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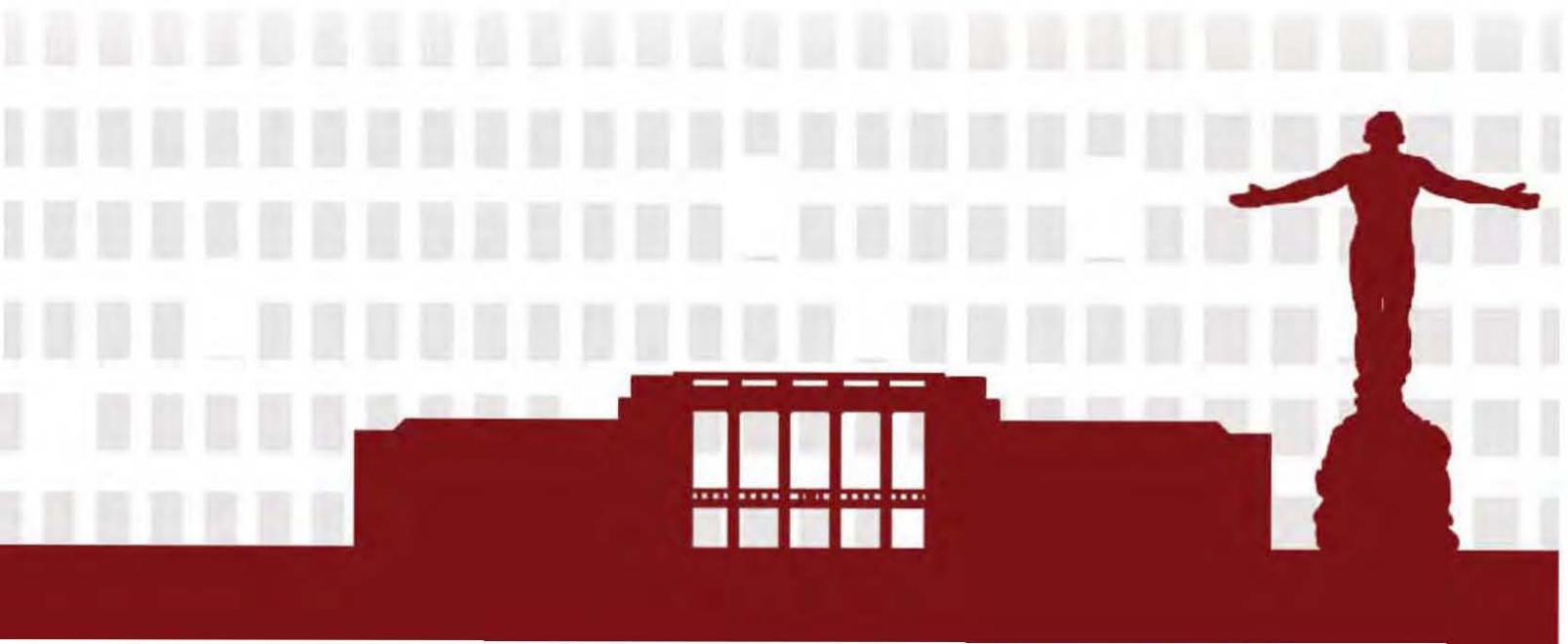
11th ERDT Conference
on Semiconductor and Electronics, Information and Communications Technology and Energy

16-17 November 2015
Metro Manila, Philippines



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REAL-TIME IMPLEMENTATION OF AN ENERGY DETECTION-BASED SPECTRUM SENSING USING USRPN200 AND GNU RADIO

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ABSTRACT

In 2008, the Federal Communications Commission (FCC) of the United States decided to allow the use of Cognitive radio (CR) for broadband wireless access in the TV bands as defined under the IEEE 802.22 standards. This was in response to the seeming scarcity problems brought about by the proliferations of wireless devices and applications demanding for more bandwidth. In Cognitive radio, a secondary user is allowed temporary access to frequency bands owned by primary users if the latter are not using it. This has the effect of increasing spectrum efficiency. To ensure that cognitive radios do not interfere with primary users, a reliable spectrum sensing is a key requirement in Cognitive radio.

In this study, an energy detection-based spectrum sensing method is implemented in a software defined radio (SDR) platform and tested in real-time environment. The primary goal is to develop a spectrum sensing system for quantifying spectral opportunities within Metro Cebu. Because of its low implementation complexity and the fact that it does not require prior knowledge of the transmitted waveforms, Energy detection has gained practical significance and thus, is the sensing method used in this study.

The system's block diagram is shown in Figure 1. The signal sources coming from FM and Analog TV Broadcast stations in the locality were initially used as Primary User (PU) transmitters. Then, to test the performance of the spectrum sensing method under

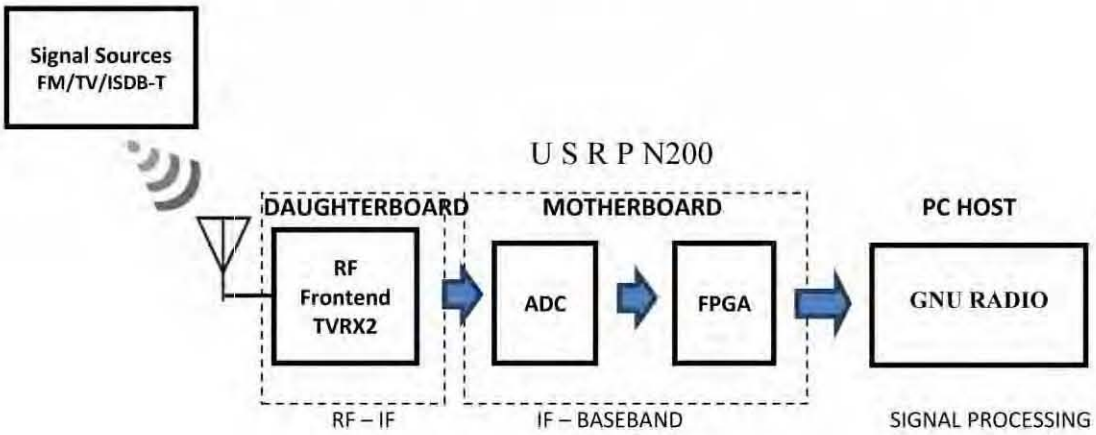

Figure 1. Experimental System Block Diagram

varying signal-to-noise ratio (SNR), a 5.6 MHz wide, 1024-FFT OFDM-based modified ISDB-T signal was generated in another SDR platform using USRP1. The signal is centered at 677 MHz and was so chosen as this is within the ISDB-T UHF band and is currently unoccupied/unassigned in the area where the tests were conducted. The TVRX2 50-860 MHz daughterboard front end captures the Radio Frequency (RF) signal, down converts it so the speed of the ADC in the Universal Radio Peripheral (USRP) N200 motherboard can cope with the high frequency RF input signal. The digital down converter (DDC) found in the Field Programmable Array (FPGA) scales down the digitized signal in a programmable even value ranging from 4 to 256 for transfer to the PC host via the Ethernet cable. The GNU Radio software installed in the PC host running on Ubuntu 14.04 operating system was used to further process the signal.