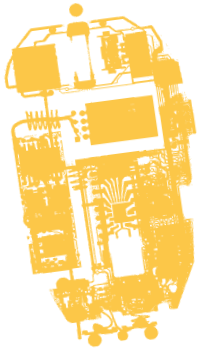


## SPECTRUM SENSING

### SYSTEM FOR DETECTING AND IDENTIFYING RADIO SIGNALS



This system features a software application developed using Software Defined Radio techniques that capture radio signals using a dedicated conversion hardware and is capable of detecting radio transmissions over a broad range of frequencies. The signal is processed using techniques that go from simple spectrum analysis to more efficient methods based on advanced signal processing algorithms. The algorithms implemented by CSP are capable of identifying the type of signal captured and estimating its quality. The research work focused above all on television signals with the aim of analysing and assessing their characteristics, even when the signal received is very weak, considerably less than the minimum level required to use the service.

The techniques implemented are cornerstone of experimental transmissions in the field of white spaces, the frequencies freed up after the switchover to Digital Terrestrial Television. This field is the focus of CSP's research work into wireless technology, work that has enabled the laboratories to acquire considerable experience in the field of cognitive networks, giving us the opportunity to investigate the creation of extremely versatile, flexible systems.

In short, Spectrum Sensing is a system based on hardware and software components which detects digital radio transmissions using advanced digital signal processing algorithms.

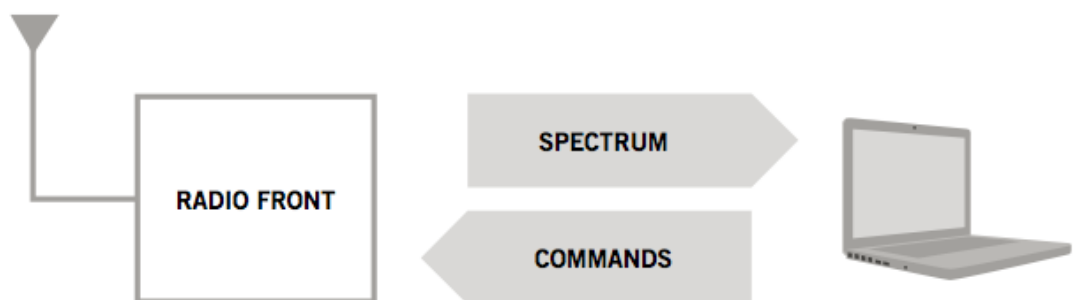


Figure 1 – System diagram



## HOW IT WORKS

The radio signals are captured using a broadband reception and analog/digital conversion system with a wide tuning range, and then transferred to a workstation to be processed.

Stronger signals can be identified more clearly, while for weaker signals a signal processing technique is applied that exploits the periodic nature of almost all digital transmissions and enables them to be identified even in the presence of loud sounds and interference.

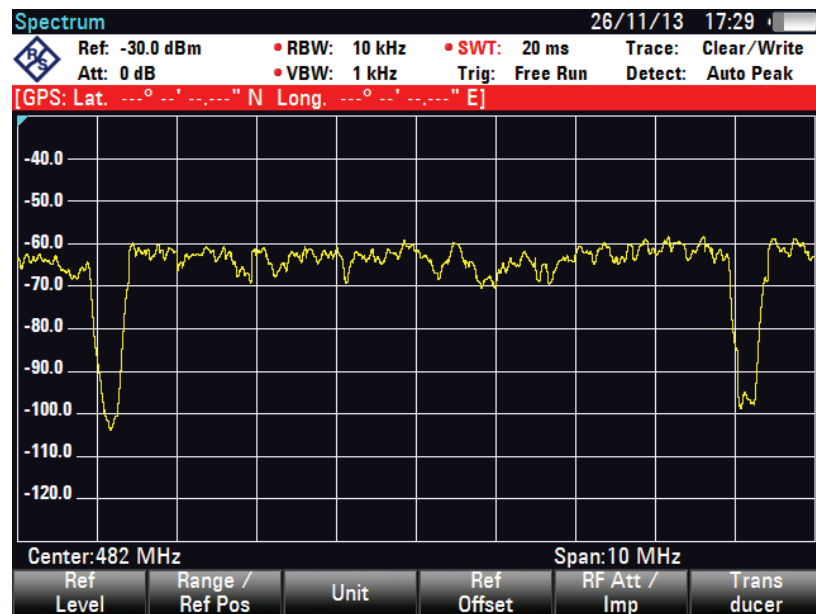


Figure 2: The spectrum of a high intensity DVB-T signal, easy to identify using a simple power measurement.

Spectrum Sensing is therefore a system that can be applied to all digital transmissions, and can be used for detecting digital terrestrial television signals (DVB-T) and in general all the signals that use Orthogonal Frequency Division Multiplexing (OFDM), like the standards LTE and WiMAX, DAB and DRM, and the radio signals of local wireless networks such as WiFi.

Spectrum Sensing is currently being developed to identify signals of different kinds such as analog and digital signals of other types.

