Section 3 –Spectrum use by the PMSE sector in the UK **Question 1**: What are your views on how our processes work - for example our online booking system, turnaround times, and event coordination. Do you think the current approach works well? How could we improve it?	Confidential? – N Generally OK. PMSE within Ofcom are approachable and responsive. Online system is a little clunky (and when it failed, it failed BADLY) and it would be better if it followed the 'gov.uk' design template. It would be nice to be able to create 'favourites' of typical spectrum we'd book for typical events (i.e. a football match. General requirements are identical – it's only the location and KO time that varies). It would be nice to have API access to query what is available at given locations, and automate booking. To be fair – it is 2026! These things should be possible!!

## Section 4 – PMSE historic trends **Question 2**: Do you have any comments on how we have analysed and characterised wireless microphone and IEM demand, or suggestions for alternative ways of characterising this demand?	Confidential? – N Demand growth in coordinated assignments reflects: • Increasing production complexity • Higher expectations from audiences and rights holders • Greater use of in-ear monitoring • Larger casts and more technically ambitious staging The increase in coordinated assignments underlines the sector's reliance on interference-managed spectrum rather than licence-exempt alternatives. However, I would highlight one additional factor that may partially explain the slight decline in national Channel 38 and VHF shared licences: There remains limited awareness among some users that licences are required for operation of radio microphones and IEMs. Manufacturers do not consistently provide clear guidance at point of sale regarding licensing requirements. I strongly believe: • All manufacturers should include a simple information leaflet in every product • This should clearly state licensing requirements and how to apply • Industry bodies such as BEIRG could assist as an advice and guidance outlet Improved education would likely stabilise or increase legitimate licence uptake.
Question 3: Do you have any comments on how we have analysed and characterised wireless video demand, or suggestions for alternative ways of characterising wireless video demand?	Confidential? – N With spectrum demands as they are, rather than just selling 10MHz slots, 5MHz, 8MHz, 16MHz or 20MHz slots might be useful – especially for larger events. I appreciate this could complicate things for the majority of users, but most wireless video equipment is happy working on adjacent channels, and squeezing in an extra system is often useful.

	I understand it is still OfCom policy that 7GHz spectrum is 'recommended' for PMSE Video requirement – yet this spectrum is under review for IMT use… With further reviews on 2GHz use (satellite to phone use), if not careful – we could end up with no viable spectrum for PMSE video usage.
# Section 5 – Future trends and opportunities ## Wireless audio ### Drivers of demand **Question 4:** What factors have driven changes in the demand for audio PMSE applications, specifically for: a) the increased use of coordinated wireless microphones and IEMs, particularly the peak number of simultaneous assignments used at the largest events? b) the slight decline in the number of national wireless microphone licences (UHF channel 38 and VHF)? Has the extent of use of these licences changed, and if so why? c) the declines in talkback, fixed audio links and ADS licences?	Confidential? – N The key drivers of increased coordinated microphone and IEM use at major events are: • Larger productions with more contributors • More mobile presentation formats • Increased performer monitoring requirements • Redundancy planning (dual microphones, backup systems) • Audience expectations for high production value There is no evidence of inefficiency driving this growth. Production teams already plan spectrum carefully and reuse where possible. The slight decline in national shared licences may partly reflect: • Migration of some low-end use to licence-exempt bands • Reduced awareness of licensing requirements • Replacement of legacy VHF equipment Declines in talkback and fixed audio links appear driven by: • Migration to DECT systems • IP-based connectivity • Integrated digital production systems These changes reflect technology evolution rather than reduced need for reliable spectrum.
Question 5: What factors could drive further changes in the demand for audio PMSE applications in the future, and what will this mean for future demand, specifically for:	Confidential? – N Demand is expected to continue increasing due to: • Growth in live events • Immersive and reality programming

a) coordinated wireless microphones and IEMs, particularly the peak number of simultaneous assignments used at the largest events? b) national wireless microphone licences (UHF channel 38 and VHF)? c) talkback, fixed audio links and ADS licences?	• Increased technical complexity • Higher audience expectations • Growth in streaming and global distribution No production or broadcaster wishes to take a backwards step in quality. Technical delivery standards only increase over time. Working practices are already highly optimised. Further efficiency gains are likely to be incremental rather than transformational.
Question 6: Do you agree that, given the trends, we are right to focus on wireless microphones/IEMs?	Confidential? – N No, you should continue to focus on the full PMSE spectrum requirements. Concentrating on sub-sections allows focus to be taken from the wider picture of what the creative industries offer the UK. IMT industries have more resource and lobby groups available to divert attention. We are under-funded in this area – and not able to focus as much attention as possible on these areas – so your support is needed more than ever to protect our industry and allow us to continue making great shows/content for people to watch on their mobile phones!!

Changes in the take-up of bands already available **Question 7:** What factors have driven the take-up of different bands for wireless audio? What are the barriers to greater use of the DME band?	Confidential? – N Band selection is driven by: • Reliability • Propagation characteristics • Coverage performance • Equipment maturity • Regulatory certainty • International harmonisation UHF remains dominant because it provides the best balance of these characteristics and is harmonised across the UK and Europe. **DME band** The DME band has been an important supplementary resource. However, barriers include: • Limited international harmonisation • Aviation use • Restricted geographic availability • Reduced usable bandwidth in parts of the UK • Limited manufacturer product ecosystems (historically) Manufacturer response has varied: • Wisycom rapidly delivered DME-capable systems • Shure adapted existing AXIENT products for part of the band • Sennheiser initially declined to support DME due to focus on alternative technologies Wider adoption depends on regulatory certainty and international alignment.
Question 8: What actions could enable greater take-up of the DME, DECT and licence exempt bands in the future?	Confidential? – N Licence exempt frequencies fill Outside Broadcast people with dread. We are asked to provide 'reliable' equipment – but if we can't rely on the spectrum being available – or control the congestion, we are unable to provide our clients with what they require.

Changes in spectrum availability **Question 9:** Which potential additional bands might be suitable for wireless audio applications, particularly microphones and IEMs at the largest events and venues?	Confidential? – N Other bands are possible, but any/all changes require investment for research and development and commitment on the medium and longer term from the likes of OfCom to commit to keeping spectrum available. It wasn't that long around we were pushed to 7GHz (from 2GHz) for radiocamera requirements – and now we're being pushed from the remainder of the 2GHz band, and from 7GHz as well… Design takes time, and equipment cycles need to be managed with ever increasing CapEx costs. Clients will need to pay more for services, and their budgets (often defined by advertising – which is often restricted by OfCom) are dwindling. Ever-higher frequency bands requires more specialist equipment and more special engineering support to operate equipment on site. This leads to even more cost to the client. This increased cost needs to be covered – and there is no plan in consultations like this to address that.
Question 10: To what extent do the characteristics of different audio applications drive their requirements for spectrum – for example particular requirements for latency, resilience or capacity?	Confidential? – N Latency for audio is paramount. Feed your own voice into your ear – and then add latency to that feed – and see how much your brain can deal with, before you turn into a jabbering wreck!! I am happy to set up equipment to demonstrate this if required. Video must be timed with audio – it's very easy for the eye to detect when things are wrong, and tying everything up together is paramount to a clean production. Resilience is what we do for a living. There are examples of when broadcast feeds have failed (big screen work for example) and very quickly crowds of people get upset. What we provide in live broadcasting is vital to the public. It's essentially why public service broadcasting exists. It's partly why OfCom exists.

Changes in efficiency of spectrum use **Question 11:** What changes in spectrum use (technology, working practices, different bands, etc) have enabled audio wireless growth to be accommodated to date, particularly the increased use of wireless microphones and IEMs at the largest events and venues in the context of reduced UHF spectrum availability?	Confidential? – N Growth has been accommodated through: • More spectrally efficient digital systems • Improved tuning ranges • Advanced coordination tools • Introduction of the DME band However, large productions already operate near practical efficiency limits. Indoor high-density environments (e.g., film studios, theatre clusters) cannot replicate the spatial reuse possible at festivals like Glastonbury. The introduction of WMAS is promising but unproven at scale for broadcast-quality, low-latency, high-reliability applications.
Question 12: What technologies are currently available or are being developed which can improve audio spectrum efficiency in the future, particularly in the use of wireless microphones and IEMs at the largest events and venues?	Confidential? – N I am not aware of any 'new' technology on the horizon that will significantly reduce the required bandwidth for broadcast quality, low latency audio.
Question 13: Are there any barriers to adopting more efficient technologies for audio applications, particularly for wireless microphones and IEMs at the largest events and venues? What could industry do and what could Ofcom do to facilitate greater use of those technologies?	Confidential? – N Money / funding is always required. Technology advances are always possibly, but the cost vs return equation is getting harder and harder to justify.
Question 14: What changes to working practices and spectrum planning could improve audio spectrum efficiency in the future, particularly in the use of wireless microphones and IEMs at the largest events and venues?	Confidential? – N Large productions already operate with: • Professional spectrum coordinators • Detailed advance planning • Dynamic reuse where possible • Cross-production coordination Further efficiency gains are likely to be incremental.

	Working practices alone cannot offset significant reductions in available spectrum.
Question 15: Are there any barriers to adopting working practices that could enable more efficient use of spectrum by audio applications, particularly for wireless microphones and IEMs at the largest events and venues? What could industry do and what could Ofcom do to facilitate those efficiencies?	Confidential? – N Barriers include: • Cost of replacing installed equipment • Investment cycles • International touring requirements • Regulatory uncertainty • Performer requirements for specific equipment Ofcom can assist by: • Providing long-term certainty over UHF and DME availability • Supporting international harmonisation • Increasing on-site presence at major events • Supporting manufacturer engagement and education

Wireless video

Drivers of demand

Question 16: What factors (such as more complex events and use of higher resolution equipment) have driven the demand for wireless video bandwidth, in particular for:

a) the increased bandwidth required for the largest sporting events such as Formula 1 at Silverstone and The Open Championship?

b) the bandwidth required for nationally important state events such as The Coronation?

c) the slow growth or decline in bandwidth used at horse racing fixtures?

Confidential? – N

Wireless cameras have transitioned from niche "glory shot" tools to core production infrastructure.

Drivers include:

- Higher resolution (UHD, HDR)
- High frame rate and specialist systems (e.g., multi-phase or "TriMotion" systems requiring up to ~38 MHz per deployment)
- Health & safety (reduced cabling)
- Mobile presentation formats
- Increased use in immersive and reality programming
- Increased global distribution expectations

Formula 1 and The Open Championship reflect growth in sport popularity and global media value.

State events (e.g., The Coronation) demand maximum resilience, redundancy and coverage density.

Horse racing bandwidth reflects stable production models and tighter commercial budgets.

Question 17: What factors could drive further changes in the demand for wireless video bandwidth in the future, and what will this mean for future demand, in particular for:

a) the bandwidth required for the largest sporting events like Formula 1 at Silverstone and The Open Championship?
b) the bandwidth required for nationally important state events such as The Coronation?
c) the bandwidth used at horse racing fixtures and other major sporting events?

Confidential? – N

Future demand is likely to increase due to:

- Greater adoption of specialist RF cameras
- More shallow depth-of-field systems (often wireless)
- Increased use of high-speed cameras
- Reality programming requiring live video assist
- Increasing global distribution requirements

There is no realistic scenario where production standards regress.

Potential news bands **Question 18:** What factors have influenced the degree of take-up of existing bands used by wireless video applications, particularly the growth in take-up of the 7 GHz band?	Confidential? – N 7 GHz growth has been directly influenced by Ofcom policy positioning it as the preferred band for wireless video PMSE. Assignment growth in 7 GHz has been substantial, reflecting real operational reliance. However, WRC-27 Agenda Item 1.7 introduces uncertainty over 7 GHz availability. This creates significant investment risk.
Question 19: Which potential additional bands might be suitable for video PMSE applications, particularly at the largest events and venues?	Confidential? – N Ofcom has indicated this should consider *new* bands. While manufacturers can adapt, higher frequency bands: • Have inferior propagation • Require higher infrastructure density • Increase deployment cost • Increase power and antenna complexity • Increase engineering burden Development cycles are long. Clear medium- and long-term regulatory commitment would be required before industry invests.
Question 20: To what extent do the characteristics of different video applications drive their requirements for spectrum – for example particular requirements for resilience or capacity?	Confidential? – N Video PMSE requires: • Ultra-low latency • High reliability • Deterministic performance • Sufficient bandwidth for broadcast quality • Stable, protected access Unlike some mobile broadband applications, video PMSE is mission-critical and intolerant of interference.

Changes in efficiency of spectrum use **Question 21:** What technologies are currently available or are being developed which can improve wireless video spectrum efficiency in the future?	Confidential? – N Incremental improvements include: • Improved modulation schemes • HEVC and next-generation codecs • More spectrally efficient link budgets • Bi-directional data integration However, these improvements are evolutionary rather than transformational. There is no "silver bullet" technology that replaces the need for sufficient dedicated spectrum.
Question 22: Are there any barriers to adopting more efficient technologies for wireless video? What could industry do and what could Ofcom do to facilitate greater use of those technologies?	Confidential? – N Barriers include: • Equipment replacement cost • Client budget constraints • Long capital cycles • Regulatory uncertainty • International compatibility requirements Industry can invest — but only with spectrum certainty. Ofcom can support by: • Protecting 2 GHz and 7 GHz from IMT encroachment • Providing clarity on long-term access • Supporting UK positions at WRC-27
Question 23: What types of video demand could realistically be supported by private (for example 5G) networks?	Confidential? – N Private 5G may support: • Non-critical video assist • Data return paths • Some ENG applications However, it cannot currently replace: • High-quality broadcast RF camera links • Ultra-low latency live production links

	• Non-broadcast applications. Security and defence.
Question 24: What changes to working practices and spectrum planning could improve video spectrum efficiency in the future, particularly in the use of wireless microphones and IEMs at the largest events and venues?	Confidential? – N Video spectrum is already carefully managed: • Use of cabled cameras wherever practical • Spectrum reuse planning • Cross-provider coordination • Daily release of annual assignments where possible Further efficiency gains will be incremental. Working practice changes cannot compensate for substantial spectrum loss.
Question 25: Are there any barriers to adopting working practices that could enable more efficient use of spectrum by wireless video? What could industry do and what could Ofcom do to facilitate those efficiencies?	Confidential? – N Barriers include: • Capital investment • Equipment maturity • International harmonisation • Physical propagation limits Ofcom support through regulatory certainty is critical.

Other comments

Question 26: Do you have any other comments or views on the issues raised in this document?

Confidential? – N

The PMSE sector underpins:

- National cultural life
- Public service broadcasting
- International sports production
- State ceremonial events

It operates in the public interest.

Current uncertainty arises from:

- Potential DTT reconfiguration and UHF reallocation
- WRC-27 agenda items affecting 2 GHz and 7 GHz
- Increasing IMT pressures

The sector has already absorbed:

- 800 MHz clearance
- 700 MHz clearance
- Migration from 2 GHz to 7 GHz

Repeated forced migrations increase costs, reduce efficiency and introduce investment risk.

Spectrum policy should:

- Recognise PMSE as critical national infrastructure
- Provide long-term regulatory certainty
- Protect UHF, 2 GHz and 7 GHz access
- Avoid cumulative erosion across multiple bands

The UK's creative industries are globally competitive. Their ability to deliver world-class content depends directly on secure access to appropriate RF spectrum.

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