Ofcom Consultation

British Entertainment Industry Radio Group (BEIRG)

A Framework for Spectrum Sharing

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Introduction

The Programme Making and Special Events (PMSE) industry is a prolific sharer of spectrum; PMSE has successfully shared with Digital Terrestrial Television (DTT) for many years. BEIRG supports sharing if the right conditions are in place to govern it. As such, BEIRG would welcome an overarching framework for spectrum sharing that provides protection for, and consideration of, incumbent users. BEIRG recognises that spectrum is a valuable and finite resource and supports innovation to make its use more efficient, but maintains that the rights of existing users must be the primary focus when considering potential for spectrum sharing. BEIRG also believes that bands where spectrum sharing is already taking place should not be considered the prime candidates for further sharing. Instead, Ofcom should first look at bands where there is no sharing.

PMSE is a crucial component of the creative industries, which is worth £8.8 million an hour[1] to the UK economy. The continued success of these industries is dependent upon sufficient access to high-quality, interference free spectrum. It is absolutely imperative that PMSE access to interference free spectrum is not jeopardised by additional spectrum sharing.

For BEIRG, the main concern is the imposition of White Space Devices (WSD). Our concern is that these devices are being allowed onto the market without a proper consideration of how the technology will develop and what future spectrum requirements for WSDs will be. BEIRG therefore emphasises the importance of considering the high level characteristics of use of prospective sharers, with particular focus on the evolution of technology.

Response

Question 1: Do you have any comments on the barriers to increased sharing that we have identified above? Which are the most significant and why? Are there others we should take into account?

Sharing spectrum has hidden costs for the would-be sharer. The PMSE industry's experience of sharing spectrum shows that being the "sharer" is a sizeable burden requiring considerable time, effort, knowledge and experience in order to make effective use of the shared spectrum resource. Ofcom itself currently employs around a dozen people directly engaged in the day to day management of PMSE spectrum. This is in addition to the work done every day by equipment suppliers, rental companies and end users to locally manage the use of the shared spectrum. These are significant resource overheads, much of which would not be required in order to manage exclusive spectrum. Replacing the human processes with entirely technology based solutions, if even possible, would entail huge efforts in research and development for manufacturers and regulatory bodies and would ultimately add complexity to equipment with consequences going beyond added financial burden on the industry.

For PMSE equipment, greater complexity in small battery powered portable devices such as wireless microphones is undesirable. For example, these devices frequently need to be concealed, for instance in theatre, film and TV drama production, so size and weight is critical. Battery life would also be adversely affected; greater technical complexity entails greater energy consumption necessitating greater battery capacity which adds further size, weight and cost penalties. These are critical problems for many PMSE activities.

Question 2: Have you experienced or are you experiencing the effects of these barriers? If so, in what circumstances and with what impact?

In recent discussions in Europe, BEIRG has been struck by the unwillingness of some parties to share spectrum in any circumstances. BEIRG has always been in favour of spectrum sharing under the right conditions, yet the lack of incentive to share means that some parties are uncooperative.

Question 3: Are the categories of information set out in paragraph 5.5 the right ones? Are there any areas here that you think we should prioritise? Are there other types of information that we should be improving?

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[1] https://www.gov.uk/government/news/creative-industries-now-worth-88-million-an-hour-to-uk-economy

PMSE users already provide much of this information as part of their licensed usage.

BEIRG would require more detail on how any additional spectrum information would be collected and managed and protection for PMSE afforded. BEIRG members are primarily small businesses, making additional centralised data collection, particularly real time usage, impractical and potentially burdensome.

Question 4: Do you think the information about spectrum characteristics described in paragraph 5.9 would be useful? What information would need to be included as a minimum to make it useful?

Please see answer to Question 8

Question 5: Have we identified the relevant market enablers, or are there others we should take into account? For each one, what is the potential for it to facilitate sharing and what are the downsides? Are there any that you think would be particularly effective or problematic?

BEIRG does not consider market enablers to be suitable for PMSE bands. Despite their large contribution to the UK economy, PMSE users are often small businesses, lacking the organisation and purchasing power to compete in auctions or on the open market, especially given that the competition includes mobile network operators.

Question 6: Have we identified the relevant technology enablers, or are there others we should take into account? For each one, what is the potential for it to facilitate sharing and what are the downsides? Are there any that you think would be particularly effective or problematic? What, if any, role should Ofcom play in helping to develop them?

Geolocation databases

If they are properly designed and maintained, geolocation databases have the greatest potential to overcome the technological barriers to coexistence in bands involving PMSE.

Accurate location data is essential for geolocation databases to be effective. In the case of portable devices, this would require the database to update near instantaneously, ensuring that devices do not continue to operate as they move in to range of licenced users. It also requires that the geolocation cannot be bypassed by the end user. If the end user is capable of bypassing the parameters set by the geolocation database, interference to incumbent users could occur. For this reason geolocation must be automatic and not manually configurable.

It is crucial that geolocation databases adequately serve the interests of PMSE users. Databases that are owned and managed by companies with a vested interest in the performance of WSDs are unlikely to consider the PMSE community a priority.

BEIRG has expressed, on several occasions and over many years, its concerns regarding the introduction of White Space Devices (WSDs) that use geolocation databases. The introduction of WSDs poses severe risks to the quality of PMSE productions and, despite the recent real-life testing undertaken by Ofcom (with the assistance of BEIRG), concerns remain. Chief amongst these are the effects of intermodulation, which were not tested in 2014. We are also deeply concerned by the possible decision to introduce manually

configurable WSDs. This system would be far more open to abuse than one which relied on automatic geolocation and we do not believe that Ofcom has sufficiently outlined how it will prevent such abuse. While Ofcom has stated that the same policing and regulatory approach would apply that is currently used to enforce licensing arrangements around PMSE, the fact that in recent years just one person has been prosecuted for non-licensed operation suggests that those enforcement regimes are currently insufficient.

Sensing

Sensing is potentially the most problematic of the technology enablers for PMSE.

Devices that use sensing to determine available frequencies run a high risk of mistakenly transmitting on an occupied frequency because of the presence of hidden nodes[2]. PMSE equipment is particular vulnerable to this problem because of the distance between its transmitters and receivers. It is easily possible for a sensing device to be out of range or out of sight of a transmitter, therefore perceiving a frequency as available, but in close enough proximity to the receiver(s), or more specifically receiving antennas, to cause interference on that frequency. For an industry that is reliant on perfect quality of service, this is an unacceptable risk.

Sensing devices present a further unique threat to PMSE users. Wireless audio requires freedom from all types of interference, including intermodulation. To avoid this type of interference, frequencies that are vulnerable to intermodulation are intentionally left unused. It is entirely feasible that devices that 'sense' would deem these intentionally empty frequencies available, making them liable to cause interference. This is especially true of large scale events, where a greater presence of wireless technology vastly increases the potential for intermodulation, and therefore the amount spectrum left intentionally empty[3]. For this reason, sensing cannot be considered an appropriate defence for wireless PMSE.

Protocols for Accessing

Conditions on spectrum access must be a prerequisite of any spectrum sharing scenario. However, it is important to be clear about exactly what 'protocols for accessing' are being proposed for each individual case. For instance, the protocols used as examples in the consultation document ('carrier sense multiple access' and 'listen before talk'), while possibly suitable between spectrum users in other bands, would not be appropriate in a band involving PMSE because of the potential for intermodulation, as described above.

Conversely, protocols for accessing spectrum that require definitive, fully automated communication with a geolocation database would be more acceptable. In this situation, an unlicensed device would be allowed to access spectrum if it can a) communicate with a geolocation database and b) the database indicates that the frequency is free or unprotected. If either of these conditions are not met, then the device would not be allowed to transmit on any frequency.

As part of any spectrum sharing plan, Ofcom should be able to define the particular protocols for accessing suitable for that situation. In tiered systems, it is essential that there will be different protocols for licensed and unlicensed users to reflect the different levels of priority and protection.

Automatic Reporting of Interference

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[2] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP159.PDF
[3] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP204.PDF

Interference is disastrous for live productions; PMSE requires the best possible quality of service. A system where operational parameters are changed according to reported interference is therefore completely unacceptable. There must not be any interference in the first place.

Frequency and Band Agile Equipment

Frequency agility is useful to a point. While it potentially opens up more of the spectrum for use, this is largely irrelevant for large scale events where most, if not all, of the available spectrum is in use.

Professional PMSE users already own the most frequency agile equipment available. This is because efficient use of spectrum is critical for large scale events. Frequency agile PMSE equipment will not facilitate more sharing in these cases because there simply is not enough available spectrum.

What role should Ofcom have to play in driving technology development?

In order to drive technology development, Ofcom should not allow new devices to share spectrum until they are technologically capable of abiding by the regulatory framework in place in that band. For instance, if there is a tiered access model in place, the new devices must be able to respect the primacy of higher tiers in a way that can be reliably enforced and guarantees freedom from interference.BEIRG's concern is that Ofcom is relaxing regulatory conditions surrounding WSDs in the face of technological challenges; specifically their ability to automatically geolocate. Due to the potential for abuse of manually configurable WSDs, manual geolocation cannot be considered an alternative, even in the short term on a licensed basis. As the use of WSDs proliferates, manual configuration will be unsustainable. For this reason, they must be required to automatically geolocate from the beginning; it is the only way to guarantee the continued feasibility of the regulatory system. For this reason, BEIRG opposes Ofcom's recent decision to approve the use of manually configured WSDs.

Allowing technologically immature devices onto the market limits the incentives to develop technology that will be sustainable going forward and undermines the regulatory arrangements already in place.

Question 7: Do you have any comments on the authorisation tools that we have identified above? Are there others we should take into account? For each one, what is the potential for it to facilitate sharing and what are the downsides? Are there any that you think would be particularly effective or problematic?

'Tiered access' is a laudable principle, but it must work flawlessly in practice. Audio PMSE in UHF 4 and 5 is already governed by a tiered access model, with digital terrestrial television (DTT) forming the first tier and PMSE the second. Sharing based on this model has been extremely successful. However if there is to be a third tier of unlicensed white space devices, the system must be robust and enforceable.

Tiered access requires that higher tiers are guaranteed freedom from interference from lower tiers. In the case of PMSE, this means that there must be adequate protection zones around PMSE venues. In November 2014, following 'real-world' testing of WSDs, Ofcom announced the protection criteria that would apply to give assurance to PMSE users. These criteria must not be compromised under any circumstances.

WSDs must be technologically capable of reliably abiding by this framework. If WSD users can easily work around the tier system, then the tiered access framework is unworkable. In the US, WSDs are governed by a geolocation database built on manually configurable location data. Research shows that more than a

third of the input location data is highly questionable or obviously false[4]. In this situation, incumbent, licensed services cannot be guaranteed freedom from interference, rendering the tiered access model irrelevant.

Ofcom must ensure that, where it pursues a tiered access spectrum sharing model, it is sustainable and enforceable.

Question 8: Are the characteristics of use we have identified sensible and sufficient to provide a high level indication of sharing potential? Are there other factors that we should expect to take into account? Are there any factors that you consider to be particularly significant? Are there any which we should attach less weight to?

BEIRG welcomes the high level characteristic of use. Particular attention should be paid to the 'evolution of use'. It is important to consider how the evolution of new devices will impact on the proposed spectrum sharing agreement and those already in place. If new devices are liable to fast or unpredictable development, it is essential that the initial spectrum sharing agreement is sustainable.

For PMSE in particular, special attention should be given to the need for the best possible quality of service. Any level of interference is unacceptable in the context of a live production, and any spectrum sharing agreement must respect that.

On density of use, Ofcom must consider the effect that dense groupings of devices have on the noise floor for all other users of spectrum in that area. PMSE equipment transmits on the lowest possible power to avoid intermodulation and maximise the efficiency of its spectrum use; boosting power to compensate for a higher noise floor results in a less efficient use of spectrum.

An additional characteristic of use could include technological capability to abide by the sharing framework in place. For instance, if devices are required to connect to geolocation databases, they must be reliably able to do so.

About BEIRG

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. Productions that depend on radio spectrum include TV, film, sport, theatre, music, newsgathering, political and corporate events, and many others. In the context of the spectrum sharing, BEIRG campaigns for the maintenance of Programme Making and Special Events (PMSE) access to sufficient quantity of interference-free spectrum.

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[4] https://www.nab.org/documents/filings/TVDatabasePetforRulemaking031915.pdf