Abstract: An Analysis of Channel Access Delay in Synchronized MAC Protocol for Cognitive Radio Networks

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Abstract

The spectrum scarcity issue due to the fixed radio spectrum allocation system has become an obstacle for future wireless communication. Cognitive radio devised the idea of an open spectrum that allows unlicensed users to utilize these underutilized licensed spectrum bands opportunistically. There are several synchronization-based medium access control protocols for cognitive radio networks in the literature. In this paper, we analyze how the synchronization-based medium access control protocols for cognitive radio networks suffer from common control channel bottleneck problem in a dense network. The analysis result shows, the control messages exchange in fixed channel negotiation window in control channel is not efficient in a dense cognitive radio networks. This increases the channel access delay and limits the performance of the network. We develop an analytical model to calculate expected channel access delay and analyze the impact of number of nodes on channel access. We verify our analysis results with the simulation.

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