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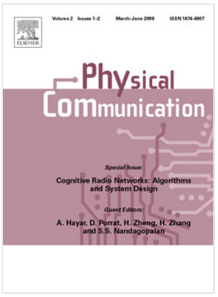

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Multi-channel Sensing And Resource Allocation in Energy Constrained Cognitive Radio Networks

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Abstract

We consider a cognitive radio network in a multi-channel licensed environment. Secondary user transmits in a channel if the channel is sensed to be vacant. This results in a tradeoff between sensing time and transmission time. When secondary users are energy constrained, energy available for transmission is less if more energy is used in sensing. This gives rise to an energy tradeoff. For multiple primary channels, secondary users must decide appropriate sensing time and transmission power in each channel to maximize average aggregate-bit throughput in each frame duration while ensuring quality-of-service of primary users. Considering time and energy as limited resources, we formulate this problem as a resource allocation problem. Initially a single secondary user scenario is considered and solution is obtained using decomposition and alternating optimization techniques. Later we extend the analysis for the case of multiple secondary users. Simulation results are presented to study effect of channel occupancy, fading and energy availability on performance of proposed method.

Keywords: Cognitive radio, energy constrained networks, resource allocation, sensing-throughput tradeoff

1. Introduction

Cognitive radio (CR) facilitates efficient spectrum use of current licensed spectrum that is highly underutilized and is considered as a potential solution to the

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