

**Statistical Admission Control in Multi-Hop Cognitive Radio Networks**

**Abstract:**

We address the problem of online admission control in multi-hop, multi-transceiver cognitive radio networks where the channel access is regulated by a bare-bones time-division multiple access protocol and the primary user activity is modeled as an ON/OFF process. We show that the problem of computing the available end-to-end bandwidth-necessary for admission control-is NP-Complete. Rather than working on an approximation algorithm and analyzing its worst-case performance, we relax the problem of online admission control by using a randomized scheduling algorithm and analyzing its average performance. Randomized scheduling is widely used because of its simplicity and efficiency. However, computing the resulting average throughput is challenging and remains an open problem. We solve this problem analytically and use the solution as vehicle for BRAND-a centralized heuristic for computing the average bandwidth available with randomized scheduling between a source destination pair in cognitive radio networks. Driven by practical considerations, we introduce a distributed version of BRAND and prove its correctness. An extensive numerical analysis demonstrates the accuracy of BRAND and its enabling value in performing admission control.