



January 15, 2011

Reference: RSPG Opinion on Cognitive Technologies (RSPG10-348)

The APWPT is pleased to submit its comments in this proceeding. APWPT is an EU-based association that promotes, on an international level, the efficient and demand-driven provision and use of frequencies for professional events and productions ("PMSE"). Wireless microphones and cameras are examples of the wireless equipment critical to such events and productions. APWPT believes strongly that it is important to preserve the ability to use such frequencies to support professional productions even as other spectrum policies and uses change. (Website: www.apwpt.org). Its members have a vested interest in the issues raised by this consultation. The APWPT has been very involved in PMSE-related frequency matters on the EU level, such as the European Commission's ("EC") PMSE workshop of October 26, 2010 and at ETSI.

1) Comments on Section 2 of the PMSE Opinion: Greater density of the spectrum use by PMSE is very likely

Many EU member states are currently discussing how cognitive technologies can be used to make more spectrum available for broadband applications. Whatever specific approaches are developed, these changes will have a significant impact on PMSE. Especially in metropolitan areas, the density of users will increase dramatically as a consequence of the UHF-TV spectrum that is already allocated to mobile services or is in discussion to be allocated (Digital Dividend part 1 and part 2).

2) Comments on Section 4.1 of the Opinion: Sensing by the Cognitive Devices is not a viable solution

The APWPT cannot support a "stand-alone sensing" solution. A major obstacle for the sensing approach is that it only detects those spectrum users that are on air at any given moment at any given location. Those behind the "horizon" (or some other blockage) are out of sight and are not recognised (also referred to as the hidden node problem).

Based on measurements, tests and studies performed by the Federal Communications Commission ("FCC") in the United States and the European bodies within CEPT and ETSI, it is clear that spectrum access by sensing-only devices is very problematic and cannot protect incumbent users of the UHF-TV spectrum. Therefore, the RSPG should make it clear that

sensing other spectrum users by the Cognitive Devices is currently not a viable solution and should be rejected. Further studies and real life testing are needed.

To complete the picture, creating “safe harbour frequency bands” to protect PMSE implies that certain empty TV channels are reserved only for the operation of PMSE. Such a safe harbour exacerbates the above-mentioned spectrum density problem, possibly requiring widespread modifications to PMSE equipment, and impose regulatory challenges to make such a safe-harbour available throughout the EU, unless there is a clear mandate from the ITU or the EC.

3) Comments on Section 4.2 of the Opinion: Cognitive Pilot Channels (“CPC”)

CPC is not discussed in full detail yet. However, one most likely significant disadvantage of this solution is that the pilot channel occupies valuable spectrum that cannot be used for the operation of the Cognitive Devices and is by itself an additional interference source. In order to supply the pilot channel with the information, it must use another frequency which may be occupied. In other words, a pilot channel might create a new source of harmful interference.

4) Comments on Section 4.3 of the Opinion: “Database”

While the database approach is the most promising methodology, it comes with various challenges:

- A database needs to be updated very quickly to capture temporary users (an example for this is ENG – Electronic News Gathering). A database is only reliable if all fixed and temporary operating wireless units are registered.
- It will be very difficult, or even impossible, to track cognitive radio users. Given the challenges of tracking and responding to potential interference incidences, it is imperative that the national regulators mandate that a Cognitive Device’s ID (such as information on the type of device it is and where it is located) be transmitted with every contact to the database; moreover, this ID must clearly identify the hardware and software of the Cognitive Device asking for spectrum access.

The frequency management is a sovereign function of national administrations. However, it is not without limits. The national regulatory agency is the responsible body with a duty to ensure interference-free access to spectrum. The APWPT is concerned that national regulators may shift their responsibilities for spectrum management to the database operators or to the Cognitive Devices network operators who do not have any sufficient incentives to protect PMSE or other incumbent users. Those responsibilities should only be shifted to the database operators and/or the Cognitive Devices network operators if there is proven evidence that the national regulator cannot fulfil the tasks itself, and that the national regulator will be able to supervise the transferees efficiently and effectively. For this purpose, the national regulator must set up rules that determine in detail what the database operators’ and the network operators’ responsibilities are, how the national regulator will oversee and monitor their performance, and how complaints will be managed. The national regulator must also design and implement an efficient complaints procedure along with clear and demonstrable remedies.

5) Comments on Section 5: “Opinion of the RSPG”

Based on these observations, the APWPT briefly comments on the various observations and considerations of the RSPG in Section 5 of the Opinion as follows:

“The RSPG notes

1. *that in several European countries, licences have been given for the provision of digital terrestrial television in the UHF bands for the next 15 to 20 years;”*

“2. that the licensing period, planning requirements and use of the incumbent services in the UHF band (i. e. Broadcast and PMSE) varies between different national administrations. This will have an impact on the timing and amount of white space that could be made available for use by cognitive devices;”

Comment: The RSPG should add the following subparagraph: *“Given the debate on the EC’s Digital Dividend Part 2 which has already commenced, the amount of white space spectrum available for CR technologies could be very limited and its impact on PMSE should be further investigated. The burden of proof is on these technologies to demonstrate that they will not cause harmful interference. “*

Reasons:

- PMSE is already using the white spaces. A device using CR technology must not be allowed in these bands where other devices, such as PMSE devices, are already present and operating, without the appropriate tools and safeguards in place to detect the available frequencies and avoid interference.
- All Cognitive Devices are expected to be low-cost consumer devices. This means that expensive filtering is not possible, which decreases the amount of readily available white space even more. However, high quality filters are needed to overcome interference from high powered TV transmitters and for avoiding interference in adjacent TV-channels used by PMSE or other services.

Therefore, the APWPT believes that the UHF-TV band is not a preferred spectrum location to target for consumer applications of Cognitive Devices.

“3. that CEPT is, in the first instance, the most appropriate entity to undertake any European-wide studies in order to identify spectrum available and develop sharing conditions in order to implement CR technologies;”

COMMENT: APWPT would be pleased to assist CEPT and its project teams in these studies. Unfortunately, only a few administrations have contributed to the study performed by CEPT PT SE43. Moreover the findings available through CEPT Report 159 do not include the usage of PMSE, i.e., the focus is on DVB-T allocation/usage only. Thus, more work needs to be done.

“4. that academia and researchers have already assessed the technical issues related to cognitive radio technologies;”

COMMENT: APWPT disagrees with this statement. The CEPT PT SE43 report shows that there are still many unresolved technical issues which require further study and careful consideration.

“5. that ETSI is the appropriate standardisation body to develop harmonised standard related to devices with CR technologies;”

COMMENT: APWPT agrees with this observation. ETSI TC RRS has already started a work item about CR in the UHF-TV band. Furthermore, ETSI STF 386 has developed two reports leading to a definition of Cognitive PMSE systems.

“6. that, in case of databases, there does not seem to be any European regulatory framework applying to accreditation of databases;”

COMMENT: CEPT PT SE43 supports the database approach as the most promising spectrum access solution for Cognitive Devices. Other mechanisms and solutions are problematic at this time. However, it is also clear that there will be no harmonized EU database available in the very near future. APWPT has explained its concerns relating to the database approach in more detail above (comments on Sec. 4.3).

“7. that harmonisation of CPC at European level should remain on standardisation level until technical and commercial uncertainties have been solved.”

COMMENT: APWPT agrees that the issue of Cognitive Pilot Channel (CPC) is at an embryonic stage and raises numerous critical issues, such as the issue of spectrum efficiency mentioned above.

“The RSPG considers

1. that the R&TTE Directive covers all of the essential requirements that can be applied to CR devices”;

COMMENT: APWPT agrees with RSPG that the importer, the hardware and/or the software manufacturer for Cognitive Devices are and should each remain responsible for the products that they place on the EU market, in compliance with the R&TTE Directive and all applicable law in the EU for such devices. It is critical that the regulatory bodies prohibit any modifications of hardware or software of any Cognitive Device on the market without prior authorisation.

“2. that the existing regulatory framework already covers devices that implement sensing techniques to enable sharing between different services;”

COMMENT: This consideration should be deleted. As explained above, APWPT has serious and legitimate concerns that sensing technology is an unproven methodology and cannot be considered to be a reliable approach to interference protection at this time.

“3. that technical and legislative options involved in this transition should not be determined by economic factors alone but ought also to take account of social, cultural and political factors;”

COMMENT: APWPT wholeheartedly agrees. As explained above, PMSE equipment is essential for social, cultural, civic and sporting events and the content production related to these events. Interference-free PSME operation is, therefore, essential for the social cohesion of the EU. It is important to consider for a moment what will happen if PMSE users do not have these tools for production and live performances. Going back to wireline equipment is no alternative.

“4. that promising new services fostering growth and innovation are seeking access to spectrum;”

COMMENT: The APWPT is pleased that RSPG has opened this proceeding for comments for opening the market for innovation. The APWPT agrees that an approach that relies solely on letting commercial market forces enable innovation and ensure adequate protection to existing services would not work. There is a strong need to balance the opportunities that Cognitive Devices might provide and the feasibility of their technical innovation with the protection of incumbent professional users of UHF-TV white space. Purely concentrating on potential positive results that may or may not derive from any deployment of Cognitive Devices without fully exploring the potential (and very real) negative effects they may have on incumbent users should be avoided.

“5. that the amount of spectrum available for cognitive radio use is still to be studied and evaluated;”

COMMENT: As stated above, the amount of white space in the UHF-TV band may be less than regulators and users expect. Therefore, thorough study of how Cognitive Devices may fit into this picture is crucial. APWPT will be pleased to assist CEPT and its project teams in these studies. These studies should also consider the pending proceedings on Cognitive Devices at the Federal Communications Commission in the United States to discuss what lessons can be learnt for Europe. Unfortunately, far too few European administrations so far have contributed to the Cognitive Devices study performed by CEPT PT SE43. RSPG should thus encourage a broader participation. Moreover, the findings of SE43 so far have not included the full scope of PMSE usage since they only focus on DVB-T.

“6. that CR devices may enable and/or improve spectrum sharing in a number of bands;”

COMMENT: On a theoretical basis, cognitive technologies are able to improve spectrum sharing. Therefore, the PSME industry is currently investigating the possibilities of CR technologies in the ETSI STF 386 Cognitive-PMSE in more detail.

“7. that there does not seem to be any discernable support at this time to introduce harmonised frequency allocations to accommodate CPC, but some standard bodies have introduced the possibility of sharing with other services by recognition of beacons which could be part of the incumbent normal protocol;”

COMMENT: APWPT deems CPC problematic since every additional in-band transmitter will increase the interference possibility, i.e. spectrum efficiency decreases, and CPC may be prone to errors. Other unresolved issues include: Who will be responsible to ensure that CPC works? Who pays for it?

“8. that EU funded research covering the following activities:

- a. Evaluation of terminal radiofrequency hardware and computations constraints relevant to sensing, leading to specifications of suitable embedded hardware and computing capabilities;*
- b. Definition of sensing scenarios, by taking into account several radio environments;*
- c. Evaluation of communications resources that are necessary for interfacing sensing components in case of cooperative sensing and for connection to the database;*
- d. Evaluating the safety mechanism to be implemented in order to ensure a safe data communication (for database and cooperative sensing) to prevent degraded functioning.”*

COMMENT: APWPT welcomes and supports the research activities. RSPG should add that

“e. any CR activity in the UHF-TV band needs to protect incumbent services, in particular to ensure that interference to PMSE and other existing services is avoided.”

“The RSPG recommends

- 1. that implementing measures to introduce the CR technologies in some bands could be left to Member states as long as border coordination issues are addressed and the following recommends are taken into account;”*

COMMENT: APWPT disagrees with RSPG’s recommendation. PMSE is a recognised user and needs protection for the production of all kinds of cultural and social events throughout the EU. The EC should learn from the implementation of the Digital Dividend when national administrations were developing their own national PMSE frequency plan. This has led to various practical problems. Cognitive Devices will probably be used throughout the EU and potentially will harm PMSE. Therefore, mere coordination among the EU Member States is not sufficient to protect PSME and could lead to a build up of new frequency borders within the EU.

Rather, the EC should determine, to the extent possible under EU law, which frequency bands these devices should use. The EC should follow the same approach on the ITU level to ensure that PMSE is protected.

“2. that a platform shall be created to allow researchers, academia and regulators to coordinate research activities;”

COMMENT: APWPT applauds the idea of a platform allowing the exchange of information. APWPT would be happy to contribute to this endeavour on regulatory and technical aspects.

“3. that Administrations, when implementing CR technologies that require to utilise databases should (possibly with guidance developed in the CEPT):”

- a. indicate how the databases should be certified or accredited, supplied and updated by national regulatory bodies, and to supply relevant information to CR systems;*
- b. provide information to database managers on algorithms;*
- c. provide information on incumbents directly or through a designated entity;*

COMMENT: RSPG lists several important aspects, which need to be addressed for the protection of PMSE service in the UHF-TV band and elsewhere. National consultation documents (as an example, the recent consultation on Cognitive Devices released by OFCOM UK) as well as the work of CEPT PT SE43 indicate that the requirements of the geolocation database protecting PMSE cannot be finalised before real-life testing demonstrates that the Cognitive Devices can actually “deliver” what they promise. It also needs to be clear who the data base provider is, what the requirements are, and what appeal and troubleshooting mechanisms will be available to provide relief. See our comments on Section 4.3 for more details.

To name just a few unresolved issues:

(a) Many PMSE applications need to operate at short notice, within seconds. Therefore a database needs to react in quasi real-time. It is not clear that the current proposed Cognitive Devices provide this reaction standard.

(b) The algorithm that calculates the protected area for an active PSME device is unknown, as long as there is no clear industry standard for the cognitive technology.

(c) To protect the user, the communication between the Cognitive Devices and the databases must be encrypted. Due to data protection considerations, it has to be determined who will have access to this data and whether this access is compatible with applicable data protection and privacy laws.

(d) The requirements for a database that must protect incumbent users needs further thought and study. For instance, there needs to be a clear and efficient enforcement mechanism in place if and when the administrator of the database is acting unreasonably.

(e) CEPT / ETSI should further explore requirements that will allow the data base provider to immediately end the use of the frequencies by a Cognitive Device causing harmful interference (“kill switch”).

We request that a proposed algorithm need to be validated and qualified in the field under real-life conditions. APWPT is happy to offer its assistance.

“4. that Administrations and the EC should request ETSI to study the relevant means that could be implemented in order to secure the access from CR devices to the relevant database and the exchange of information between them;”

COMMENT: ETSI is responsible for managing the technical harmonisation. However, as stated above under Section 3, the regulatory part also requires harmonisation, which should be RSPG's prime responsibility.

“5. that Administrations, in relation with the EC and TCAM, should give to ETSI relevant information on suitable data elements, equipment behaviour and output signal radio characteristics which will allow ETSI to develop harmonised standards;

6. that any Cognitive Radio harmonised standard developed by ETSI should include:

a. compliance testing instructions under R&TTE Directive;

b. relevant information on how CR device could access only certified or authorised databases;

c. HS information that should be given to CR devices from the database for a given period of time;

d. information to be supplied by the CR device to the database including appropriate geolocation information;

e. means needed to secure transmission between the database and the CR device;

7. that TCAM should keep Notified Bodies up to date regarding specific requirements under the R&TTE Directive for CR devices;

8. that in order to provide some confidence to all stakeholders, EC should investigate if JRC facilities can be made available to carry out proof of concept testing on CR devices supplied by industry.

COMMENT: APWPT requests that proposed technologies need to be validated and qualified in the field under real-life conditions. APWPT is happy to offer its assistance.

9. Conclusion

APWPT sums up its various suggestions as follows:

- Cognitive Devices should only be allowed in bands that PMSE occupies if it can be proven that the devices will not cause harmful interference or otherwise adversely affect the quality of service of the content producers relying on PSME devices operating in the band.
- The operational behaviour of Cognitive Devices must be thoroughly tested in real-world field conditions and judged to be reliable. All untested or unauthorised modifications should be prohibited.

There are numerous PMSE devices operating in the UHF band -- according to the Professional Audio Manufacturer Alliance (PAMA) study of 2008, there are more than 6 million alone in Western Europe. These PMSE devices form sensitive systems to provide high-quality, professional sound support for the benefit of TV and movie productions, political gatherings, shows, musicals, theatres, conferences, communication centres and other cultural activities -- many of which are designed to attract tourists. All these high-quality, professional systems may be in jeopardy if Cognitive Devices commence operating on the same frequencies without reliable, robust and proven methods to prevent interference to PSME.

Please do not hesitate to contact any of us if you have any questions.

Respectfully submitted by

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