10 things you need to know about...

White Space Devices (WSD)

1 **'White spaces' are channels within the licenced TV spectrum that are not used for TV services at a given location**
This is a consequence of the physical characteristics of radio (e.g. the interference range is larger than the range of useful signal) and the manner in which most terrestrial networks are designed, not only TV networks. White spaces are sometimes also called the 'interleaved spectrum'.

2 **The white spaces are used for wireless microphones**
The valuable TV spectrum is not left unused. It is used for a number of services, in particular for wireless microphones for which the UHF band is the most important frequency range. These other services, including wireless microphones, can operate in the TV white spaces only under the condition that they don't cause interference to TV reception and don't require protection from TV transmission.

3 **It is proposed to use the white spaces for cognitive radio**
Cognitive radio is a new concept of radio systems that are capable of obtaining knowledge about their location and environment and, on the basis of this information and pre-defined algorithms, dynamically adjusting their operational parameters. This technique has a potential to significantly improve the efficiency of using the radio spectrum. The adjustment could be autonomous, based on spectrum sensing made by the device or could be assisted by a central system, called geo-location database which provides the device with suitable operational parameters depending on its situation.

4 **Wireless Internet: among the current WSD applications under consideration**
Some argue that in the long term, the cognitive approach could transform the whole wireless industry as it offers flexibility (it can be implemented in any frequency band and in any service), but this is yet to be proven and will require large investments in research. In the short term, wireless Internet applications seem to be the applications proposed mainly from the IT industry (Google, Microsoft, Dell etc.) and currently under study.

5 **Broadcasters and cognitive radio**
1) Once cognitive radios become available they can be used for a range of broadcaster applications.
2) Great care must be taken because Cognitive Radio operating in the TV white spaces could cause interference to broadcasting services and wireless microphones. This is particularly important if cognitive radios are to be allowed on a license-exempt basis.

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6 The white spaces might be available everywhere

For Cognitive Radio to work well at any location there will need to be some TV channels that are unused for TV. However, the amount of white spaces available at any given location will differ depending on:

- *spectrum occupancy by the primary services (e.g. television);*
- *pre-defined conditions and criteria for 'unused spectrum' (e.g. under which conditions can a channel be considered unused by TV services);*
- *transmitter parameters and operational mode of the devices that operate in the white spaces.*

7 Regulatory and technical conditions for white space devices are in the process of being established

The regulators in Europe, including CEPT and European Commission, are working on the technical and regulatory conditions that would enable introduction of cognitive radios in the UHF TV white spaces. The main technical issues under discussion include the use of spectrum sensing and/or a geo-location databases, transmit power limits and frequency or distance separation required to protect the broadcasting service and other incumbent services, including radio microphones. A first trial of WSD has started in July 2011 in Cambridge UK with the involvement of the Regulator, a broadcasting network operator and several industrials.

8 WSD are already authorised in the USA

In the USA, the FCC decided in October 2008 to authorize WSD in the TV Bands on a license-exempt basis, with two types of devices: portable/mobile low power devices and fixed outdoor high power devices. The use of geo-location database is made mandatory, at least in the first phase of introduction.

9 There are no cognitive radio devices on the market yet

Although there are proposals to allow introduction of cognitive radio systems in the white spaces of the TV UHF frequency band on a license-exempt basis, there are no device available on the market. Cognitive radio devices that would operate in the TV white spaces are also called 'white space devices'.

10 ITU is starting work on WSD

The ITU-R World Radiocommunication Conference to be held in 2012 will consider regulatory measures and their relevance, in order to enable the introduction of software-defined radio and cognitive radio systems. Currently some administrations argue that they are not Radiocommunication services, and therefore there is no need for any changes to the Radio Regulations; an ITU-R Resolution may be agreed providing guidance for further studies on cognitive radio systems.