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Power Allocation for Full-Duplex MISO Underlay Cognitive Radio Networks with Energy Harvesting

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Abstract:

In this paper, we investigate the performance of the energy harvesting (EH) concept in full-duplex multiple-input-single-output cognitive radio networks (FD-MISO-CRNs). In the proposed model, a single secondary user (SU) harvests energy from a hybrid base station (HBS) and the primary user (PU) transmission on the downlink and transmits its data on the uplink over Nakagami-m fading channels. Assuming underlay CRN, the total SU transmitted power (i.e., data and energy) cannot exceed the maximum allowable PU interference threshold. In practice, the HBS might have no prior knowledge on the SU battery status. A closed-form expression for the SU exact outage probability is derived and simplified to its asymptotic formula for the high signal-to-noise-ratio (SNR) regime. Based on the derived expressions, a power allocation optimization problem is formulated to minimize the SU asymptotic outage probability. Simulation results are obtained to validate the derived analytical formulas. Moreover, The proposed power allocation model shows a significant enhancement of the system performance compared to conventional equally distributed power allocation model.

Reference:

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