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Sennheiser response to the RSPG consultation:
Opinion on the strategy on the future use of the frequency band 470-694 MHz beyond 2030 in the EU

Sennheiser electronic GmbH & Co. KG welcomes the opportunity to provide feedback on RSPG's draft opinion on the strategy on the future usen of the frequency band 470—694 MHz beyond 2030 in the European Union (EU). We fully recognise the importance of the RSPG's Opinions in advising the European Commission and in helping to map out the longer-term spectrum management strategy of the EU.

About Sennheiser

At Sennheiser, we aim to shape the future of audio by creating unique sound experiences for our customers. As a third-generation family-run business, we are equally proud of our over 75-year history and past accomplishments and innovations in the world of audio and of our ambition to shape its future.

Sennheiser electronic GmbH & Co. KG, headquartered in Wedemark (Germany), is the leading European manufacturer for professional audio solutions such as microphones, meeting solutions, streaming technologies, and monitoring systems. The business with consumer devices such as headphones, soundbars and speech-enhanced hearables is operated by Sonova Holding AG under the license of Sennheiser.

The economic importance of the Cultural and Creative Industries

The cultural and creative industries (CCI) are recognised as one of the most dynamic economic sectors, essential for cultural diversity, strengthens social cohesion and increases Europe's attractiveness internationally.[1] Studies consistently show the scale of the value of the CCIs to the EU. For example, a 2021 study by EY noted that in 2019 (before COVID-19), CCIs represented 4.4% of EU GDP in terms of turnover, with annual revenues of €643 billion and a total added value of €253 billion, employing more than 7.6 million people.[2]

The European Commission study on "The situation of theatres in the EU Member States" (published in 2022), highlighted that on its own the Performing Arts sub-sector had the strongest growth among all CCI sub-sectors between 2013 and 2017 of 8.6% CAGR, reaching EUR 44,7 billion in 2017.[3] In addition, the study presents the view that theatre and the performing arts:

- Fosters democracy by enabling citizens to understand and accept different points of view.
- Enhances social cohesion by bringing people together and providing the space for various communities to engage.
- Promotes intercultural dialogue through the cross-border mobility of artists and performances, contributing to the awareness and appreciation of the diversity of languages and aesthetics, both within Europe and beyond.

[1] Data on the cultural sector | Culture and Creativity (europa.eu)
[2] Rebuilding Europe – The cultural and creative economy before and after the COVID-19 crisis: 4b2ba2_1ca8a0803d8b4ced9d2b683db60c18ae.pdf (rebuilding-europe.eu)
[3] Study 'The situation of theatres in the EU Member States' - Publications Office of the EU (europa.eu)

Wireless audio applications, such as wireless microphones, in ear monitors (IEMs) and talkback communication systems (collectively referred to as Programme Making and Special Events – PMSE) are extensively used by many cultural, creative, and societal activities, providing the tools needed for creators and performers to capture and deliver content to live audiences, film and television viewers, and attendees at social and cultural events. As such, it is important to highlight that the PMSE sector is, itself, a significant contributor to economic and cultural value within the European Union. In this context, spectrum policy for audio PMSE should be considered in its own right, and not as a secondary consequence of other spectrum policy decisions, for example those relating to the future digital terrestrial television (DTT) in the 470 to 694 MHz band.

The importance of the 470 to 694 MHz band to audio PMSE

The band 470 to 694 MHz band is the primary spectrum resource for audio PMSE. It is identified as a harmonised tuning range for audio PMSE equipment in ERC Recommendations 70-03 (Annex 10) and 25-10 (Annex 2) and is made available in every Member State of the EU (and more broadly in all countries of the CEPT and many countries globally). PMSE operates in the band, sharing with TV broadcasting in accordance with established sharing criteria that are well-understood and have been in effect for many decades.

The importance of this spectrum allocation for PMSE is recognised in the Commission's study on the use of the sub-700 MHz UHF band for TV broadcasting and events.[4] In the study the Commission noted that, "…in 25 of the Member States, PMSE spectrum within the 470 to 694 MHz band constitutes at least 50% of the available spectrum...". It is worth highlighting that in many Member States, the UHF band makes up more than 50% of available spectrum for audio PMSE.

Many studies that analyse demand for audio PMSE identify the growth in content production and the consequential increased demand for spectrum to meet this growth. The Commission's study on the sub-700 MHz band[4] also highlights that approximately 50% of Member States indicating an observed growth in PMSE spectrum demand. This growth is independent of how that content is consumed, whether live, distributed and broadcast via traditional terrestrial networks or online video distribution, or recorded and archived.

This growth has occurred at the same time as spectrum access for PMSE in the UHF band has reduced through the reallocation of the 800 MHz and 700 MHz bands to mobile broadband. In response, audio PMSE manufacturers developed more spectrally efficient technologies which have allowed users to meet these increased requirements in this constrained spectrum environment.

As the sub-700 MHz band study recognises, even though the capabilities of PMSE equipment have improved, in some areas securing access to sufficient spectrum is already difficult and would be more difficult if there were further reductions in available spectrum in the sub-700 MHz band. The study states that, "…a change in access to this spectrum [470-694 MHz] would likely represent a significant impact for users of PMSE equipment".

It is clear, therefore, that the 470 to 694 MHz band is a critical resource for audio PMSE, and no credible alternatives (that are comparable to the 470 to 694 MHz band) have been identified. Any reductions in access to this spectrum will have a significant negative impact on the PMSE sector and the CCIs it supports. This impact will be hardest on those events that have the greatest economic,

[4] Study: the use of the sub-700 MHz UHF band for TV broadcasting and events | Shaping Europe's digital future (europa.eu)

social and cultural importance for Member States, and could lead to some areas (and some countries when considering touring events) becoming PMSE 'not-spots'.

Consequently, it is essential that audio PMSE maintains access to the 470 to 694 MHz band in a way that recognises the critical importance of this vibrant industry of the economic and cultural benefits to the European Union and its citizens.

Comments on the Draft RSPG Opinion: Strategy on the future use of the frequency band 470-694 MHz beyond 2030 in the EU

The nature of PMSE use is similar across Member States

The draft RSPG Opinion suggests that there are diverse requirements in PMSE [spectrum] needs among EU Member States and that actual use in different countries depends on national needs. We do not agree with this view.

The nature of PMSE use is similar across Member States regarding equipment and spectrum demand for events of equal size i.e. an 80 channel event in country A will have the same spectrum demand as in country B, (this is particularly the case for touring of an artist or production). Where differences do occur, they are often caused by different spectrum availability and/or regulations. Furthermore, most countries will have large festivals, concerts, sporting, cultural and national events that generate high spectrum demand for audio PMSE, so in this context every country will experience 'peak demand' events. These peak demand events have the greatest economic and social value and are most impacted by reduced access to spectrum.

Harmonised approach to spectrum for audio PMSE

Sennheiser agrees with the RSPG view that "…the demand for spectrum for PMSE applications will increase in order to cope with the growing content production, and therefore access arrangements will have to be found to ensure sufficient spectrum for PMSE," and all analyses show this increasing demand. The draft Opinion then states that this should be further analysed at a national level. We do not agree that access arrangements, and possible alternative spectrum sharing opportunities, are identified at a national level.

As is common across all sectors, there are clear benefits to be gained from harmonisation and regulatory consistency across Member States. These benefits apply across the CCI and PMSE value chains and support the single market within the European Union. A fragmented approach across Member States risks undermining the economic, social and cultural benefits that the PMSE sector delivers.

Consequently, we are of the view that a harmonised approach for spectrum for audio PMSE should be developed within the 470 to 694 MHz band, recognising that access arrangements will be different between sharing with DTT to sharing with other applications in the band. In addition, alternative harmonised frequency bands that meaningfully support PMSE activities, i.e. not small, fragmented, 'islands' of spectrum, are identified and made available to accommodate the ongoing growth of PMSE. The requirement to identify additional spectrum for audio PMSE was highlighted in

both the RSPG Opinion RSPG15-595 FINAL[5] and in RSPG17-037 FINAL REV1[6] (both in the context of the reallocation of the 700 MHz band to wireless broadband). It is noted that the PMSE sector has already presented to CEPT ideas for new work items addressing the future needs of audio PMSE.[7]

Recommendations

Recommendation 3

Recognising that a single scenario for the use of 470 to 694 MHz may not be possible across all Member States, the RSPG recommends that any future regulatory action by the EU facilitates, as far as possible, these different scenarios. What is consistent in all these scenarios is the requirement for audio PMSE to maintain access to the band.

For those countries that preserve DTT across the whole band, PMSE sharing can continue under established regulatory provisions. For those countries looking to reallocate some or all of the band to other applications, there is a fundamental requirement to develop and implement new sharing regimes that allow for other applications while preserving access to the 470 to 694 MHz band for audio PMSE. These new sharing arrangements, and potential new spectrum allocations for PMSE, should be harmonised as far as practicable.

Recommendation 5

The RSPG notes that some Member States have indicated a need, at a national level, for spectrum for Public Protection and Disaster Relief (PPDR) and Defence. The RSPG recommends that sub-700 MHz spectrum should be made available nationally for these use cases where there is a decreasing need for broadcasting.

This recommendation further underlines the future challenges that audio PMSE may face, i.e. moving from a well-understood and reliable sharing environment with DTT in all Member States, to a future where there could be a range of different sharing scenarios depending on national implementations of new mobile services. It is therefore crucial that the impact of these future scenarios is assessed, and new sharing models established to support the growth in PMSE and ongoing access to the 470 to 694 MHz band.

Recommendation 6

The RSPG notes that the long-term evolution of the use of the sub-700 MHz band at a national level may impact the spectrum available for audio PMSE. The RSPG recommends that those Member States that allocate the sub-700 MHz band to applications other than broadcasting should look to preserve sufficient spectrum for PMSE, "…taking into account the transition of PMSE to new spectrum efficient technologies".

It is unreasonable of the RSPG to imply that audio PMSE manufacturers (and the PMSE industry as a whole) are spectrally inefficient. PMSE spectrum needs are local demand driven, i.e. spectrum is only

[5] RSPG Opinion on a long-term strategy on the future use of the UHF band (470-790 MHz) in the European Union.
[6] Opinion on a long-term strategy on future spectrum needs and use of wireless audio and video PMSE applications.
[7] The last new spectrum allocation for audio PMSE in ERC Recommendation 25-10 was made in 2016 before clearance of the 700 MHz band and before publication of RSPG17-037 FINAL REV1, specifically 1350 to 1400 MHz and 1518 to 1525 MHz which have not been widely adopted by Member States.

needed at a particular location for a specified duration, and is then released. This local demand model is a very efficient way of using radio spectrum.

Regarding technology, 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, low latency.[8]

New broadband technologies such as Sennheiser's Wireless Multichannel Audio Systems (WMAS), will reduce the spectrum needed for large multi-channel events, and will also enable new workflows, immersive audio solutions, and higher audio qualities for recording and playback. One of the main gains in spectrum efficiency of our WMAS technology is the ability to use a single 8 MHz channel for both microphones and in ear monitors (IEMs).[9] Traditional narrowband microphones and IEMs need to operate in separate 8 MHz TV channels to avoid mutual interference, so a user would need two DTT channels (2 × 8 MHz) spaced several MHz apart for microphones and IEMs. However, when using our WMAS technology, the same microphone and IEM requirement could be accommodated in a single DTT channel (depending on other factors such as number of audio channels, audio quality, latency, range etc). Due to the varied use cases and deployments of audio PMSE, narrowband digital and analogue technologies will continue in their vital and highly competitive markets.

It should be noted that when introducing new technologies, such as WMAS, the PMSE industry does so in existing spectrum bands allocated for PMSE use under current sharing arrangements with other services and allowing coexistence with existing installations of previous PMSE technology generations.

Recommendation 9

The RSPG notes that any future EU action in the 470 to 694 MHz band is independent of the outcome of WRC-23. This highlights that within the EU, regulatory uncertainty for access to the 470 to 694 MHz band for audio PMSE will exist beyond 2023 regardless of the outcome of the WRC-23. Given the timescales for studies, analysis and development of alternative spectrum sharing frameworks, work within CEPT should begin as soon practicable after WRC-23 to explore post-2030 spectrum options.

Conclusion

The RSPG draft Opinion highlights the difficulty in developing a common position on future use of the 470 to 694 MHz band. Some Member States will continue with DTT; there is potential for development in terrestrial broadcasting with the introduction of 5G Broadcast; some Member States are looking to utilise the sub-700 MHz band for other applications such as PPDR or wireless

[8] OPUS FAU | Spectrum demand of professional wireless production tools (PMSE) : Study report (kobv.de)
[9] Our WMAS technology allows for bidirectional operation (along with a control channel) which means a single frequency channel can accommodate both microphones and in ear monitors (IEMs)

broadband, including International Mobile Telecommunications (IMT). Within these different scenarios there is a consistent, evidence-based requirement – the ongoing growth of audio PMSE and the requirement to maintain access to the 470 to 694 MHz band.

All studies addressing the 470 to 694 MHz band recognise its importance to the ongoing and growing need for audio PMSE to access the band. These studies also highlight that there are no current alternatives, and that loss of access would have a significant impact on audio PMSE (and by extension the CCIs it supports). The RSPG draft Opinion itself notes that new access arrangements will need to be found to ensure sufficient spectrum for audio PMSE.

The RSPG draft Opinion suggests that new access arrangements should be analysed at a national level. We disagree with this view. While Member States may develop different spectrum policies within the sub-700 MHz band for other applications, the use of spectrum for audio PMSE is broadly similar from country to country, particularly for large, 'peak demand' events and for touring productions. Consequently, to avoid single-country solutions and fragmentation of product market across the EU, we propose that harmonised (as far as practicable) sharing frameworks for audio PMSE are developed and to give priority to local demand-driven spectrum use.