Your response

Question	Your response
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 The process for applying and renewing existing PMSE licnse is generally straightforward and easy to use.
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 No comments
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 No comments

Question	Your response
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 Increased use of wireless IEM, instruments and backup channels for critical artists/performers Utilisation of non-licensed bands and ISM frequencies for smaller users/productions. Lack of awareness of license requirements amongst non-professional users. Using IEM/microphone channels as part of an integrated solution.
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: 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)?	Confidential? – N Increase demand, particularly for IEM, will drive channel counts across all production types. Channel 38 is the already widely in use and has full geographic coverage. Users and hire companies generally have this well resourced although channel counts can be limited.

Question	Your response
c) talkback, fixed audio links and ADS licences?	
Question 6: Do you agree that, given the trends, we are right to focus on wireless microphones/IEMs?	Confidential? – N Yes
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 Channel 38 and 823-832 are well understood for mics/IEM and have few complex restrictions. DME has complex geographic restrictions and equipment is less readily available,
Question 8: What actions could enable greater take-up of the DME, DECT and licence exempt bands in the future?	Confidential? – N Work to remove the geographic restrictions, be clear the bands are available in the standard PMSE license. License exempt is unlikely to be used in professional scenarios due to potential other uses nearby.
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 The 1350-1400 Mhz band may be suitable and is already supported by major wireless manufacturers. Higher bands suffer from limited range/reliability in medium/large venues.
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 The combination of digital wireless mics and IEM drive a requirement for low latency. End-to-end latency in excess of 5ms can start to cause problem for performers. High profile events also drive the requirements of capacity and resilience – live events can't suffer interruptions.

Question	Your response
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 Introduction of digital technologies with improved linearity allowing intermodulation free operation has improved capacity of narrowband solutions. WMAS will further enhance solutions but is not currently available to many users as will require investment in all new equipment.
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 WMAS solutions appear to be the major development in this area.
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 The primary factor is cost in having to replace working and well understood equipment with new technologies. We are dependent on technology lifecycles to update equipment unless a mandated change is required.
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 No comments
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	Confidential? – N No comments

Question	Your response
Ofcom do to facilitate those efficiencies?	
## 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 No comments
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?	Confidential? – N No comments

Question	Your response
c) the bandwidth used at horse racing fixtures and other major sporting events?	
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 No comments
Question 19: Which potential additional bands might be suitable for video PMSE applications, particularly at the largest events and venues?	Confidential? – N No comments
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 No comments
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? – Y / N
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 No comments

Question	Your response
Question 23: What types of video demand could realistically be supported by private (for example 5G) networks?	Confidential? – N No comments
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 No comments
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 No comments
Other comments **Question 26:** Do you have any other comments or views on the issues raised in this document?	Confidential? – N No comments

Please tell us how you came across about this consultation.

- ☐ Email from Ofcom
- ☒ Saw it on social media
- ☐ Found it on Ofcom's website
- ☐ Found it on another website
- ☐ Heard about it on TV or radio
- ☐ Read about it in a newspaper or magazine
- ☐ Heard about it at an event
- ☐ Somebody told me or shared it with me
- ☐ Other (please specify)

Please complete this form in full and return to liz.hall@ofcom.org.uk.