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Radio Spectrum Policy

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EU workshop on
"A long term approach to radio spectrum for PMSE in Europe"
26 October 2010, Brussels
Summary report

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Introduction

The workshop was a follow-up to the Commission's Communication on "Transforming the digital dividend into social benefits and economic growth" (COM 2009/586) in which the Commission identified the use of spectrum by wireless microphones and PMSE applications as an activity clearly affected by the digital dividend policy and requiring further attention at EU level. This initiative results also from the findings of the Commission study on the digital dividend which had concluded that further EU coordination in the field of spectrum for PMSEs could offer potential economies of scale and scope, as well as benefits for the users.

This workshop was a first step towards the longer term objective of improved spectrum coordination for the benefit of PMSE users.

The list of speakers is included in the attached copy of the workshop agenda.

Potential benefits of coordinated spectrum for PMSEs

The speakers underlined the social, cultural and economic importance of PMSE applications, in particular the various types of wireless microphone applications. There are more than two millions devices in circulation. PMSE applications in the EU support directly or indirectly economic activities representing a turnover in excess of € 38 billion. In this context, any harmonisation of frequencies could generate significant benefits, especially for "touring" events which include operations in several Member States.

In their contribution, equipment manufacturers pointed to important differences in the terminology used respectively by the ITU and the CEPT when referring to PMSEs¹ as it sometimes results in confusions regarding the scope of spectrum harmonisation discussions. The manufacturers clearly called for considering the broadest scope (i.e. SAB/SAP) in the context of the discussion on harmonisation.

The speaker representing professional users raised the issue of the types of harmonisation which would be needed, distinguishing between:

- The technical harmonisation of frequencies or at least harmonisation of tuning ranges.
- The issue of fragmentation in the EU between the various licensing regimes for PMSE uses.
- The various regulatory approaches in Member States and the varying degree of responsibility given to industry (from self-regulation/management to formal regulations by spectrum authorities).

Speaking on behalf of professional users, several participants stressed the need for having access to spectrum offering a predictable quality of service. Some categories of PMSE uses require not only high speed and reliable communications but also very short transmission latency time (less than 3 or 4 milliseconds for live concerts). This is one of the reasons why most of the existing equipment is still based on analogue transmission.

¹ ITU restricts the definition to Services Ancillary to Broadcasting (SAB) only, while the sector also includes Services Ancillary to Production (SAP)

As regards the advantages and disadvantages of EU harmonisation, several speakers called for a flexible strategy as there are so many different "flavours" of PMSE uses. On one hand, harmonisation should facilitate cross-border transportability of equipment, foster economies of scale and increase competition. On the other hand, it may cause inefficiencies due to the complexity of an EU spectrum re-farming process, and create possible confusion in the market place if there would be no clear delineation any longer between national and EU responsibilities. In addition, substantial cost benefits may be illusionary in cases where the cost of the radio element is relatively small compared to the total cost of equipment and operation (this is typically the case for sophisticated professional installations such as wireless TV cameras used by professional broadcasters at special events). Professional equipment is also regularly rented locally, reducing the need for cross-border interoperability. In this context, it was suggested to establish clear problem definitions before assessing solutions and to subordinate any EU harmonisation initiative to a proper cost/benefit analysis. Some speakers finally expressed concerns about the overall availability of spectrum for PMSEs for large events in the future, in particular once large swaths of spectrum of the digital dividend will have been auctioned in Member States.

Trends regarding PMSE technology beyond 2012

In this session, the discussions concentrated on two main technology trends beyond 2012:

- The possibility to apply cognitive radio technology to wireless microphones;
- The prospect of using digital, instead of analogue, transmission, and the magnitude of the expected benefits and disadvantages (e.g. latency) of using digital compression.

The session began with an overview of current standardisation developments in ETSI (ETSI STF 386) concerning cognitive technology for PMSEs (C-PMSE). The speaker stressed that standardisation work is not sufficient if not accompanied by proper research efforts. He also insisted on the need to make sufficient spectrum available for use by cognitive systems for PMSEs, and that it may also require to adapt spectrum regulations.

Representatives of the equipment manufacturers first referred to the fact that the PMSE sector has already used 'manual' cognitive approaches for decades as equipment has to be tuned on a case by case to the specific spectrum that is locally available. They also explained the difficulty of using digital transmission and compression technologies taking into account the need to meet very high requirements in terms of speed, reliability and sound/image quality. They however recognised that digital technologies will progressively play an increasing role in the next few years, starting with their introduction to manage ancillary functionalities such as signalling (channel coding, etc). This view was clearly challenged by several other speakers, mainly those representing potential new entrants, which argued that both digital and cognitive technologies are now progressing faster than anticipated a few years ago. In this context, some speakers suggested that there is a need for more generic "unlicensed" spectrum not only for use by PMSEs but also for new applications based on cognitive access. A speaker referred to a need for more "fine grain exclusivity" for PMSEs rather than more classical allocations of spectrum.

At the moment, it seems that no clear conclusion can be drawn to support that digital technologies are necessarily more spectrally efficient than current analogue ones, in particular for wireless microphones requiring very high quality of the audio transmission (professional use).

However, a mobile equipment manufacturer announced at the workshop that it was about to offer a digital solution for wireless microphones which meets the most demanding technical criteria. According to the speaker, this new development in digital technology for wireless microphones has become possible thanks to the billions of dollars already invested in research in cellular mobile communication technology. Mobile technology is now close to reaching theoretical transmission efficiency limits and the existing accumulated know-how can be transposed to other application areas such as PMSEs for a fraction of the initial R&D investment. The following performances were quoted by the speaker: high signal to noise ratio (superior to equivalent of 40 dB in analogue), very high audio quality (24-bit / 48 kHz sampling), end-to-end latency inferior to 5 ms, accommodating up to 30 digital microphones in a 8 MHz channel in full duplex (100 meter range). The technology is based on OFDM modulation which is already compatible with current regulations. It was admitted that one of the aspects which requires improvement on the current prototype is to extend the operating time on a single battery charge.

In response to this announcement, existing microphone manufacturers expressed scepticism that such a prototype can quickly become a mature commercial product and will meet the stringent audio quality requirements of professional PMSE, not to speak about reaching a significant market share any time soon. There were renewed claims that analogue technology is likely to remain the predominant PMSE technology for at least 10 to 20 years. Microphone manufacturers also referred to prospects of further transmission efficiency improvements in analogue technologies, for example in the field of inter-modulation.

Past experience and two case studies / lessons regarding possible EU coordination opportunities

This session was aimed at reflecting on the lessons to be learned from the recent experience of re-organising PMSE spectrum in Germany, the United Kingdom, and in the US. The slide presentations, which are all available on the Commission web site², illustrate quite accurately the information presented at the workshop.

In addition to the information available in the slide presentations, the following key points were raised during the discussions:

- The (Arquiva) UK approach has demonstrated the advantage of relying on spectrum management by a specialised band manager. However, additional efficiencies could be achieved by simplifying further the administrative procedures, including for example a more straightforward price structure and more explicit service level contractual arrangements.
- The US approach to white spaces has illustrated the difficulty to rely exclusively on "sensing" technologies for applying cognitive technology. Instead, the FCC has now adopted new regulations favouring the use of geolocation, combined with on-line consultation of databases, to authorise temporary access to spectrum in a given location and creating safe harbour channels for PMSE.

² http://ec.europa.eu/information_society/policy/ecommm/radio_spectrum/document_storage/other_docs/pmse20101026workshop_presentations_documents.zip

Types of PMSE uses versus spectrum needs

The wide variety of PMSE uses was largely illustrated in this session (wireless microphones being the largest application but also including other important uses like wireless headphones, in-ear monitoring devices, IFB³, wireless cameras, as well as more niche application such as video links to helicopter, wireless intercoms, presentation clickers, lighting controls, etc).

CEPT studies have already concluded that harmonisation at EU level may often be the most appropriate compromise between global ITU allocation agreements, which are difficult to establish, and independent national approaches, which prevent economies of scale and interoperability. Again, the balance between classical frequency harmonisation and the harmonisation of tuning ranges was raised by the participants.

There was a clear recognition by the speakers that the identification of the PMSE application categories which would be relevant for spectrum harmonisation should be done by industry and not by regulators. Industry has the most thorough understanding of the various functional and business needs. Once industry has done its classification work, regulators could then address the harmonisation issues in response to a clear demand.

Regulators brought forward the possible need to recover spectrum once allocated to unlicensed use, such as to some categories of PMSE uses. There was a general agreement at the workshop that mechanisms and conditions to be able to reclaim spectrum should be further studied by regulators. Such an approach could also provide new possibilities for regulators to allocate more spectrum for PMSEs on a temporary basis.

The way forward: What degree of EU harmonisation? For which uses? What are candidate bands?

This part of the workshop was conducted as two successive interactive panel discussions with experts. Speakers had an opportunity to make introductory remarks.

The key conclusions are summarised below:

1. *List of most relevant bands (or possible tuning ranges) in relation to a possible EU harmonisation initiative:*

- UHF band below 790 MHz: possible harmonised channel(s) or tuning range(s).
- Central duplex gap of the 800 MHz band (11 MHz).
- Extension downward to 862 MHz of the already harmonised 863-865 MHz band (1MHz).
- L-band at 1.5 GHz (25 to 40 MHz).
- Band at 1.8 GHz.

It was noted that some stakeholders believe that, in addition, regulators should be able to claim back spectrum from primary users to make it available to PMSEs on a local and temporary basis (for very large events such as the Olympic Games for example). This would require adequate provisions in the terms of the related spectrum licences.

³ IFB refers to Interrupted Feedback, or, in other words, uninterrupted news broadcasting.

The prospect of re-farming spectrum at 2110 MHz (video links) and spectrum between 2200 and 2300 MHz (ENG⁴) to wireless microphones was mentioned.

2. *PMSE users should be in a position to acquire spectrum on the market provided proper and possibly specific spectrum trading conditions are put in place by regulators.*

3. *Consumer (mass market) PMSE equipment is the category that would benefit the most from spectrum harmonisation.* A recurring view was that, ideally, there should be a minimum set of harmonised core bands for PMSEs in the EU. However, it was also recognised that the difficulty is to identify those few bands.

4. *Spectrum access conditions should drive the type of use.* In other words, no spectrum band should be formally reserved exclusively for a particular type, or sub-type, of PMSE applications.

5. *There is a lack of central knowledge (by regulators) regarding the use of spectrum by the various existing PMSE applications* (which spectrum, location, duration and intensity).

6. *PMSE use is a special category of use that falls between two other important categories of more permanent/more ubiquitous uses:* the very short distance communications (e.g. wifi) and the medium or long distance communications (typically, mobile communications and broadcasting). This should not undermine the right of PMSE application to access spectrum under appropriate interference protection conditions.

7. *Digital technology would facilitate "spectrum aggregation".* This would be a key advantage in terms of spectrum allocation as it would increase the possibility to identify spectrum in non-contiguous bands.

8. *The spectrum needs of professional and non professional users must be clearly distinguished:*

- Non professional uses (consumer use): several speakers suggested that a practical way forward would be to identify two or three 8 MHz channels for EU-wide availability, mainly for the purpose of standardisation of non professional “prosumer” wireless microphones or for very small (micro-level) professional uses.
- Professional uses: the majority view was that "tuning" ranges will always be necessary as it would be impossible to reserve the sometimes very large amount of spectrum for such uses on a permanent and ubiquitous basis. One of the suggestions made at the workshop was to assess the feasibility of a possible commitment by all member States to ensure that a minimum amount of spectrum will remain available in the future for professional PMSE uses across the EU (not harmonised, but as part of an agreed set of tuning ranges).

9. *There would be a benefit of studying the actual availability of "white spaces" in each Member States,* and to develop a common understanding of the expected long term evolution in terms of availability and quality, taking into account cross border effects between Member States and existing DTT allotments.

⁴ Electronic News Gathering

10. *PMSE users do not need individual licenses for the sake of it. They rather need to have a predictable level of protection.*

11. *The appointment of band managers could be a way forward in some cases. The band manager could also provide useful information to regulators on the actual demand and its evolution (better monitoring of demand).*

12. *There is a need for more consistency between national regulatory regimes applicable for PMSEs in Member States, as well as more clarity regarding access to regulatory information.*

13. *The possibility to consider additional spectrum for PMSEs (SAB/SAP) at WRC-15 was raised. This may have an impact on setting EU priorities for agenda item 8 at WRC-12.*

14. *The anticipated use of geolocation databases for managing cognitive access would probably require some degree of harmonisation at EU level.*

15. *Sufficient contingency time is needed to be able to migrate the current equipment base to new frequencies.* Representatives of the professional wireless microphone users, as well as wireless microphone manufacturers, requested that regulators provide sufficient lead time for the industry to adapt when spectrum is being re-farmed away from PMSE applications. They suggested that regulators could issue guidelines, or a joint statement at EU level, providing more clarity and predictability on expected transitional arrangements in Member States between now and 2015, and possibly up to 2020.

Commission conclusions and possible next steps

The Commission representative attempted to draw some conclusions and to outline possible next steps, as follows.

The high social, cultural and economic impact of PMSE applications is recognised by all. In addition, PMSE applications are essential contributors to the production of the rich media content that will be critical to the success of the high speed broadband services to be delivered over fibre networks.

This workshop was probably the first time that all relevant sectors could be involved in a common reflection on EU-level cooperation regarding spectrum for PMSEs. The Commission thanked therefore the participants for the open and frank exchange of views.

The debates have confirmed the willingness of stakeholders to cooperate to find harmonised solutions where appropriate. The workshop should also increase awareness among policy makers of the various issues facing the PMSE sector, only part of which is related to the use of the digital dividend by new services. At the same time, the PMSE sector faces the challenge of accelerating technological developments in a market characterised by relatively long product life cycles.

In the view of the Commission representative, some of the clearer outcomes of the workshop were:

- The spectrum suitable for most PMSE uses is located above 470 MHz and below 2 to 3 GHz due to propagation characteristics, antenna size and power consumption.

- Many of the potential candidate bands for future use by PMSEs are already well identified. It may be useful to investigate why there are so few of such candidate bands in the 1 GHz to 2.5 GHz range (where mobile technology has already proven to overcome possible propagation issues).
- The use of cognitive technology for improving spectrum management for PMSE applications is a promising way forward. However, the current consensus among experts is that this will probably not have a noticeable market impact before a minimum of five years.
- The idea of a switchover from analogue to digital technology is a controversial subject. It is clear that, at the moment, digital solutions are not suitable for all types of PMSE uses. There is a need to assess in more detail the feasibility and cost of digital technology, as well as its advantages and disadvantages for the various categories of PMSE users.
- There is a need to increase research efforts in the sector (e.g. regarding flexible spectrum access, digitalisation). Community research funding could be one of the relevant instruments.

The workshop did not identify any precise mandate for action to the Commission. However, the discussions highlighted a set of areas where the Commission could consider action, namely:

- To clarify future spectrum demand by ensuring that there is a clear categorisation of PMSE uses (in particular in terms of required quality of services, amount of spectrum needed at a given time and location, number of users, etc). Without a clear understanding of the various classes of demand, there is little possibility to identify the best opportunities for EU harmonisation. This activity should be performed primarily by industry but the Commission could provide a discussion platform. Alternatively, the Commission could contract a study to address the subject.
- To address the issue of EU fragmentation of licensing conditions, or at least the fragmentation in conditions of spectrum use (licensed and unlicensed). This topic could also include the EU dimension of relying more on professional "band management", and also the issue of temporary allocation of spectrum for PMSEs for large/special events.
- To analyse the most immediate opportunities for harmonisation (e.g. 800 MHz central duplex gap or the small extension of the 863-865 MHz band to also include the 862-863 MHz frequency).
- To consider the possibility to mandate ETSI to further develop appropriate standards to facilitate the use of cognitive technologies in a PMSE context (e.g. database access).
- To speed up work to clarify the longer term future of the L-band. The objective would be to increase predictability regarding the potential use, or not, of this band for PMSEs on an EU-wide basis.
- To assess the pros and cons of promoting an agenda item to identify additional spectrum for SAP/SAB in the agenda of WRC-15 (through the negotiation of the agenda item 8 at WRC-12).

As part of the immediate follow-up, it was noted that the Commission:

- will report on the outcome of this workshop to the Radio Spectrum Committee (RSC) at its 34th meeting on 8-9 December 2010;

- will examine how to ensure that the identification of the relevant categories of PMSE users (and their specific spectrum requirements) will take place without delay;
- will make a proposal on how to improve access to national regulatory conditions applicable to the various types of PMSE uses.

As part of the closing comments, the Commission representative expressed the conviction that the specificities of the PMSE sector is an opportunity to showcase a more modern spectrum management approach and, in doing so, also pave the way for improved spectrum management in other sectors.



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Brussels, 22 October 2010
 DG INFSO/B4/PHL/prm

Workshop on

"A long term approach to radio spectrum for PMSEs in Europe"

Tuesday 26 October 2010, 10h00 – 17h00

**Venue: Conference Centre "Albert
 Borschette"
 Room AB-1A
 Rue Froissart 36, 1040 Brussels**

Workshop Agenda

9:30-10:00 **Registration and coffee**

10:00-10:05 **Opening and welcome**

Philippe Lefebvre, DG INFSO B4, European Commission

10:05-11:00 **Potential benefits of coordinated spectrum for PMSEs**

Types of benefits (economies of scale, interoperability, etc).

Which categories of PMSEs would most benefit?

What is the commercial and technical feasibility?

*Peter Roberts, Performing Arts Employers Associations League Europe
 (Pearle)*

*Wolfgang Bilz, Association of Professional Wireless Production
 Technology (APWPT)*

Catherine Smadja, British Broadcasting Corporation

11:00-12:15 **Trends regarding PMSE technology beyond 2012**

*Prof. Georg Fischer, Co-Chairman of ETSI STF 386 (on cognitive
 PMSE systems)*

Volker Schmitt, Head of PWMS development, Sennheiser

Andrew Stirling, Consultant, Microsoft

Cyril Measson, Qualcomm

Dr. Radu Circa, Bosch

12:15-13:15 **Past experience and two case studies / lessons regarding possible EU coordination opportunities**

Germany - National arrangements following the allocation of the 800 MHz band by Electronic Communications Services: *Guido Göddel, Head of Section SRD, PMR, Amateur Radio, BNetzA*

The UK - Experience of JFMG Ltd: *Paul Gill, Arqiva (former Managing Director, JFMG)*

US experience: *Edgar Reihl, Shure Inc., USA*

13:15-14:00 Lunch break (*sandwiches will be available to participants*)

14:00-14:40 **Types of PMSE uses versus spectrum needs**

Nigel Laflin, BBC, Chairman CEPT FM45

Bruno Marx, Association of Professional Wireless Production Technology (APWPT)

Alan March, BEIRG, League Europe (Pearle)

14:40-15:40 **What degree of EU harmonisation? For which uses? What are candidate bands? (round table, interactive session with all participants)**

Chair/moderator: William Webb, Ofcom, UK

Industry:

Sennheiser, Norbert Hilbich

Audio Technica, Dré Klaassen

Regulators:

Margit Huhtala, FICORA Finland

Frank Bodewes, Radio Communications Agency Netherlands

15:40-16:50 **Roadmap for the way forward (interactive session)**

Chair/moderator: William Webb, Ofcom, UK

Colin Thomson, regulatory engineering director, Access Partnership(UK)

Fokko Bos, Chairman RSPG working group on cognitive radio

Wolfgang Bilz, Association of Professional Wireless Production Technology (APWPT)

Wendelin Reuter or Karl-Heinz Laudan [TBC], Deutsche Telekom, on behalf of GSMA

Darko Ratkaj, European Broadcasting Union (EBU)

16:50-17:00 **Closing comments**

Philippe Lefebvre, INFSO B4, European Commission