Proactive channel access in Cognitive radio networks using Probabilistic suffix tree Algorithm

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Vast growth in the Wireless services in the past decade has pushed the FCC to find more efficient spectrum allocation mechanisms to avoid spectrum scarcity [1]. The measurement operation carried out by the FCC’s Enforcement Bureau in 2002, in single locations in the US, for a limited time period gave some insight into the real cause of the widely accepted notion of spectrum scarcity [2]. The recommendations made by the Spectrum efficiency working group based on these findings consists of promoting flexible use of spectrum, development and deployment of advanced technologies and promoting secondary markets for spectrum [2]. A novel technology known as Cognitive Radio (CR), neXt Generation (XG) or Software Defined Radio is found to have the capability to implement those recommendations [1].

Proactive channel access in Cognitive Radio (CR) networks has been proposed for the purpose of reducing the interference caused on primary users and to reduce the idle channel search delay incurred by the secondary users. In this paper we introduce a low complexity proactive channel usage scheme with proactive channel switching which is capable of reducing the interference caused by the unlicensed users in a decentralized CR network. We introduce a CSMA/CA based MAC protocol for the communication between the CRs. In this scheme we learn the primary user traffic characteristics of the channels using a learning scheme called Probabilistic Suffix Tree algorithm [3]. We compare our prediction scheme with another technique found in the literature to predict the channel status called the Hidden Markov Model (HMM) [] technique. Both these schemes were tested in a decentralized cognitive radio scenario and results for the throughput, average time to rendezvous and transmission rate. We show in our simulation that our scheme out performs the HMM scheme in all of these performance metrics.

REFERENCES


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