Interference-aware Channel Bonding in IEEE 802.11n/ac Networks

**Topic**

Channel bonding is a promising mechanism for accommodating growing 802.11 WiFi data capacity requirements. It was first introduced with 802.11n to allow 40 MHz channels. It was further extended with 802.11ac to allow 80 MHz and 160 MHz channels. Unfortunately, cellular network operators are starting to offload data traffic in unlicensed 5 GHz ISM spectrum using LTE Unlicensed (LTE-U). In LTE-U listen-before-talk is not applied before frame transmission. Instead a mechanism called carrier sense adaptive transmission (CSAT) to adapt its duty cycle is used.

Our main idea is to optimize the operation of WiFi suffering from LTE-U interference as follows. First, WiFi needs to synchronize with the LTE-U duty cycle. Second, WiFi will adapt its channel bonding so that the secondary channel suffering from LTE-U interference will only be used during the LTE-U OFF phase.

**Goal**

The task is to implement and evaluate the proposed interference-aware channel bonding scheme using commodity IEEE 802.11 hardware (Atheros, ATH9k). In particular the LTE-U duty cycle estimator developed by TKN need to be extended to provide information required for synchronization of WiFi with LTE-U so that the usage of the secondary WiFi channel can be limited to the LTE-U OFF phases, i.e. blacklisting of HT40 operation in Minstrel rate control algorithm (part of mac80211 subsystem).

**Requirements**

- Basic understanding of wireless communication in particular IEEE 802.11
- Good C/C++ programming skills
- Basic understanding of Linux OS/drivers

**Contact**

Dr. Anatolij Zubow (zubow@tkn.tu-berlin.de)