



BRITISH ENTERTAINMENT INDUSTRY RADIO GROUP

Securing access to spectrum for the UK's creative industries

BEIRG Spectrum Report March 2025

This report is created for Programme Making and Special Events (PMSE) stakeholders, the creative industry and associated trade bodies, regulators and government.

It aims to:

- Introduce, communicate, and engage BEIRG with new and existing industry stakeholders.
- Explain what the outcome of the World Radio Conference 2023 (WRC-23) means for PMSE against a backdrop of imminent decisions around the future of DTT, what the coming WRC cycles are likely to have in store (at WRC-27 and WRC-31), and BEIRG's ongoing engagement strategy.
- Provide the basis for ongoing discussion with Ofcom to safeguard access to radio spectrum for PMSE and demonstrate proactive industry engagement on behalf of the PMSE sector.

Scope of the report

The 'BEIRG Spectrum Report' aims to set out:

- 1 What is BEIRG?
- 2 Who we are, and who we represent
- 3 The background and milestones achieved in our 20-year history
- 4 The issues we face – and our future strategy for addressing them
- 5 The current landscape and the future of UHF spectrum, post WRC-23, DTT decline, Broadcast 2040+
- 6 Our stakeholders – regulatory, political, trade bodies, and industry
- 7 Impact analysis
- 8 Conclusion

Executive Summary

The British Entertainment Industry Radio Group (BEIRG) is an independent, not-for-profit organisation working for the benefit of all those in the creative industries who produce events and create and distribute content using radio spectrum. BEIRG campaigns to maintain the provision of the Programme Making and Special Events (PMSE) sector's access to sufficient quantity and quality of spectrum for use by wireless production tools such as microphones, in-ear monitor systems (IEMs), and wireless communications equipment.

This report provides analysis to Ofcom, government and industry about the likely effect of further spectrum loss on PMSE. It also strongly encourages government and Ofcom to pay due regard to PMSE's incumbent usage and its future needs when considering the future of DTT, and therefore the future of the 470 – 694 MHz band, on which PMSE is so heavily reliant. These decisions have significant implications for the future of PMSE and the creative industries it underpins.

The creative industries and PMSE are driving economic growth

In the government's green paper, *Invest 2035: the UK's modern industrial strategy*¹, economic growth is identified as its 'number one mission' and the creative industries are named as one of eight growth-driving sectors, making the UK a 'cultural powerhouse' that punches above its weight, a top ten exporter of creative goods and services worldwide, and one of only three net exporters of music in the world.²

Between 2010 and 2019 the creative industries grew more than one and a half times faster than the wider economy and in 2021 they generated £108bn in economic value. In 2021, they employed 2.3 million people, a 49% increase since 2011.³ There is also a deep and intricate web of connections in our sector between skilled employment, local businesses and local communities. One third of those working in theatre, for example, also work in music and live events, with 29% also working in television and 26% in film production.⁴

In prioritising economic growth and nurturing the socioeconomic contribution of our creative industries, we would struggle to put it better than the House of Lords' Communications and Digital Committee,

*'there is a serious and well evidenced business case for the sector to sit at the heart of the UK's future growth plans.'*⁵

Further spectrum losses for PMSE will endanger that growth

BEIRG is wholly supportive of the government's growth strategy. However, the creative industries face an underappreciated but very real risk from radio spectrum policy that perpetuates uncertainty and instability in our sector, thereby running counter to the government's stated objectives, and discouraging investment. Specifically, the 470 – 694 MHz band, which remains the core spectrum resource for the UK creative industries and supports a mature global equipment ecosystem, is under grave threat.

¹ Department for Business and Trade, '[Invest 2035: the UK's modern industrial strategy](#)', November 2024

² McKinsey & Company, '[The Arts in the UK: Seeing the big picture](#)', November 2023

³ DCMS, '[Creative Industries Sector Vision](#)', June 2023

⁴ McKinsey & Company, *ibid*

⁵ House of Lords' Communications and Digital Committee, '[At risk: our creative future](#)'

Wireless PMSE audio capture is critical to successful content creation. That content drives consumption via myriad delivery platforms and methods. Without PMSE there is no content. In common with government's proposal for an industrial strategy that includes bespoke arrangements tailored to each sector, Ofcom and government must ensure PMSE is served by dedicated spectrum policy that recognises its huge intrinsic value to the UK's economy, and not seen merely as collateral damage in policy made for other sectors.

Impact analysis of further spectrum losses to the UK creative industries

BEIRG provides as an Annex to this report the 'Future Audio PMSE spectrum availability analysis'. This models the impact of further reduced spectrum on the ability to produce many regular productions as well as world-class events such as the Eurovision Song Contest or Events of State like the King's Coronation.

Decisions taken in the near-term regarding potential changes of spectrum use in the 470 – 694 MHz band and the future of TV distribution will have profound long-term consequences for PMSE and the broader UK creative industries. As DSIT stated in its Spectrum Statement of 2023, 'regardless of changes to viewing habits, there will be an ongoing requirement for spectrum for PMSE which uses, among other bands, spectrum in the 470-694 MHz band.'⁶

PMSE uses spectrum very efficiently but cannot innovate its way out of further spectrum loss

We are operating with significantly less spectrum than we were 10 years ago. Ofcom's assessment of the 700 MHz band clearance showed that a wide range of events and productions would be severely impacted by the loss of access to the band. This analysis has proven accurate, and to adapt to the impact the industry made significant technical progress in terms of spectrum efficiency, and PMSE users adapted their workflows to respond to reduced spectrum availability.

It is reasonable to conclude that a further reduction of access to spectrum, for example if the 600 MHz band was reallocated to mobile services, would cause a far greater impact to events and productions than that experienced from the 700 MHz clearance. There is a limit to what can be achieved through technical innovation or further changes to working practices within the industry to mitigate a reduction of at least 77 MHz of spectrum (34% reduction), particularly where events are becoming bigger and more sophisticated in response to consumer and audience demands.

⁶ [DSIT Spectrum Statement](#) of April 2023

1. What is BEIRG?

BEIRG stands for the British Entertainment Industry Radio Group.

BEIRG is an independent not-for-profit group dedicated to supporting everyone involved in producing, distributing, and enjoying content that relies on radio spectrum in the UK.

BEIRG campaigns for the protection of Programme Making and Special Events (PMSE) spectrum, essential for wireless production tools like microphones and in-ear monitors, which power everything from TV and film to live music, sports, and theatre.

BEIRG's mission is to safeguard access to this crucial spectrum, vital to the UK's entertainment landscape.

BEIRG works with regulatory bodies, such as Ofcom, and other stakeholders to ensure that the needs of the entertainment industry are considered in spectrum management policies.

2. Who are BEIRG?

The **BEIRG** Steering Committee is made up of a diverse team and includes representation from leading industry organisations and manufacturers.

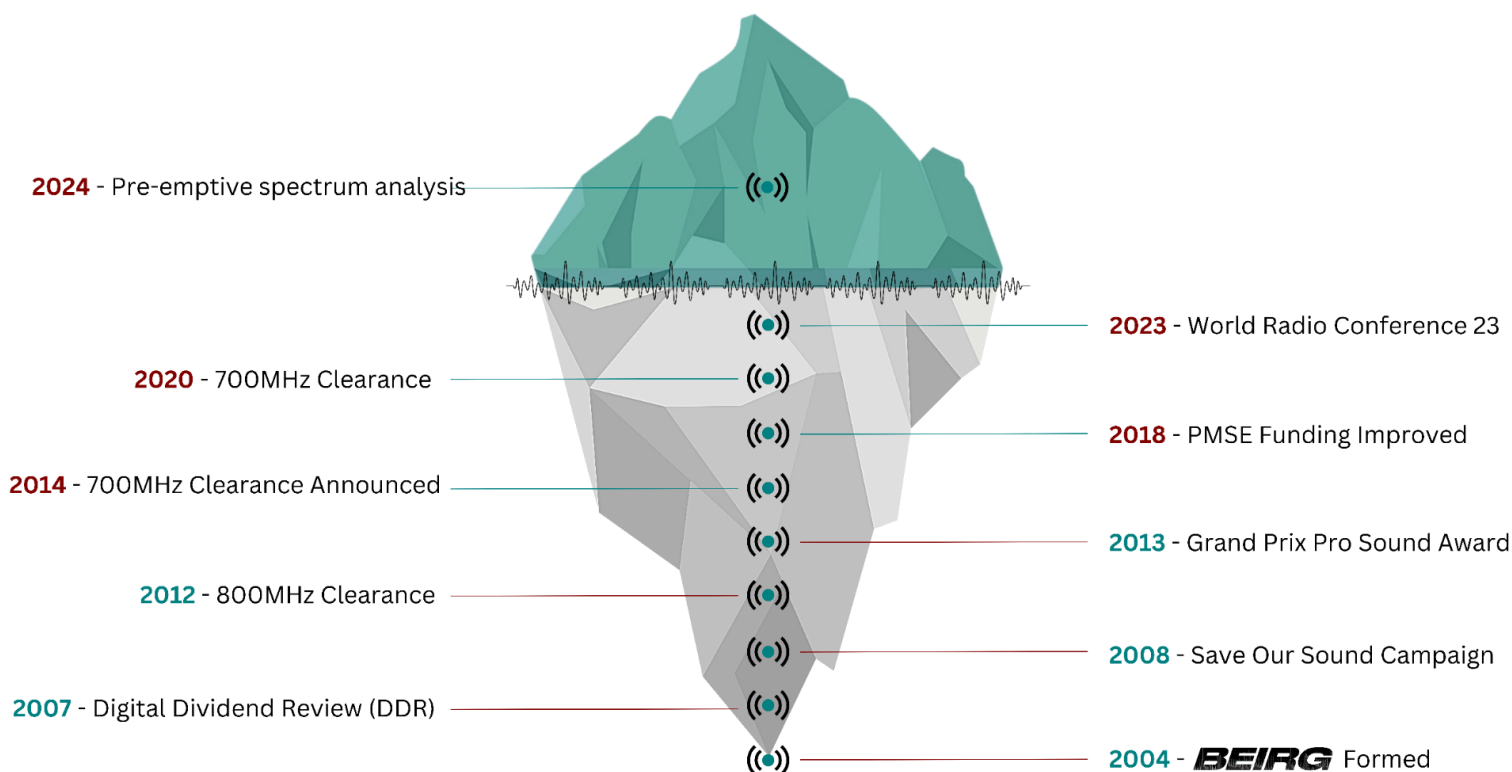
BEIRG was formed in 2004, and the Steering Committee established in 2006.

BEIRG has worked with the UK Government and Ofcom, in consultation with manufacturers, rental companies, trade associations, and individuals, to minimise the adverse consequences of spectrum changes in the UHF band.

BEIRG's activities are supported and coordinated by public affairs consultancy, Ranelagh International, who have been continually engaged for some 15 years of the journey so far.

BEIRG is supported by a wide cross-section of affected entities that include leading manufacturers of wireless equipment, theatrical producers, rental companies, manufacturers, and trade associations alike.

3. The background and milestones achieved in our 20-year history



As the graphic shows above, since 2004, BEIRG has successfully engaged with Government, Ofcom, the European Commission, and other stakeholders to ensure that the PMSE sector has a voice in the face of damaging spectrum management policies.

Working for the benefit of all those who produce, distribute, and consume content made using radio spectrum in the UK, BEIRG campaigns to ensure PMSE has continued access to sufficient quantities of interference-free spectrum.

BEIRG has been responsible for several key engagements and results, overleaf, despite being a lone voice facing huge pressure from mobile phone giants, and initially complete anonymity to the regulators:

Our Engagement and Results

Our campaign shifted Ofcom's view of PMSE

In 2007, our engagement with Ofcom during the Digital Dividend Review (DDR – the release of spectrum by TV Broadcasting as a result of moving from analogue to digital TV) ensured that the PMSE sector's cultural and economic importance was recognised and considered in spectrum policy decisions.

We launched Save Our Sound

After previously confirming continued access to Channel 69, Ofcom decided to align with Europe's Digital Dividend and clear the whole of the 800 MHz band, including Channel 69. The high-profile campaign Save Our Sound lobbied HM Government and Ofcom to provide compensation.

We won government funding and new spectrum

Following extensive engagement and discussion with Government and Ofcom, and many consultation responses on the value of PMSE, we achieved funding of 50% of the costs of replacement equipment for those that had to move out of Channel 69 into alternative spectrum. We also achieved access to Channel 38 to replace Channel 69 under the same conditions – UK-wide, shared access, and with the same licence fee.

We protected our industry from WSD

Ofcom developed a policy to allow access to unused spectrum in the UHF band under its TV White Space Device framework. We engaged with Ofcom to strengthen the regulations and ensure that PMSE was adequately protected. BEIRG and its members worked closely with Ofcom, providing access to venues and equipment to carry out on-site measurements to establish technical working parameters to achieve the necessary protection.

Clearance of the 700 MHz band and more funding for our industry

After the World Radio Conference in 2012 decided to allocate the 700 MHz band to mobile, Ofcom began its process of clearing the band of PMSE and Digital Terrestrial Television.

Once again, BEIRG lobbied hard to secure funding to help fund equipment replacement costs and successfully argued to increase the level of funding from 47% of replacement costs to 60%. In addition, we persuaded Ofcom to include an uplift in funding to help with the associated costs of replacing equipment. Initially, Ofcom proposed a 5% uplift, and we were successful in getting this increased to 10%.

We have secured circa £70m in funding for our industry

From our early days in 2004, we have promoted and highlighted to Ofcom and Government the importance of PMSE's cultural and economic contribution to the UK. Through this engagement, our sector's value has been recognised and has secured funding of approximately £70m to support our industry through the 800 and 700 MHz spectrum clearances.

We continue to promote our industry with Ofcom and Government

While it may seem that no imminent changes are expected to our access to spectrum, the future of DTT, and therefore the future of the UHF band for PMSE, is already being considered by Government and Ofcom, with decisions anticipated in the next 18 months. Alongside this, the well-resourced mobile network operators continue to press for more spectrum, specifically the 600 MHz band. We remain vigilant to this threat and continue to press Ofcom to commit to maintaining spectrum for PMSE use, including an allocation to dedicated, high quality, clean spectrum and to provide a viable long-term solution.

Today, BEIRG continues to press Ofcom and to engage with Westminster for a commitment to allocating PMSE users dedicated, quality, clean spectrum as part of a viable long-term solution –
Continued in Section 6

4. The issues we face – and our future strategy for addressing them.

The primary issue the PMSE sector faces is the constant pressure and uncertainty of PMSE access to spectrum.

Despite the ubiquitous nature of PMSE use, it is predominantly a consequence of policy for others, rather than benefitting from dedicated PMSE policy and this needs to change.

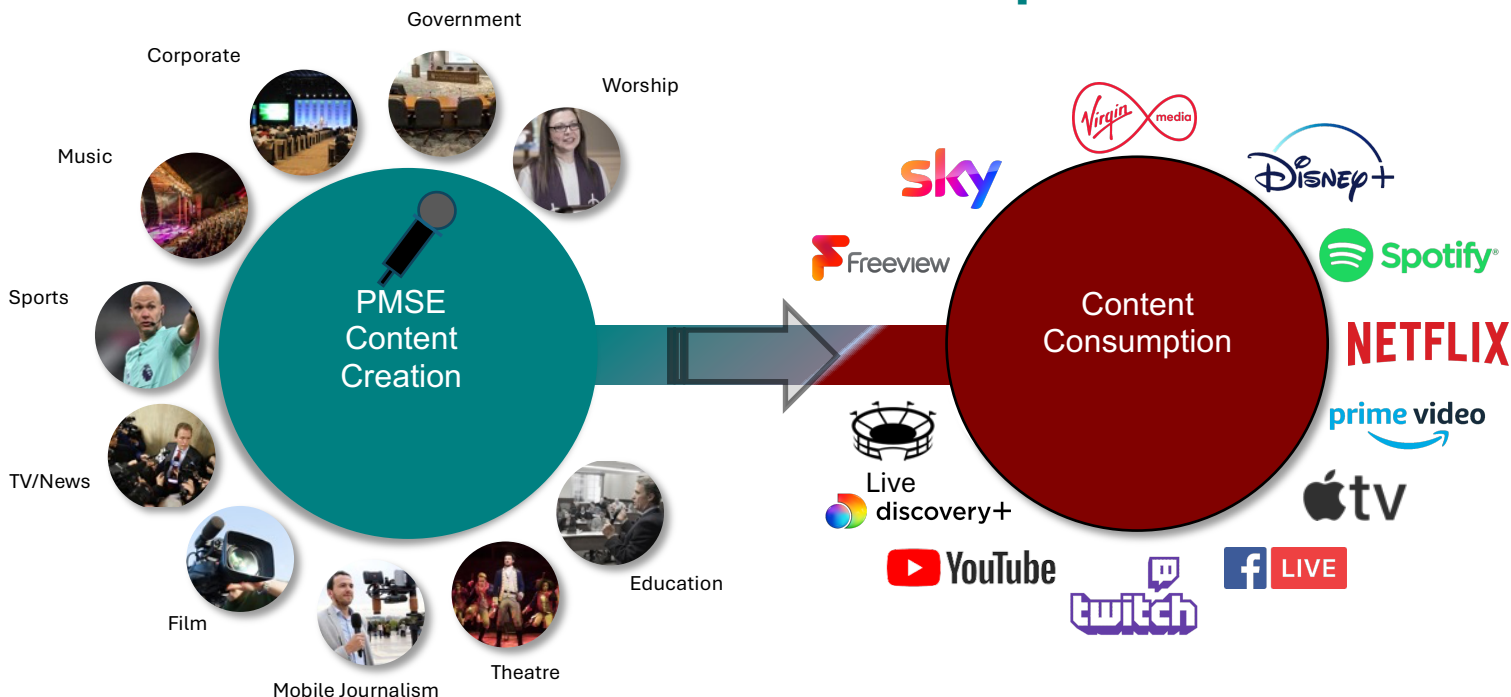
The key drivers supporting this change are:

The PMSE sector creates content, and that content drives consumption via the myriad delivery platforms and methods.

- The PMSE audio capture is critical to the successful content creation
- **Without PMSE there is no content**
- Content creation enables consumption
- This relationship is symbiotic whether it is a live performance, or via a multitude of platforms. i.e. more content requires more platforms while growing platforms demand more content
- Demand for PMSE-created content is experiencing significant growth driven by both the traditional audiences and the new global audience realised by new delivery platforms
- The creative industries contributed £108 bn to the UK economy in 2022, employing over 2.3 million people. They remain one of the fastest-growing sectors and have experienced double-digit growth for nearly two decades

Content Creation

Enables Consumption



A post World Radio Conference 2023 perspective

The outcome of WRC-23 appeared to present no imminent threat to spectrum access for audio PMSE in the UHF band (470 - 694 MHz). However, while the impact of any changes may not be felt for several years, government and Ofcom are already discussing the future of the band, and decisions are expected to be taken far sooner.

The World Radio Conference 2023 (WRC-23) did not make a primary allocation to the Mobile Service in the 600 MHz band in Region 1, although several footnotes were agreed to allocate the band to the Mobile Service as a secondary allocation. However, Resolution 235 (WRC-23) has set a requirement to revisit this after WRC-27 which may lead to allocating the 600 MHz to Mobile (with a possible identification for IMT) as a primary allocation at WRC-31. It is important to highlight that for 2023 the UK/Ofcom was not considering any change to the delivery/distribution of terrestrial television and therefore was not in favour of an allocation to mobile. However, for WRC-31 this position might change.

In May 2024, Ofcom provided a report to the Government on the future of TV Distribution. The report states that the nature of TV distribution is changing due to TV audiences shifting to more online content delivered over the internet, including on-demand streaming services like Netflix and internet-based linear delivery from iPlayer. The report also highlights that many broadcasters and DTT stakeholders said that they anticipate a tipping point at which it is no longer economically viable to support digital terrestrial television (DTT) in its current form.

With many TV multiplex licences expiring in 2034, and some sooner, Ofcom highlights the need for certainty about the future approach to DTT. In the report, Ofcom sets out three broad approaches that could be taken:

1. Invest in upgrading the DTT platform to deliver greater efficiency and quality.
2. Slim DTT down to a lower-cost, core service to serve as a 'nightlight'.
3. Set a course for full switch-off of DTT, and a managed transition to IP-only distribution.

As Ofcom notes, each approach includes several design questions and variants within it, and so are not full proposals or options. However, each of these options would allow for DTT spectrum use to be reduced (reduced to zero in option 3), and for the 600 MHz band to be reallocated to mobile (in the same way as the 800 and 700 MHz bands have been).

There is little certainty around the timeline of these changes, but as many believe it may be sooner rather than later, it is critical that BEIRG continues as the voice of the audio PMSE industry so that any decisions on the future of DTT, and by extension the future of the UHF band, does not undermine our ability to produce world-class content. To this end, we must continue to engage with Ofcom, Government, and directly with Ministers to ensure our voice continues to be heard.

The future of DTT – A global trend for decline in DTT

With the global decline, or reduced reliance on DTT, the focus has shifted further towards the mobile sector setting their sights on 470 - 694 MHz.

PMSE has enjoyed a position of relative protection provided by DTT (and ATT before) for many years but the constant pressure and demands on spectrum requirements from a growing number of applications, including MNOs, create significant disruption and concern for the future stability of our sector and our ability to deliver world-class content and everyday events.

Spectrum sharing

In recent years there has been a significant increase in pressure for 'spectrum sharing'. While PMSE has been and remains a good sharer, the language, implications and pre-conditioned framework around the term sharing is potentially inflammatory and misleading.

To address these issues, BEIRG believes that detailed work must be carried out by Ofcom to define the terms of access for any shared usage in order to make certain appropriate status and recognition is given to respective spectrum users for any given technology or application.

Future spectrum access solutions demand that regulators recognise the 'incumbent user' and that as such any prospective sharer is not given priority or higher user status than the incumbent user.

As a result, it should be recognised that PMSE has incumbent status in the 470-694 MHz range and that this is reflected in any decision to allow new users of this spectrum.

Subject to adopting the above principles, future spectrum solutions can then explore specific sharing solutions such as time-allocated or geographically defined sharing.

BEIRG is keen to engage on this topic with Ofcom to ensure due consideration is given to the high power, wide-coverage, full-time application that MNOs require in their deployment vs the high-density phone device usage converging on high-density PMSE deployment – for example using Coleago report scenarios – London becomes a 'no-go zone for MNOs in 500 or 600 MHz bands as it has consistent ubiquitous PMSE applications, and while rural deployment for MNOs could be viable without significantly impacting PMSE, the idea of relying on MNOs to deactivate cells around high-density temporary PMSE usage for events such as Silverstone or Glastonbury seems flawed as those events gather sufficiently large crowds that MNOs would surely require increased capacity rather than decreased?

In order to engage in discussions around long-term solutions, and considering the unknown future of the UHF band, BEIRG has worked closely with its stakeholders to explore various scenarios that could become relevant in the future. BEIRG has modelled these alternatives by applying the PMSE spectrum planning process for a broad range of UK events to the different spectrum availability scenarios, described below:

- No further change to DTT and therefore unlikely change for PMSE access to the interleaved spectrum.
- No further change to DTT but co-primary allocation to mobile placing pressure on PMSE if mobile is deployed in any of the geographical interleaved spectrum
- Reduced scale of DTT leading to re-mapping of DTT using fewer multiplexes, leading to less interleaved spectrum availability for PMSE, with likely access to cleared spectrum being available to mobile – likely clearance of 606 - 694 MHz
- Removal of DTT completely leaving the whole 470 - 694 MHz open to mobile

It is important that BEIRG highlights the impact of these scenarios that are in line with ongoing pressure from the mobile sector for more spectrum, and without the appropriate policies to protect/enable ongoing PMSE access to UHF band spectrum, coupled with further exploration of new spectrum ranges that are viable for PMSE equipment development, the effect on PMSE, the cultural and creative industries and events sector could be severe with significant economic impact as well.

5. The changing and current spectrum landscape

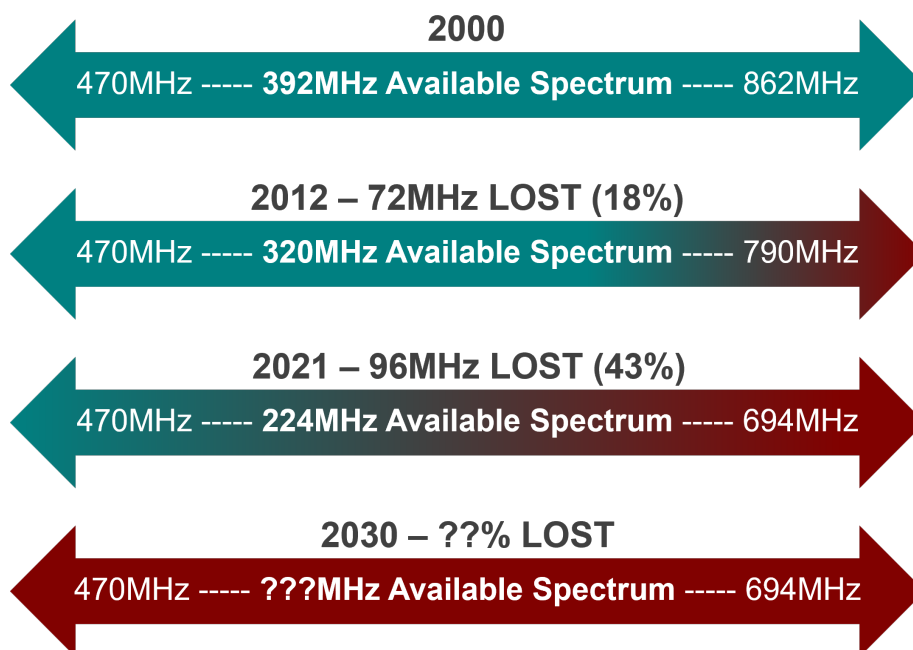
PMSE is everywhere, every day

The content created by the creative industries and events sector plays an essential role that connects people, generates emotion, and creates the content we all consume, every minute of every day, via an ever-growing range of platforms across the digital economy

Over the last 12 years, we have seen **PMSE** access to spectrum reduce dramatically.

In parallel with this, the industry has improved spectral efficiency and equipment agility.

Demand and scale of productions are growing and even with technological advances, **PMSE** still requires a significant amount of spectrum.



Currently, **PMSE** has access to 470 - 694 MHz as well as 960 - 1154 MHz (UK only). Additional spectrum in VHF, the duplex gaps, and 1.8 GHz are also available and serve a purpose in terms of delivering some of the more 'consumer or less complex' type applications for PMSE, such as House of Worship, small-scale educational facilities, etc.

The core ranges of 470 - 694 MHz, as well as 960 - 1154 MHz (UK only), are the principal focus of the 'Pro-PMSE user'

The sector has adapted well since the loss of the 700 MHz band.

This is partly through the funding schemes delivered by the UK Government and partly through technological developments (driven by a combination of manufacturers' own R&D vision, together with the voice of the regulator amidst the ever-changing spectral landscape) which have helped mitigate the reduction in spectrum illustrated above. Significant recognition should be afforded to industry manufacturers in achieving this. BEIRG fully recognises that the severity of the impact of clearing 700 MHz was significantly mitigated by a combination of enabling sharing access to the 960-1154 MHz "DME" spectrum band and greater flexibility provided by new product developments that are now available from a wide range of manufacturers.

The development of new equipment and technologies continues to be strong but there is no doubt the PMSE sector needs a secure long-term solution and as such it is critical that Ofcom and Parliament

create and deliver a strategy that recognises PMSE must be included and considered prior to further spectrum clearance plans.

Following the outcome of WRC-23, the 'no change' outcome of Agenda Item 1.5 on allowing co-primary to mobile across 470 - 694 MHz was positive in the short term, but ultimately this can be seen as 'kicking the can down the road' until the review in WRC 27 or WRC 31. But the reality is if PMSE solutions are 'kicked too far down the road', it will be too late. Future plans for PMSE have to be addressed now as part of assessing the future of DTT and as a consequence the future of the UHF 470 - 694 MHz band. Government decisions on the future of UHF spectrum will be informed and made over the next 18 months, so it is vital that BEIRG engages in this work now.

Our aim with this report is to pre-empt those reviews by proactively exploring the implications of them. The core issues here are:

- Providing early empirical analysis to Ofcom, Government and industry about the likely effect on PMSE, and by extension the cultural and creative economy of the UK, caused by yet another large loss of spectrum.
- Continuing pressure for mobile to access more spectrum and ensuring that viable alternatives are considered which do not harm PMSE, and that any cost-benefit analysis of a further reallocation includes the detrimental effects on the PMSE sector and creative economy it underpins.
- The future of DTT – A global trend for a decline in DTT vs pressure campaigns such as Broadcast 2040+ enabling longer-term access vs changes to DTT driven by the continued pressure on spectrum allocation in the UHF band.

Technological development

Modern PMSE equipment is very spectrally efficient, particularly when considering the requirements of the audio channel and its use, for example, audio quality, latency, equipment size, battery life, challenging RF environment with moving performers and scenery etc creating deep fades, body absorption (of the RF signal), and the operational requirement of zero failure for any live event.

Audio PMSE manufacturers continue to innovate to meet the growing demands and expectations of content creators and consumers within an already spectrum-constrained environment. PMSE equipment is close to the limit of what is technically and economically achievable given the performance demands of audio PMSE, e.g. high audio quality, and low latency.^[1] In addition to developments in equipment, users have developed their working methods and workflows to maximise the use of spectrum. Even with these innovations, today some events and productions are constrained by spectrum availability as events grow and become more sophisticated.

Manufacturers have developed Wireless Multichannel Audio Systems (WMAS) that leverage the benefits of multiple access communication techniques to support multiple audio channels within a single wideband RF channel. WMAS can deliver gains in spectrum use and workflow management to further increase the efficient use of spectrum by PMSE. It is important to highlight that while WMAS delivers efficiency gains it is not applicable to every event and production environment and narrowband systems will continue to be extensively used, including in large multi-channel events.

While innovation in the industry delivers efficiency gains in spectrum use, it also unlocks creative innovation which increases demand. This increased demand is shown clearly, and is supported by many studies, by the fact that the PMSE industry continues to grow as events and productions become more complex and sophisticated to satisfy consumer and audience expectations. Innovations in the industry (and a lot of hard work) allow these events to take place within the available spectrum, albeit recognising that in some cases even today some production ambitions are constrained by a lack of spectrum.

Consequently, even with continued innovation in technology, the industry would be severely impacted by further loss of spectrum access as shown in the impact analysis provided in Annex1.

In short – access to spectrum is the fundamental requirement for audio PMSE, and given the environment of use, this has to be below 2 GHz (as recognised by Ofcom in 2015 when consulting on new spectrum for audio PMSE).

The PMSE sector has demonstrated efficient spectrum use through both sharing and multiple deployments of the same frequencies within multiple adjacent locations for many years.

In addition, the PMSE sector has also already demonstrated significant increases in spectral efficiency and agility through the technological developments provided by the transition to digital systems or more efficient narrow-band analogue systems.

These developments have all enabled the sector to successfully adapt to the reduction in spectrum created by the 700MHz clearance, which demonstrates our proactive and pragmatic approach to accommodating previous changes in the spectrum landscape.

In broad terms, much of today's equipment can be deployed with over twice the number of channels per MHz than just over ten years ago.

Whilst all these developments are positive and help the sector to continue to operate, there are several key factors to highlight:

- **Regardless of these developments PMSE still requires access to sufficient quality and quantity of radio spectrum.**
- **Innovation alone cannot be relied upon to mitigate further loss of spectrum.**
- The recent announcements of WMAS-based systems further demonstrates the industry's commitment to finding innovative solutions.
- These developments allow multiple audio channels to share the same spectrum, which can increase spectrum efficiency.
- Latency, range, interoperability with existing narrowband equipment, price factors and international regulatory variances, all must be considered if we are to take a balanced view of its current benefits.

As demonstrated above, it is vital that regulators do not require or expect long-term solutions to be delivered solely by technological change.

[1] [Spectrum demand of professional wireless production tools \(PMSE\): Study report](#)

Development timelines

As an adjunct to the technological development insight above, there is a further significant factor to consider and that is the R&D cycles and timelines required by manufacturers to innovate and develop and a further time period required for the industry to adopt, invest and deploy new technologies as well. Using WMAS as an example, the initial regulatory discussions took place in 2013, and product development around six years ago, and by the time products are being shipped and utilised significantly, probably still a further one year from now.

With this in mind, the issues that are perceived as medium to long-term require short-term consideration to ensure sufficient development and deployment time.

6. Our stakeholders - regulatory, political, trade bodies, and industry.

Regulatory affairs for Radio Spectrum are managed by Ofcom and BEIRG has built and maintained a strong constructive dialogue with Ofcom, through several CEOs, Group Directors of Spectrum Policy, and the PMSE team.

- Through continuous, constructive engagements BEIRG has established a strong, well-recognised voice and seat at the table.

Political engagement - At key stages of the journey BEIRG, via its Political consultants, Ranelagh Political Communications, has engaged with dozens of Cabinet Ministers, MPs, and Civil Servants via DCMS, BIS/BEIS to ensure Westminster is fully briefed on the value of the creative industries sector (CIS) and acutely aware of the key contribution the PMSE sector makes to the CIS on an embedded, ubiquitous daily basis.

BEIRG recognises our core issues are complex in many ways and that our specific profile in the political field is limited, however, the impact of the pandemic and the activities of many campaign and action groups on a wide range of topics has significantly raised the profile and relevance of the cultural and creative industries and events sector. During the campaigns of organisations such as #WeMakeEvents, it became widely understood and recognised in Westminster that the cultural and creative industries and events sector represented over £70bn in UK value and was the 5th largest contributor to overall GDP.

- One of our key aims is to capitalise on this increased exposure by maintaining connections previously made and engaging with the broad cross-section of new MPs elected in the recent general election.

Trade bodies such as PLASA (Professional Lighting and Sound Association), ABTT (Association of British Theatre Technicians), APWPT (Association of Professional Wireless Production Technologies), IPS (Institute of Production Sound), WME (WeMakeEvents) have supported BEIRG's activities extensively and our future plans.

- We aim to create stronger, wider support for BEIRG and build closer connections with these and other associations to collate and deliver clear messages to their respective members.

Industry stakeholders – In the early stages of the campaign, our core stakeholders and funders were A-list West End theatre producers, larger rental companies, wireless microphone manufacturers, and key trade associations. Over the last decade, this list has grown in numbers in these categories as well as widening to include theatre owners/operators, and a broader base of manufacturers and rental companies.

- Our future plans aim to further widen the reach and quantity of stakeholders and their engagement and support.

Our aims set out above are vital to grow and broaden our profile and support because the impact of continued pressure on spectrum access, the potential further reduction of the quantity of available spectrum becomes ever more critical and no longer impacts a few manufacturers or suppliers – it affects and threatens the whole cultural and creative industries and events sector. The ubiquitous nature of wireless mics and links means that the whole cultural and creative industries and events sector is impacted – not just the manufacturer or suppliers, but the creative teams, the performers, the venues, the hospitality suppliers, and the audiences alike.

7. Impact Analysis

BEIRG have produced a 'Future audio PMSE spectrum availability impact analysis' report that forms Annex 1 to this document that will be used as a key study in engagement with Ofcom.

The scenarios above are modelled in our impact assessment in Annex 1.

BEIRG has adopted the same approach that Ofcom used in its assessment of the impact of the 700 MHz clearance.^[1]

In summary, we:

- identified several representative events, number of frequency assignments, and equipment used;
- applied an indicative spectrum availability profile for each event location consistent with the DTTB approaches identified by Ofcom;
- replanned the event against the new spectrum availability plots; and,
- assessed each event in terms of whether the assignment count has been met, and if not, whether changes to working practices and/or equipment choice can mitigate the loss of spectrum and meet demand.

Extract from: Consultation on future use of the 700 MHz band Cost-benefit analysis of changing its use to mobile services

8. Conclusion

To conclude, the content of this report is focussed on:

- Re-iterating and emphasising the relevance, scale and importance of PMSE.
- Demonstrating the need for a long-term spectrum solution for PMSE.
- Proactively engaging with the regulatory process.
- Challenging the pre-conceived dialogue that any further spectrum clearance or re-allocation should default to mobile.
- To introduce the scope for incumbent usage to take priority or equal place with allocations to new uses/applications.
- To demonstrate a range of scenarios and their potential impact on the PMSE sector.
- To demonstrate an industry willingness and engagement in helping forward-thinking innovative regulators find smart spectrum solutions for the future.

Annex 1

Future audio PMSE spectrum availability impact analysis

Background

The Public Mobile industry (International Mobile Telecommunication – IMT) is looking to secure yet another spectrum allocation in the UHF band, this time in the 600 MHz band (for the purposes of this analysis we consider this to be the band 614 to 694 MHz) within Europe and, more widely, ITU Region 1.⁷ As was clear from regulatory action following the successive repurposing of the 800 MHz and 700 MHz bands to IMT, Programme Making and Special Events (PMSE) applications are unable to coexist with IMT that is authorised on a nationwide basis.

The World Radio Conference 2023 (WRC-23) did not make a primary allocation to the Mobile Service in the 600 MHz band in Region 1, although a number of footnotes were agreed to allocate the band to the Mobile Service as a secondary allocation. However, Resolution 235 (WRC-23) has set a requirement to revisit this after WRC-27 which may lead to allocating the 600 MHz to Mobile (with a possible identification for IMT) as a primary allocation at WRC-31.

In addition to possible regulatory developments under a future WRC, the UK is separately considering the future use of the 470 to 694 MHz band for terrestrial TV broadcasting. In its report to Government on the Future of TV Distribution⁸, Ofcom identifies three broad approaches to the future of digital terrestrial television broadcasting (DTTB):

- Investment in a more efficient DTT service could accommodate all existing channels while requiring significantly less radio spectrum to broadcast. The remaining spectrum could then be put efficiently to other uses.
- Reduce DTT down to a core service to offer a small number of channels (such as the main PSB services and news channels) and reduce the number of DTT multiplexes. Reducing the number of multiplexes would allow spectrum to be allocated for alternative uses.
- Move towards DTT switch-off over the 2030s which would free the entire Ultra High Frequency (UHF) spectrum band currently used by DTT, for alternative uses.

In all scenarios, Ofcom is signalling the potential to reduce DTTB spectrum use and reallocate that spectrum to other services and applications. In the report, Ofcom highlights the potential to free up spectrum for wide-area mobile services in rural areas and deep indoor locations.

It is clear, therefore, that although the outcome from WRC-23 did not initiate a widespread reallocation of the 600 MHz band, future spectrum access for PMSE in the 470 to 694 MHz band is uncertain, both at a national and international level. To assess the potential impact of any reallocation of spectrum in the 470 to 694 MHz band, BEIRG has carried out a replan of representative events against three future spectrum availability scenarios that align with the approaches Ofcom identified in its report to Government on the Future of TV Distribution.

Methodology

⁷ Region 1 comprises Europe, Africa, the Commonwealth of Independent States, Mongolia, and the Middle East west of the Persian Gulf, including Iraq.

⁸ [Future of TV Distribution \(ofcom.org.uk\)](https://www.ofcom.gov.uk/consult/condocs/futureofdistribution/futureofdistribution.pdf)

BEIRG has adopted the same approach that Ofcom used in its assessment of the impact of the 700 MHz clearance.⁹ In summary, we:

- identified a number of representative events, number of frequency assignments, and equipment used;
- applied an indicative spectrum availability profile for each event location consistent with the DTTB approaches identified by Ofcom;
- replanned the event against the new spectrum availability plots; and,
- assessed each event in terms of whether the assignment count has been met, and if not, whether changes to working practices and/or equipment choice can mitigate the loss of spectrum and meet demand.

Scenarios and assumptions

Given the uncertainty of future spectrum availability for PMSE in the 470 to 694 MHz band, it is necessary to consider scenarios based on some general assumptions on future digital terrestrial television broadcasting alongside assumptions for a reallocation of the 600 MHz band for IMT.

The principal assumption is that the 600 MHz band is reallocated to IMT and cleared of DTTB and PMSE, i.e. that spectrum above 614 MHz is not available for use by DTTB or PMSE. This assumption aligns with the proposed allocation of spectrum to IMT as set out in various regulatory methods in the Conference Preparatory Report for agenda item 1.5 (WRC-23). Consistent with PMSE industry practice, it is also assumed that the use of any duplex gaps is not considered viable for the representative events studied, due to the risk of interference from adjacent mobile transmissions.

Against the above principal assumption, we have the DTTB scenarios given in Table 1:

Table 1: DTTB Scenarios

DTTB Scenario	Description of DTTB scenario
1	Maintain current DTTB service. The full suite of DTTB above 614 MHz is replanned below 606 MHz (noting that Channel 38 is allocated to PMSE under the UHF Shared Access licence so would likely not be used at a peak demand event due to the risk of uncoordinated PMSE use). This assumption is based on a typical 6-mux plan, i.e. six frequency channels are utilised by DTTB. However, based on Ofcom’s proposed approaches, a future 6-mux plan is unlikely.
2	Reduced DTTB. In this scenario, DTTB is reduced to a 3-mux plan. This scenario addresses both a reduction in DTTB programmes and/or an improvement in more efficient DTTB that provides the same number of programmes in fewer DTTB channels.
3 (Note:1)	Switch-off of DTTB. In this scenario, there is no DTTB provision in 470 to 606 MHz. While this scenario assumes all the spectrum is available for PMSE, this outcome is very unlikely. Far more likely is that the 470 to 606 MHz band would be made available for other use/applications. It is also uncertain, under this scenario, what would happen to PMSE use of Ch 38.

Note 1: A review of the 3GPP standardised frequency bands does not show a current reference to any band number related to the 500 MHz band other than Band 108 for standalone downlink only

⁹ Consultation on future use of the 700 MHz band Cost-benefit analysis of changing its use to mobile services

(SDO) across 470 to 698 MHz. SDO is identified for “LTE-based 5G terrestrial broadcast” and work is ongoing in 3GPP to develop the associated technical standards – SDO for broadcast can be considered equivalent to DTTB with regard to PMSE. There does not appear to be work underway to establish a standardised “IMT” channel arrangement below 606 MHz, nor is there work (internationally) looking at a potential reallocation of the 470 to 606 MHz band from the Broadcasting Service. It is therefore difficult to predict what alternative use might be made in this band in the future.

Spectrum availability for PMSE

PMSE accesses spectrum on a shared basis with incumbent users. The main spectrum resource is the 470 to 694 MHz band sharing with DTTB. In addition, to mitigate the loss of the 700 MHz band, Ofcom made spectrum available to PMSE in the 960 to 1154 MHz band, sharing with aeronautical services (this sharing arrangement is only available in the UK).

Because PMSE must protect the incumbent use, spectrum availability for PMSE varies by location, due either to a regulatory need to protect the incumbent DTT and aeronautical frequency arrangements across the country or because of interference from those incumbents to PMSE. It is worth noting that, in the UHF band, for indoor use of PMSE the whole band is available with the limitation being the potential interference from DTT into PMSE (this can be seen in the Eurovision Song Contest case study provided in the annex).

For each PMSE case study, an estimate of spectrum availability was made under the DTTB scenarios in Table 1. There are no changes in the 960 to 1154 MHz band, and spectrum availability here was taken from Ofcom’s PMSE spectrum planning portal.

In the examples given in Figures 1 to 3 below, DTTB channels in use have been taken from the Freeview Channel Checker.¹⁰ This provides information on the “most likely (DTTB) transmitter” and does not consider overlapping coverage areas, which may reduce PMSE spectrum availability even further, particularly for outdoor events. In the examples, Local TV assignments are included in the baseline but discounted in future scenarios. Where DTTB channels are within the 600 MHz band, these have been relocated below channel 38 in the same configuration as the baseline.

Figure 1: Example scenarios for Wembley (main DTT Transmitter: Crystal Palace)



¹⁰ Transmitter data from: [Freeview Channel Checker](#) | [Freeview](#)

Figure 2: Example scenarios for BBC Cardiff (main DTT Transmitter: Wenvoe)

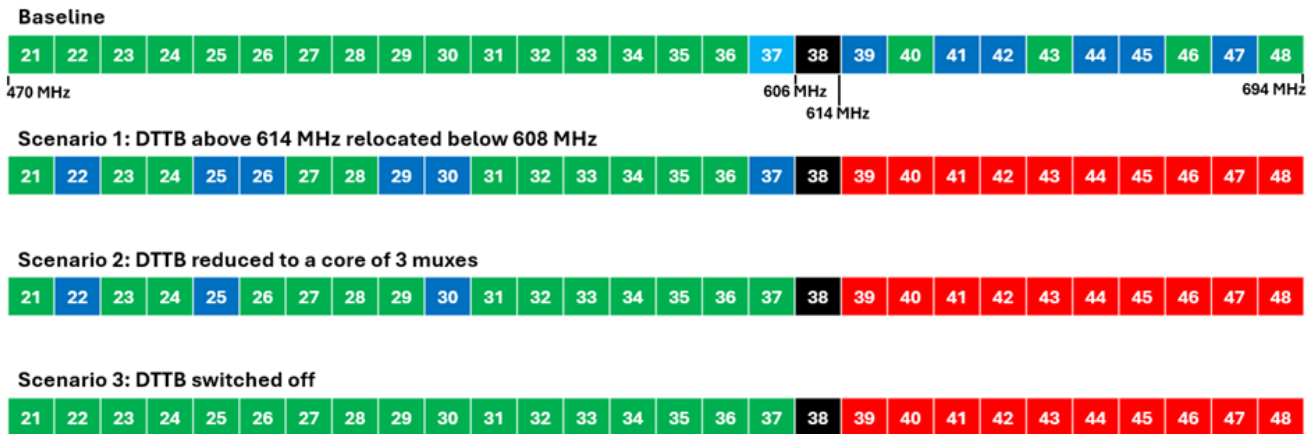
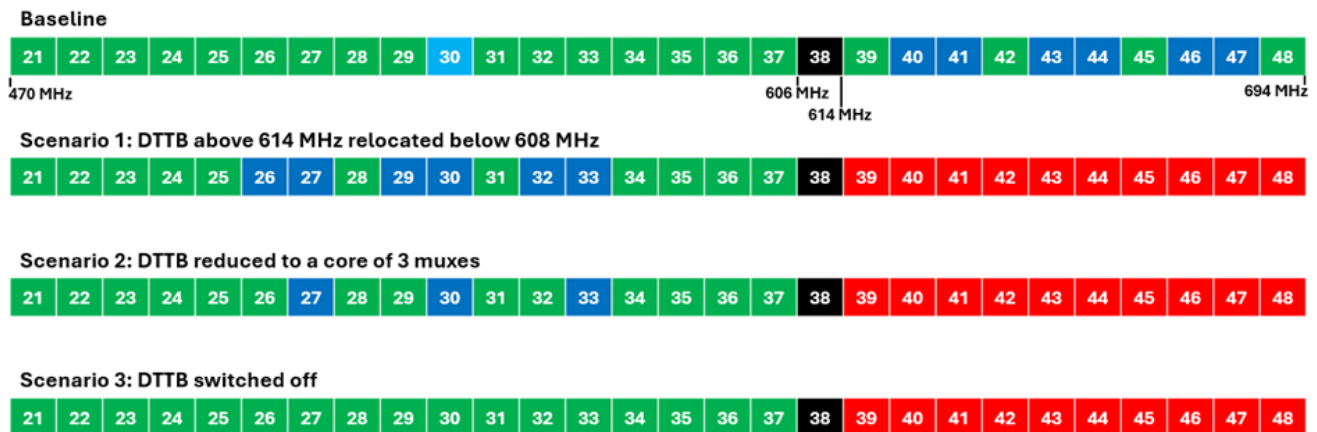


Figure 3: Example scenarios for BBC Glasgow (main DTT Transmitter: Black Hill)



Key

- Available for PMSE
- Ch38 UHF Shared licence
- DVB-T
- Local TV
- Mobile/IMT

In these examples, for each corresponding DTTB scenario, the amount of spectrum considered available for PMSE is the same at each location. This is a simplistic approach as it does not consider any overlapping DTTB coverage which will further reduce spectrum availability depending on location.

In re-planning the representative events, spectrum availability also considered information based on local knowledge of what spectrum was used at an event, for example, if PMSE was able to operate co-channel with DTTB then this assumption was made for the replanned event.

Classification of impact

To assess the impact on PMSE (from loss of access to spectrum) it is necessary to define an approach to classify the impact. The variables that apply to different events, such as types of equipment, number

of assignments, production and artistic innovation, etc. mean that it is not possible to meaningfully define an amount of spectrum for all events. Therefore, we have adopted the same classification process Ofcom used for its impact assessment of the 700 MHz clearance on PMSE.

In the replan, if a shortfall of spectrum was identified, we considered illustrative changes in equipment type and working practices to satisfy the demand e.g. using a microphone with a wider tuning range than that used by the event to allow other frequencies to be utilised. From this, we qualitatively assessed the impact this would have. We graded this assessment using Ofcom’s five-point scale:

Table 2: Classification of impact (Source: Ofcom)

Classification	Impact on equipment selection	Impact on working practices	Assignments
Minimal	None	None	Satisfied
Slight	The same equipment could be used, albeit in different frequency ranges	Some minor changes needed	Satisfied
Substantial	High-specification equipment needed if not already in use	Substantial changes needed	Satisfied
Severe	High-specification equipment needed if not already in use	Substantial changes needed	Some assignments lost (production quality reduced)
Critical	High-specification equipment needed if not already in use	Substantial changes needed	Significant loss of assignments; the event would no longer be viable in any recognisable form.

Representative PMSE events

The types of events that will experience the biggest impact will be those that have the greatest number of PMSE frequency assignments. These events generate the greatest cultural and economic value and are characterised by the number of audio channels deployed with a corresponding high spectrum demand. Even today, some peak demand events may already face challenges to be planned and delivered within existing spectrum availability.

We have identified a number of events for analysis. These case studies are representative of the range of PMSE use cases and are not extreme or unusual examples of a different nature to these day-to-day events and productions. For each event, the original spectrum planner/coordinator has taken the three DTTB scenarios and looked to replan the events against those scenarios.

Results

Table 3 summarises the outcome of the analysis. It can clearly be seen that the loss of the 600 MHz band, alongside a reallocation of DTTB to the 500 MHz band (below channel 38) has a critical impact on events and studios where there is a high concentration of PMSE activity. There simply is not enough spectrum available to deliver the event. It is highlighted that the assumptions for DTTB scenarios 1 and 2 are based on the best-case, i.e. no overlapping DTTB coverage is assumed, so the maximum amount of white space (spectrum not used by DTTB) is considered available for the replanning exercise.

Even in DTTB scenario 3, where all the 500 MHz band is considered available for PMSE, there is still a severe impact on many events, i.e. even with changes to equipment and working practices some assignments will be lost and the production quality, and hence the audiences' experience, is reduced. However, in the case of the Eurovision Song Contest, even with no DTTB in the 500 MHz band, the impact on the production of the event is assessed as 'critical', i.e. with the 600 MHz band reallocated to IMT and PMSE has access to the whole 500 MHz band, there would still be a significant loss of assignments. More detail on the ESC analysis is provided in the annex.

Table 3: Presentation of results example

Name of Event	Sector	Number of assignments	DTTB Scenario	Impact
King's Coronation (Windsor Castle)	State Event (Outdoors)	197	1	Critical
			2	Critical
			3	Severe
King's Coronation (Westminster Abbey)	State Event	64	1	Slight
			2	Slight
			3	Slight
Festival of Remembrance (Royal Albert Hall)	TV Show	118	1	Critical
			2	Critical
			3	Severe
	TV Show	90	1	Critical

The Voice (DOCK 10 Studios, Manchester)			2	Critical
			3	Severe
Strictly Come Dancing (Elstree Film Studio)	TV Show (Live)	104	1	Critical
			2	Critical
			3	Severe
BBC Proms (Royal Albert Hall)	TV Show and Radio Broadcast	>100	1	Critical
			2	Critical
			3	Severe
Major League Baseball (London Olympic Stadium)	Sports Event (Outdoors)	16	1	Slight
			2	Slight
			3	Slight
Eurovision Song Contest (M&S Bank Arena, Liverpool)	TV Show	191	1	Critical
			2	Critical
			3	Critical

Elstree Film Studio (Note 1)	Studio Complex	>200	1	Critical
			2	Critical
			3	Severe

BBC Elstree (Note 1)	Studio Complex	>100	1	Critical
			2	Critical
			3	Severe
Dock 10 Studios (Note 1)	Studio Complex	>80	1	Critical
			2	Critical
			3	Severe

Note 1: Due to the nature of use at studio complexes such as Dock 10 and Elstree, with multiple concurrent productions in the same location, independent of any individual event these locations are at least severely impacted (under DTTB Scenario 3) by loss of access to spectrum. Many of these locations already make extensive use of PMSE equipment that operates in the 960 MHz band to accommodate channel counts that today cannot be satisfied within the UHF band alone.

Consideration of the 960 MHz band

The 960 MHz band was made available to audio PMSE to mitigate the loss of the 700 MHz band and was not intended to account for further loss of access in the UHF band. Within studios, e.g. Elstree and Dock 10 and BBC, many fixed installations have migrated to the 960 MHz band to allow space in the UHF band to accommodate temporary events such as The Voice (and in the case of The Voice, 30 audio channels were already accommodated in the 960 MHz band).

In addition, as the 960 MHz band is a UK-only option for audio PMSE, there is limited incentive from industry stakeholders to invest in equipment for use in this band. This is partly because inbound production teams from outside the UK will not hold inventory of suitable equipment, but more significantly, existing UK teams and particularly rental suppliers are less likely to invest as their inventory has no potential rental market outside the UK. Consequently, there is little potential to offload a sufficient number of assignments from UHF to the 960 MHz band to make good the loss of the 600 MHz band.