

Alcatel-Lucent comments to the Radio Spectrum Policy Group Draft Report on “Cognitive Technologies”

(File: http://rspg.ec.europa.eu/_documents/documents/meeting/rspg20/rspg09_299.pdf)

Alcatel-Lucent thanks RSPG for providing an opportunity to comment on the Draft Report on **“Cognitive Technologies”**.

Alcatel-Lucent considers this report as an important step towards the usage of cognitive technologies. The report provides a very good summary of the current status of cognitive radio technologies, identifies challenging issues which require further attention and will provide a good basis for decision making on the issues where standardisation activities are needed.

1. General comments

Alcatel-Lucent agrees that cognitive radio technologies have the potential to support new applications in several markets and therefore the capability to increase the overall spectrum usage and to increase sharing opportunities between applications.

Nevertheless, we have slight concern on the use of the term “spectrum efficiency”. We recognise that cognitive radio technologies may also have the ability to increase the global spectrum efficiency, but we feel that what is described in the report is more an increase of the spectrum usage than of the spectrum efficiency itself. The term “spectrum efficiency” may be understood from different point of views and its use could be controversial. Conventional systems are also designed to use the spectrum efficiency and this is requested from them as a general requirement in the Radio Regulations and as an essential requirement in the R&TTE Directive.

We also agree with the use in the Report of the definitions of SDR and CR prepared at ITU-R SG1. The use in Europe of internationally agreed terminology and definitions will limit the risk of divergence between Europe and the rest of the world and possibly facilitate the adoption of common rules for the use of CR systems (CRS).

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Alcatel-Lucent shares the opinion expressed by RSPG that the introduction of CR technologies should be prepared by the study of the associated challenges and opportunities. One of the main objectives of these studies is the definition of **a clear regulatory framework which shall guarantee the continuation of the operation of the** primary systems in proper conditions while ensuring a convenient framework for the development of CRS.

Alcatel-Lucent agrees that sensing only will in many cases not be sufficient for the avoidance of interference between users or for the protection of primary users and thus supporting mechanisms are needed for the exchange of information e.g. from the network towards the user indicating which frequencies can be used and which rules and policies need to be applied.

Alcatel-Lucent supports ETSI activities for Reconfigurable Radio Systems (RRS) in order to complement the regulatory activities launched by CEPT ECC.

In conclusion Alcatel-Lucent welcomes this Report and considers that it provides a good summary and very useful background information on cognitive technologies.

2. Specific comments

In addition Alcatel-Lucent has identified specific issues in the Report which may need further improvement, and therefore also provides the following comments:

2.1. Technical Comments

a) Section 4.2.1: Sensing

Paragraph 9 last 3 sentences as noted in the report:

“Therefore the cognitive radio must be more sensitive than the other spectrum users’ receivers. In order to develop adequate sensing technologies, the receiver parameters of the existing users should be known too. The issue needs to be addressed in any future spectrum management decision”.

Alcatel-Lucent proposes to replace this above text by following text:

“Therefore, depending on both the applications a cognitive radio shall support and the primary user signal that shall be detected, in some cases, CR receiver must be more sensitive than the other spectrum users’ receivers. In order to develop adequate sensing technologies, the receiver parameters of the existing users should be known too. The issue needs to be addressed in any future spectrum management decision, noting that requirement for CR could also be relaxed by introducing collaborative sensing.”

Rationale

It is not sure that sensitivity of the CR equipment needs to be higher than the other spectrum users’ receiver sensitivity in all cases. It depends on the applications that the CR should support and of the nature of the primary user’s signal.

b) Section 4.2.3: Databases:

This section should clearly state that the database is located on network side and not inside the terminal. Further on, the sentence *“An alternative to ... the CPC is ... to have a database ...”*

is misleading: The CPC needs some kind of database on network side to derive the data to be distributed via the CPC. Thus, it is proposed to rewrite the first sentence into:

“An alternative to sensing is for a CR to have a database in the network available of the frequencies which can be used at certain locations as well as the applicable rules. The terminal needs a mechanism to access the database, e.g. using an existing access technology to access the database or using the CPC to provide the terminal with the essential information contained in the data base.”

c) Section 4.3: Pre-cognitive Radio Systems

In this section, after the third paragraph, Alcatel-Lucent proposes the following text to be included:

“The lesson from the introduction and usage of the pre-cognitive technologies – for example the introduction of WLANs (Wireless Local Area Networks) in the 5 GHz band and their co-existence with radar systems – is that these technologies can successfully operate and share the spectrum with primary users but at the expense of a very good knowledge of the characteristics of these systems. This implies that the technical parameters of these systems should be known in detail and properly managed by the cognitive system. It is expected that in the future such precise knowledge will remain a pre-requisite for the correct operation of CRS.”

d) Section 5.3: Summary of Regulatory Intervention

Alcatel-Lucent agrees with this text in the Report.

e) Section 5.4: Regulatory Considerations of technologies related to CR

In this section, sub-section 5.4.2 related to Cognitive Pilot Channel (CPC), Alcatel-Lucent proposes to cancel the text after CPC in the second line of the second paragraph.

Also Alcatel-Lucent proposes that RSPG should refer to the last version of the CPG-Draft Brief on WRC-2012 Agenda Item 1.19 stating that no modifications in the Radio Regulations are necessary.

“CEPT is of the view that frequencies or frequency bands (tuning range) for specific applications could be harmonized, as necessary, on world wide basis in ITU-R Recommendations or regionally. CEPT is also of the view that no regulatory actions would be required for SDR.”

Section 6.3: Activities in the ITU

Alcatel-Lucent has considered in detail the possible regulatory implications of the use of cognitive radio systems and does not believe that changes to the Radio Regulations are required to facilitate cognitive radios under a particular service. No spectrum needs to be identified for Cognitive radio technologies or any of its radio elements such as the Cognitive Pilot Channel (CPC). When the cognitive system uses a particular spectrum opportunistically it should ensure that it does not cause any harmful interference to systems that have a primary allocation to that spectrum. However, Alcatel-Lucent considers that there is still a need for the so called “Static Spectrum Management” and to identify spectrum for defined usages (e.g. Broadband Mobile Access) and that the development of the CR technologies should not hinder this well-established process.

2.2. Editorial Comments

Finally, the following editorial issues have also been noted:

Section 7: Research Projects and Standardisation

Abbreviations for COST, ECC are not explained in the abbreviations section.

Type: “radio reconfigurable systems (TC RRS)” should be “reconfigurable radio systems (TC RRS)”

Contact People:

Dr. Wolfgang KOENIG

Head of Multi-Standards Base Station Solutions
Alcatel-Lucent Deutschland
Lorenzstrasse, 10
70435 Stuttgart
GERMANY

Tel: +49 711 821 33 103

E-mail: **Wolfgang.Koenig@alcatel-lucent.com**

Alternatively :

Mr. Jean-Pierre BONIN

Solutions and Marketing, LTE E2E
Alcatel-Lucent France
7-9, Avenue Morane Saulnier
78141 Vélizy Cedex
FRANCE

Tel: +33 1 3077 04 94

E-mail: **jean-pierre.bonin@alcatel-lucent.com**

Dr. Cengiz EVCI

Carrier Business Group/Wireless /CTO Office
Alcatel-Lucent France
7-9, Avenue Morane Saulnier
78141 Vélizy Cedex
FRANCE

Tel: +33 1 3077 06 17

E-mail: **cengiz.evci@alcatel-lucent.com**

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