

Orange France Telecom Group response to the Radio Spectrum Policy Group the draft RSPG opinion on “COGNITIVE TECHNOLOGIES”

15 January 2011

Orange welcomes the opportunity to share some views with the Radio Spectrum Policy Group on the Cognitive Radio in Europe. In addition, Orange thanks all the national and EU administrations, which are members of RSPG for their interest in Cognitive Radio System issues in general and for the consultation on the Cognitive Technologies.

1. General remarks

Orange would like to stress that the Cognitive Radio is considered as an emerging and disruptive communication technology intended to improve the overall efficiency of the spectrum use. As such, the cognitive radio systems might profoundly impact many aspects of communications. However, Orange believes that we are still at an early stage of the understanding and development; so, it seems premature to widely deploy without careful consideration of technical and regulatory issues.

2. Feature to obtain knowledge of the radio environment

- Naming of Sensing, geo-location database and beacon

In the draft opinion, these operations are named under the general term of “cognitive functionalities”. However, the term “Cognitive” refers to the ability to learn and act as defined in the ITU-R Report SM 2152. It would be preferable to clarify the naming by using the term “observation” rather than “cognitive” functionalities. So, Orange proposes to substitute “Cognitive functionalities” by “Observation functionalities”.

- Sensing

It is a matter of fact that sensing technologies are not yet mature and still under development. 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. Furthermore, Orange has the view that sensing approaches are technology-based, and associated impact in term of usage evolution of the primary service should be carefully considered. Avoiding any risk to sterilise part of the spectrum due to the limited possibilities to evolve the technology of the primary services and to introduce new primary services should be carefully addressed. About the conclusion of the draft report, Orange supports the view that sensing technique, employed by a stand-alone Cognitive Radio Device (autonomous operation), appears not to be reliable enough to guarantee a correct identification of available channels at a given location and to avoid interference with primary service on the possible co-channel nearby areas.

- Database / Geolocation

Orange 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 extremely attractive; however some issues should be carefully analysed before considering and authorising its implementation. Orange 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.



The database needs to be appropriately designed, managed and correctly updated without transgressing confidentiality. Orange believes that information to be sent to the database will be defined on the case by case basis, function of the scenario, frequency bands (including impact in the adjacent channels) and usage. Finally, the issue on the responsibility of the different actor, when implementing the database solution should appropriately addressed.

- Beacon

The beacon solution as pilot channel raises concerns including the availability of globally harmonised frequencies for pilot channels and the associated cost of a beacon network deployment. On the disable beacon solution, Orange has some concerns on the detection reliability.

3. Regulatory Aspects

- Sharing responsibilities

Orange supports that sharing responsibility issues need to be carefully understood and appropriately clarified for the cognitive radio systems, especially for the specific geolocation/database deployment.

Orange believes that a "database" cannot "allow" or give "permissions". While the overall intention of the corresponding pieces of text can be understood easily, it is preferable that the opinion is fully correct

- Monitoring of Agile Systems

Orange would like to highlight that adaptive systems, and cognitive systems probably even more than others, are very difficult to observe, identify, and determine, when necessary, as a source of interference, in particular because they are frequency "agile", and do not necessarily transmit at all times. As a consequence, it would be even more difficult for those observing how much spectrum is used to associate transmissions with the originating devices or for other cognitive devices to identify who is doing what. Therefore, the issue of "2G" cognitive devices which will have to observe both traditional devices and cognitive devices to make their own decisions, should be carefully addressed.

- License Regime

Since license exempt use of spectrum may be appeared to be irreversible, Orange believes that the individual right of use represents the most appropriate solution for the development of Cognitive Radio

4. Proposed modification to be included in the final Report on Cognitive Technology

To facilitate the acceptance of the Orange's proposed modifications, a specific template for changes request covering category of modification, as well as the associated section and the proposed change has been developed.

- Change Request #1

Section	Introduction	page	1
Category	Correction		
	Addition of feature		✓
	Functional modification of feature		
	Editorial modification		

Reason for change	<p>At the end of the section of the introduction, it is stated that the report of Cognitive Technologies highlighted the TV White Space as one of the first applications. It would also be interesting to further emphasize the other approach to implement the Cognitive Technology.</p> <p>Orange believes that Cognitive Radio term should not be limited to opportunistic spectrum access. Instead, Orange supports modifications in the final RSPG report to clarify the possible uses of cognitive elements for other non opportunistic uses.</p>
Summary of change	<p>Orange proposes the following sentence to be added at the end of the first paragraph:</p> <p>“Other deployment scenarios such as the use of CRS technology by an operator of a radiocommunication service to improve the management of its assigned spectrum resource are in a much earlier state of development”.</p>

- Change Request #2

Section	Background	page	2
Category	Correction		✓
	Addition of feature		
	Functional modification of feature		
	Editorial modification		
Reason for change	<p>In this section, the opinion provides information on the definitions of the Cognitive Radio System which has been developed at the ITU-R Study Group 1.</p> <p>The definition is on the Cognitive Radio System and not Cognitive Radio or Cognitive Radio Technologies. Since the opinion refers to this definition, Orange believes it would be appropriate to precisely define the term which is defined. In addition, in any case, the definition is not included in a ITU-R Recommendation but in a ITU-R Report.</p>		
Summary of change	<p>Orange proposes the following sentence to be modified:</p> <p>“The following definition has been set by the ITU-R Study Group 1 in <u>Report ITU-R SM.2152</u>.”</p> <p>In addition, Orange believes that the exact definition proposed by the ITU-R should be reflected in the opinion. Orange proposes to delete the paragraph of the page 2 (below the Figure 2-1) and include the following sentences coming from the ITU-R Report SM.2152:</p> <p>“Cognitive radio system (CRS) is a radio system employing technology that allows the system to obtain knowledge of its operational and geographical environment, established policies and its internal state; to dynamically and autonomously adjust its operational parameters and protocols according to its obtained knowledge in order to achieve predefined objectives; and to learn from the results obtained.”</p>		

- Change Request #3

Section	Work in CEPT and ETSI	page	3
Category	Correction		✓
	Addition of feature		
	Functional modification of feature		
	Editorial modification		
Reason for change	ETSI works under work items and technical committee and not project teams. For clarity, Orange believes that correct term and wording should be included in the opinion.		
Summary of change	Orange proposes to delete the wording “project team” and include the exact wording “Technical Committee”.		

- Change Request #4

Section	Work in outside Europe	page	3
Category	Correction		
	Addition of feature		✓
	Functional modification of feature		
	Editorial modification		
Reason for change	Orange believe that work outside Europe should not be limited to USA but details on the RRBS deployment in Canada should be also developed. It would be also interesting to highlight the different options which has been taken on the license regime.		
Summary of change	<p>Orange proposes to add the following text:</p> <p>Industry Canada has developed “Technical Requirements for Remote Rural Broadband Systems (RRBS) Operating in the Bands 512-608 MHz and 614-698 MHz (TV Channels 21 to 51)”, referenced as SRSP-300.512 edited in March 2010.</p> <p>The intent of this document includes several elements such as:</p> <ol style="list-style-type: none"> 1 This Standard Radio System Plan (SRSP) states the minimum technical requirements for the efficient use of the UHF television broadcasting bands by point-to-multipoint remote rural broadband radio systems (RRBS) in the fixed service. 2 The frequency bands 512-608 MHz and 614-698 MHz may be licensed for RRBS. 3 This SRSP specifies system characteristics relating to efficient spectrum usage only and is not to be regarded as a comprehensive specification for equipment design and/or selection. 4 RRBS is for fixed wireless access¹ only and can be used only for subscriber-based broadband Internet applications. In-band backhaul and 		

	<p>other subscriber-based services are permitted at the discretion of Industry Canada's regional office, on a case-by-case basis, provided that the main application of the network is broadband access.</p> <p>5 RRBS will be licensed on a first-come, first-served (FCFS) basis.</p> <p>In addition, it would be appropriate to add the following wording: "In the short term <u>some</u> regulators....are investigating and/or looking at implementing cognitive systems for the use of White Spaces in the UHF bands <u>with different technical and regulatory options</u>."</p>
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- Change Request #5

Section	Different Cognitive Functionalities	page	4
Category	Correction		✓
	Addition of feature		
	Functional modification of feature		
	Editorial modification		
Reason for change	these general operations to learn about the environment are named under the general term of "cognitive functionalities". However, the term "Cognitive" refers to the ability to learn and act as defined in the ITU-R Report SM 2152.		
Summary of change	<p>In the section 4, Orange proposes to substitute "Cognitive functionalities" by "Observation functionalities".</p> <p>4- Different <u>Observation</u> Functionalities</p> <p>The RSPG considered three different <u>observation</u> functionalities that a Cognitive Radio <u>System</u> can use to acquire information about the operational radio environment. These functionalities can be used separately but it is also possible to make use of a combination of these techniques.</p>		

- Change Request #6

Section	Sensing	page	5
Category	Correction		
	Addition of feature		
	Functional modification of feature		✓
	Editorial modification		
Reason for change	Sensing technologies are not yet mature and still under development. 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. Furthermore, Orange has the view that sensing approaches are technology-based, and associated		

	impact in term of usage evolution of the primary service should be carefully considered.
Summary of change	Orange proposes the following additional text: At the current state of technology, a case-by-case approach is required which takes into consideration the existing <u>and future</u> spectrum usage <u>in order to avoid any sterilisation of the spectrum use</u> .

- Change Request #7

Section	Database	page	6
Category	Correction		
	Addition of feature		
	Functional modification of feature		✓
	Editorial modification		
Reason for change	Database solution addresses a number of concerns related to the responsibility of each actor which takes part of the deployment. These concerns should be mentioned in the opinion.		
Summary of change	<p>Orange proposes the following changes: It should be very clear which party is responsible for the various components of the regulatory environment including the provision and updating of information <u>as well as responsibility of each actor which takes part of the deployment</u>.</p> <p>.....</p> <p>The <u>way of implementing database</u> should be left to National administrators to develop autonomously are the following:</p> <p>In addition, Orange has the view that a dedicated paragraph on the responsibility should be included at the end of the sub-section 4.3. Orange proposes the following text: <u>In the case of database deployment, it should be clearly stated the role and the responsibility of each actor.</u></p>		

- Change Request #8

Section	Opinion of the RSPG	page	9
Category	Correction		✓
	Addition of feature		
	Functional modification of feature		
	Editorial modification		

Reason for change	As described in the introduction of the draft opinion, the scope of this draft opinion should encompass high level approach of the Cognitive Radio. However, in the 2 first points described in the section 5, under the sub-section RSPG notes, the elements seem to strongly oriented to TV White Space. For the clarity of the opinion, it would be preferable to suppress these 2 points.
Summary of change	Orange proposes to delete the bullet points 1. and 2. on the “RSPG notes”.

- Change Request #9

Section	Opinion of the RSPG	page	9
Category	Correction		
	Addition of feature		
	Functional modification of feature		✓
	Editorial modification		
Reason for change	In the case of cross border coordination, Orange believes that some issues should be raised. Especially due to the fact that some information of the neighborough countries need to be included. In the RSPG notes dealing with “(6.) that, in case of databases, there does not seem to be any European regulatory framework applying to accreditation of databases”, need to be further adressed.		
Summary of change	Orange proposes the following modification: (6.) that, in case of databases, <u>in general</u> , there does not seem to be any European regulatory framework applying to accreditation of databases. <u>However, the specific case of cross border issue, specific regulatory framework or geographical limitations needs to be developped.</u>		

- Change Request #10

Section	Opinion of the RSPG	page	9
Category	Correction		
	Addition of feature		
	Functional modification of feature		✓
	Editorial modification		
Reason for change	In the bullet point 2 of the sub-section, “RSPG considers”, the exisiting regulatory framework does not include the possible evolution of use of the bands. Since Orange has the view that sensing approaches could increase the risk of sterilisation of the spectrum, it should be carefully addressed.		

Summary of change	Orange proposes the following modification: 2. that the existing regulatory framework already covers devices that implement sensing techniques to enable sharing between different services. <u>However, the current regulatory framework does not cover the evolution of primary service deployment as well as implementation of the second generation Cognitive Radio devices in bands shared between services employing Sensing only capabilities;</u>
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- Change Request #11

Section	Opinion of the RSPG	page	9
Category	Correction		
	Addition of feature		
	Functional modification of feature		✓
	Editorial modification		
Reason for change	In the bullet point 4 of the sub-section, "RSPG considers", dealing with promising new services fostering growth and innovation are seeking access to spectrum; Orange believes that Cognitive Radio is not a service but a system as developed in the different ITU-R studies related to the WRC-12 Agenda Item 1.19.		
Summary of change	Orange proposes the following modification: 4. that promising new <u>systems</u> fostering growth and innovation are seeking access to spectrum;		

- Change Request #12

Section	Opinion of the RSPG	page	10
Category	Correction		
	Addition of feature		✓
	Functional modification of feature		
	Editorial modification		
Reason for change	In the bullet point 2 of the sub-section, "RSPG recommends", dealing with a platform shall be created to allow researchers, academia and regulators to coordinate research activities, it would be beneficial to include elements on the necessity to further research on the impact of future generation of cognitive radio devices.		
Summary of change	Orange proposes to add the following text: 2bis. that further research activities focus on the possibility of a second generation of cognitive devices to detect the first generation, and what would be the implications, in order to ensure a possible coexistence and survival of all future generations of cognitive devices, on the design of the first		

	generation.
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- Change Request #13

Section	Opinion of the RSPG	page	10
Category	Correction		
	Addition of feature		
	Functional modification of feature		✓
	Editorial modification		
Reason for change	In the bullet point 3 of the sub-section, "RSPG recommends", Orange believes that responsibility issues should be also included		
Summary of change	<p>Orange proposes to add the following text:</p> <p>3. that Administrations, when implementing CR technologies that require to utilise databases should (possibly with guidance developed in the CEPT):</p> <ul style="list-style-type: none"> 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; <u>d. provide information on the responsibility of each actor;</u> 		