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Radio Spectrum Policy Group – Secretariat
DG CNECT B4: Spectrum – Office: BU33 7/065
European Commission, B-1049 Bruxelles, Belgium

Public consultation on the Draft Opinion on a long-term strategy on future spectrum needs and use of wireless audio and video PMSE applications

Dear Sir/Madam,

Response of broadcast facility company United, part of the Euro Media Group, the Netherlands to the Radio Spectrum Policy Group (RSPG), Directorate-General for Networks, Content and Technology, European Commission, consultation on [Draft] opinion on a long-term strategy on future spectrum needs and use of wireless audio and video for Programme Making and Special Events (PMSE) applications.

United welcomes the opportunity to provide input to the RSPG on this Consultation, proceedings that mark an important and necessary effort to identify additional new spectrum for Programme Making and Special Events ("PMSE") in the European Union.

The RSPG was asked to advise the European Commission on a long-term strategy on wireless audio and video PMSE spectrum use and requirements. United is pleased that the European Commission asked the RSPG to develop an opinion on a mid- to long-term strategy for PMSE and also appreciates the RSPG accepting the request. The opinion focuses on the challenges of satisfying peak demand requirements. However, the suggested plans will require further coordination and discussion with the incumbent band users, other national and EU regulators, and bodies dealing with spectrum matters. United supports a coordinated, systematic approach to explore the PMSE opportunities and to find mutually acceptable solutions to obstacles. The clients of United include broadcasters, production firms, theater, events, film industry, and other users. United is operating local and global. We feel that international spectrum coordination in cross border situations is necessary. We do not feel that the solution will come from national authorities only.

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Our remarks:

1. **PMSE plays a critical role in the national and international economy, culture, and everyday life; the negative impact of the expected PMSE spectrum shortfall will be widespread.**

   Wireless microphones are critical production tools essential to activities in many sectors of broadcast, entertainment, music and sporting events as outlined in the Consultation. In addition to content production, wireless tools ensure occupational safety and security, especially in the case of "moving" productions.
   In other words, many productions can not be wired or require a mix of wired and wireless equipment. United would add that today audio PMSE is also important to commercial, educational, civil, religious events and (news) gatherings. PMSE use has increased across all sectors and is now embedded in many facets of everyday life. As such, ensuring that users and audiences across these various applications can continue to rely on high-quality audio PMSE is a matter of economic, cultural, and civil concern.

2. **United welcomes thoughtful work to date exploring potential new spectrum resources suitable for sharing with PMSE. Targeted spectrum should be free from interference and not slated for reallocation to other services.**

   Wireless microphones have made excellent use of available spectrum resources. This is based on existing coordination tools and methods. PMSE has successfully shared spectrum with other services for many years, well before spectrum sharing became the focus of national policies. For decades, wireless microphones have shared spectrum with TV broadcasters, and, depending on the jurisdiction, other services without any known interference incidences. Further, manufacturers have pushed technical advances to achieve significant gains in spectral efficiency and wireless microphone channel counts per megahertz continue to increase. However, production demands for spectrum are high and expanding every year; interference, latency or too little spectrum significantly undermines PSME services by restricting the ability to increase channel counts, and/or by degrading quality thereby frustrating both PMSE users, and the millions in the live, televised and online audiences who expect flawless, crystal clear audio for all professional productions.
   Technological developments and regulatory requirements could contribute to meet the spectrum demands and quality of service demands for wireless audio and video PMSE.
   Shared use of spectrum, which could include appropriate and innovative sharing approaches e.g. the availability of geo-location, a higher level of certainty than a framework of non-interference and non-protection accessibility of spectrum in identified cases, as well as a common approach on authorizations and opportunities of localized temporary shared use of spectrum, could be a solution in case of large spectrum needs.
   PMSE applications typically share spectrum with other services based on sharing criteria, primarily defined to protect these other services from mutual interference. We see in practice that coordinated spectrum use (as with the current Licensed Shared Access experiment for PMSE video in the Netherlands) can solve, to a certain extent, the problem of limited availability of spectrum in a peak-demand situation.

UNITED

3. **The RSPG should consider the possibility of harmonization between countries' regulations.**

The RSPG should also pay close attention to the impact this proceedings will have on an international level. United doesn't feel that identified national needs can be satisfied better on a national level according to national circumstances. Often, we see in the report the remark that frequencies could be subject to some evolution of use at national level. The RSPG-report is to advise the European commission on a long-term strategy on wireless audio and video PMSE spectrum use and requirements. A clear directive on international, European, tuning ranges will hopefully lead to manufacturers, producing for PMSE markets, making standardized equipment instead of equipment exclusively produced for individual countries. United recommends taking into account ITU (region 1) recommendations.
The report states that requirements in peak demand situations, due to the local and temporary nature of PMSE, are best addressed on a case-by-case basis at a national level using the "tuning range concept" developed by the CEPT.

United strongly feels this is no solution for limited availability of spectrum. In practice, if there's no or less spectrum available locally, the PMSE market can not 'borrow' from other services. Equipment is often limited to a single market solution, due to national spectrum regulatory differences (e.g. UHF channel 38 may not be used in the Netherlands, but is at the same time a regular PMSE channel for the UK). For manufacturers this current situation makes it difficult to develop equipment that can be used in all countries in the EU. Coordination is necessary.

4. **The PMSE industry has already reaped the benefits of skilled frequency planning and digital techniques.**

The Consultation suggests that PMSE users can address the spectrum shortfall by improvements in central planning and frequency management "on the ground" as well as by incorporating digital techniques. The PMSE community is populated with many professional frequency coordinators and producers highly skilled and experienced in the task of providing audio PMSE support to the complex broadcast, entertainment, sports and other productions that are typical in today's production environment. Today, these professionals cooperate across different venues and productions to balance competing demands for PMSE spectrum. The everyday examples of events are daily business with a lot of areas with more request (especially more than the suggested 60 MHz for Audio PMSE). PMSE-users are already requiring sophisticated skills, technologies, and extensive consultation among the stakeholders.
Digital techniques also are not a simple cure to spectrum scarcity. Clean, interference free spectrum must be available in order for users to reap the full potential of spectrum efficiencies made available by digital techniques. Without clean spectrum, the potential for alleviating spectrum congestion through the use of digital technology is limited. PMSE users can not realize the full potential for efficiency and an expanded channel count even with digital equipment if, for example, it is operating in a noisy duplex gap situated between LTE or other signals.

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5. **Useable spectrum**

Another important aspect of these sharing arrangements is that the spectrum is able to provide the high quality of service required for live events and programme making. 'High quality' in this context does not only mean increasing demands on content quality, but also high demands on radio spectrum quality. There has been growth in the use of wireless PMSE in the last decade and decrease of useful spectrum in the same time span. For this moments, the PMSE equipment operators are already reporting a capacity crunch at daily normal events, especially in cross-border coordinated areas.
The loss of the 700 MHz band for PMSE users is already "a challenge". After the 700 MHz auction, the frequency loss for audio PMSE is at least 50%. A further review of the UHF band in 2023 could mean the industry loses even more spectrum in the future. Stable spectrum is needed so the industry can focus on it for the foreseeable future. Companies (production teams, PMSE manufacturers and users and their service providers) make investment decisions based on forecasts of return of investments in a number of places. At this moment the manufacturers for PMSE equipment are reluctant to develop UHF equipment and the same goes for developing equipment for other spectrum due to the lack of directives on which spectrum is of will be available in the near future.
Although the present document covers all spectrum, United emphasizes that multi-channel audio PMSE systems used in professional production are best suited to spectrum under 2 GHz for reasons of propagation and body interaction.
The RSPG document suggests that tuning ranges will solve planning issues. United emphasizes that tuning ranges of equipment give no guarantee on usable spectrum. Further information on audio PMSE is available in ECC Report 204 [i.15].

Given the importance of the audio and video PMSE industries in the production of European content it is essential that certainty over future spectrum access is offered in order to ensure continued high quality productions. European content is exported worldwide and the substantial financial returns generated by production of this content should not be allowed to be constrained by either financial or spectrum related pressures brought to bear by spectrum re-allocations.

Political decisions often change the framework conditions. Therefore, the enthusiasm for further investments is limited.

6. **Technical solutions alone will not solve spectrum shortage.**

An increase in the use of PMSE equipment does not necessarily mean an increase in the use of spectrum. But, a loss of spectrum in the spectrum (e.g. UHF band) will not be solved by new technology, if that technology even exists today or in the (near) future. United is not aware of an existing technology or even an idea which will increase spectrum efficiency. In the longer term, perhaps new technology (if ever developed) will help. However, new technology presents regulatory and standardization challenges that must be overcome before equipment can be placed on the market and adopted by PMSE operators.

UNITED

7. **Solution in Cognitive-PMSE:**

The most important objective in the C-PMSE project is the preservation and possibly increase of the operational reliability under the conditions of dynamic and heterogeneous frequency utilization. The result of this research project is (summarized) that it is possible to maintain production quality even in case of disturbances, if you can quickly switch to undisturbed frequencies. This results in a higher frequency requirement for production.
The basic idea is to scan continuously the usable frequency range against potential risks. As soon as potential interferers are detected, countermeasures will be initiated. The basic principle sounds quite easy, but it requires very complex interaction between different components and different stake-holders. Equipment with the specifications needed are not available yet on the market or are still under research. The results of tests with a large amount of channels are not impressive.

8. **Video PMSE**

Wireless camera equipment, that is more spectral efficient, might be developed and be available within the next few years, with codec technology improving roughly in step with the demand for increasing resolution. (Please note, that spectral efficiency does not automatically lead to technically better video quality!) Codec technology gives latency in a video stream. In live broadcast situations, the latency and battery use will become an issue. We think there is still a need to have spectrum for wireless camera's (especially needed for Ultra HD). The development in the area of 5G should be monitored, because this could have an impact on the long-term bandwidth needs of extra spectrum for video PMSE and multichannel Audio PMSE. United does not feel the implementation of 5G technology alone will eliminate the problem of undisturbed production frequencies. The telecom networks provide at this moment on large events not the high quality of service required for live events and programme making (and are not allowed due net-neutrality). There's also a risk of overloaded network and capacity problems in case of calamities. We agree that there is a new use in situations as point-to-point delivery of video and audio, but this is not reliable in peak demand situations.

United strongly recommends that the RSPG maintains the possibility of PMSE use (audio and video) of spectrum, that is not specifically designated to PMSE, in extraordinary circumstances. This is necessary to meet specific short-term peak demand locally (e.g. national disasters), but also cross-border (e.g. large international (sport)events). Obviously PMSE users will only make use of this additional spectrum if possible and appropriate.

Yours faithfully,

Kees Knepper