This document is the IET's response to the Ofcom consultation:- Digital dividend: cognitive access

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The evidence and comments in this submission have been compiled from discussions within the IET led by The Communications Sector Panel. This panel consists of senior members of the IET who are influential representatives of both academia and industry. It provides a high-level "think-tank" for opinion formers to work together on neutral territory. Additional specific Sector panel information can be found at the URL;

http://www.theiet.org/publicaffairs/panels/comms/

1. Introduction

The IET strongly supports the suggested provision of spectrum for use by cognitive radio systems and applauds Ofcom for their vision and awareness of the need to support innovation in this area.

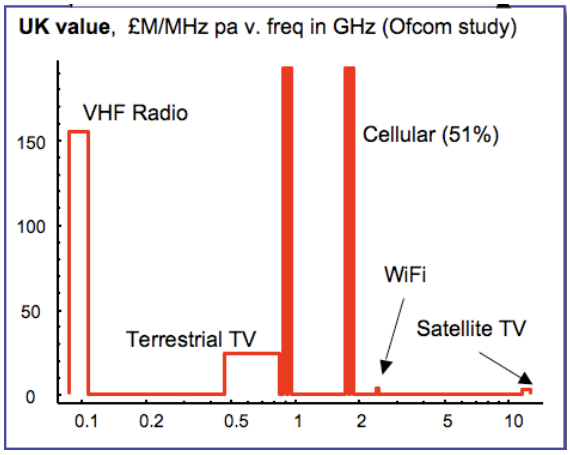
2. The Future of Radio

The IET notes that existing largely fixed-channel wireless systems make extremely inefficient use of precious wireless spectrum for essentially the same reason that the old circuit-switched communications systems were inefficient: the bulk of capacity is assigned to 'circuits' that are not, at any given moment, actually in use. We foresee that with declining technology costs, essentially all wireless systems will ultimately become cognitive for this and other reasons, heralding a revolution no less significant in its space than the internet protocol (IP) has been in communications routing.

The potential impact of this is hard to overstate. For example many wireless services today are quite severely constrained by the available spectrum capacity, hence the continuing pressure on any spectrum that becomes available. But our communications demand is clearly growing rapidly, not only for our direct use, for example in wireless broadband, but also for the rapidly growing number of devices that are expected to monitor our health and provide support for transport systems. These systems are likely to require an intermittent high rate communications capability. It seems clear

that more capacity will be needed fairly soon. Although considerable efforts have yielded capacity released from military uses (Cave review) and from the digitisation of terrestrial television ('digital dividend') the possibilities here are clearly limited to a modest fractional increase. The gains from a switch to cognitive-adaptive 'IP-wireless' systems on the other hand could yield enormous gains in efficiency even up to thousands of times.

Some idea of the scale of the available potential gain can be seen from combining the data from Ofcom studies on the economic value enabled by the existing use of spectrum with the corresponding spectral allocation information to yield a plot of value-enabled-per-MHz as a function of frequency as shown on the right. Over half of the total enabled value is derived from the cellular bands, which are far more effectively used. Although the cellular handsets are not at present cognitive the provision of capacity-on-demand inherent in the management of the cellular network provides some of the gains of a full cognitive system – with spectacular results.



2.1. Innovation

The IET notes that a key objective of Ofcom is to encourage innovation. This initiative is an excellent example of the power of Ofcom's role here. The initiative creates a real chance for the UK to lead technically in an emergent area (rather like GSM) that will be of huge importance in the future. We note that this is about much more than the hardware involved, important though that is – the network protocols and management techniques also require substantial innovation with corresponding opportunities to create valuable intellectual property and new business. The chance to repeat the UK's above-our-weight success with cellular telephony should not be overlooked, even if the present user community is not fully aware of the possibilities.

2.2. The international dimension

The IET notes that cognitive wireless systems will, like all major technical developments in future, be a world-wide phenomenon, and we recommend that full account of this should be taken in international negotiations. For example appropriate input should be made to the WRC in 2011, which already has cognitive on the agenda. Inputs should also be made at a European level and through the FCC and US interest groups. This does not mean that the UK should not move first and maximize our advantage – indeed the very adaptability of cognitive systems may make globalisation simpler at the physical level, though care will be needed over protocols.

2.3. The wider spectrum

In line with the views expressed above the IET suggests that an outline roadmap for the future of cognitive wireless be developed by Ofcom in consultation with the industry and worldwide stakeholders that will inform the community and ensure that the role of cognitive approaches is fully taken into account when future spectrum decisions are made.

3. Conclusions

As previously indicated the IET strongly supports this initiative and suggests that a watching brief be established on what new opportunities may arise for the use of cognitive systems as the technology develops.

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