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**Comments on**  
**RSPG Opinion on “Cognitive Technologies**  
**(RSPG 10-348 Draft for Consultation – Nov. 04<sup>th</sup> 2010)”**

14 January 2011

ARD and ZDF welcome the opportunity to comment on the Draft RSPG Opinion on "Cognitive Technologies" (of 04 November 2010).

**Introduction**

ARD and ZDF are the Public Service Broadcasters in Germany using extensively the broadcasting bands for the terrestrial distribution of their programmes.

ARD and ZDF support the activities of the RSPG to provide an overview of the technical and regulatory aspects of Cognitive Radio (CR) technologies. We agree with the statement from the first report on Cognitive technologies [RSPG 10-306, Feb. 2010] stating that CR technologies may provide key elements of innovation, resulting in a significant increase of overall spectrum efficiency, the present draft is a follow-up of this previous report. Since spectrum scarcity is and will remain a major problem in spectrum management innovative technologies are of great importance.

As broadcasters we focus our comments on the possible implications of CR technologies as described in this opinion for broadcasting if operating in the broadcasting bands.

**Possible CR applications for broadcasting**

Broadcasters use the UHF spectrum not only for the delivery of terrestrial television but also use the interleaved UHF spectrum for radio applications of their production services. These PMSE applications are of high importance for the production of broadcast content and have high requirements with regard to quality of service. Already at present spectrum resources for these services are not sufficient in areas with particularly high DTT usage and/or in cases of major events like Olympics.

It is our expectation that future PMSE devices applying CR technologies will provide means for a more efficient spectrum usage and thus help to alleviate this shortage.

**Considered frequency bands**

In chapter 2, “Background” of the RSPG draft, possible candidate bands were categorized following a proposal by ETSI and CEPT, with a first group of bands in which cognitive functionality is already used to improve spectrum efficiency and a second group where “incumbent” services are operated and cognitive systems might be used in these bands on a non-interfering (and non-protected) basis.

The draft opinion often employs the UHF band as an example to explain the aims and principles of cognitive radio technology. We would like to emphasise that the UHF band is not the only frequency range for the application of cognitive radio technology. The focus on the UHF band in the opinion gives rise to the strong impression that for RSPG the UHF band constitutes the primary frequency range to deploy cognitive radio technology. ARD and ZDF would like to note that:

- We recognize that DVB-T channels and DVB-T system parameters make the UHF band suitable for CR applications, also called TV White Space (TVWS) applications in this band:
  - Wavelengths are long enough to have good propagation characteristics. This is often regarded as an advantage of broadcast bands. But it must be taken into account that, depending on the TVWS application, this may also be disadvantageous, e.g. for WiFi / short range connections where the good propagation and wall penetration may cause interference to adjacent systems.
  - Wavelengths are short enough to get acceptable antenna size. At least for the lower channels for hand held devices required antenna size may be too large, yet.
  - Broadcast use, i.e. assignment of channels and locations, is quite stable over time, making use of a geo-location database possible. However PMSE as a second incumbent application may cause some problems due to being not registered in a database in some European countries. If sensing shall be used to protect PMSE, its low transmit power compared to indented transmit powers for WS devices may cause detection threshold unrealizable low.
- However, besides the UHF band there exist various other bands that may be appropriate for CR usage, e.g. 880-915/925-960 MHz (mobile services), 790-862 MHz (broadcast/mobile services), 1920-1980/2110-2170 MHz (mobile services and space research), 2500-2690 MHz (mobile services) or 3400-4200 MHz (satellite services).
- It has to be pointed out that terrestrial TV broadcast is by no means a waste of spectrum. DVB-T uses high transmit powers to cover large areas with DVB-T signals. At the edge of the coverage areas the signals drop only slowly and so reuse of the same channel requires a certain distance to avoid mutual interference of systems using the same channel. When using small transmit powers the problem scales down but remains the same: safety distances are required to guarantee interference free operation. The improvement in spectrum use comes from low power systems being operated in the areas not usable by additional high power broadcast transmission. Knowing these areas, no further cognitive functionality is required: PMSE has been using such locations for more than 50 years so far.
- Digital Dividend and upcoming developments (increasing PMSE use, HDTV over DVB-T2, Simulcast in case of switch over to DVB-T2, spectrum demands of PSSS) have reduced and will further reduce TVWS in UHF significantly.

Therefore, some caution is appropriate when favouring some bands against others following some oversimplified arguments. To reach a valuable conclusion, among others, system parameters of the considered application have to be taken into account.

#### • R&TTE directive

The opinion assumes that the manufacturer is responsible for the CR device to be compliant with the R&TTE directive, where ETSI is expected to provide suitable guidance on how to meet compliance with the R&TTE directive for cognitive functionalities.

The R&TTE directive has been proven to be a valuable tool to reduce administrative efforts while, at the same time, it is assured that equipment brought to the market is in line with regulations. Usually the regulations aim is to make the products, e.g., safer and/or more interchangeable and such paves the way to the markets for these products. In this way, the manufacturer has a vital interest to fulfil the requirements of R&TTE directive.

In the case of CR devices, however, one aim is to protect the existing users. In this special case being fully in line with the directive may limit the functionality of the device whereas violating some of the requirements might, in the user's view, cause an "improvement" in device functionality.

ARD and ZDF therefore believe that self-certification according to the R&TTE directive is not a safe way to guarantee non-interfering operation of CR devices within the broadcast bands, especially when bearing in mind that possible interferers may be difficult to identify in the field. Hence we recommend to allow only such devices to be brought to market that were certified by a neutral institution. This is in line with the regulation of FCC which also requires such equipment to be certified for the US market.

## **Chapter 5: Opinion of the RSPG**

Item 1 of the RSPG notes states that licenses for DVB-T in European countries run for 15-20 years. Considered for itself, this is not really surprising news. However read in conjunction with item 2 it seems to suggest that after the run off of the DVB-T licenses parts of the spectrum might be cleared by existing users to the benefit of so called "white space" applications. ARD and ZDF would like to point out that this is not a white space use in the way it is defined.

Item 7 is not a note, it is a recommendation, so it should be under "recommends".

## **Chapter 4.1 on Sensing**

"Stand alone sensing" is described as a back-up capability in case of unexpected situations, e.g. database not available. It should be considered that sensing only, due to the hidden node problem, is not appropriate to protect the incumbent services in an adequate way. As a consequence a device losing connection to the database or being unable to appropriately locate its position, immediately has to stop transmission.

## **Conclusion**

Public service broadcasters in Germany believe that the application of cognitive technologies on a non-interfering and non-protected basis can be a means to reduce spectrum scarcity and increase spectrum efficiency in the considered bands. The RSPG present draft opinion raises many relevant aspects in this regard.

To make it a balanced and fully thought-through document there is, however, some improvement required, especially by having a more general approach to cognitive systems without prematurely focusing on the UHF band and also by stipulating appropriate means that can guarantee the interference free operation of the incumbent systems.