BEIRG
BRITISH ENTERTAINMENT INDUSTRY RADIO GROUP

## Ofcom Consultation

## British Entertainment Industry Radio Group (BEIRG)

# *Future use of the 700MHz band: Cost benefit analysis of changing its use to mobile services – Response*

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**Contact Details:**

**Jamie Slavin**

**Ranelagh International Ltd on behalf of the BEIRG Steering Committee**

**One Ranelagh Road**

**Westminster**

**London SW1V 3EX**

**Tel: 020 7828 1603**

**jamie.slavin@ranelagh-intl.com**


**British Entertainment Industry Radio Group**

The British Entertainment Industry Radio Group (BEIRG) is an independent, not-for-profit organisation that works for the benefit of all those who produce, distribute and ultimately consume content made using radio spectrum in the UK. Entities that depend on radio spectrum include TV, film, sport, theatre, churches, schools, live music, newsgathering, political and corporate events, and many others. BEIRG campaigns for the maintenance of 'Programme Making and Special Events' (PMSE) access to sufficient quantity of interference-free spectrum for use by wireless production tools such as wireless microphones and wireless in-ear monitor (IEM) systems.

As well as being vital in producing live content, wireless PMSE technologies play a key role in helping to improve security and safety levels within the entertainment industry and other sectors. Their benefits include improving the management of electrical safety, the reduction of noise levels, the development of safety in

communications and reducing trip hazards. Wireless equipment and the spectrum it operates in are now crucial to the British entertainment industry.

BEIRG is a member of the Association of Professional Wireless Production Technologies (APWPT)[1], which promotes on an international level the efficient and demand-driven provision and use of production frequencies for professional event productions, as well as safeguarding such production frequencies for the users on the long run.

# BEIRG Response

## Executive Summary

- BEIRG recognises and welcomes Ofcom's commitment to work with the PMSE sector to safeguard the cultural, social and economic benefits which PMSE provides, and are encouraged by the work that has already been undertaken to examine the requirements of the PMSE sector if the 700 MHz band were to be cleared.

- However, BEIRG disagrees with the proposal to allocate use of the 700 MHz band of radio spectrum to Mobile Network Operators (MNOs).

- MNOs already have access to enough spectrum to satisfy their demands. BEIRG believes that, if MNO's are permitted and encouraged to use their existing spectrum holdings more efficiently, capacity would be sufficient to meet current and future demand.

  According to Ofcom in 2011, some 6% of the UK still has zero usage of the 900MHz and 1.8GHz bands. A further 34% of the area of the UK has some unused spectrum in these bands. 24% of the UK has zero use of the 2.1GHz 3G band and 87% of the UK has some unused spectrum in the 2.1GHz band – ten years after this spectrum was released[2]. As for coverage and uptake of 4G services in the 800MHz band, BEIRG believes that it would be naïve to rely on statistics from MNOs which are based on '4G ready' contracts or handsets which are capable of using a 4G service regardless of whether they have 4G services enabled or are ever in an area with appropriate 4G coverage. Rather, Ofcom should examine closely the **actual** usage of 4G services by subscribers.

- In addition, BEIRG believes that other industries, including PMSE, are more critically dependent on the favourable properties of the 700 MHz band than MNOs, who can and do operate at much higher frequencies.

- Estimates for future mobile broadband demand are unreliable and appear to disregard future market forces and economic restraints. It is inadvisable that Ofcom has used these estimates to guide its policy.

- In many cases the traffic and spectrum projections do not clearly identify the use of Short Range Device bands to carry that traffic.

[1] http://www.apwpt.org/

[2] Professor Stephen Temple, *Anatomy of Global Mobile Technology Revolutions – The Essential Dialogue,* table taken from Ofcom Communications Infrastructure Report 2011, available at https://www.techuk.org/component/techuksecurity/security/download/1942?file=SPF_Cluster_2_-_5G_Spectrum_The_Essential_Dialogue_v2.pdf&Itemid=182&return=aHR0cHM6Ly93d3cudGVjaHVrLm9yZy9pbnNpZ2h0cy9tZWV0aW5nLW5vdGVzL2l0ZW0vMTk0Mi11ay1zcGVjdHJ1bS1wb2xpY3ktZm9ydW0tY2x1c3Rlci0y (accessed on 12 August 2014)

- BEIRG asks that Ofcom undertake a clearly independent analysis of projected mobile data demand in 2020 and beyond.

- Furthermore, BEIRG strongly suggests that Ofcom undertake an independent review of the efficiency with which MNOs utilise the spectrum to which they currently have access. Ofcom list several ways by which MNOs could increase their mobile data capacity. MNOs should be made to employ these options before, **not after**, they are allocated additional 700 MHz spectrum.

- The suggested benefits of 'harmonisation' of the 700MHz band are exaggerated. The need to coexist with 800MHz LTE means that the UK and Europe cannot simply adopt any of the existing 700MHz LTE band plans. Thus, the European band plan for 700MHz LTE will actually add further complexity to handsets rather than reducing it. Given that increasing complexity of handsets has already led to a steady decline in mobile handset radio performance, which in turn leads to an increase in the required number of base stations to maintain network coverage, coupled with higher handset power to maintain the link budget any addition of further complexity to mobile handsets (and / or other mobile network UEs such as dongles and tablet computers) will not promote spectral efficiency.

- The cellular communications industry is not the only industry that requires harmonisation. PMSE users also need international frequency harmonisation. Quite apart from the economies of scale which make a harmonised frequency band more attractive for manufacturers, the significance of which must not be ignored, many live music and theatre productions tour internationally. Many facilities suppliers such as Professional Audio equipment rental houses provide equipment and personnel to events in the Theatre, live Music and Corporate sectors on an international basis, not just in the UK.

- Given the potential for this process to cause the PMSE sector catastrophic damage, it is essential that mitigating actions are taken in good time. While recognising the efforts currently being made by Ofcom in this regard, BEIRG is concerned that an appropriate quantity and quality of spectrum has yet to be specified into which professional PMSE users can migrate if the repurposing of the 700 MHz band to mobile services goes ahead. Yet, a consultation is already under way on clearing part of the spectrum currently available to PSME users. Suitable alternative sources of spectrum must be allocated to PMSE users before any final decision is taken on whether the 700 MHz band will be cleared. BEIRG are deeply concerned that alternative bands have yet to be clearly specified.

- The alternative bands which are being examined have very different propagation qualities to those in which PMSE equipment currently operates. For example, the range of a typically used transmitter would halve when being operated at 1350MHz as opposed to 700 MHz. The consultation document does not acknowledge these differences, nor does the proposed compensation scheme include any of the costs of accounting for these changes.

- The compensation scheme does not offer a fair valuation of the costs of replacing PMSE equipment, as it does not appear to include the cost of uninstalling and disposing of redundant equipment, and designing and installing new systems. Furthermore, BEIRG believes that Ofcom has underestimated the mark up required to purchase more frequency agile equipment, and the lifespan of professional PMSE equipment.

- It is unfair to suggest – when Ofcom has yet to allocate an alternative band to which PMSE can be granted access and there is no clear understanding of the configuration of spectrum below 694 MHz post the clearance of the 700 MHz band – that no equipment purchased between now and 2022 will be covered by the compensation scheme without such clear guidance being available.

- The scale of retraining necessary within the PMSE sector, and therefore the financial costs of this process, has been vastly underestimated. However, Ofcom should not overemphasise the mitigating effect that

additional training will have for the PMSE sector. Furthermore, the consultation fails to acknowledge the costs of research and development incurred by manufacturers in order to design equipment to operate at higher frequencies.

- In the event that the 700 MHz band is cleared, full compensation should be provided for affected PMSE users, access to alternative spectrum should be granted to PMSE users **before** access to the 700 MHz band is withdrawn, and continue afterwards to allow a viable transition period for the PMSE sector (as was the case with the 800 MHz band clearance process) and Ofcom should commit to preserving for PMSE use the remaining UHF spectrum beyond 2030. There should be no further reduction in UHF spectrum availability for DTT/PMSE usage below 694 MHz.

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## Clearance of the 700 MHz band

BEIRG recognises that Ofcom have no choice but to plan and prepare for the UK's future spectrum 'landscape'. By its nature, this process involves uncertainties and attempts to make judgements regarding rapidly changing technology and usage patterns. BEIRG also recognises that there is a legitimate desire from Mobile Network Operators to create capacity for possible future demand for their services.

However, for the reasons explained throughout this response, BEIRG disagrees with the proposals to clear the 700 MHz band for mobile data use. BEIRG urges Ofcom to reconsider its apparently already taken decision and retain the band for use by PMSE users and Digital Terrestrial Television.

### Future, predicted mobile data usage and spectrum currently held by MNOs

BEIRG disputes the figures offered by the consultation document regarding future mobile data demand and believes that it would be unwise to base an entire strategy for the 700 MHz band on these figures. The European Broadcasting Union believes that current models offered by ITU-R SG 5D overestimate mobile traffic density in 2020 by a magnitude of two orders - a factor of one hundred[3]. If current projections used to justify the 700MHz band are closely examined could the same conclusions be drawn?

The website CBROnline recently reported that research from Goldman Sachs has suggested that WiFi will become the dominant wireless access technology for the Internet of Things (IoT). Goldman Sachs reported that 70% of respondents to a survey by VDC Research stated that WiFI would be the dominant technology[4]. CBROnline also reported, in May, comments from Neul that 4G technologies such as LTE will struggle to play a meaningful role in the IoT[5]. These assessments reveal the vast uncertainty surrounding predictions of future uses of technology such as mobile broadband.

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[3] European Broadcasting Union, Spectrum Factsheet, http://www3.ebu.ch/files/live/sites/ebu/files/Knowledge/Publication%20Library/Fact%20sheets/Fact%20sheet%20-%202014-07%20Spectrum.pdf, (accessed 23rd July 2014)

[4] CBROnline, "Wi-Fi, Not Cellular, To Lay The Foundation For The Internet Of Things", http://www.cbronline.com/news/mobile-and-tablets/wi-fi-not-cellular-to-lay-the-foundation-for-the-internet-of-things-4307312 (accessed 23rd July 2014)

[5] CBROnline, "Internet of Things can't be built on LTE", http://www.cbronline.com/news/internet-of-things-cant-be-built-on-lte-4263590 (accessed 23rd July 2014)

The predictions for data use on which Ofcom has based this consultation appear to be rooted in speculation. There does not appear to be a consideration of market forces or economic constraints. For example, will consumers actually be prepared to pay for so much data? BEIRG would also be keen for Ofcom to quantify what this explosion in data usage would actually translate into in terms of daily use as this may give some insight into how realistic these predictions are.

Ofcom itself acknowledges in this consultation document the "uncertainty over forecasts of demand"[6]. And yet a decision which will have a negative, potentially catastrophic, effect on one of the UK's most vital sectors, the Creative Industries, may be taken based on this "uncertainty". While some predications indicate that demand for mobile data will increase based on current usages, they do not reflect the consumer's willingness to pay for additional data. Nor do they recognise the fact that the content for which consumers need mobile data is created by PMSE users. Any damage to the PMSE sector will inevitably reduce the quantity and quality of the content consumed over mobile data, thus potentially reducing data demand itself.

Before any decision is made regarding the future use of the 700 MHz band, BEIRG urge Ofcom to carry out ***clearly independent*** analysis of future mobile data demand.

In addition, BEIRG asks that Ofcom carry out independent analysis of the efficiency with which MNOs use the spectrum to which they currently have access. BEIRG believe that if MNOs were made to use their current spectrum more efficiently there would be less, if not no, need to allocate them additional 700 MHz spectrum.

The past actions of extending mobile broadband spectrum access, without supporting or demanding the reuse of existing resources, have not encouraged sufficient efficiency amongst the mobile telephone industry. Whilst PMSE is an efficient user of spectrum, able to utilise interleaved spectrum and to operate alongside other users such as DTT, mobile telephone technology is, at present, not and is unable to coexist with other users.

Additional spectrum should only be allocated for use by MNOs once they have shown that they have made efficient use of their current spectrum and their need for additional spectrum has been confirmed by critical, independent analysis. Currently, BEIRG do not believe that MNOs have made a convincing case in this regard. Much more efficient and cost-effective use could be made of this spectrum, and it is therefore imperative that mobile telephone companies make the most of their large spectrum holdings, as meeting any likely future demand will be greatly dependent on this. Ofcom should model the outcome of a re-farming effort by the mobile companies and ensure they comply with this to ensure the greatest possible level of spectral efficiency, before going ahead with the hugely disruptive and damaging action of a 700 MHz clearance.

The increasing complexity of handsets has already led to a steady decline in mobile handset radio performance, which in turn leads to an increase in the required number of base stations to maintain network coverage[7]. The addition of further complexity to mobile handsets (and/or other mobile network user equipment such as dongles and tablet computers) will not promote spectral efficiency. BEIRG believes that MNOs should be encouraged to exclude poor performing handsets from their networks.

[6] Ofcom, Consultation on the Future Use of the 700 MHz Band, pg. 19

[7] Eurexcem Engineering, *Study for the European Commission – Enterprise and Industry Directorate General: Technical support relating to performance of antennas of mobile phones, Final Report*, 28 January 2014

In addition to the proposed use of the 700 MHz band by MNOs the exceptionally high levels of out of band energy for both 10MHz channels and even higher for > 10MHz channels will pollute the adjacent spectrum and the duplex gap for PMSE or DTV use. Is this efficient use of spectrum?

Ofcom list several ways by which MNOs could increase their mobile data capacity. MNOs should be required to employ these options before, **not after**, they are allocated additional 700 MHz spectrum. A mobile telephone industry that in general refuses, for example, to share network infrastructure resources such as masts, clearly has more interest in its market penetration than in the efficient use of spectrum.

Mobile users already offload onto Wi-Fi to make voice calls and to send and receive data in an already overloaded SRD Band. As a more efficient, reliable and better quality means of data transfer, this raises the question of how much more spectrum the mobile community actually needs in future. The future may see most consumers offloading services onto Wi-Fi, as a preference to mobile broadband, especially with increasing amounts of people working from home. Use of Wi-Fi could allow for a much larger capacity and faster throughput of data. This offloading of voice calls and data is not accurately reflected in predictions for future data use.

It should also be noted that mobile broadband is only one mechanism for data delivery; one which cannot deliver the benefits of a wired connection. Ofcom should encourage the use of wired Wi-Fi systems to facilitate data delivery wherever possible. While there is a difference in relative costs, the life of a wired network is 30-50 years, compared to 10-15 years for wireless. Spectral efficiency of networks should be Ofcom's primary focus, and a concentration now on Wi-Fi provision to provide data access would help to relieve a great burden on spectrum use, and allow PMSE to continue operating at its current level.

### Alternative bands available for mobile data

The consultation references the "particularly favourable qualities" of the 700 MHz band. But it is specifically these favourable qualities on which PMSE is **critically dependent**. PMSE users rely on having perfect audio quality. Any reduction in the audio quality of a live music, theatre or television event at its source is entirely unacceptable. If PMSE users lose access to the 700 MHz band, without alternative bands being identified and allocated, there will simply not be a sufficient quantity and quality of spectrum available in the future to continue to produce the world class shows, concerts and events which contribute billions of pounds per annum to UK plc.

In contrast, mobile data is not a service which is quality dependent. A lower level of quality is an accepted part of most people's mobile data service, and these services already operate at higher frequencies, such as 2.3 and 2.6 GHz, which do not have the favourable qualities of spectrum below 1 GHz. BEIRG believes that if MNOs, after taking the steps to improve spectral efficiency described in this response, still require additional spectrum, that spectrum should be allocated in higher frequencies, already identified as candidate bands by ITU, in which PMSE equipment would find it difficult, if not impossible, to operate in.

## Impact on PMSE users of a potential change

### Experiences of PMSE users following the clearance of the 800 MHz band

Following the clearance of the 800 MHz band, many PMSE users were encouraged to purchase replacement equipment in the 700 MHz band. They did so in good faith that this equipment would be a long-term investment. Decisions regarding equipment were not made on a whim but were considered and professional. Instead, these same users, who expected their investments to last for twenty years, now face eviction from the 700 MHz band and the prospect of having to replace equipment for a second time. The impact on the sector as a whole, and on individual businesses, cannot be overstated.

The industry had been racked with uncertainty for several years as discussions regarding the clearance of the 800 MHz band progressed. PMSE users hoped that that clearance would mark the end of this uncertainty and the creation of a stable environment in which they could work. Instead, almost immediately, discussions began about the clearance of the 700 MHz band. In effect, manufacturers, suppliers and users of PMSE equipment have not enjoyed the stability, on which any industry relies, for over a decade.

Instead, the PMSE industry in the UK has faced serious upheaval. The clearance of the 600 MHz (Channels 31-37, 550-606 MHz) and 800MHz bands has placed a serious financial burden on the industry. The threat of interference from unlicensed White Space Devices (which would compete with any future potential 'Cognitive systems for PMSE') and the proposed clearance of the 700MHz band are providing further concern for PMSE professionals and undermining investor confidence. At the same time, consumer demand for PMSE produced content is rising. BEIRG believes there will soon be insufficient clean spectrum available to operate necessary quantities of PMSE equipment for large-scale productions to be staged at prime venues across the UK.

**The requirements of the PMSE sector**

The economic and social importance of PMSE, and the creative industries which rely on it, is growing. In the UK the creative industries are currently responsible for 1.5 million jobs, and contribute nearly £72 billion annually to the UK economy. PMSE services contribute significantly to the economic, cultural and social wellbeing of the UK. For example, London theatres, which use PMSE equipment to produce much of their content, attracts visitors from all over Britain and tourists from across the world. The current annual turnover of London theatres is £618.5 million, which represents just over 22 million attendances annually[8]. Including downstream revenue such as merchandise, the estimated economic impact is £1.5 billion. Similar figures apply to theatres outside London. Similarly, music festivals and live music concerts also contribute a significant amount to the British economy.

Without sufficient access to spectrum, the PMSE sector's ability to produce content for consumers will be severely hindered. It is essential to recognise that any impingement on PMSE usage poses a serious threat to the revenue generation of this sector. Industry users will be directly affected and face a huge potential loss of earnings and consumer reputation. In any production **uninterrupted** audio is absolutely critical. Consequently, any interference experienced that causes a wireless audio failure has severe repercussions for both the production and the audience alike. Therefore new services need to recognise, respect and co-exist with PMSE users, as well as to make the most of the spectrum that they have, to ensure fair usage for all.

Unlike other technologies, wireless microphones do not have the capability to move to platforms other than radio spectrum. Whereas currently terrestrial television services may potentially be able to be broadcast online in the longer-term, PMSE equipment cannot function on any platform other than clean, interference-

[8] SOLT, *London Theatre Report*, pg.8, http://www.solt.co.uk/downloads/pdfs/pressroom/London%20Theatre%20Report%202014.pdf (accessed on 15th August 2014)

free spectrum. Currently there is only a limited pool of PMSE equipment that operates outside the UHF spectrum; the UHF bands offer the largest quantity of contiguous, good quality spectrum required for large professional events. This is not the case for other "usable" blocks of spectrum like 1.8GHz, 2.4GHz, or even 5GHz for which some manufacturers make a small amount of equipment. Furthermore, interference from TV in the UHF bands is predictable and can be accounted for, while in other parts of spectrum where radio mics can operate, PMSE users must share spectrum with license exempt devices and find that access can be much more unreliable and of a poorer quality.

While BEIRG recognises that mobile broadband may bring benefits to MNOs and consumers in the future, this should not be at cost to other industries reliant on spectrum, such as PMSE. The impact on these industries will outweigh those benefits to citizens and consumers. Demand for spectrum in the UK is extremely high, and growing. Upwards of 90,000 requests for PMSE spectrum access are made to the licensing band manager in the UK each year. Any changes to spectrum allocation which will affect the ability of these industries to operate risk diminishing their contribution to society, and reduce their capability to provide a range of benefits to consumers.

If PMSE users lose access to the 700 MHz band, without appropriate mitigation of the potential effects of this decision, the results for the sector could be catastrophic. Following the clearance of the 800 MHz band, engineers already struggle to plan large scale events such as major TV shows or festivals. An additional loss of a minimum of one third of the spectrum that is currently available in UHF bands IV and V would make many events impossible, as acknowledged by this consultation. Furthermore, the practical loss of spectrum could be far greater. According to Figure 16 of the Consultation's Annex 11, the practical reduction in spectrum available in some prime locations to PMSE users could be as high as 75%.

Uncertainty over the re-planning of DTT transmissions in the 600 MHz band is another destabilising factor. If Ofcom have gained a sufficient understanding of how this process may develop in order to make the decisions contained within this consultation, BEIRG requests that Ofcom shares this knowledge. Crucially, the likely configuration of DTT transmissions will have a significant impact on the quantity of spectrum that PMSE users will require in alternative bands.

BEIRG are baffled by the assertion in paragraph 1.10 of the consultation that Ofcom "do not believe that the proposed change would materially reduce white space availability overall" and request that Ofcom explain how it has reached this conclusion.

Allowing relatively high-powered telecommunications services to operate in the 700 MHz band along with the 800 MHz band may present interference issues to PMSE users operating in nearby channels in the 600MHz band. This will further reduce available spectrum, and have an effect on the benefits that industries, such as PMSE, can bring to both citizens and the economy. Furthermore, in the event of a clearance of the 700 MHz band, the subsequent re-planning of DTT in 600 MHz would lead to a reduction of available channels, and the availability of less and less spectrum for PMSE as DTT is compressed into a smaller quantity of spectrum. This will impact on the quality of available spectrum for PMSE, which will suffer unwanted interference and will lead to limitations on the shows and events that can be staged. All this before a period of simulcast is considered should DTT move from the DVB platform to the more efficient DVB-T2 standard. Cancellations and compromised production values will become more common if PMSE access to spectrum is further inhibited.

## Alternative spectrum for PMSE users

For the reasons outlined in this consultation, it is absolutely imperative that new spectrum for PMSE users is specified and allocated before a final decision is taken regarding the clearance of the 700 MHz band.

A Study by the German Federal Network Agency in October 2008[9] identified that 96 MHz of spectrum was the minimum requirement for PMSE audio equipment to operate productions on a daily basis. This study was carried out in an urban area, and took into consideration the operation of PMSE systems in close proximity to each other. Both practical application and the report show that at least 96 MHz is required for each of these locations to operate PMSE services at the current standard of production and without interference or difficulty. It is fair to say that the UK situation is no different. At each performance in the West End there are over 1000 pieces of wireless PMSE equipment in use across all venues. At the same time, news crews and other content producers are also operating in this area, requiring further spectrum access. Furthermore, this study did not include special events, such as Royal occasions, national and international political gatherings and conferences, VIP visits, elections, large open air events, national and international sports events, religiously motivated meetings, parades and more – all of which rely on PMSE equipment. These would require Ofcom to ensure that a great deal more spectrum is available in order for PMSE to operate successfully.

In light of the above, BEIRG welcomes the fact that Ofcom are in the process of identifying potential candidate bands as alternative spectrum for PMSE users. However, investigations of the suitability of these alternative bands is at a very preliminary stage, in stark contrast to the fact that Ofcom is already consulting on clearance of the 700 MHz band with a view to finalising a decision in Autumn 2014. The natural conclusion which is reached is that there is a risk that PMSE users will be evicted from the 700 MHz band long before any alternative spectrum is secured for the sectors use. This has two implications.

First, there is the distinct possibility that PMSE users will lose access to the 700 MHz band before alternative spectrum is made available. This would have serious implications for the sector, for businesses and for the UK. Major shows and events will become impossible to plan and key industries such as the West End, sporting events and concerts and festivals will be disrupted.

Second, until alternative spectrum is finalised, PMSE users cannot begin research and development into new equipment designed to work at these higher frequencies. There is, obviously, a time lag between spectrum being identified and suitable equipment being made available. The PMSE sector requires a period of years between spectrum being allocated and migration in order for suitable equipment to reach the market. This raises the prospect of there being a period of time during which PMSE users have access to a new set of frequencies, but not to equipment which operates at those frequencies. Manufacturers will not produce suitable equipment capable of tuning to any alternative bands until those alternative bands are clearly identified and long term access is guaranteed.

BEIRG has a further, grave concern regarding the process by which alternative spectrum is secured for PMSE use. BEIRG understands that Ofcom is working towards a solution whereby the alternative spectrum is secured and released before or at the same time as the 700 MHz band is cleared. However, naturally there is a point during the process of clearing the 700 MHz band, at which that process cannot be halted or delayed, for either financial or practical reasons. The consultation gives no indication that a contingency plan has been established in the event that a 'point of no return' is reached in the 700 MHz clearance but a delay is encountered in the allocation of alternative spectrum to PMSE users. As articulated both by Ofcom in the

[9] http://www.apwpt.org/downloads/reportonthefrequencyresourcerequirementsofpwms.pdf

consultation and by BEIRG in this response, such a scenario would leave PMSE users without access to a sufficient quantity of spectrum in which to operate.

Therefore, BEIRG call on Ofcom to consider how it will shield the PMSE sector from this threat. When will such a contingency plan be established? At what point would Ofcom consider slowing or halting the release of the 700 MHz band if it fears that there may be a delay in allocating alternative spectrum for PMSE use?

### Concerns regarding suggested bands

BEIRG welcomes the identification of the two candidate bands - 960-1350 MHz and 1525-1710 MHz – for possible PMSE use in the future. Aside from our concerns expressed above, regarding the speed at which this process is taking place, BEIRG also harbour concerns with these bands.

Whilst PMSE equipment can operate at these frequencies, the change will have significant implications. For example, one would expect a transmitter operating at 1350 MHz to have twice the path loss of a device operating at 700 MHz. In addition, one would expect a further 5 or 6 dB reduction in signal strength for a body worn transmitter. This equates to another halving in range in addition to that due to the increased path loss. A transmitter operating at 1350 MHz would therefore have only one quarter of the range of that operating at 700 MHz. This has significant implications for engineers and companies working on large events such as stadium concerts, sporting events and festivals, as these typically take place in large venues in which the loss of range described above would be a significant issue.

Naturally, this would require changes in both the way that engineers plan events, but also the quality and quantity of equipment used. Additional cabling and antennas would be needed, with the additional associated costs this would bring. Equipment may also, potentially, become less spectrally efficient as equipment at higher frequencies would need to operate at higher power, which in turn is limited by the EMF generated.

## Compensation scheme

BEIRG welcomes Ofcom's acknowledgement that a comprehensive compensation scheme must be instituted to protect PMSE users from the negative financial effects of any 700 MHz band clearance. Whilst BEIRG remains fiercely opposed to this potential clearance, for the reasons explained above, it is important that, if the clearance does take place, measures are put in place to ensure that PMSE users can continue to contribute to the social, cultural and economic wellbeing of the UK.

However, any compensation scheme will simply be treating a symptom, rather than providing a cure, if alternative spectrum for PMSE use is not identified and allocated before 700 MHz is cleared. Therefore, as indicated above, it is crucial that any compensation scheme is allied to an allocation of a sufficient quantity and quality of spectrum for PMSE use, potentially free from White Space Devices and secured for a period of time long enough so as to provide the PSME sector with the economic certainty it has so far been denied.

As a consequence of the delay in making the decision to allow PMSE services in the 600 MHz band, many PMSE operators reinvested in PMSE equipment in the 700 MHz band following the clearance of Channel 69. These users will be penalised for equipment investment decisions which, at the time, were made in good faith. The majority of recent professional equipment sales have been in the 700 MHz band. Being allowed only ten years of use out of new equipment, before new purchases must be made as a result of spectrum clearance is

not acceptable for the PMSE sector; the industry typically gets between fifteen and twenty years of use out of professional equipment.

Any clearance of the 700 MHz band will lead to PMSE equipment that operates solely in this band being scrapped. In addition, any equipment operating between 470-694 MHz may face potential abandonment as a consequence of the subsequent DTT replan. Our industry cannot afford this uncertainty, and faces declining sales and a lack of confidence as a result. None of these identified costs should be taken lightly as part of a decision on 700 MHz, in particular those that outline the requirement for additional expenditure from consumers and PMSE users to replace equipment, and the associated upheaval and harm this will cause to our industry.

Furthermore, Ofcom also needs to consider the potential social and cultural costs to consumers and the economic cost to UK plc in instances where PMSE is unable to put on shows, concerts and other events as a consequence of 700 MHz clearance. This cost will be hard to quantify. Clearance of 700 MHz will also cause costs to small organisations, such as schools and churches, who use PMSE on a smaller scale and who will be forced to replace redundant equipment again.

**Cost of replacing equipment early**

BEIRG believes that Ofcom has significantly underestimated the costs of replacing PMSE equipment early. Following the clearance of Channel69, the total funds allocated to compensate PMSE users was £53m, compared to the £6-18m estimate made by Ofcom in this consultation. If the 700 MHz band were to be cleared, PMSE users would lose access to a far greater amount of spectrum than they did because of the previous clearance. Since the clearance of Channels 61- 69, the majority of professional equipment sales have been in the 700 MHz band. In addition, the re-planning of DTT transmissions and possible interference from mobile transmissions operating above 694 MHz, may well further reduce the spectrum available to PMSE users, requiring those operating below 694 MHz to purchase new equipment.

Furthermore, BEIRG are concerned that Ofcom have underestimated the 20-40% uplift in costs of purchasing more frequency agile equipment. The RF environment after the clearance of the 700 MHz band will be far more challenging. It is likely to be the case that users who previously used low to mid-range equipment, will now require more expensive, high range equipment in order to have the frequency range and agility to operate.

BEIRG also thinks that Ofcom's assessment of the lifespan of equipment is inaccurate. Professional PMSE users tend to use higher end equipment, as they operate in the interleaved spectrum as opposed to Channel 38. This equipment tends to be more robust and have a lifespan of at least twenty years, as opposed to the fifteen years suggested by Ofcom.

BEIRG object to Ofcom's assessment that "Any equipment that is replaced between now and 2022 would be unaffected by 700 MHz change of use…..we expect owners of equipment to purchase new items with tuning ranges suitable for the remaining UHF spectrum (or alternative bands as they are designated.)"

This is simply incorrect for two reasons. Firstly, until alternative bands are designated, in theory all PMSE users will be forced to purchase equipment operating below 694 MHz. Along with the re-planning of DTT and the

potential introduction of WSDs, this will mean that the spectrum below 694 MHz will be even more crowded than it is now.

In reality PMSE users will need to continue buying equipment which operates in the 700 MHz band, on the same basis that they do now, in order to have access to enough channels for large productions.

Secondly, any equipment purchased over the next eight years, will be bought without a clear understanding of the configuration of spectrum post the clearance of the 700 MHz band. Hence, it is entirely possible that this equipment will become redundant; compensation must be offered for this as well.

Ofcom should therefore be aware of the risk of a two stage migration process. As DTT is re-planned down to the 470-694 MHz band, some PMSE users currently operating in that spectrum will be displaced by the incoming DTT transmissions. These users will have no choice but to use allocations in the 700MHz band, especially, as is possible, no alternative spectrum has been allocated for PMSE use. Regardless, if a user's equipment can tune to both the lower sub 694 MHz and upper 700 MHz band frequencies, that user is likely to want to continue using their existing equipment for as long as possible, even if new bands are available, since the new bands will definitely require new equipment and designs for venues. Ofcom may need to consider providing incentives for users to re-equip and move to new bands (if or when they become available) as early as possible.

Furthermore, Ofcom has, in effect, only guaranteed PMSE access to the spectrum below 694 MHz until 2030. So, theoretically, a PMSE user might purchase equipment for use in this spectrum in 2021, only to be told that in 9 years that equipment will become redundant. This is an impossible situation for PMSE users to find themselves in, with yet more uncertainty for the industry.

The consultation fails to take account of the costs of removing old, defunct equipment in entertainment venues, disposing of it and replacing it with new equipment. Nor does it account for the administrative work which will need to be undertaken by those who claim under any compensation scheme. During the 800 MHz band clearance, one company (and Beirg member) was forced to commit 501 'man' days to the process of identifying which equipment would need to be replaced at a cost of well over £100,000. The process included liaising with customers already using kit, creating new frequency plans, applying to revise licences held, programming new equipment, installing and testing it, removing the old units and processing their return Equiniti and completing the necessary administration for Ofcom and Equiniti. There are costs in addition to those of actually purchasing new equipment and they should not be borne by either manufacturers, venue owners, producers or, indirectly, consumers as part of the cost of tickets to events. Moreover, those most affected by this process and the associated upheaval, will be those least aware of it and least equipped to absorb the costs; schools, community centres, places of religious worship, etc.

### Improvements in equipment and working practices

The PMSE sector in the UK is in a continual state of innovation and development to ensure that equipment and expertise can keep pace with rapid innovation within the wider Creative Industries, which rely on our expertise. Engineers are constantly establishing new ways to use spectrum more efficiently and to maximise the capacity of their equipment.

The PMSE users who will be most adversely affected by a clearance of 700 MHz band – professional users planning large scale, technically complicated events – already take steps to achieve the spectral efficiency described by the consultations. BEIRG therefore do not believe that the steps suggested would have a significant impact on mitigating the negative consequences for PMSE users of the 700 MHz band being cleared.

The loss of spectrum will also impact the ability of the UK to host major international events, where the media involvement is complicated by an influx of foreign broadcast companies.

However, of even more significant concern is Ofcom's underestimation of the number of RF engineers who would need to be retrained or given additional training, should the 700 MHz band be cleared. The consultation states that between 15 and 20 new RF engineers will need to be hired and between 20 and 30 current employees will need further training. BEIRG believes that as many as 1000 current employees will need further training, with the additional costs associated with this.

## Research and Development

The consultation makes no mention of the research and development that will be required were PMSE users to be moved to higher frequency spectrum. Equipment which is designed to work at these frequencies does not currently exist in any appreciable numbers and manufacturers will be compelled to design new products. This is assuming, of course, that they retain their interest in the UK market. Considering the vast uncertainty surrounding PMSE use in this country, this is by no means a certainty. BEIRG believes that compensation should be made available to cover some, if not all, of the costs incurred through having to do research and development into new equipment and the venue design which will be necessary to successfully use that equipment.

The consultation states that there is widespread support for these measures (clearance of the 700 MHz band) amongst European countries, but the PMSE sector in the UK is vastly different and much larger than that of most other EU countries, and hence their support for these proposals should not be taken as evidence that it would be the appropriate step for the UK.