



## **Broadcast Networks Europe Response to the Public Consultation for the draft RSPG Opinion on Cognitive Technologies (RSPG10-348)**

### **1. Introduction**

BNE welcomes the opportunity of expressing its view on the draft RSPG opinion on cognitive technologies. BNE is the association of broadcast network operators in Europe. The association includes among its 14 member companies all the major operator in Europe serving 25 European countries.

More information about BNE can be found on [www.broadcast-networks.eu](http://www.broadcast-networks.eu)

### **2. General comments**

BNE considers that cognitive technologies have the potential to increase the efficiency in the use of the radio spectrum, thus bringing benefits to citizens of the European Union.

However, these technologies need to be regulated in a way to guarantee that incumbent services are not interfered with.

Cognitive technologies introduce a new paradigm in the way that radio spectrum is exploited. This paradigm change has implications on various domains: it is necessary to have a clear view of what is technically feasible (see for instance the case of spectrum sensing); we believe it is necessary to act at the level of standardization, to consider aspects of enforcement and market surveillance.

In our opinion, a focus on these topics and their interrelation has only just started; as a consequence sufficient consideration has not been afforded these topics and we believe that a prudent approach is necessary. Also, a prudent approach is encouraged because otherwise it will be very difficult to intervene at a later stage, as it is well expressed by this quote from the RSPG "Public Consultation on the Draft RSPG Opinion on Streamlining the Regulatory Environment for the Use of Spectrum" (July 2008):

"... when a frequency band is open to a new application, in particular in the case of mass market devices operating under general authorisation, it is felt extremely difficult to place more stringent requirements on the conditions of use at a later date, even in the case of well identified risks of interference. It is felt that it would be even more difficult to stop access for such devices in the frequency band affected. ..."

### **3. Comments related to sensing**

During the works of CEPT Group SE43 on technical and operational requirements for the possible operation of cognitive radio systems in the “White Spaces” of the frequency band 470-790 MHz, the following aspects of sensing emerged:

- Autonomous sensing is not reliable enough to provide adequate protection of the broadcasting service, at least at the current stage of the technology development. This is mainly due to the so called hidden node problem. The hidden node problem is strictly related to the physics of radio wave propagation and the operational scenario in which it is used, so in most cases it is not prudent to assume that in the future technological advances will make it a reliable approach.
- Sensing of low signal levels requires a-priori knowledge of at least some technical characteristics of the signals to be sensed. This in turn means that sensing is not fully adequate to follow the evolution of services to be sensed.
- Cooperative sensing is still a topic of research and not yet a mature technology. The real benefit that such an approach can bring is still to be quantified.
- The combination of sensing and a geolocation database is also still a topic open for research.

These shortcomings have been outlined in detail in the case of sharing with the broadcasting service, but it is assumed that similar difficulties will be encountered when sensing is applied to other services (for instance satellite services, as already suggested by some contributions in ITU study groups).

We believe that the RSPG opinion should be updated to reflect these results and to avoid the misunderstanding that spectrum sensing can with certainty be an enabler of the widespread use of cognitive technologies.

#### **4. Comments related to the geolocation database**

The main aspect of concern about the geolocation database, from an incumbent operator point of view, is who will manage the database. This point seems to be overlooked by the document “RSPG10-348 Draft for consultation”.

However the document, although indicating that information about incumbent services needs to be provided and certified by the national regulator, as well as the way that policy algorithms need to be implemented, does not discuss whether the database manager should be a private entity or an independent public body

The issue is very important for an incumbent service operator for two reasons:

- Detailed information about coverage maps for broadcasting services is commercially sensitive. This applies both to intra-platform competition at network level and inter-platform competition across platforms. For instance, knowing detailed coverage maps of an operator may make it possible to shape adverse marketing campaigns (sending targeted advertising to customers inside or outside the coverage areas) or to implement customer discrimination techniques (charging customers different prices depending on where they live: if company X knows that customer A cannot get the signal from its competitor, while customer B can, why offer the same price to both?). Therefore broadcasters and broadcast network operators as their service providers have severe difficulties in disclosing any such information to third parties.
- The database will act in a certain way also as a referee, ensuring protection of incumbent services from interference and at the same time allowing access to the

spectrum for cognitive devices. It is not only a matter of defining proper policy algorithms (as the RSPG draft opinion suggests). It is also a matter of the daily operation of the database. The database will operate on the basis of maps of predicted coverage. As accurate as the prediction might be, there will always be residual interference. How proactive will the database manager be in tracking and solving these problems? How fast will he be in acting after one or several cases of interference have been reported? For the reasons above, operators of incumbent services will have difficulties in trusting a proprietary database operated by providers or manufacturers of cognitive systems.

In addition, from a Member State perspective, the proposed geolocation database approach described in the RSPG draft opinion does not consider issues of privacy, jurisdiction and sovereignty .

- Privacy: The database may (see draft ECC Report 159) collect not only the position of white space devices, but also their serial number. It is possible to foresee a future scenario where smart-phones, embedding a white space card, will continuously submit their position and serial ID to a geolocation database. The body who controls the database will be in a key position to profile citizens, possibly matching their position and movements with their internet browsing history. Who will handle the database is an issue of crucial importance. The model proposed in the draft RSPG opinion (for instance, see the architecture in figure 4-1) does not seem to address this issue.
- Jurisdiction: The database will control access to a strategic resource: spectrum. The question of whether the database will be located inside or outside the jurisdiction of the country whose spectrum it administers is relevant and needs to be addressed. This aspect also is not fully considered in the RSPG draft opinion.

On the other hand, it might be reasonable to think about a mechanism to “switch off” individual CR devices if their operation has been identified as being the source of continuous reports on interferences into services to be protected. However, this again raises the question of “Privacy” mentioned above.

## **5. Comments related to the effectiveness of the R&TTE Directive**

The Draft Opinion of RSPG analyses the issue of whether the R&TTE Directive is a suitable tool for regulating the introduction of cognitive devices. In order to express the BNE point of view, we would like to note the differences between cognitive and non-cognitive types of equipment:

- Traditional equipment is normally conceived to operate in segmented bands. To give an example, it is very likely that a terminal designed to operate in the citizens band will not be able for instance, because of its hardware built in filters, to work in other bands where systems with higher priority operate. Non-compliance with the standards is not necessarily likely to impact a wide range of services and services with higher priority. This to some extent limits the amount of potential interference.
- A cognitive device operates in a shared spectrum environment, normally with licensed services having higher priority. Thanks to its frequency agility and adaptability, the device ideally avoids creating harmful interference to enable this. In this scenario, compliance with appropriate and almost “perfect” standards and policy is the cornerstone of the approach.

More generally, we would like to stress here that spectrum management via cognitive technologies embodies a principle that is closely related to what in game theory is known as the tragedy of commons: if all devices abide by the mandated policies (i.e. they operate by the standard), every one can access the spectrum under fair conditions, but if one cheats and applies aggressive and illegal policies e.g. by not following the standards (for instance not applying correctly the mandated interference avoidance algorithms) or by misusing “holes” in the standard it has a competitive advantage over its neighbours and monopolizes the spectrum resources.

In other words, for the successful management of spectrum via cognitive technologies, it is essential that there is a reliable method to make sure and enforce that all devices do not deviate from the prescribed policies for access to the spectrum.

Given the above considerations, asking, as the RSPG does, whether the R&TTE Directive is ready for the introduction of cognitive devices is certainly an important issue. But another question is at least as important, that is whether today there is a mechanism to make sure that all cognitive devices will follow the policies indicated in the standards (and a related question: will they be compliant with the R&TTE Directive?).

We would like to quote here from the Report of the Commission to the Council and the European Parliament 2<sup>nd</sup> progress report on the operation of directive 1999/5/EC (document identifier: COM(2010)43 final):

Quote 1: “Every year MSAs in charge of market surveillance notify to the Commission approximately 50 cases of non-compliant equipment banned from their national market under the safeguard clause procedure foreseen in Article 9.”

Quote 2: “The past campaigns already flagged **concerns about compliance levels in certain families of products**. In particular, **a very low level of compliance to the provisions of the Directive was observed among low power radio devices** and to a lesser extent in other areas” (bold characters are from the original report).

Quote 3: “A number of importers and manufacturers of this equipment are not aware of the Directive or deliberately ignore it.” The Report includes the sentence “A number of stakeholders noted that this has not led to obvious risks for consumer safety and for the integrity of telecommunication networks, or to an increase in harmful interference”, but the Report does not specify whether these stakeholders belong to the category of those who have interest in having the least control of compliance for devices or to the category of stakeholders that may potentially suffer from the effects of non-compliance.

Quote 4: “**Traceability of defective products** is an issue of concern: market surveillance authorities can often not identify the manufacturer or the person responsible for placing a product on the market”.

From the quotes above, one may conclude that assuming that WSDs will necessarily be compliant with the R&TTE Directive and with appropriate standards is not a realistic assumption. Also, from the quotes, it is evident that, today, on the European market there is not a reliable system to ensure the principle that devices have to operate by the standards.

Another aspect that needs to be considered, in relation to the R&TTE Directive is Article 6(1) of the Directive, reproduced here for ease of reading:

“Member States shall ensure that apparatus is placed on the market only if it complies with the appropriate essential requirements identified in Article 3 and the other relevant provisions of this Directive when it is properly installed and maintained and used for its intended purpose. It shall not be subject to further national provisions in respect of placing on the market.”

That is, the Directive indicates that the apparatus must comply with the general requirements set in the Directive, when it is installed and operated as it should be. This Article seems weak in the case of frequency agile devices, possibly software defined radio, able to span a potentially wide set of bands and potentially to cause harmful interference to other services. Today, the vast majority of licence-free devices, available off the shelves, are able to transmit only in a very limited set of bands and generally the damage caused by incorrect use cannot be severe. For instance, Wi-Fi cards are normally able to transmit only on the Wi-Fi bands and GSM phones cannot be easily altered to use them in public safety bands. We believe that to foster the development and widespread deployment of equipment employing cognitive technologies, the Directive should seek to ensure that the equipment should not be easily modifiable in a way that might create harmful interference.

With respect to CR/SRD devices, the same article discussed above, raises another issue: devices could be operated even in countries where the particular band is not to be used for CR, depending on the mechanism to contact a geo-location database not necessarily only in bordering areas.

## **6. Additional proposed modifications to the draft RSPG opinion**

In addition to the comments expressed above, BNE suggests the following modifications to the draft RSPG opinion.

To insert in “The RSPG notes” a point 1b:

“That CR and SDR technologies should be assessed as useful tools to facilitate the sharing of the spectrum by more than one service or to enhance the quality of the communications, i.e. by improving the reliability of the transmission channel, but not as a means to designate some specific parts of the spectrum for new systems, which in any case must be subject to the ITU Radio Regulations and, specifically, to the adequate protection of the incumbent services”.

To insert in “The RSPG notes” a point 1c:

“That CR must be efficient and doubtless on the detection of both the transmission and reception channels, one particular feature being to identify the reception-only equipment attached to an authorized service”.

To insert in “The RSPG notes” a point 1d:

“That since the CR and SDR devices will be an integral part of the upcoming heterogeneous Next Generation Networks, those aspects related to the quality of the services, network security and stability, must be essential elements in the definition of CR and SDR, in addition to having the capacity to adapt to the electromagnetic environment or to identify the unused bands in time or location”.

To modify in the “RSPG notes” point 3:

“that CEPT is, in the first instance, the most appropriate entity to undertake any Europe wide studies in order to identify spectrum available and develop technical conditions in order to implement CR technologies on the basis of ‘no interference no protection”

To modify in the “RSPG notes” point 4:

“... that academia and researchers already study several technical issues related to cognitive technologies”

To insert in “The RSPG recommends” a point 4b:

“That when Member States arrange for the selection of the eligible white spaces or the qualification of the unused bands to allow CR/SDR deployment, the combination of the cognitive functionalities such as sensing and geo-location databases should be permitted under the national regulations”.

To insert in “The RSPG considers” a point 5b:

“That the activities of the European institutions should be focused on developing the criteria to select the candidate bands for white spaces, to prevent a-priori designation of a specific range of frequencies (such as the UHF TV band)”.

To insert in “The RSPG considers” a point 5c:

“That in identifying spectrum to be used by white spaces, Administrations should not a priori limit the search to one specific band or to the coexistence with one specific technology and incumbent service

To insert in “The RSPG considers” a point 5d:

“That some of the key steps to identify the bands available for white space operation should be: the specification of the maximum power levels of the white space devices; the specification of the sensing detection threshold; the definition of the conditions for geo-location; the evaluation of the diverse options of the suitable spectrum for white space devices.”

To insert in “The RSPG considers” a point 5e:

“That white space should be considered as the spectrum available for radio communication service on a non-interfering, non-protected basis in respect of incumbent or other priority systems”.

To insert in the “RSPG considers” under point 7, at the end:

“However, it is noted that any connection to a geo-location database would require a certain kind of a communication channel, e.g. by a fixed (wired) connection or a dedicated channel of a certain bandwidth outside the spectrum under consideration.”

To insert in “The RSPG recommends” a point 7b:

“That although the R&TTE Directive fully applies to CR/SDR devices, the European Commission in conjunction with Member States should undertake the appropriate analysis and actions to adapt the R&TTE Directive to the requirements of CR/SDR, mainly regarding the protection of the reception-only equipment related to digital broadcasting”.

To insert in “The RSPG recommends” a point 9:

“That member States should proceed to consider potential frequency bands eligible for white space devices or suitable for CR/SDR systems, taking into account spectral, economic and social considerations, , including foreseeable developments and evolution in technology, prior to the selection of any specific band for that purpose”.

To insert in “The RSPG recommends” a point 10:

“That additional regulation for the CR/SDR/WS regime should be developed. If appropriate, the European Commission jointly with member States, should build on the outcomes of WRC-12 concerning Agenda item 1.19, as well as on the inputs from CEPT/ETSI/TCAM dealing with the CR/SDR/WS functionalities”.