ABSTRACT

Cognitive Radio is a system that can understand the communication environment and can set parameters optimally in the communication process. With this technology Secondary Users can fill the Primary User spectrum holes that are not in use without causing interference. One of the main functions of Cognitive Radio is Spectrum Sensing. This function will detect all spectrum holes for later use. One of these spectrum sensing methods is Energy Detection. But because Energy Detection is still sensitive with noise uncertainty then another method is needed to support the performance of this method, that is by using Eigen Value. Eigenvalues, signals and noise are generally different. Thus, this difference can be used in this method to distinguish signals from noise. This proposed sensing method is expected to improve the deficiencies of the Energy Detection problem.

This final project proposal analyzes Energy Detection using Eigenvalues. The Primary User signal will be built using OFDM which will be transmitted via a channel distributed by Rayleigh scattering and added by Additive White Gaussian Noise (AWGN). After that the signal received by the secondary user (SU) premises using a single detector which afterwards sampled with the number of samples for the calculated Eigen values of the matrix. After that the restult of the detection performance of both methods using the Receiver Operating Characteristic (ROC) Curve comparison.

The result of this simulation is, Eigenvalue has better detection ability than Energy Detection, because Eigen Value is not affected by noise uncertainty. Thus it can detect the spectrum hole in PU more accurately. The performance of the Eigen Value Method will continue to increase when using the more antennas, like 16 or 32. If the Signal-to-Noise Ratio (SNR) value, the higher probability of detection of the Eigenvalue will be. Probability detection of -2 dB SNR will be better than -8 dB.

Key words: *cognitive radio, energy detector, spectrum sensing, threshold*, *eigen value*.