

## ABSTRACT

Cognitive Radio is a new technology that allows the secondary user (unlicense) to using primary spectrum (license) whenever available. Spectrum sensing is affected by the time of detection of the primary frequency spectrum, in order to avoid any error detection or false alarm. Increasingly sensing time or the time of detection, the more accurate the detection of the frequency spectrum. Thus, the possibility of a false alarm or interference from secondary users will decrease.

On this research has designed cognitive radio systems to detect signals of Orthogonal Frequency Division Multiplexing (OFDM) as a signal PU with two different types of noise. The process starts by generating a random signal of OFDM with the varying sensing time. Then the signal is added with noise power invariable (Certain noise) and variable (uncertain noise). Each output used as input for a process spectrum sensing performed by energy detector to determine the detection performance with two inputs in the form of distribution E. After getting the detection results, obtained the optimal sensing time to get optimal throughput without ignoring the accuracy of the detection (probability of detection).

Based on the results of tests performed with sensing time interval up to 50 ms, was obtained the shifting of the value E from the distribution of E between signal and noise. That indicates the existence the greater shift in the distribution of E when sensing time is increases. Because of shifting from the distribution E can facilitate the energy detector to detect more accurately. This leads to the greater probability of detection. Usage of energy detector in practice is going poorly because of the uncertain noise. When sensing time duration of 24 ms, which is the optimal of sensing time with probability of detection of 0.992, obtained received throughput for the condition (iii) is 0.4387 bits / ms, (ii) is 0.2503 bits / ms and (i) is 0.1040 bits / ms. Because the OFDM technology, required probability of detection ( $P_d$ ) must be great to minimize interference from SU to PU.

**Keywords :** Cognitive Radio, OFDM, Energy Detector, Sensing Time, Throughput