**PMSE Perspective - Ireland**

I am only qualified to speak on RTÉ's approach to PMSE and current use of the UHF Band. Many of the workflows and challenges will be similar to what is experienced by other users in the country and throughout ITU Region 1.

In Ireland there is no representative body of user's co-ordinating or sharing information about PMSE. The setting up of such a group was recently put to the Communications Regulator by RTÉ as part of a submission on a draft Radio Spectrum Management Strategy. Many production teams who work in TV and Radio Broadcasting, Entertainment and Cultural Sectors know one another and routinely meet when covering certain events together. Some maintain contact through social media. This is often the only way of catching up and sharing knowledge and would benefit from a more formal structured approach. The profile of PMSE has been raised in Ireland as it has been throughout Europe and it is now clear to all concerned that PMSE Devices are not just associated with Broadcasting and Film Production. There is an understanding that often hundreds of devices are used concurrently at Concerts, Corporate Events, Museums, Civic Buildings and Theatres.

2RN is the DTT Operator in Ireland with whom RTÉ enjoys very positive engagement. We also have a good working relationship with the Communications Regulator: ComReg. Following EC Decision 2017/899 (published 17th May 2017), RTÉ vacated the 700MHz space of Audio PMSE six months ahead of the regulatory deadline of June 2020. Our Technical and Financial Planning began for this in 2015. The 700MHz Multiband Spectrum Auctions were delayed in Ireland and limited use for PMSE is permitted in the 700MHz Band. We took the view that Professional Broadcast PMSE equipment should not utilise licence exempt frequencies and that Duplex gaps are a limitation to PMSE already classified as a secondary user. RTÉ decided that 470 to 694MHz would be our new operating space for PMSE as there was too much ambiguity about some of the repurposing of the 700MHz Band and when that might happen. This turned out a prudent approach on a number of fronts including the subsequent release of the 700MHz Band for Emergency Communication Services for additional 4G/5G Broadband during Covid which was unforeseen in the world at the time. In Ireland, the temporary emergency licences granted are due to expire on 1st April 2022. During the period of the Pandemic, both the Regulator and all associated MNO's have published reports showing the massive growth rate in Data Traffic and Voice Traffic during lockdowns while the shift took place to working from home.

In Ireland spectrum is made available for PMSE following a licence application to ComReg. Each device, whether an In Ear Monitor, a Bodypack Transmitter or a Handheld Radio for Vocal Performances/Interviews is licensed at a cost of €12 per device. An additional €12 admin fee applies for the overall application which is an online based system. Licences are valid for only 6 months in a specific location. For ease of operation, we have aligned our PMSE licensing period with the calendar. Considering a DTT Channel Block of 8 MHz in a fixed Studio environment, we know which Channels to avoid and allow a 200 kHz guard band either side. As part of our PMSE Frequency Planning, we avoid DTT Blocks planned for future use. In the Studio environment we have identified many known causes of interference so we removed them or worked around them. We have also discovered some unknowns that have proved impossible to trace so we avoid those frequencies. Currently we have 188 UHF PMSE devices on the Studio campus operating in the permitted space from 470MHz to 694MHz. In a major compliance project in 2018/19 to clear the 700MHz Band, we opted entirely for Digital Radio Mic kit.

Primarily, this was for spectral efficiency reasons and has proven to be the right decision for us. Our In Ear Monitor Systems are Analogue until such time as manufacturers can reduce latency in Digital IEM offerings. The Analogue IEMs present a significant challenge as they require specific non linear spacing characteristics plus they create intermod products that fall elsewhere in the UHF space. Those artefacts effectively sterilise otherwise usable spectrum and we avoid them. As a rule, we have located all IEMs in the upper part of the 600MHz spectrum but due to congestion can only do so with an 8MHz gap from the nearest Radio Mic frequency. Although this meets best practice, it would have been preferable for more separation, but space is already tight and we are not the only users of the UHF Band. Our IEMs are used for Performers but also for Talent Talkback. There is heavy dependence on these channels as they are very often used for Legal and Editorial Guidance Live, On-Air, direct to Presenters/Newscasters. Our overall Studio Talkback System for Production Crews is DECT based, so at least that keeps it clear of the UHF Band. Try as we might, we cannot prevent Talent from passing through studios, taking short cuts to Make Up and Costume Departments or Dressing Rooms. We had to factor this in to our master frequency plan devised in 2019. As a result, this ensures Talent do not cause or receive momentary interference if a particular studio is in rehearsal mode and they are wearing their Radio Mic and IEM packs while passing through. We find this to be the most effective deployment in our working environment.

Like many countries, Ireland routinely hosts large high profile events such as Political and State Visits, Festivals, indoor and outdoor Concerts, major Sporting and Cultural events and Tournaments. These can be specific to one location or nomadic depending on the nature of the event. In particular this poses significant challenges for Outside Broadcast Operators. The available channels for PMSE change as events move location within Ireland depending on DTT priority in a given area.Once again in these situations, all bands of permitted spectrum from 470MHz to 694MHz are routinely used due to channel spacing parameters and for the avoidance of known localised interference. This requires the use of premium and expensive kit that can tune within a very wide range.

We have seen an extraordinary growth of around 30% since 2012 in demand for “everything wireless” in modern production workflows. Additional focus on public Health and Safety concerns has also been a catalyst given that RF devices are wireless by their very nature and as such dramatically reduce trip hazards. Wireless devices also reduce rig times, crewing and hardware costs as we move away from the complexities of running cabled copper connectivity. We routinely use wireless feeds to PA Systems for special events mainly to avoid putting in time consuming cable runs for a temporary event which are also time consuming to take out after the event. *ECC Report 323 – Spectrum Use and Future Spectrum Requirements for PMSE* – Feb 2021, showed growth of 32% over a 5 year period in demand for PMSE devices. When assessing the figures in this robust report, it is vital to take cognisance of the fact that data was gathered from 2014 to 2019. The UHF Band in Region 1 at that time spanned from 470MHz to 790MHz but the extra wireless traffic was just about accommodated. Strong demand and future growth is expected to continue despite the loss of 96MHz post clearance of the 700MHz Band. It was one matter accommodating such growth within a 320MHz space but emphasis needs to be put on how such growth could potentially be accommodated in the now reduced 224MHZ of space which is also occupied by DTT (Primary user) and others who had to relocate below 700MHz in addition to PMSE.

Any reduction or re-purposing of spectrum creates congestion when all parties are impacted whether of primary or secondary status. I believe the ECC Report will be a very useful reference document and that we should utilise its contents to show just how crowded the UHF space already is sub 694MHz.

It is not uncommon for us to utilise 110 channels of PMSE concurrently Live On Air in adjacent Studios on a given day. This would represent a combination of Bodypack Transmitters, Handhelds and IEMs. Content Creators and Producers have become very used to stable RF based equipment and its reliability. Much of the content produced in Live settings is unrepeatable or intolerant to RF disturbances. Apart from Performance related frequencies there is a significant requirement for reliable spectrum associated with crowd control, security and medical services at major events. Though Video PMSE operates outside of the UHF band, its presence can impact on Audio PMSE channel availability. Typically Wireless Cameras utilise UHF spectrum for Wireless Telemetry of exposure, zoom and focus control.

During the Pandemic and major weather events, terrestrial Broadcasting has remained the "go to" most reliable and stable platform that did not suffer in any way during peak demands. We expect in Ireland that this technology will be in place in the UHF band until at least 2031. DTT is licensed to December 2031 and significant investment was made to migrate out of the 700MHz band. It works well when managed appropriately with PMSE and we know the technologies can coexist. Current DTT delivery technology is the most energy efficient way to deliver high quality broadcast content which is of significant importance in an era of climate change and heightened awareness around energy consumption. For PMSE, UHFs' in-building penetration and ability to transmit successfully within Production Sets and on Stages is widely known and used in confidence daily. There is currently no appetite to investigate alternative technology or frequency bands. All of us in Region 1 have been through this twice in the last 10 years with Digital Dividend 1 and Digital Dividend 2. It may differ in other countries but no PMSE users in Ireland forced to re-equip for compliance reasons received any external funding. Shortages in PMSE spectrum are becoming apparent in specific high usage situations (e.g. TV Studios) due to the combined effect of increased demand with reduced access to UHF spectrum.

There is much talk of future consumption methods. Regardless of how modern content is consumed now or in the future, the vast majority of it is originated in the first instance utilising wireless UHF PMSE equipment. This is highly dependent on access to adequate clean UHF Spectrum from the very beginning of the production process. The Regulated permitted occupancy of 200 kHz for PMSE devices can often be misleading. We know this does not mean that 5 devices can operate contiguously in a 1MHz space nor does it imply 40 devices can operate within a typical 8MHz Spectrum Block. This point is often missed and I believe we could all play a part in emphasising it to the appropriate authorities. Many years ago I attended a Spectrum Management Conference hosted by Ofcom. One key take away that keeps coming back to me was on the subject of licensing. If we know of any operators running PMSE kit unlicensed, then it is in all our interests to encourage them to licence it. Apart from the obligatory compliance element, it also puts down a historic marker that such an amount of spectrum is required. In future battles to save our spectrum it will be very useful to look back on what was required at a given time and a licensing record will help enormously in this situation.

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RTÉ is a member of EBU and APWPT. We routinely submit responses to calls for input from the National Regulator and engage at CEPT and ITU Level in order to accurately monitor international regulations and potential changes. We are one of many institutions formally on record advocating for a “no change” in the 470 - 694 MHz usage in regard to Agenda Item 1.5 at WRC’23 as we attempt to play our part in the protection of UHF-spectrum for Broadcasting and Culture.

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