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Channel-Hopping-Based Communication Rendezvous in Cognitive Radio Networks

Abstract:

Cognitive radio (CR) networks have an ample but dynamic amount of spectrum for communications. Communication rendezvous in CR networks is the process of establishing a control channel between radios before they can communicate. Designing a communication rendezvous protocol that can take advantage of all the available spectrum at the same time is of great importance, because it alleviates load on control channels, and thus further reduces probability of collisions. In this paper, we present ETCH, efficient channel-hopping-based MAC-layer protocols for communication rendezvous in CRnetworks. Compared to the existing solutions, ETCH fully exploits spectrum diversity in communication rendezvous by allowing all the rendezvous channels to be utilized at the same time. We propose two protocols, SYNC-ETCH, which is a synchronous protocol assuming CR nodes can synchronize their channel hopping processes, and ASYNC-ETCH, which is an asynchronous protocol not relying on global clock synchronization. Our theoretical analysis and ns-2-based evaluation show that ETCH achieves better performances of time-to-rendezvous and throughput than the existing work.