

Modern Spectrum Sensing Techniques for Cognitive Radio Networks: Practical Implementation and Performance Evaluation

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Abstract : Spectrum underutilization has made cognitive radio a promising technology both for current and future telecommunications. This is due to the ability to exploit the unused spectrum in the bands dedicated to other wireless communication systems, and thus, increase their occupancy. The essential function, which allows the cognitive radio device to perceive the occupancy of the spectrum, is spectrum sensing. In this paper, the performance of modern adaptations of the four most widely used spectrum sensing techniques namely, energy detection (ED), cyclostationary feature detection (CSFD), matched filter (MF) and eigenvalues-based detection (EBD) is compared. The implementation has been accomplished through the PlutoSDR hardware platform and the GNU Radio software package in very low Signal-to-Noise Ratio (SNR) conditions. The optimal detection performance of the examined methods in a realistic implementation-oriented model is found for the common relevant parameters (number of observed samples, sensing time and required probability of false alarm).

Keywords : cognitive radio, dynamic spectrum access, GNU Radio, spectrum sensing

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