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Spectrum sensing and SINR estimation in IEEE 802.11s cognitive radio Ad Hoc networks with heterogeneous interference

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Abstract
This paper addresses spectrum sensing (SS) in a Cognitive Radio Ad Hoc Network (CRAHN). The interconnec_tions of the nodes are formed on Dynamic Spectrum Access (DSA) channels, such as Television White Spaces (TVWS), so the CRAHN can suffer from heterogeneous Secondary User (SU) interference. We suggest that the idle time in IEEE 802.11s devices resulting from the employment of the Network Allocation Vector (NAV) and Mesh Coordination Function (MCF) be used for off_channel SS without causing any disruption to data transmission in the network. We perform Markov chain analysis to find the expected length of time of a sensing window. This work also specifies how an efficient minimum-variance unbiased estimator of the interference-plus-noise can be found. Estimation is more granular, accurate, and appropriate to the problem of SU-SU coexistence than the binary hypothesis testing methods that are common in the DSA and SS literature. We construct confidence intervals for the interference-plus-noise estimates based on the observations and find relationships between the number of sampling windows and sampling time, the interference power, and the achievable confidence interval width. The SU interference estimates can then be used to find improved channel assignments for the CRAHN.