Syndicat des Entreprises de Négoce en Electronique Professionnelle

Comments on the RSPG project of “Opinion on a long-term strategy on future spectrum needs and use of wireless audio and video PMSE applications”

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CONTACT DETAILS

SEINEP, Syndicat des Entreprises de Négoce en Electronique Professionnelle, is a French not-for-profit trade association created in 1984 that gathers companies (importers or French subsidiaries of international groups) active in the field of professional electronics, such as :

- **Audio / video professional equipment including CCTV**
- Security equipment
- Medical devices
- Electronics instrumentation and measurement
- Professional IT

The members of SEINEP include PMSE manufacturers and importers on the French market.

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CATEGORY

Other : trade association

TYPE OF PRODUCTS TO WHICH THE ANSWERS APPLY

Wireless microphones, in-ear monitors, wireless cameras

ANSWER SENT TO

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

COMMENTS OF SEINEP

SEINEP welcomes the opportunity to comment on the draft "opinion on a long-term strategy on future spectrum needs and use of wireless audio and video PMSE applications" and thanks the RSPG for the said opportunity.

We would like to underline the fact that we will focus our comments on **audio PMSE.**

Introduction

PMSE enable daily productions of high-quality audio-visual content, be it live-events, political events, conferences, feature-films, TV productions, ENG productions and so on.

The particularity of PMSE's is of:

- being a secondary user of bands allocated to different primary users, for whom PMSE need to ensure non-interference;
- needing high-quality, interference-free frequencies in order to grant flawless audio and video quality to instant/live productions, which are the core of PMSE uses.

The core band for PMSE is the UHF broadcast band, which has been reduced by roughly 45% by two successive digital dividends: first the 800 MHz and recently (in France, at least) the 700 MHz band. Other portions of the UHF band (600 MHz) could be compromised in the medium term, following the pressure by some States at a worldwide level to allocate more portions of the UHF broadcast spectrum to IMT users.

The intrinsic properties of the UHF broadcast band (coverage, penetration and low-impact on the body for body-worn equipment) as well as well-honed sharing practices with broadcasters as primary users, make the UHF broadcast band an indispensable production-tool for audio PMSE and the Commission has noted the importance of preserving its use to broadcasting and PMSE, at least until 2030[1].

The important losses incurred in availability of frequencies in this band entail the necessity to find alternative spectrum for audio PMSE. This necessity has been recognized by the Commission Implementing Decision 2014/641/EU (see recitals (13) and (14)), which has asked Member States to insure a baseline of about 60 Hz of sustainable spectrum at a Union level to meet ordinary recurring needs for wireless audio PMSE equipment users. This spectrum baseline is partly insured by the possibility granted to PMSE to use the duplex gaps of 800 MHz and 1800 MHz bands[2]. We would like to point out that, of these two duplex gaps, the 1800 MHz band has been mainly implemented for conference-systems -the risk of interference with 1800 MHz IMT equipment being considered too

[1] DECISION (EU) 2017/899 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union
[2] http://www.erodocdb.dk/Docs/doc98/official/pdf/CEPTREP050.PDF

high by manufacturers and users alike to use this band for professional high-quality productions. In practice, it is therefore not available for professional high-quality use.

Conscious of the frequency loss and of the growing PMSE use and needs, the Commission in its previously quoted 2014 implementing decision asks Member States to find amongst the national frequencies another 30 MHz of bandwidth for shared use by PMSE, leaving the Member States free to allocate more than a total of 59 MHz to peak needs.

Based upon the previous considerations, we would like to point out that:

- **Finding usable, high-quality spectrum** for interference-free operations is and remains a necessity for PMSE manufacturers and users, in order to compensate the high losses of quality-spectrum in the UHF band. We do not think that technological evolutions alone will enable to circumvent this fact.
- **Long term stability in the allocation of frequencies to PMSE** is of the utmost importance, in order to support the necessary financial investments and R&D efforts and to grant economies of scale to PMSE manufacturers.
- Multi-national, cross-border operations will become an increasing reality given the increasingly global approach of international production companies and the growing appeal of international sports events or news coverage. It is therefore important to **harmonize frequencies for PMSE throughout Europe**, as far as possible and to incite Member States to implement them.

Peak demands at large events vs. day-to-day needs

The RSPG *"is of view that […], especially for **peak demand situations**, requirements are best addressed on a case-by-case basis at a national level using the tuning range concept developed by CEPT"*.

Our first comment concerns the focus that RSPG has decided to give to the opinion. In fact RSPG concentrates the analysis on **peak demand of spectrum**, which seems an excessively focused axe for a long-term strategy analysis.

Although peak needs during large events are important, and probably the most visible in term of quality and reliability issues, they are not necessarily –as the opinion itself states[3], the most critical events. In fact they are very dependent on the combination of time and location's conditions, and if these are favorable, then no strain emerges. Moreover, especially in the case of national events (like the Tour de France), the regulators and agency (ANFR) are accustomed to provide extra-frequencies (typically frequencies normally allocated to military uses) in order to compensate the lack of frequencies generated by extremely high requirements (more than 600 wireless links are needed for the Tour the France).

[3] See « Draft opinion on a long-term strategy on future spectrum needs and use of wireless audio and video PMSE applications », pages 7-8

Daily productions are less visible, but nevertheless highly important as they insure the cultural identity of Member States and the social and political life of the Union. This is why it also of the uttermost importance to secure them.

Following several studies, day-to-day events need an average of 96MHz for PMSE use, and these cannot be fully covered, as the RSPG's draft opinion suggests, by the harmonized baseline of 60 MHz provided by the Commission Implementing Decision for audio PMSE (2014/641/EU). Implementing decision 2014/641/EU in reality harmonizes at a European level only 29 MHz in the duplex gaps of the 800 MHz (823-832 MHz) and 1800 MHz ((1785-1805 MHz) bands and asks Member States to find an additional 30 MHz bandwidth at a national level. Moreover, the implementation decision 2014/641/EU is meant to cover the loss by PMSE of the 800 MHz band and not the subsequent refarming of the 700 MHz band. The latter has not –to date- been compensated and represents an additional loss of 30% of bandwidth for PMSE.
In addition, the possibility offered to national regulators to allocate frequencies to PMSE in the 700 MHz duplex gap or guard-bands has not been retained by France, so there is factually no compensation for the loss of the 700 MHz frequencies, yet.

It has to be equally noted that duplex gaps frequencies are not suited for high-quality audio productions, as interferences by the adjacent IMT users in the 800 and 1800 MHz bands represent a risk for audio-visual productions.

For all these reasons, we think that a long-term strategy should assess both peak and day-to-day uses of PMSE and not restrict itself to specific use-cases. This would be coherent with recital (18) of implementing decision 2014/641/EU which states: "There is a need for a regular review of this Decision to cover new developments in particular to assess wireless audio PMSE spectrum requirements and the actual use of the harmonized bands".

European harmonization vs. national implementations

The RSPG *"is of view that […], especially for peak demand situations, requirements are best addressed on a case-by-case basis at a **national level** using the tuning range concept developed by CEPT"*.

We think, contrarily to what the RSPG opinion seems to suggest, that the European harmonization of frequencies for PMSE use should be pursued in order to facilitate international use of equipment and create economies of scale for the industry. Although punctual peak demands can be efficiently addressed locally, as they are extremely time and location-bound and need close collaboration with the regulators and spectrum-management authorities, we think that there is also a sound basis of regular audiovisual and scenic productions whose needs are best addressed by granting the same trans-European harmonized spectrum to PMSE, in order to ensure both cross-border compatibility of equipment and a more predictable sharing environment. Therefore, we think that the European Commission should consider providing the relevant framework conditions. The aim should be to combine planning security with the necessary flexibility for PMSE applications.

Pre-existing constraints in Member States due to national planning of frequencies should not prevent the search for a European coordinated approach as they are unluckily not exclusive to PMSE

frequency-bands. European frequency-management authorities have dealt with these constraints for several types of stakeholders and have already proven their capacity to find supra-national harmonized solutions, even if it takes time.

Tuning ranges

The RSPG *"welcomes PMSE equipment that can operate with **larger tuning ranges**"*.

Since several years the manufacturers have increased the number of tuning ranges their equipment is capable of working with.

Unfortunately, larger tuning ranges cannot compensate loss of spectrum. Nor can they be further increased unless a clear view is given on the long-term availability of new frequencies for PMSE to compensate the loss of the 800 MHz and 700 MHz bandwidths. We think that if the frequency-band choice is left solely to Member States, no certainty can arise for manufacturers of the effective usability of a given frequency in a given Member State. This will hinder investments, namely on the newly identified European frequencies for PMSE use. European coordination and harmonization decisions, implemented nationally, would be the best way to ensure current and future planning security.

We would also like to draw your attention to the fact that increasingly large tuning ranges could turn out to be a false good idea. In fact, the larger the tuning ranges, the higher the noises and interference by-products and the lower the actual spectrum efficiency of the equipment.

New technologies / digital technologies and R&D

The RSPG" *is of the view that technology advances will improve the spectrum efficiency of PMSE and enable more efficient sharing with a wider range of users, technologies and applications*" […].

First of all, we would like to point out that –to date- we are not aware of a specific technology able to increase spectrum efficiency, but –should such technology become a reality in the short term, we would be more than glad to discuss it with the relevant European and national regulators.

We also wish to underline that R&D is a complex task for a small industry like that of PMSE, and often only the larger groups have the financial scale to invest in the development of new technologies.

By putting the accent on R&D at the manufacturer's side exclusively, the Commission takes the risk of favoring a few large worldwide groups, capable R&D investments and financial efforts, versus smaller companies. From a European fair competition perspective, this policy does not seem to offer equal opportunities to all competitors on the market.

A European proactive policy of financial R&D incentives is therefore necessary in order to foster innovation and grant equal opportunities to the various actors in the industry.

RSPG "*encourages the PMSE industry and academia to continue to research and develop more advanced and spectrally efficient technologies, including digital ones […]*".

As far as digital technologies for audio PMSE are concerned, we would like to point out that a digital signal is interesting if the aim is to compress it. Given the high quality demanded in professional audio use, compression can scarcely take place at the production level (source coding), but mainly at the distribution one. In fact, production archives have to be captured in high quality in order to be later distributed at different quality levels. Multiple compressions would lead to artefacts, thus compromising the quality of the content.

Moreover, the number of PMSE links that can be operated in temporarily available local spectrum is limited by the necessity of separating frequencies to avoid interferences. The reduction of distances amongst adjacent frequencies is only conceivable in stable production environments. In practice this option is used very cautiously.

For these reasons, digital is not the "dream-solution" to solve PMSE spectrum scarcity, even though it can be complementary to other spectrum-efficiency approaches.

In fact, if the signals cannot be compressed at the production level, and if channel separation is necessary in order to grant high-quality audio, the gain in spectral efficiency is marginal and does not enable to mitigate the drastic reduction of usable, high-quality spectrum. In other words: better spectrum efficiency will not be able to overcome the lack of available frequencies for PMSE.

Another point to bear in mind is that the latency engendered by digitalization of signals is still too high (>5 msec) for PMSE professional live uses and also for cross-use with analog equipment. This technological barrier has not been overcome, yet, excepted by very high-end products which are typically chosen only in capital-intensive productions and the use of which is far from being generalized.

The RSPG is also "*of the view that PMSE may benefit from R&D funding or related industries development*".

We welcome RSPG's awareness of the importance of R&D funding for the PMSE sector.
As stated before in this paper, PMSE is a small industry worldwide and has limited financing capability for important R&D efforts. Only the major players have significant R&D budgets and they cannot alone drive the digitalization and technical evolution of the global PMSE sector.

Therefore we share RSPG opinion that European funding of the PMSE sector and proximity to academic and industrial efforts will be of great value to increase innovation in the PMSE sector.

In order for the PMSE industry to see its needs included in ETSI harmonised standards and hence to benefit from the R&D effort of related industries, we think that the support of RSPG is of the utmost importance, in particular to heighten awareness of the relevant working groups to include the needs of PMSE in their discussions of future standards. We will give examples under the chapter "5G".

C-PMSE

RSPG states: "Cognitive PMSE systems may eventually […] contribute to a more coordinated coexistence of different users in the same frequency range thereby resulting in increased spectral efficiency. […] Cognitive capabilities for PMSE are therefore encouraged to be further studied".

Cognitive systems are intended to dynamically and continuously scan the spectrum in order to identify free spectrum to be used and avoid interferences with other users. They are thought to increase operational reliability in an environment where the primary users, LTE for example, transmit with higher power and therefore put at risk PMSE operations which, by nature, have to be 100% duty cycle and of extremely high quality (an interruption of audio is not acceptable in live performances or political events, for instance).

Although cognitive equipment is presently being developed by some manufacturers, its primary aim is to secure PMSE high-quality transmission and it is not –to date- capable in itself to improve spectral efficiency. If the primary equipment engenders severe out-of-band emissions, for instance, cognitive equipment will avoid using channels adjacent to the primary user but will not be able to "squeeze" the PMSE signal into quality-inadequate spectrum and to improve spectral efficiency.

So, once again, cognitive systems, can insure quality transmissions in crowded spectral surroundings but will not mitigate the absence of sufficient "clean" frequencies available for PMSE use.

5G

RSPG "*recommends PMSE stakeholders further to explore the development of 5G regarding its potential or PMSE*".

The first implementations of 5G technologies, namely in the cellular phone industry, could intervene from 2019.

The possibilities offered by 5G technology are many fold and appealing to several industries:

- Classical Cellular Communication
- IoT/WSN
- Autonomous driving
- Industry 4.0
- Smart metering/smart grid
- Broadcast ? (eMBMS)
- PMSE ? (PMSEo5G)
- BOS (Police/Firemen/Ambulance) ?

The stated advantages of 5G for PMSE are **ultra-low latency** (<1 ms) and **high reliability** of single packet transmission. However, the xG Project, an industry and academic project evaluating the possible use of audio and video PMSE in 5G, notes that "the specified value has to be met by every

packet of a potential audio/video stream with the specified data rates" [4].

Additional key requirement by the PMSE industry are: "the ability to have all devices tightly synchronized and the support of a reliable multicast"[5], but also effective interference management.

Also, to enable the integration of audio and video PMSE in the 5G ecosystem, there needs to be a viable business model for PMSE industry stakeholders, namely but not solely, an affordable price of frequencies/service by mobile operators. Dependency from mobile operators and the necessity to pay for the use of frequencies would be, at least in France, the main difference with the present system, where frequencies are allocated freely to PMSE mainly, but not only, in the 470-694 MHz band, on a non-protection, non-interference basis.

At the moment, the specific use-cases of PMSE have not been covered yet by the technical requirements of 5G, the focus being put onto distribution and reception of the signals.

In conclusion, and despite the undeniable technical interest of 5G for PMSE, a number of pre-requisites have to be fulfilled in order for the project to be viable, and these conditions are not bound to be fulfilled in the short to medium term. This means that, before 5G can become a viable option for PMSE, the current technologies will continue to predominate and they will need frequencies.

The PMSE-xG Project, points out three necessary conditions[6] in order for 5G to become a real option for PMSE:

- The 5G standard needs to meet the technical requirements directly derived from **audio and video PMSE use cases**, which are currently not covered by the 5G / IMT 2020 use cases;
- The above-mentioned adaptations of the 5G standard, have to be implemented in **commercially available 5G chipsets** in order to offer 5G-enables PMSE equipment;
- The integration of PMSE applications in 5G networks needs the development of **specific business models** developed collaboratively by network operators and the PMSE industry

RSPG's help in making sure that these conditions are properly addressed in the relevant discussion and decision groups, together with an active support of standardization of 5G encompassing PMSE, would be highly appreciated.

[4] PMSE-xG, « White Paper : PMSE and 5G », p.4, 27 March 2017, http://pmse-xg.research-project.de/

[5] PMSE-xG, « White Paper : PMSE and 5G », p. 1, 27 March 2017, http://pmse-xg.research-project.de/

[6] [6] PMSE-xG, « White Paper : PMSE and 5G », p.7, 27 March 2017, http://pmse-xg.research-project.de/

Improvements in working practices

RSPG states : "Especially for the largest events, detailed planning and assistance from a Member State's band manager or administration (both at the design stage and implementation phase of an event), coupled with the adoption by PMSE users of more efficient working practices[7] can be used successfully to achieve high density spectrum usage with minimal impact on the quality of production".

We would like to point out that PMSE users are pioneers in shared use of spectrum, which they have initiated long before it was even identified as one of the leading strategies to improve spectrum efficiency. For decades PMSE users have been able to share spectrum with braodcasters or other users, following the circumstances, without known interferences or incidents. Highly skilled frequency coordinators and producers work daily in close contact with national spectrum administrators when the size of the event justifies the intervention of national spectrum agencies. They deal with these stakeholders in good cooperation with the mutual aim of finding the best practical solutions to sometimes complicated spectrum situations. PMSE users' best practices could in fact serve as guidelines to other spectrum users, newcomers in the spectrum sharing arena.

For all these reasons, and although there is always room for improvement, we actually think that practices, both on the users' and on the Agency's (ANFR) side are already optimized.

Of course, in the future, the existence of a dynamic, geo-localized database capable of identifying and allocating frequencies in real-time, particularly during big events, would enable innovative sharing approaches, including the temporary and localized sharing of spectrum not normally allocated to PMSE. To our understanding such systems are under study but not finalized, yet.

[7] The underlining is ours