

ABSTRACT

Cognitive radio is an intelligent wireless communication system that is aware of its surrounding environment. The basic idea of cognitive radio is efficient radio spectrum utilization in the environment that is change dynamically. Therefore, we need a new communication system that can adapt rapidly.

Wavelet Domain Communication System (WDCS) is one of cognitive radio candidate that uses wavelet transform as a tool to estimate the radio spectrum. Wavelet transform has several advantages, one of them is able to present the time domain and frequency domain simultaneously. In addition, wavelet transform is also able to analyze non-stationer signal accurately. The ability of the wavelet is to be used by the WDCS system to estimation a radio channel spectrum, by dividing the channel into several sub-channels and checking the presence of interference on each sub-channels.

All WDCS models and performance simulations were developed in Matlab R2010. This simulation is performed several times using different parameters, such as: different type of modulation, a different type of wavelet decomposition, and different type of orthogonal wavelet families. The result of simulation will be compared to finding out what components that can affect system performance. Besides that, the performance of WDCS will be compared with TDCS performance in the same parameters.

The results of this research show that selection of modulation can influence the performance of WDCS. Compared with WDCS-BCSK, WDCS with 4-ary CSK can give improvement up to 2 dB. From the result of simulation, we also can see that selection type of wavelet family come to affect system performance. WDCS by using Daubecies8 have the best performance, which provides 3 dB improvement when compared with WDCS by using Haar. And for the type of decomposition technique, WDCS by using packet wavelet decomposition provides performance much better than basic wavelet decomposition technique. Whereas, when compared with TDCS, WDCS allows improvement up to 9 dB.