

An efficient quorum-based rendezvous scheme for multi-radio cognitive radio networks

ABSTRACT

Rendezvous is an initial and vital process for establishing data communications between devices in cognitive radio networks. Channel hopping (CH) provides an effective method for achieving rendezvous without relying on a dedicated common control channel. Most of the existing rendezvous schemes are designed for single-radio devices. Due to the dropping cost of wireless transceivers, the use of multiple radios to significantly reduce the rendezvous delay becomes economically feasible. In this paper, we propose a deterministic multi-radio rendezvous scheme that exploits the combinatorial features of grid quorum systems. We refer to our proposed scheme as multi-grid-quorum channel hopping (MGQ-CH). Our scheme uses multiple overlapped grid quorums to map the available channels at each device to its radios. We derive the theoretical upper-bound of the maximum time-to-rendezvous of MGQ-CH. Furthermore, we conduct simulations to study the performance of MGQ-CH under various system parameters and compare it with the state-of-the-art multi-radio rendezvous algorithms. The simulation results demonstrate the superior performance of MGQ-CH compared to previous schemes.