AIP (Administered Incentive Pricing).

In view of the situation, it looks increasingly likely that, over time, the PMSE sector will be forced to migrate out of channel 69.

However, if the PMSE sector is to move out of channel 69, then every wireless device that operates in channel 69 should be replaced with a new one that operates in the alternative spectrum. Also, any replacement for channel 69 must replicate its current benefits and be better suited to the PMSE sector's long-term needs than channel 69 would be subsequent to the DDR auctions:

1. it must be available on a nationwide basis;
2. it must lie adjacent to the digital interleaved spectrum (channel 69 lies adjacent to the analogue but not digital interleaved);
3. it must lie in the UHF band;
4. available bandwidth must at least replicate that in channels 67-69, allow room for expansion and help with the spectrum scarcity issue; and
5. must have an affordable licence fee (have a relatively low opportunity cost).

1. **Introduction**

- 1.1. Back in December 2007, Ofcom told us in their DDR statement that channel 69 would be included in the package of spectrum to be awarded to the band manager with PMSE obligations. Ofcom's reason for this decision was that they recognised the importance that professional and community PMSE users attach to the high quality, interference-free spectrum that licensing produces in channel 69 and the unique role played by channel 69 as the only channel available UK-wide for PMSE use. While this is still Ofcom's official position, in June 2008 they stated in their consultation document on the detailed design of the Digital Dividend Review (DDR) cleared award that 'channel 69 in isolation is of limited value to PMSE users because touring companies, who generally use this spectrum, also require access to channels 67 and 68.' They also proposed to 'enter into discussions with PMSE stakeholders to identify whether there is alternative spectrum, comparable in quality and quantity that could be used in place of channel 69 that may offer a superior long-term solution for PMSE needs'³. They have since done so. On Wednesday 8th October Ofcom held a workshop under Chatham House rules entitled 'potential alternatives to the use of channel 69 for programme-making and special events'. The future of channel 69 is clearly not as certain as we once thought.

2. **European-wide band for two-way mobile**

- 2.1. The 790-862 MHz band (channels 61-69 inclusive) has been earmarked (by ITU⁴ and CEPT⁵) for non-mandatory harmonisation across Europe for mobile phone use, the benefits of which to the telecommunications companies are fairly obvious (e.g. economies of scale). This idea has been gathering momentum over the past few months (i.e. after Ofcom's December 2007 DDR statement). Indeed, the French Government has very recently signed up and others are expected to follow.

³ See <http://www.ofcom.org.uk/consult/condocs/clearedaward/condoc.pdf> Section 4.34

⁴ International Telecommunications Union

⁵ European Conference of Postal and Telecommunications Administrations

3. **The consequent increase in value of channel 69, opportunity cost and AIP charges**

- 3.1. The opportunity cost of any spectrum band is a monetary value that is imposed upon it. The value is based on the value that other users would derive from it if it were not awarded for a particular use, in this case PMSE.
- 3.2. 'Administered Incentive Pricing' or 'AIP' is what Ofcom call the annual licence fee that the band manager has to pay to use the spectrum it is awarded. It is called AIP because it is designed to achieve an end other than generating revenue; in this case, the band manager is charged at a certain level in order to 'incentivise' it to make efficient use of spectrum.
- 3.3. Ofcom have previously estimated the opportunity cost of awarding channel 69 to the band manager with PMSE obligations to be in the region of £2.8 million per annum. Opportunity costs, as a lower-end estimate of what other users would be prepared to pay for the spectrum if it was available, change over time.
- 3.4. As a result of the developments towards pan-European harmonisation of channels 61-69 for mobile use, the value of channels 61-69 (i.e. what the mobile companies would be prepared to pay for them) has dramatically increased.
- 3.5. In line with the spectrum liberalisation agenda, Ofcom have stated that AIP charges to the band manager for each individual band will be phased in over a period of time to 'full opportunity cost' for each band to be awarded. Although we question the imposition of AIP, Ofcom are unlikely to forsake this approach, which they believe 'maximises efficient use of spectrum'.
- 3.6. As the value of channel 69 has increased dramatically, so has the opportunity cost of awarding it to the band manager with PMSE obligations.
- 3.7. If channel 69 is awarded to the band manager with PMSE obligations, Ofcom will revise their opportunity cost estimate of this award based on the spectrum values generated by the DDR auctions (potentially those held abroad as well as those in the UK). Whilst we do not know what the new opportunity cost of channel 69 will be, we are certain that it will be much higher than the current £2.8 million p. a. estimate. Indeed, if included in the DDR auctions channel 69 could sell for billions of pounds.

4. **Implications of a higher opportunity cost for the band manager/PMSE sector**

- 4.1. Although we question the imposition of AIP to full opportunity cost, the AIP charges that the band manager will have to pay for use of channel 69 are likely to be phased-in over time to a level that reaches the opportunity cost of awarding channel 69 to the band manager, as revised following the DDR auctions.
- 4.2. The AIP charges that the band manager has to pay for use of channel 69 will be very high, likely to reach tens and potentially hundreds of millions of pounds over time.
- 4.3. If it is to be commercially viable, the band manager will somehow have to recoup the AIP charges it pays for the channel 69 licence. It is difficult to see how this will be possible for the following reasons:
 - 4.3.1. the price of a channel 69 licence would have to be increased to such a high level that PMSE users could not afford to pay;
 - 4.3.2. the price increase would discourage PMSE users from buying a channel 69 licence, which would diminish the band manager's customer and revenue base;
 - 4.3.3. much of channel 69 use is unlicensed; and

4.3.4. the band manager will have no legal powers of enforcement.

4.4. Channel 69 is likely to be a poisoned chalice for any commercial band manager if the band manager is required to licence channel 69 for PMSE use (as it would do as part of its obligation to meet reasonable PMSE demand). If the AIP charges that the band manager would have to pay for channel 69 are to be recouped through licensing of channel 69 to PMSE, then the licence fees that the band manager would have to charge PMSE would be far too high for PMSE to be able to pay. In other words, the band manager would be burdened with AIP charges for an asset that could not be recouped from PMSE, the users of that asset. This would lead to two possible scenarios:

4.4.1. the band manager would be forced to return channel 69 to Ofcom since AIP charges for channel 69 would render the venture commercially unviable if retained. This would leave the future of channel 69 uncertain (unlike the band manager, Ofcom would have no legal obligation to licence channel 69 for PMSE use);

4.4.2. in order to recoup AIP for channel 69, the deficit between channel 69 AIP levels and channel 69 licensing revenue would have to be made-up by increasing licence fees for all spectrum awarded to the band manager (i.e. all PMSE spectrum, thus affecting all PMSE users). The AIP charges for channel 69 are likely to be so high that, if this is the route chosen by the band manager, the resultant licence fees would be too high for many (and potentially all) PMSE users to be able to pay, potentially leading to PMSE market failure (PMSE meaning all PMSE users of spectrum to be awarded to the band manager). It is worth noting here the discrepancy between current JFMG licensing revenue and the potential AIP charges for channel 69. JFMG's revenue for all PMSE spectrum (i.e. for licensing of the 75 distinct bands between 47.55 MHz and 48.4 GHz) is currently in the region of £1.5 million p.a. At a very conservative estimate, the AIP charges for channel 69 only are likely to reach tens of millions p.a. over time. In these terms, the financial threat to the PMSE sector of awarding channel 69 to the band manager is clear.

5. **Conclusion and way forward**

5.1. To summarise, if channel 69 is awarded to the band manager with PMSE obligations, the PMSE sector will be forced from channel 69 in one way or another, either through excessive prices or the band manager being forced to return channel 69 to Ofcom, because the AIP licence fee attached to channel 69 will be far too high for the PMSE sector to be able to pay.

5.2. Rather than the PMSE sector suffering a slow and painful death by AIP, we reluctantly recognise that the PMSE sector has little alternative but to migrate from channel 69 over a period of time. However, we take the view that a suitable alternative to channel 69 must be identified and allocated to PMSE and that the migration to this alternative spectrum should be comprehensively funded by either the Government or the mobile phone companies. The cost to the Government/mobile phone companies of replacing every wireless microphone that currently operates in channel 69 would be a small fraction of the amount that will be paid by the mobile phone companies for channels 61-69 if included in the DDR auctions. It is crucial here to highlight the difference in value between channels 61-69 as opposed to 63-68; it has been indicated that the value of the upper cleared spectrum increases by at least a factor of 10 if channels 61, 62 and 69 are included.

6. **The necessary criteria for any replacement(s) for channel 69**

6.1. When considering possible replacements for channel 69, we must consider the benefits of channel 69 to the PMSE sector. These benefits must be at worst replicated by any replacement. Any replacement should also address the wider problems caused to the PMSE sector by the DDR, namely the reduction in overall UHF spectrum availability and increased fragmentation of the spectrum that will be available.

- 6.1.1. **UK-wide access:** channel 69 is the only UHF band available for wireless microphones and in-ear monitors at every venue across the UK. This is very important to PMSE users as it means that productions can move from location to location without equipment having to be swapped or replaced. Any replacement for channel 69 must be available for PMSE use on a nationwide basis.
- 6.1.2. **Proximity to interleaved spectrum and the importance of contiguous bands:** channel 69, of course, lies adjacent to channels 61 to 68, which are used heavily for wireless microphones and in-ear monitors and all of which are accessible in varying locations across the UK. Relative to other UHF channels used for analogue television broadcasting, the interleaved spectrum available for PMSE in channels 67 and 68 is greater. Indeed, the small amount of analogue television broadcasting in these bands means that they are almost as useful to the PMSE sector as contiguous cleared bands would be (i.e. those available on a UK-wide basis). Therefore, any replacement for channel 69 must replicate the proximity of channel 69 to other available UHF spectrum (i.e. directly adjacent to it), and those adjacent bands must be as or more available for PMSE use as channels 67 and 68 currently are. It is worth noting here that, in June 2008, Ofcom stated in their consultation document on the detailed design of the Digital Dividend Review (DDR) cleared award that channel 69 in isolation is of limited value to PMSE users because touring companies, who generally use this spectrum, also require access to channels 67 and 68. Also relevant here is the fact that, as channel 69 is currently heavily congested, users whose equipment operates in any of channels 61-68 as well as channel 69 often migrate into these less-congested areas of spectrum where available. As a consequence of the clearance and subsequent release of channels 61-68 for new uses, this (relatively ad hoc) migration will no longer be possible. Therefore, if channel 69 is awarded to the band manager it will become more congested and the risk of interference will be higher; this demonstrates why any possible replacement for channel 69 should include more than one 8 MHz band and lie adjacent to other spectrum that will be available for PMSE use. At the very least, the replacement spectrum should replicate the current spectrum availability in channels 67, 68 and 69.
- 6.1.3. **Interference from out-of-band (high power) users:** channel 69 currently lies adjacent to unlicensed low-power PMSE users in channel 70 and analogue television broadcasting and low-power PMSE users in channels 67 and 68. Channel 69 users suffer no interference problems from users in these adjacent bands. Therefore, any replacement for channel 69 must not suffer any interference problems from users in adjacent bands. If necessary, guard bands must be established adjacent to any replacement for channel 69 to prevent out-of-band interference from high-power users. As any guard bands clearly must not reduce the useable size of or impinge upon the PMSE-allocated bands; they must lie adjacent to the PMSE band rather than be included in the PMSE allocation (e.g. if 24MHz of cleared spectrum was awarded to the band manager with PMSE obligations but the threat of interference from high-power users in adjacent bands meant that guard bands were required, then these guard bands must be granted in addition to the 24MHz as opposed to parts of the allocated 24MHz constituting the guard bands). We are aware that Ofcom have already published a study on the potential for interference from mobile terminals in the DDR upper sub-band to PMSE equipment in channel 69, which suggests that no guard-band is necessary. We are concerned that Ofcom will seek to apply the same results to any new spectrum replacing channel 69 because the study was seriously flawed. It considers only the most basic case of a single user equipment (UE) interfering with a single radio microphone (RM) due to bandwidth limitations of both devices. It failed to consider intermodulation products (IP's) due to either (a) two or more UE's mixing together to generate IP's on multiple frequencies within the PMSE band, or (b) one or more UE's mixing with one or more RM's to generate IP's within the PMSE band. Intermodulation is a serious issue for users of radio mics because it is the ultimate governing factor that limits the density of RM use within a given frequency band. The presence of strong adjacent UE signals will greatly limit the

number of RM's that can be used within the band. When frequency assignments are made for RM's at any given location, the frequency of each individual RM is carefully calculated to avoid intermodulation interference. It is not possible to take account of UE frequencies in advance because they will not be known in advance and may change continually. In assessing the need for guard-bands, Ofcom must commission a full study taking proper account of intermodulation effects in the presence of multiple adjacent UE's and multiple RM's. This will involve practical tests as well as theoretical ones: BEIRG members would be glad to advise and assist with suitable equipment and locations.

- 6.1.4. Fragmentation of interleaved spectrum to be available for PMSE post-DSO/DDR awards:** as we have demonstrated in our responses to Ofcom's cleared and geographic interleaved award consultations, the spectrum to be available for PMSE that will interleave between DTT broadcasts will be much more fragmented than the spectrum that currently interleaves between analogue television broadcasts. Based on the white space maps that are currently available, BEIRG's models show that the increased fragmentation and reduction of available spectrum will result in an increase in equipment costs for touring theatre by a factor of at least 2. While Ofcom's welcome commitment to recast the white space maps based on the median DTT protection coverage option should help with the fragmentation issue, it will not result in the interleaved spectrum being as or less fragmented than it is now. Therefore, any replacement for channel 69 should help to solve the fragmentation problem. In order to do so, the replacement for channel 69 must lie in close proximity to interleaved spectrum that will be available for PMSE post-DSO include at least two 8 MHz bands available on a nationwide basis. In addition, as channel 69 is currently very spectrally congested, the replacement of it with at least three 8 MHz bands available UK-wide will allow for much-needed expansion. For example, cleared channels 38, 39 and 40 could offer a replacement for 67, 68 and 69.
- 6.1.5. Dependence on the UHF band at least into the medium term:** there are very few viable frequencies available for wireless microphones, IEM and talkback use. Wireless microphones and IEMs use 470 – 862 MHz almost exclusively due to the quality and quantity of spectrum available in this band along with use of this band on a long-term basis being secured by virtue of the coexistence with analogue television broadcasting as the primary user. Talkback uses 425.3125-469.8750 MHz almost exclusively for similar reasons (although talkback does not have the protection of the analogue television umbrella as interleaved spectrum users do). In general, the bands of low or no PMSE demand to be awarded to the band manager will either be too high or the bandwidth too narrow to be viable for wireless microphone or IEM use. Users of wireless microphones and IEMs depend almost exclusively on the UHF spectrum and will continue to do so at least into the medium term. Indeed, we understand that CSMG, a consultancy recently commissioned by Ofcom, came to a similar conclusion - that wireless microphone technology is unlikely to be able to operate in alternative spectrum to the UHF band, at least into the medium term. Indeed, Ofcom themselves have stated that 'these (high-demand) bands are often critical to PMSE users, not least as there are no identifiable alternatives to many of these bands in the short term to medium term'⁶. As the UHF band is a high-demand PMSE band, it can be reasonably inferred that Ofcom agree with both ourselves and CSMG that there are no viable alternatives to the UHF band for use of wireless microphone technology in the short to medium-term. Therefore, any replacement(s) for channel 69 must include spectrum in the UHF band.
- 6.1.6. Low opportunity cost:** for the reasons explained above, channel 69 has a very high opportunity cost and, if awarded to the band manager, this would be reflected in the AIP-based licence fee. Any replacement for channel 69 must have a low

⁶ <http://www.ofcom.org.uk/consult/condocs/bandmgr/condoc.pdf> A5.20

opportunity cost and hence low licence fee to be charged to the band manager (which would be affordable for PMSE users).

7. **In view of the criteria above, what would be the best replacement(s) for channel 69?**

- 7.1. Ofcom have put forward several options for a possible replacement for channel 69. There are problems with all of them, but one stands out as the best solution. We believe that channel 38 along with cleared channels 39 and 40 would offer the best replacement for channel 69. Alternatively, if channels 61 and 62 are cleared of DTT and DTT broadcasting has to spill over into channels 39 and 40, then channel 38 and the cleared channel 37, along with the interleaved spectrum in channels 39 and 40, would offer the best replacement for channel 69.
- 7.2. Before going into greater detail on our current view of the best potential replacement for channel 69, it is necessary to explain why each of the other options that Ofcom are looking at would not by themselves offer an adequate replacement for channel 69. It is crucial to note here that, while Ofcom have to consider all possible replacements for channel 69, they do recognise that some would not be viable or acceptable (based on what PMSE users need). They also seem to appreciate our arguments about what would offer the best replacement. The aim of this exercise is to explain why we believe our suggestion is the most suitable and why other potential alternatives are not.

7.2.1. **Interleaved spectrum:** by its very nature, the interleaved spectrum is not and will not be available on a UK-wide basis as channel 69 currently is. The fragmentation problem applies to the very interleaved spectrum that this option would involve. Moreover, the interleaved spectrum to be awarded to the band manager will be significantly smaller in terms of bandwidth than the spectrum that interleaves between existing analogue television broadcasts. In all respects, the interleaved spectrum would not offer an adequate replacement for channel 69. Indeed, as it is going to be awarded to the band manager with PMSE obligations anyway, it would not even constitute a replacement for channel 69.

7.2.2. **Channel 70:** as channel 70 is and will continue to be available for PMSE use on an unlicensed basis anyway, it would not constitute a replacement for channel 69. Also, the term channel 70 is in itself misleading as currently; only 2 MHz is available for PMSE use as opposed to 8 MHz in channel 69. As per the DDR regulatory statement of 13th December 2007, Ofcom recognises the importance that professional and community PMSE users attach to the high quality, interference-free spectrum that licensing produces in channel 69. If Ofcom evicted PMSE from channel 69 and did not offer any replacement other than encouraging increased use of channel 70 as an unlicensed band, Ofcom would clearly have dismissed their own arguments about the importance of a licensed nationwide band. Moreover, Ofcom themselves have stated that channel 69 in isolation is of limited value to PMSE users because touring companies, who generally use this spectrum, also require access to channels 67 and 68. This is why Ofcom claim that PMSE migration from channel 69 would be on the table irrespective of the plans for pan-European harmonisation for mobile. Post-DDR, channel 70 will be even more isolated from the interleaved spectrum than channel 69 will be. Again, if channel 70 was offered in isolation as a replacement for channel 69 then this would disregard Ofcom's own arguments. In addition, if channel 69 is included in the DDR auctions then channel 70 may not even be useable for low-power PMSE applications due to interference from high-power applications (i.e. mobile phone networks) deployed in the adjacent channel 69.

7.2.3. **A potential FDD duplex gap:** the mobile phone companies have suggested that if channels 61, 62 and 69 are included in the DDR cleared award and they buy channels 61-69 between them and deploy mobile networks in them, then for technical reasons a 8-12 MHz gap in the middle of this band (centred around channel 65) would be created. As they say that they cannot envisage this spectrum being useful to any

sector other than PMSE, they believe that it could offer an ideal long-term and pan-European replacement for channel 69 with a low opportunity cost and hence low-AIP charge attached to it. There are, however, several problems with this option and too many uncertainties involved:

- 7.2.3.1. The potential creation of the duplex gap depends on the mobile companies actually securing channels 61-69 through the DDR auction process. In a technologically and service-neutral mechanism for spectrum release, this is by no means certain. It is possible, though admittedly unlikely, that users other than mobile companies will buy the spectrum. If this happened then no duplex gap would be created.
- 7.2.3.2. Even if the mobile companies secured channels 61-69 through the DDR auction process, it is still not clear that the duplex gap would be created. Such an eventuality would presumably require considerable cooperation, coordination and agreement between the rival mobile companies over the need for and location of a duplex gap, and for the spectrum to be divided in a certain way. We are not confident of such an outcome.
- 7.2.3.3. Even if a duplex gap were created, it is not clear who would own it (whether a combination of the mobile companies or just one of them) and what the mechanism for licensing it would be.
- 7.2.3.4. If a “duplex gap” were created and it was licensable for PMSE use via the band manager, it is by no means certain that it would be useable for low-power PMSE applications. The RF noise floor in the “duplex gap” would most probably be elevated such that it may be too high to enable any low-power PMSE applications to be usefully or reliably deployed anywhere in it. Firstly there could be considerable interference due to spurious emissions from the high-power downlink transmitters which would form the infrastructure of any mobile networks deployed in the Channel 61 – 69 bands. The downlinks would most likely operate on the frequencies below the duplex gap. Any spurious emissions from the uplink transmissions of mobile devices operating above the duplex gap will only further add to the noise floor on an unpredictable and sporadic basis (bearing in mind that absolutely no interference can be tolerated for PMSE productions).
- 7.2.3.5. We are not aware of any testing that has been carried out to assess potential usability of a duplex gap for low-power PMSE applications. Therefore, any duplex gap could not constitute a replacement for channel 69 because the extent of its usability, if any, for PMSE applications will not be known for certain until it is too late (i.e. after the award of channel 69 and services have been deployed). It is likely by then that all the remaining UHF spectrum would have been allocated to other services and there would be no viable replacement for channel 69 for PMSE left available.
- 7.2.3.6. Even if a duplex gap were created and it was found to be useable for low-power PMSE applications, the long delay between the date of any announcement that PMSE use of channel 69 was to be discontinued and the date at which the duplex gap would become available for PMSE use would cause significant problems for the PMSE industry and particularly to those manufacturers and suppliers of equipment that operate in channel 69. As the future of channel 69 is currently uncertain, users are currently reluctant to invest in any new equipment that operates in that channel. Consequently, businesses that manufacture and supply channel 69 equipment are now experiencing a significant drop in sales, to the extent that a number of UK firms have had to lay off the majority of their staff and are on the brink of financial ruin. If it is decided that channel 69 will be included in the DDR auctions rather than awarded to the band manager, then from that point it is likely that little or no new equipment that

operates in channel 69 will be purchased. If no replacement for channel 69 (that satisfies all the criteria outlined in section 6 above) in which PMSE equipment can operate is available by the time it is decided (if it is decided) that channel 69 is to be included in the DDR auctions, then many UK businesses will face financial ruin. The duplex gap clearly could not be such a replacement since it would only be available for PMSE use after the service and technology-neutral DDR auctions have taken place.

7.2.3.7. To offset the problems associated with the delay between the potential decision to include channel 69 in the DDR auctions and availability of a potential duplex gap, it might be possible for Ofcom to award to the band manager 8-12 MHz of spectrum in the upper cleared band as centred around channel 65 prior to the DDR auctions and prior to any announcement about the future of channel 69. However, such a decision would still not ensure that this spectrum would be useable for PMSE applications once high-power networks are deployed in the adjacent bands. In addition, while 8-12 MHz centred around channel 65 would be closer to the interleaved spectrum than channel 69 (and therefore, in theory, slightly less 'isolated'), in practice it would not be sufficiently close to make any difference to the need for replacement PMSE equipment and it would not be as close to interleaved spectrum as any combination of channels 37, 38, 39 and 40 would be.

7.2.4. **870-876 MHz and 915-921 MHz:** these bands would be available on a nationwide basis but do not lie either in the 470-862 MHz band or in close proximity to the interleaved spectrum, which would be a preferred requisite for any direct replacement. These bands have a high opportunity cost, which would be reflected in the AIP charges that the band manager would have to pay for the licence and hence prices PMSE users would have to pay. In addition, these bands are unsuitable due to the close proximity of GSM cellular radio bands.

7.2.5. **1785-1805 MHz: a portion of** this band would not be available in Northern Ireland and hence not on a UK-wide basis. In terms of frequency, it lies a great distance away from the interleaved spectrum; any PMSE equipment manufactured to operate in this band would be restricted to it. We are not aware of any existing wireless microphone technology that is capable of operating in these bands. If this technology does exist, it is certainly unproven. Moreover, there are health and safety concerns about wireless microphone and IEM technology that operates at such a high frequency as 1.8 GHz because they have to do so at a comparatively high-power due to their propagation characteristics. If worn on the body or on the head, PMSE devices that operate at such a high power have the potential to cause harm to the individual. In light of the risk associated with these high-frequency, high-power devices, which is exacerbated by the need to wear them for up to 8 hours a day, many PMSE users could not use these devices without endangering their health or contravening UK Health and Safety legislation in so far as the requirement to ensure employee or self employed health, safety and welfare.

8. **BEIRG's current view of the best potential replacement for channel 69**

8.1. As stated in section 7.1 above, we believe that channel 38 along with cleared channels 39 and 40 would offer the best replacement for channel 69. Alternatively, if channels 61 and 62 are cleared of DTT and DTT broadcasting has to spill over into channels 39 and 40, then channel 38 and the cleared channel 37 along with the interleaved spectrum in channels 39 and 40 would offer the best replacement for channel 69. This is the case for the following reasons:

8.1.1. Channel 38 has a relatively low opportunity cost. In order to protect radioastronomy services that operate in channel 38 in neighbouring countries (e.g. the Netherlands), high-power networks cannot be deployed in this channel in the UK. If DTT services

are deployed in channels 39 and 40 then the resultant interleaved spectrum in these channels would have a low opportunity cost. Although channel 37 would have a higher opportunity cost than channel 38 due to the reduced constraints for deployment of high-power services, the mobile telecommunications companies have made it clear that they are not interested in the lower-cleared band as it is not available for mobile in other European countries. The service providers most interested in cleared channel 37 are those considering deployment of a 7th commercial television multiplex in the lower cleared band. However, if only one provider wants to deploy these services then, as more channels are acquired through the auction process (for instance channels 31-35), then additional channels would have a lower marginal value since the proportional increase in the network coverage (i.e. number of households/population size etc) is lower.

- 8.1.2. Channel 38 is currently used by high-end wireless microphones and , hence new technologies would not have to be developed (although the equipment designed for community and other lower-end use that currently operates in channel 69 does not exist for channel 38 and will therefore have to be developed and produced).
- 8.1.3. Once channel 38 is cleared of radioastronomy in the UK, it will be available on a UK-wide basis (as will channels 37, 39 and 40 once cleared of analogue television broadcasts). In addition, as radioastronomy services deployed in channel 38 in the UK are restricted to two geographic locations, it is already available for PMSE use on a near-nationwide basis.
- 8.1.4. Channels 38-40 lie in very close proximity to the interleaved spectrum in channels 41 upwards, hence if available to PMSE would help significantly with the fragmentation problem. If DTT services are deployed in channels 39 and 40 then channels 37 and 38 would lie adjacent to any new interleaved spectrum created in channels 39 and 40.
- 8.1.5. Channel 38 is available for PMSE use now; hence if it was awarded to the band manager rather than included in the DDR auctions it would offer an immediate long-term replacement for channel 69. This is very important as those companies who are suffering from the uncertain status of channel 69 would be able to offer their customers alternative equipment relatively quickly. Currently only high-end systems are built with the ability to access 38.
- 8.1.6. Channels 37-40 lie in the 470-862 MHz band, upon which the PMSE sector is and will continue to be dependent for use of wireless microphone technologies at least into the medium term. In addition, the time required to replace all equipment that currently operates in channel 69 with equipment that operates in channels 37-40 would be less than for the other alternatives suggested.
- 8.1.7. Cleared channels 38-40, if awarded to the band manager, would broadly replicate the availability of channels 67-69 for PMSE use. If DTT services are deployed in channels 39 and 40, then depending on the availability of the interleaved spectrum in these channels, channel 37 would most likely be required in addition to channel 38 to replicate the current availability of channels 67-69.

9. **Funding**

- 9.1. In order to facilitate the transition from channel 69 to the best combination of channels between 37 and 40, every wireless microphone that currently operates in channel 69 must be replaced. This must be paid for either by the Government, which stands to benefit from the dramatically increased auction proceeds, or by the mobile phone companies, who will benefit from channel 69 being included in the DDR auctions. The typical life-span of equipment that operates in channel 69 is 15 years. If a fund is not available to be distributed to all parties so that all of their redundant channel 69 equipment can be replaced, then the

financial consequences for those affected (many of whom are small businesses) will be devastating.