SDR Implementation of Narrow-band Interference Mitigation in Wide-band OFDM Systems
Sumit Kumar, Florian Kaltenberger
sumit.kumar@eurecom.fr, florian.kaltenberger@eurecom.fr

Abstract
Co-channel interference among heterogeneous devices in ISM band significantly degrades throughput and reliability. For example 802.11g (WiFi) and 802.15.4 (ZigBee) operate in the 2.4 GHz ISM band simultaneously and both of them face significant performance degradation. In this demonstration, we show a simple yet effective method to mitigate the effects of narrowband (ZigBee) interference on a wideband OFDM system (WiFi). We use local noise variance (LNV) estimates computed from WiFi preambles to scale the log-likelihood ratios (LLR) of WiFi subcarriers. The implementation has been done on Ettus USRP B210 and a combination of GNU Radio and Openairinterface.

WiFi-ZigBee Interference
- Out of 52 subcarriers of WiFi ($U_{sub}$), 7 subcarriers get overlapped with single ZigBee channel (2 MHz)
- Noise variance on interfered subcarriers (red) gets higher than non-interfered subcarriers (green)

Proposed Solution
- Localized Noise Variance (LNV) estimation of OFDM
- LLR scaling of OFDM subcarriers using LNV estimates

Software and Hardware Tools
- Combination of GNU Radio and Openairinterface
- Ettus B210

Acknowledgements
This work was supported by Siemens AG, Corporate Technology, Munich and Eurecom, France.

References

Conclusion and Ongoing Work
Conclusions
- LLR Scaling based on LNV estimates significantly reduce PER of wideband OFDM systems facing narrowband interference.
- Proposed solution is compatible to deploy within existing infrastructure.

Ongoing Work
- Multi-Antenna extension: Soft Bit Maximal Ratio Combiner with LNV based LLR scaling.