Analyzing Cognitive Network Access Efficiency Under Limited Spectrum Handoff Agility

Most existing studies on cognitive-radio networks assume that cognitive users (CUs) can switch to any available channel, regardless of the frequency gap between a target channel and the current channel. However, due to hardware limitations, CUs can actually jump only so far from where the operating frequency of their current channel is. This paper studies the performance of cognitive-radio networks while considering realistic channel handoff agility, where CUs can only switch to their neighboring channels. We use a continuous-time Markov process to derive and analyze the forced termination and blocking probabilities of CUs. Using these derived probabilities, we then study and analyze the impact of limited spectrum handoff agility on cognitive spectrum access efficiency. We show that accounting for realistic spectrum handoff agility reduces performance of cognitive-radio networks in terms of spectrum access capability and efficiency.