



Europe

**GSMA Europe response to the draft RSPG opinion on  
“ RSPG OPINION ON COGNITIVE TECHNOLOGIES”**

14 January 2011

GSMA Europe would like to thank the Radio Spectrum Policy Group (RSPG) for giving stakeholders the opportunity to comment on the draft opinion on "COGNITIVE TECHNOLOGIES".

In response to the public consultation, we would like to make the following points:

- 1. In our opinion, individual rights of use provide the most appropriate incentives for the deployment of mobile broadband in rural areas.**
- 2. We believe that cognitive technologies need more research before they can be introduced widely in licence exempt models.**

Arguments underpinning this point are detailed overleaf.

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

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**Register ID Number: 38516182135-93**

## **About GSMA Europe**

The GSMA represents the interests of the worldwide mobile communications industry. Spanning 219 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, internet companies, and media and entertainment organisations. The GSMA is focused on innovating, incubating and creating new opportunities for its membership, all with the end goal of driving the growth of the mobile communications industry. In the European Union the GSMA represents over 100 operators providing more than 600 million subscriber connections across the region. For more information on GSMA, please visit: Mobile World Live, the new online portal for the mobile communications industry, at [www.mobileworldlive.com](http://www.mobileworldlive.com), GSMA corporate website at [www.gsmworld.com](http://www.gsmworld.com), and GSMA Europe at [www.gsmeurope.org](http://www.gsmeurope.org).

## 1. INTRODUCTION

GSMA Europe would like to thank the Radio Spectrum Policy Group (RSPG) for giving stakeholders the opportunity to comment on the draft Opinion on cognitive technologies.

Cognitive radio is an emerging communication technology that aims to address the spectrum scarcity challenge; cognitive radio systems might have a significant effect on many aspects of communications, including spectrum allocation and utilization. However, even if the cognitive radio technology shows promise for specific applications and uses, its technical and commercial viability is so far uncertain and unproven. Furthermore, for specific deployment scenarios, the technical work in CEPT is at an early stage and ECC Report 159 identifies a number of open issues that require further study.

With regard to the provision of mobile services, it is not clear to us that cognitive technologies in the broadcast TV white spaces can add significant additional capacity for mobile services in dense urban areas, since these are also the most heavily used by broadcasters. GSMA Europe also remains to be convinced that cognitive radio devices based on licence exempt use of spectrum would accelerate the provision of broadband in rural areas. **In our opinion, individual rights of use provide the most appropriate incentives for the deployment of mobile broadband in rural areas.** GSMA Europe maintains that cognitive radio systems should not be allowed to operate in licensed bands where they impact negatively on the rights of existing licence-holders without the consent of those license holders. We do, however, support the concept of overlay licences (as an extension to trading, provided that the interested and the affected parties agree) since this should increase the efficiency of spectrum use.

**We believe that cognitive technologies need more research before they can be introduced widely in licence exempt models.** In addition to concerns over the potential impact of interference, building low-cost high-performance radios capable of tuning over a wide bandwidth will be difficult and the power limits defined will be crucial to whether such systems are commercially viable.

We feel it may be too early to support widespread licence exempt shared use of spectrum in the UHF band - it may be better to reserve TV white spaces to provide for future cleared spectrum than to allocate them to cognitive devices. Excessive fragmentation destroys value, and cognitive technologies should not be seen as an excuse for not allocating spectrum in the most efficient way.

If cognitive technologies are to be introduced into TV white spaces, operation within a number of UHF channels close to the edges of the band 790-862 MHz requires attention to potential interference towards services operating in adjacent bands. Appropriate regulation has to be established in order to limit such interference to acceptable levels. ECC Report 159 highlights a number of areas requiring further study (see section 11 of the report). The report studies but does not conclude on the inference into the band 790 – 862 MHz.

One of the key aims of any spectrum policy should be to promote the most effective use of spectrum – generating the greatest economic benefit for society as a whole. The worst outcome is when spectrum is not used. There is therefore a case that, provided it can be demonstrated that there is no negative impact on current or future uses of the spectrum by the incumbent rights holder, regimes that allow access to spectrum should be permitted.

## **2 GENERAL COMMENTS ON THE DRAFT OPINION**

### **2.1 Deployment scenario for cognitive radio systems**

GSMA Europe suggests that there is a need to distinguish between different usage scenarios for cognitive radio systems, including opportunistic spectrum usage and as complement to mobile networks in licensed spectrum (e.g. exploitation of cognitive technologies in an intra-operator scenario that allows more flexible and efficient use of the spectrum resources assigned to and managed by a single operator). Several organisations, such as ETSI, have recently studied these potential usage scenarios.

### **2.2 Regulatory consideration**

GSMA Europe welcomes the consideration within the draft Opinion of issues that are specific to the European regulatory environment - in particular we support the assumption that the essential requirement of the R&TTE Directive (the regime for placing products on the market and putting them into service) fully applies to cognitive radio devices.

GSMA Europe believes that the definition of responsibility in case of malfunction of the cognitive radio based equipment or the network connection is a key regulatory issue that needs to be resolved before authorising any deployment.

### **2.3 Features to obtain knowledge of the radio environment**

#### Sensing

Sensing, used by itself, is fundamentally incompatible with the European principles for spectrum management - flexible use of spectrum and technology neutrality. The sensing technology must be based on correlation of signals of the primary spectrum user in order to have enough sensitivity to avoid the hidden-node problem, This correlation technique must inherently be specific to the technology of the primary spectrum user. As a consequence, the primary spectrum user could not change its technology, or the primary user could not change, once cognitive devices using sensing have been deployed in the spectrum – which prevents flexible spectrum use for the primary spectrum user.

Furthermore, sensing technologies are still under investigation and not mature, even if a huge amount of effort has been spent on them in the last years. Indeed, the hidden node problems, as well as the ability to sense radio signals from other radio transmitters are still to be solved, including reliability of the entire process and terminal power consumption issues. GSMA Europe therefore believes that sensing techniques, employed by a stand-alone Cognitive Radio equipment (autonomous operation), appears not to be reliable enough to guarantee a correct identification of available channels at a given location.

## Database / Geolocation

GSMA Europe also considers that the database combined with geolocation systems could be a solution to provide appropriate information about spectrum availability and associated technical conditions to the cognitive radio device. This solution seems more attractive than other cognitive techniques; however some issues should be carefully analysed before authorising its operation. For this specific issue, GSMA Europe believes that access to the database should be based on a worldwide harmonized and standardized approach. In addition, the development of detailed procedure covering all the necessary aspects of the initial and periodic connections would be highly desirable. In addition, GSMA Europe has the view that database needs to be appropriately designed, managed and correctly updated without transgressing confidentiality.

It is important that certain frequency bands can be removed from the database at a future point in time if it becomes clear that it would be more beneficial to make available the spectrum on a licensed basis

## Cognitive Pilot Channel

The concept of Cognitive Pilot Channel (CPC) has been studied in ETSI and several ICT projects for several years. The main purpose of the CPC is to provide access to the information about spectrum availability and associated technical conditions to the cognitive radio device, i.e. the information stored in the Database described above. The CPC could be seen as an access means for this Database. Two main concepts are foreseen for the CPC: one that might be called “out-of-band” (the only one that appears to have been considered in the draft Opinion) and “in-band”.

The CPC out-of-band concept raises concerns for GSMA Europe, including the availability of globally harmonised frequencies for pilot channels and the associated cost of a cognitive pilot channel network deployment. The CPC out-band technique therefore does not seem to be viable in the short or medium term.

The CPC in-band concept is conceived as a logical channel within one or some of the technologies available in a heterogeneous radio environment (e.g. mapping the CPC data-stream on a logical channel, reducing meanwhile deployment costs and regulatory impacts). We consider that there is some merit in exploring this concept further.

### 3 COMMENTS ON THE DRAFT OPINION OF THE RSPG

#### ***The RSPG notes:***

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

RSPG has highlighted an important point. If cognitive devices are to be authorised in areas close to a national border, the databases will need to include information about spectrum usage in the neighbouring country. The arrangements under which this information is provided and used are similar in nature to an agreement for cross-border coordination.

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

The feasibility of a cognitive pilot channel is still unproven, so we agree that it is not appropriate to move past the standardisation stage (see above for further discussion of the CPC). However, we note that further studies are currently ongoing in both standardization and research bodies.

#### ***The RSPG considers:***

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

The R&TTE Directive appears to address all of the essential requirements for cognitive radio devices, provided that the proposed database scheme described in Figure 4-1 of the draft Opinion is followed.

One GSMA member has noted that, in a recent consultation<sup>1</sup>, Ofcom appears to have suggested a different scheme, in which the radio characteristics of the output signal of cognitive devices are not specified in Harmonised Standards. Instead, Ofcom appears to have suggested that they would be provided by the manufacturer and used in some way by the algorithm in the database. GSMA Europe believes that the R&TTE Directive does not cover all of the essential requirements in this case, because there is no means to enforce the accuracy of the information provided by the manufacturer.

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<sup>1</sup> Implementing Geolocation; 9 Nov 2010: <http://stakeholders.ofcom.org.uk/consultations/geolocation/> ; see especially paragraphs 4.3, 4.4 and A4.7.

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

The existing regulatory framework only covers sensing techniques to enable sharing with certain defined primary services. They therefore do not cover the case where the primary service may wish to change or upgrade its technology, or the primary service may change.

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

Cognitive access is set of technologies, not a service. All of the services that have been suggested as possible applications for cognitive radio and TV white spaces can be supported using other technologies and/or frequency bands. It is therefore important that a proper impact assessment is carried out, in order to ensure that spectrum is made available for the most valuable potential uses.

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

Cognitive techniques using databases may be valuable in facilitating the use of government spectrum for commercial applications. One particular benefit of the database approach is that it allows government spectrum to be made available without disclosing the characteristics of the government systems using it, and without prejudicing the ability of the dedicated government services to make full use of the spectrum in times of need.

***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;***

The “out-of-band” cognitive pilot channel does not currently appear to be a very promising option for cognitive radio, from either a technical or commercial perspective (see above for further discussion of the CPC). In retrospect, the decision of CEPT to propose an agenda item for WRC-12 addressing regulatory measures for cognitive radio systems, and in particular the cognitive pilot channel, was very premature. This might have displaced a topic that could have delivered real benefit to spectrum users.

***The RSPG recommends***

***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;***

It is unclear whether it would be unlawful in every EU Member State to operate a database without the permission of the Administration. Such a database might for example, provide false information on frequencies that cognitive devices can use, and therefore cause these devices to generate harmful interference to primary spectrum users.