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, turna-round times, and event coordination. Do you think the current approach works well? How could we improve it?	Confidential? – Y / N
### Section 4 – PMSE historic trends **Question 2**: Do you have any com-ments on how we have analysed and characterised wireless microphone and IEM demand, or suggestions for alternative ways of characterising this demand?	Confidential? – Y / N
Question 3: Do you have any com-ments on how we have analysed and characterised wireless video demand, or suggestions for alternative ways of characterising wireless video demand?	Confidential? – Y / N

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

a) Increased use of coordinated wireless microphones and IEMs

ITN has experienced sustained demand for coordinated wireless microphones and IEMs driven by:

- The growth in **live and near-live news output**, including extended programmes, special political coverage, and ad-hoc breaking news.
- Increased use of **presenter-led and discussion-based formats**, requiring multiple simultaneous microphones and IEMs in studio environments.
- The need to support **resilience and redundancy**, particularly for live news, where wired alternatives are operationally impractical.

Demand is typically **peaked**, geographically concentrated, and time-critical, particularly during major national events.

b) Decline in national wireless microphone licences (Channel 38 / VHF)

While ITN retains national licences, overall use has been influenced by:

- Increased congestion and coordination complexity.
- Partial migration to **shared and licence-exempt bands** where feasible.
- Greater reliance on **site-specific coordinated assignments** rather than blanket national coverage.

This reflects optimisation rather than reduced operational need.

c) Declines in talkback, fixed audio links and ADS licences

Reductions are largely attributable to:

- Migration of crew communications to **DECT-based systems**.

Question	Your response
	• Greater use of **IP-based audio transport** within fixed facilities. These changes have improved efficiency but have **not reduced reliance on PMSE spectrum for microphones and IEMs**.
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)? c) talkback, fixed audio links and ADS licences?	Confidential? – N Looking ahead, ITN expects: • **Sustained or increased peak demand** for wireless microphones and IEMs, driven by live news complexity and audience expectations. • Continued need for **national and regional flexibility**, particularly for fast-moving news events. • Limited further reduction in legacy systems; most achievable efficiency gains have already been realised. Any further reduction in UHF availability would therefore have a **direct operational impact**, rather than being absorbed by efficiency improvements.
Question 6: Do you agree that, given the trends, we are right to focus on wireless microphones/IEMs?	Confidential? – N ITN agrees with Ofcom's focus on wireless microphones and IEMs, we also think that that there should be some focus on DECT systems due to their use expanding widely. These applications are: • The **most spectrum-dependent** elements of PMSE audio. • Least able to tolerate interference, latency, or loss of predictability. • Fundamental to **Public Service Broadcasting**, particularly live news.

Question	Your response
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 ITN has adopted a **multi-band strategy**, including UHF, DECT, and licence-exempt spectrum. However: • **UHF remains irreplaceable** for many use cases due to propagation, reliability, and coordination characteristics. • The **DME band presents practical barriers**, including equipment availability, coordination complexity, and operational unfamiliarity for news production workflows.
Question 8: What actions could enable greater take-up of the DME, DECT and licence exempt bands in the future?	Confidential? –N Greater take-up could be enabled by: • Regulatory certainty and protection of **existing licence-exempt bands**. • Clear guidance and coordination frameworks for alternative bands. • Recognition that these bands **supplement rather than replace** UHF PMSE.
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 Any additional bands for wireless audio should: • Offer predictable availability. • Support low-latency, low-interference operation. • Be internationally harmonised to support equipment ecosystems. ITN notes industry concerns that **future reallocation decisions must not assume functional equivalence with UHF.** DECT systems have significantly less range than for UHF.
Question 10: To what extent do the characteristics of different audio applications drive their requirements for	Confidential? – N Different audio applications have distinct requirements:

Question	Your response
spectrum – for example particular requirements for latency, resilience or capacity?	• **Wireless microphones and IEMs** require ultra-low latency, high reliability, and predictable RF behaviour. • These requirements are **not consistently met** in higher-frequency or heavily shared bands, particularly in dense production environments.
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 ITN has already implemented: • Migration of crew comms to **DECT**. • Selective use of **2.4 GHz systems**. • Improved coordination and spectrum planning. These measures have enabled continued operation but **represent the practical limit of efficiency gains** without compromising resilience.
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 Incremental improvements may arise from: • Enhanced digital modulation. • Improved coordination tools. However, such developments **cannot offset significant reductions in spectrum availability**.
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 Barriers include: • Equipment cost and replacement cycles. • Training and operational risk. • Compatibility with existing workflows and third-party suppliers. Ofcom can assist by providing **long-term certainty** to support investment decisions.

Question	Your response
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 Further gains may be achieved through: • Earlier engagement between regulators and PMSE users. • Improved cross-sector coordination at high-demand events. However, working practice changes **cannot compensate for loss of core 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 Key barriers include: • Time-critical nature of live news. • Limited tolerance for experimentation in PSB environments. • Dependence on multi-party coordination. Industry and Ofcom collaboration is essential, but **regulatory stability remains the primary enabler**.

Question	Your response
## 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 Demand for wireless video bandwidth is primarily driven by **event complexity, camera density, and operational resilience requirements**, rather than resolution alone. b) For nationally important state events, demand is driven by: • Exceptional resilience requirements. • Increased use of multiple discrete camera positions. • Strong expectations of uninterrupted broadcast delivery under challenging RF conditions. • Continuity of coverage from remote camera positions to the receiving OB obstructed either by physical barrier or health and safety concerns.
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 changes in demand are more likely to be driven by **operational expectations and deployment patterns** than by resolution or codec evolution alone. b) For state events, demand will remain episodic but high, with: • Continued emphasis on predictable, coordinated PMSE spectrum access. • Limited tolerance for congestion or performance variability.

Question	Your response
Potential new 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 Take-up of wireless video bands has been influenced by: • Congestion and limited availability in traditional lower PMSE bands. • Equipment availability and vendor support. • Propagation characteristics and site-specific deployment constraints. Growth in higher bands such as 7 GHz reflects pressure on lower bands, but: • Range limitations. • Increased sensitivity to obstructions. • Greater dependence on antenna height and line-of-sight mean such bands are not universally suitable for all PMSE use cases.
Question 19: Which potential additional bands might be suitable for video PMSE applications, particularly at the largest events and venues?	Confidential? – N Any additional bands suitable for video PMSE should: • Offer sufficient contiguous bandwidth. • Allow coordinated, temporary use. • Provide predictable availability and protection from interference. • Be aligned with international harmonisation to support equipment ecosystems. Mid-band spectrum that supports managed, licensed use is preferable to licence-exempt bands for critical broadcast operations.
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 applications are strongly driven by: • Very low latency requirements. • High resilience and predictability. • Tolerance to congestion and interference.

Question	Your response
	News and state event applications prioritise reliability over spectral efficiency. These requirements cannot be consistently met in heavily shared, licence-exempt, or best-effort spectrum environments.
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 Efficiency improvements include: • More advanced modulation and coding schemes. • Improved video compression. • Hybrid RF/IP workflows combining wireless video with managed IP backhaul. However, in practice, gains are often offset by: • Increased redundancy requirements. • Higher reliability expectations. • Operational risk management at live events.
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 Key barriers include: • High capital cost and long equipment replacement cycles. • Interoperability challenges with existing RF systems. • Operational risk associated with deploying less mature technologies at high-profile live events. Industry adoption would be supported by: • Long-term regulatory certainty. • Clear spectrum roadmaps. • Stability in PMSE band availability to justify investment.
Question 23: What types of video demand could realistically be supported by private (for example 5G) networks?	ITN's experience from multiple **Private 5G trials and live operational deployments**, including major public events, demonstrates that private 5G networks can support a

Question	Your response
	defined subset of video production workflows, particularly when deployed with **appropriate spectrum access, notably the N40 band**. Private 5G networks are best suited to **non-critical or semi-critical video workflows**, where performance can be actively managed and dimensioned. These include: • **Roaming ENG and secondary camera feeds**, particularly in locations where public cellular networks are congested or unreliable. • **Supplementary live contribution paths**, operated in parallel with PMSE RF or satellite as part of a resilient multi-path strategy. • **Temporary production compounds and pop-up sites**, including large public events, where a closed network provides predictable performance compared to public mobile networks. • **Multi-camera IP workflows** using encoder systems (e.g. Haivision camera backs), where bandwidth, latency, and device access can be controlled. Live deployments (notably New Year's Eve coverage) demonstrated that **Private 5G networks are resilient to public-network saturation**, successfully supporting multiple concurrent video feeds and additional connected devices when public 4G/5G services became unusable due to crowd density. This was achieved through the use of a **stand-alone, closed network**, unaffected by consumer traffic, and required only local power and basic backhaul integration. **Role of the N40 band** Access to the **N40 band (2.3–2.4 GHz)** is a critical enabler for effective Private 5G use in broadcast environments: • N40 offers **favourable propagation characteristics** for temporary event deployments, particularly in urban and crowded environments, compared to higher-frequency bands. • The band aligns well with existing PMSE operational practices, antenna strategies, and site layouts.

Question	Your response

	• In ITN trials, N40 demonstrated **robust uplink performance**, supporting multiple camera feeds within a managed bandwidth envelope, and proved especially relevant for press and broadcast use cases.
	• Greater access to N40 bandwidth would allow:
	  ○ Support for **more simultaneous camera feeds**.
	  ○ Improved flexibility in bitrate and resilience planning.
	  ○ Reduced reliance on aggressive contention management.
	  ○ More consistent performance across dynamic event conditions.
	Limited access to N40 spectrum directly constrains the scale at which Private 5G can be used for video, as available bandwidth defines the number of viable concurrent video paths. Expanded and more flexible access to N40 would therefore **materially improve the operational value of Private 5G for broadcast and PMSE-adjacent workflows**.
	Limitations of Private 5G
	ITN's operational experience also highlights clear limits:
	• Performance remains sensitive to **antenna height, line-of-sight, and crowd behaviour**, particularly in dense public environments.
	• Bandwidth remains **finite and shared**, requiring active engineering and device management.
	• Licensing constraints can limit channel size, directly restricting camera count and quality.
	• Deployment requires **specialist planning and engineering**, making it less suitable for unplanned, ultra-short-notice breaking news in some scenarios.
	As a result, **Private 5G does not replace PMSE RF video** for use cases requiring:
	• Deterministic, ultra-low latency.
	• Guaranteed and protected spectrum access.

Question	Your response
	• High resilience under rapidly changing RF conditions. • Predictable performance for **primary camera paths** at major news, sporting, and state events. **Conclusion** ITN therefore views Private 5G—particularly when supported by **adequate access to the N40 band**—as a **complementary technology** that can: • Augment PMSE workflows. • Reduce dependence on congested public cellular networks. • Enable scalable IP-based production in managed environments. However, PMSE RF video remains essential for **mission-critical broadcast applications**, where public value, reliability, and operational certainty are paramount. Expanded access to N40 would significantly enhance the usefulness of Private 5G, but **cannot substitute for the continued availability and protection of PMSE spectrum**.
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 Efficiency could be improved through: • Earlier engagement between PMSE users, event organisers, and Ofcom. • Clearer event-led spectrum planning. • Improved coordination across broadcasters and OB providers. Such measures can improve utilisation but **cannot substitute for sufficient core spectrum availability**.
Question 25: Are there any barriers to adopting working practices that could enable more efficient use of spectrum	Confidential? – N Barriers include: • The time-critical nature of live news production.

Question	Your response
by wireless video? What could industry do and what could Ofcom do to facilitate those efficiencies?	• Limited tolerance for experimentation in Public Service Broadcasting environments. • Fragmented responsibilities across multiple stakeholders at major events. Further efficiencies depend primarily on: • Regulatory stability. • Continued protection of incumbent PMSE use. • Structured, Ofcom-facilitated coordination at high-demand events.

Other comments

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

Confidential? – N

ITN welcomes the opportunity to respond to Ofcom's Call for Input on the future spectrum needs of the PMSE sector. As a major Public Service Broadcasting (PSB) news provider, ITN's operations are critically dependent on reliable, predictable, and sufficient access to PMSE spectrum to deliver live news, current affairs, and nationally significant events.

ITN operates multiple broadcast studios and undertakes extensive field-based production, including breaking news, elections, major political events, state occasions, and special OBs. These activities rely heavily on **wireless microphones and in-ear monitors (IEMs)** operating primarily in **UHF spectrum**, supplemented by **DECT and licence-exempt bands**, which are now essential rather than optional components of our operational model.

While ITN has actively adopted more spectrum-efficient working practices and alternative technologies—such as migrating crew communications to **DECT at 1.8–1.9 GHz** and selective use of **2.4 GHz ISM systems**—these solutions **do not replace the unique propagation, reliability, and latency characteristics of UHF PMSE spectrum**, particularly in dense RF environments such as studios and complex live events.

ITN is therefore concerned that ongoing and potential future changes to spectrum availability—driven by **DTT policy decisions**, **CEPT work on flexible use of the 470–694 MHz band**, and **WRC-27 agenda items affecting 2 GHz and 7 GHz bands**—risk incrementally eroding the spectrum base upon which PMSE operations depend. Any reduction in access, or increased uncertainty over future availability, would directly impact the resilience and quality of PSB news output

In particular, ITN emphasises the following points:

- **UHF PMSE spectrum remains strategically critical** for live broadcasting and cannot be substituted at scale without significant cost, operational risk, and loss of resilience.
- **Licence-exempt and shared bands are already heavily relied upon**, and any degradation of these bands—through new services such as direct-to-device satellite or increased congestion—

Question	Your response
	would have disproportionate operational consequences. • **Transition timelines must be realistic and coordinated**, aligned with equipment life cycles, international harmonisation, and the operational realities of live news production. • **Public value considerations**—including democratic accountability, emergency communications, and cultural output—must be explicitly factored into spectrum policy decisions affecting PMSE. ITN strongly supports Ofcom's focus on wireless microphones and IEMs and agrees that they should remain a priority within future PMSE spectrum policy. However, this must be underpinned by **long-term regulatory certainty**, continued protection of incumbent PMSE use, and meaningful engagement with broadcasters and production companies ahead of any reallocation or secondary use decisions. Finally, ITN echoes the view expressed at the BBC PMSE Regulatory Issues meeting that it is essential for **individual organisations across the creative industries to submit their own responses**, ensuring that Ofcom fully understands the cumulative and sector-wide impact of spectrum loss on PMSE and Public Service Broadcasting.

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