Evaluation of Alternative Contention Mechanisms for IEEE 802.11 Wireless LANs (WLANs)

Description:
Wi-Fi is a ubiquitous technology to connect today’s devices, from computers to embedded systems. In order to solve the problems arising from multiple users accessing the shared channel at random times, it relies on contention based access. For this, the IEEE 802.11 WLAN standard, the basis of Wi-Fi, specified first the Distributed Coordination Function (HCF) and, later, in IEEE 802.11e, the Hybrid Coordination Function (HCF), which forms the basis for what Wi-Fi advertises as Wireless Multimedia Extensions (WME). We believe that even the rigid specification of IEEE 802.11 contention based channel access, however, leaves open the possibility of implementing any of multiple different contention mechanism alternatives. It is to be expected that the performance of these alternative mechanisms will be heavily dependent on the offered channel load and system characteristics.

Tasks:
In the context of this thesis, two alternative contention mechanisms will be implemented on both an FPGA and in a computer simulation (based on a baseline implementation of each that we provide). After a verification and validation step, a comparative performance evaluation of both mechanisms will be conducted for a variety of channel conditions; both in simulations and in live measurements.

Requirements:
WLAN, C++.
Basic knowledge of VHDL/Verilog and OMNeT++ is a plus.

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