Thesis Title	: Techniques for Multi-Standard Cognitive Radios on FPGAs
Name of Student	: Pham Hung Thinh
Supervisor	: Asst Prof Suhaib A Fahmy

Abstract

The thesis explores techniques for enabling cognitive radio design on field programmable gate arrays (FPGAs). We demonstrate the strengths of FPGAs in offering a high throughput, low-power baseband platform, and develop a flexible Orthogonal Frequency Division Multiplexing (OFDM) baseband chain with high-level control and support for multiple standards. We present contributions in OFDM synchronisation to enable more robust radios in harsher channels, and tolerating less precise RF components. We also present a novel technique for managing out of band leakage to enable more efficient spectral use in a dynamic spectrum allocation setting. For each of these approaches, we design, optimise, and characterise working hardware implementations of the required modules, with a focus on flexibility and low power. Finally, we present an approach for applying FPGA partial reconfiguration to minimise reconfiguration time when a radio switches modes, allowing intermediate data to be buffered and processed after reconfiguration is complete. These contributions form an important foundation in building a fully functional prototyping platform for cognitive radio systems.