

Joint response to the draft report on cognitive technologies

28th December 2009

This is a joint response to the Radio Spectrum Policy Group's (RSPG) Draft Report on Cognitive Technologies¹, published on 14th October 2009. It represents the shared views of BT, Dell, Google and Microsoft.

We welcome the opportunity to respond to the RSPG's timely examination of the potential of cognitive technologies. We agree that these technologies offer the prospect of considerable increases in spectrum efficiency, unlocking much-needed additional capacity for wireless services and applications.

However, regulators should not delay in releasing the potential of the TV White Spaces. Relatively simple, established techniques will be sufficient to ensure that this prime capacity can be made available without compromising existing services or constraining their evolution.

Cognitive technologies hold significant promise

Cognitive radio (CR) is strategic to the future of communications, enabling increased sharing of spectrum and therefore greater efficiency. It can release capacity without the need to wait for older communication technologies to be cleared out – a process which can take many years.

As the report points out, cognitive technologies range from relatively simple adaptive techniques through to advanced systems which can 'learn' how to get more out of the available capacity. Substantial investments are being made in research in this field, around the globe.

Cognitive technologies could enable a paradigm shift in the way spectrum is managed, with significant benefits if regulators are prepared to be bold in adopting them. Section 3 of the Draft Report [page 8] talks of 'the European Debate'. It is not clear what the terms of the debate might be, but the question should not be whether Europe allows such technology, but how quickly it can start to gain the benefits.

A degree of harmonisation is desirable to gain the benefits of market scale, in terms of technical constraints and database roaming support, for example. However, it is not necessary to dedicate any channels to cognitive radio, since the technology's strength is to facilitate sharing of spectrum. Instead, regulators should identify which bands provide the greatest opportunity for sharing, and define the technical requirements to protect existing services from harmful interference. The TV White Spaces are the most significant example, with potential to provide much-needed sub-1 GHz spectrum for the next generation of wireless LAN and rural broadband applications.

Over time, as cognitive access becomes established, existing services can be expected to adopt cognitive access themselves, taking spectrum efficiency to new heights.

Governments and regulators can encourage the development of this strategic technology by:

- Identifying bands which are underused, either temporally or spatially

¹ http://rspg.ec.europa.eu/documents/documents/meeting/rspg20/rspg09_299.pdf

- Developing frameworks to allow sharing of underused bands, as well as providing incentives to existing users to facilitate sharing and to release capacity they no longer need
- Allowing sharing on a licence-exempt basis, maximising the potential for innovation and avoiding any need to partition the available capacity. This would mean, for example, that rural communities could enjoy all the available bandwidth in their location, in building their own broadband access network.

Increasing the availability of such spectrum sharing opportunities should prove a more effective means of encouraging manufacturers to develop the enabling technologies than providing public subsidies for the underlying research.

TV White Spaces are an immediate opportunity

Although the draft report mentions TV White Spaces, we feel that it deserves greater recognition as a priority for regulatory action. Europeans should not miss out on the potential benefits from this under-used capacity, which regulators in other parts of the world have already recognised.

There is no need to wait for emerging cognitive technologies to unlock the benefits of TV White Spaces. As the report identifies, there is a simple, effective, sharing approach available, in the form of geo-location used in conjunction with a database of vacant channels. Although devices using this technique hardly merit the term ‘cognitive’, database-enabled control is practical and predictable: in terms of the protection it affords to legitimate spectrum users and the capacity it enables for consumers.

The database approach is inherently adaptable to the spectrum management regime prevailing in each country. For example, the location of white spaces will vary by region and over time, as digital television switchover progresses and broadcast services are introduced or withdrawn. The efficacy of using a database to coordinate TV White Space applications is already well established from the system operated in the UK by JFMG, on behalf of Ofcom.

Releasing the TV White Spaces in this way, on a licence-exempt basis, would provide a critical sub-1 GHz complement to the existing licence exempt (LE) bands. The favourable propagation properties associated with UHF mean that applications would benefit greatly from greater flexibility and improved network coverage.

Opening TV White Spaces, on a licence-exempt basis, would enable Europeans to benefit from:

- Next generation wireless local area networks – in which increased capacity and coverage enable HD-video and other data-intensive content to be distributed more reliably around the home and office
- More affordable rural broadband access, which communities can build for themselves
- A crucible of wireless innovation whose results we probably cannot predict today.

In more detail

[Section 5, Page 13 – Vertical Sharing] We think that, in most cases, primary users would either have little incentive to share spectrum with devices utilizing cognitive access or would be selective in a way that would restrict the scope for innovation and reduce the value that could be delivered from the spectrum, to consumers and citizens.

[Section 5.3, Page 17] Compared to other spectrum access methods, a growing use of cognitive access could actually make re-farming less complex and deliver the efficiency benefits from sharing, ahead of any moves to replace network technologies already established in the band. For example:

1. The use of databases for coordination of end-user devices enables far greater flexibility than is offered by other access technologies, allowing rapid band restructuring – without having to replace devices that are already in the field. As the RSPG notes, databases may be owned by private sector entities, with the government providing information on spectrum use in a particular market, and requiring non-discriminatory interoperability and access conditions
2. The increasing use of cognitive technologies by a wider range of wireless applications and services will enable more efficient use of spectrum, regardless of further enhancements in modulation and encoding technologies that are likely to be adopted over time.

Sometimes the report appears to blur the distinction between regulation and industry policy. Thus it talks of the need for ETSI to collaborate in the framing of new regulations. We agree that industry should be consulted in the preparation of regulatory frameworks, but the consultation should be as open as possible, to encourage those with the best knowledge of the area to bring their experience to the development process. Otherwise, there is a danger that the scope for innovation may be reduced and that potential new entrants may be discouraged from bringing fresh ideas into the market.

The ITU-R Radio Regulations should be left unchanged

In Section 6.3, the report questions whether changes to the ITU's Radio Regulations specifically authorizing cognitive technologies in certain services are necessary to facilitate the deployment of cognitive radio. As the report's authors note, such changes would have to be made on a case-by-case basis. However, making decisions on a case-by-case or service-by-service basis would inherently impede, rather than facilitate, the deployment of cognitive radio.

The Radio Regulations already require that radio use does not cause harmful interference to incumbent licensed users: complying with the band-specific operating limits and technical parameters.

In our view, the Radio Regulations should be left unchanged.

Conclusions

We agree with the report's authors that:

- There is a 'need to engage as early as possible in the discussions on challenges and opportunities raised by cognitive technologies' [Introduction, Page 7]
- Regulators need to move first to create the certainty that will provide confidence for investment in technology development by industry [Section 6.1, Page 19]
- Trials should be encouraged by national regulators, to allow industry to explore potential applications and business models [Section 8.1, Page 21].

We support the conclusion of the draft report [Section 9, Page 23] that, for the UHF band:

There are significant benefits by adopting a harmonised approach to cognitive radio technologies. The timely availability of a regulatory response across Europe and harmonised

rules for cognitive devices assist in exploiting economies of scale and encourage industry investment, thus enabling new cognitive applications that could bring significant benefits to European markets.

We urge the European Commission to act on this recommendation, by putting a harmonised framework in place as early as possible. Such a framework should enable national regulators to identify the channels available in their own territory, taking in account the local television and other market conditions.

These measures would allow the enormous potential of TV White Spaces to be released, for the benefit of all Europe's consumers and citizens.