Improved Wideband Spectrum Sensing Techniques Using Wavelet-Based Edge Detection for Cognitive Radio

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Abstract—**Cognitive Radio networks demand a fast and accurate wideband spectrum sensing in order to operate successfully and achieve efficient spectrum utilization. The wavelet transform, being a multiresolution analysis tool, has been proposed to process the target spectrum to achieve both speed and accuracy. In this paper, we propose an improved algorithm, based on the characterization of spectrum singularities from their wavelet transform multiscale information for wideband spectrum sensing. The proposed algorithm performs better than the existing ones at medium-to-high noise power. In addition, modifications are introduced to the wavelet transform multiscale sum algorithm to improve its performance. We also show that the Gaussian wavelet is the best wavelet basis function for this spectrum sensing approach. Finally, new performance measures are introduced and evaluated to provide accurate assessment of wideband spectrum sensing techniques.**

    Keywords−Cognitive Radio; wideband spectrum sensing; wavelet edge detection; Lipschitz exponents.