Spatial Interweave Demo: Implementation in OpenAirInterface Platform

Mobile Communications Department, EURECOM, Sophia Antipolis, France
http://www.openairinterface.org
bassem.zayen@eurecom.fr

1. About the CROWN Project

- The CROWN (Cognitive Radio Oriented Wireless Networks) project is funded under the FET-Open scheme within the Seventh Framework Programme
- The main purpose of the CROWN project is to understand the technical issues of Cognitive Radios, through a proof of concept demonstrator
- We demonstrate the real-time cognitive radio communication based on OpenAirInterface platform

2. Cognitive Radio Scenario

- Two secondary users and two primary users in a system based on the LTE-TDD specification

3. Reciprocity Calibration and Beamforming

- Spatial Interweave: transmit in the “spatial gaps”
- The opportunistic user designs its beamformer in order to zero-force at the primary receive antenna, causing no interference to the latter
- We do not require any a priori knowledge of the channel information but we rely on channel reciprocity in TDD transmission
- We exploit the calibration parameters to define the beamforming technique allowing to reduce interference generated by the secondary system towards the primary system

4. OpenAirInterface LTE Frame Specification

- Transmission from a single eNB antenna port (mode 1)
- Exploit the special subframe (SS) to collect channel estimations

5. Hardware Modules

- AgileRF Prototype and ExpressMIMO Baseband Engine

6. References