

## **CREW-TV: Experimental Coexistence study in TV Bands**

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TV White Space (TVWS) frequencies are becoming a real world test laboratory of dynamic spectrum sharing. A challenging aspect of TVWS use in Europe is that TV spectrum is not only occupied by fixed TV broadcasting signals. In addition to the TV broadcasts the spectrum is used by licensed Programme Making Special Event (PMSE) devices, e.g., wireless microphones.

TV White Space cognitive device operation may be permitted if (and only if) it does not interfere with incumbent services such as digital TV and PMSEs (e.g. Wireless microphones). White Space devices should either sense the presence of incumbent systems or make use of a geo-location database to determine which spectrum is unused in the vicinity.

Current regulation in the US and UK are supporting the solo use of the geo-location database. However it is increasingly recognized that a solution based on exploiting spectral sensing coupled with geo-location databases allows a more effective use of TVWS. In particular, a geo-location database assisted by a low-cost and densely deployed spectrum monitoring infrastructure is a promising approach to protect dynamic incumbent systems, such as wireless microphones that are not registered in the database.

The CREW-TV experiment was designed to demonstrate the combination of geo-location spectrum database access with a spectrum-monitoring network made available by the Jožef Stefan Institute (JSI) in the Logatec city (Slovenia). The core of the sensor network containing approximately 50 low cost nodes mounted on public lighting infrastructure in the Logatec city. The sensor nodes on light poles are equipped with different spectrum sensing and signal generation capabilities. The sensor nodes are connected over a wireless management network to a coordinator node with IP connectivity. They can be remotely reprogrammed according to the needs of the investigated use case. 8 sensor nodes in the network were used in CREW-TV to monitor UHF frequency bands.

A TVWS database for Slovenia was computed according to the algorithm and procedure describe in ECC Report 186, with a 200 m resolution grid. The communication with the geo-location database is implemented by a draft version of the IETF PAWS (Protocol to Access White Spaces).

This experiment assumes that PMSEs are not registered in the database (a common scenario in many EU countries) and therefore its protection completely relies on sensing. Once the PMSEs transmitter are detected by a distributed sensing algorithm, the TVWS geo-location database is informed and automatically removes from the white space maps an exclusion region around the PMSEs location. In this exclusion area, transmission of cognitive users of the TV spectrum is temporarily not allowed.

In summary this experiment was able to showcase the technical feasibility of dynamic spectrum databases, i.e., the combination of a pre-computed white spaces maps with real-time information from a distributed sensing network. At regulatory level, this CREW experiment will help administrations to recognize the value of spectrum monitoring as part of the progressive approach to managing spectrum more efficiently.

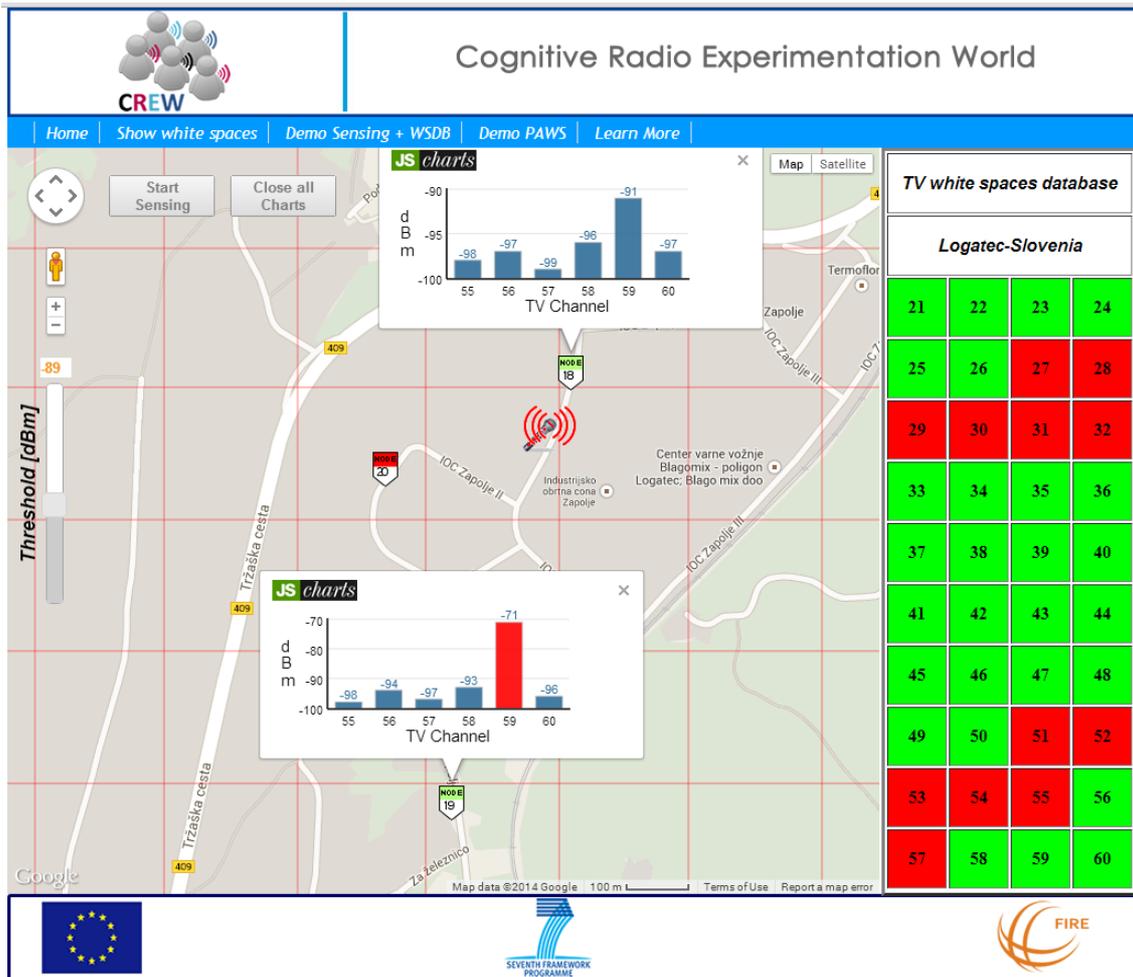


Figure 1 : The CREW-TV experiment is accessible online.

<http://www.cmsf.eu/projects/crew-tv/index.php>