



Commission for
Communications Regulation

Information Notice

Cognitive Radio

An Opportunity for Ireland

Report of Seminar on 21 July 2010

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An Coimisiún um Rialáil Cumarsáide

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1 Seminar on Cognitive Radio – An Opportunity for Ireland

On Wednesday 21st July 2010 ComReg, in partnership with the Centre for Telecommunications Value-Chain Research (CTVR), Alcatel-Lucent Bell Labs and WirelessLAB, hosted a seminar at CTVR on the subject of cognitive radio. with the objective of identifying possible opportunities which researchers, developers, industry, and others in Ireland could take advantage of

The objective of the seminar was to explore opportunities associated with the development of cognitive radio which could be exploited by researchers, developers, industry, and others in Ireland. Opportunities could lie in R&D on the technology itself, in development of applications to exploit cognitive radio such as geolocation databases, software for exploiting ‘spot markets’ in spectrum, development of compact broadband antennas for white space devices, etc.

Approximately 60 people attended the event representing academia, research organisations, telecom consultants, manufacturers and operators, government and regulators.

The seminar comprised a number of presentations followed by breakout sessions where delegates to the seminar split into a number of groups to focus on a number of issues.

The presentations from the seminar are available at <http://www.reconfigr.com/comreg-cognitive-radio-workshop>

Participants expressed a range of views on the opportunities for exploiting cognitive radio. The opportunities identified by the seminar included the following non-exhaustive list:

- Exploitation of white spaces including possible use of femto-cell technology
- Machine to machine (M2M) communications
- Inter-vehicle networks
- Use in cross-border frequency coordination by autonomously selecting radio channels
- Utility applications such as facilitating real-time switching
- Home security
- Agricultural applications, e.g., livestock monitoring
- Health applications, e.g., community care and monitoring
- Ensuring quality of service: of primary networks in the presence of cognitive devices; and in networks comprised of cognitive devices.

If you have any queries regarding cognitive radio please contact either

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2 Background

Cognitive Technology is an exciting development, particularly when applied to radiocommunications as it has the potential to deliver significant efficiency gains in the management and use of the radio spectrum

For the spectrum manager it holds the promise of more intelligent radios able to sense the local radio environment and on the basis of that information, including data on the rules to be obeyed (technical operating parameters, etc) to make a decision on which frequencies to use, when to transmit and the other characteristics such as filter shaping to be used

The most immediate area of interest for cognitive radio, as already envisaged by developments in the USA, is the exploitation of the so-called 'white spaces'. These are the gaps in between TV broadcast channels which can potentially be used for lower power systems to provide, in the case of the USA, wireless communications in rural areas. Although the laws of physics are the same on both sides of the Atlantic, the challenge in Europe, as is often the case in radiocommunications, is the higher population density and resultant greater concentration of TV broadcast transmitters leaving fewer gaps or 'white spaces'. However, there are many other areas of the spectrum, both used and unused, where there is scope for developing exciting new applications which, in effect, will be able to dynamically manage the spectrum resource at the local level, thus making much more efficient use of this valuable medium than current technologies and spectrum management tools allow.

There are already some 'smart' devices and applications on the market, e.g., 5GHz WiFi applications in laptops which share the spectrum with other primary users such as meteorological radars by dynamically selecting frequencies to avoid interfering with the radar systems. Software defined radios, in which parameters such as filter characteristics can be altered to suit the operational environment, are also becoming available. These are what could be termed pre-cognitive systems, as truly cognitive devices, as defined by Joseph Mitola and Gerald Maguire (the Mitola radio), which can "Observe, Orient, Plan, Learn, Decide and Act" in the context of the local radio spectrum environment have yet to be fully realised.

There is a great deal of research activity on cognitive technologies with much of it in Europe being funded through the EU's Framework 7 Programme.