

In this paper, we consider a cognitive radio (CR) network that consists of multiple secondary users (SUs), each of which is equipped with an energy harvesting capability. We consider the opportunistic use of the idle spectrum, unused by primary users (PUs), through a mechanism of two-step opportunistic spectrum access for the SUs, consisting of random channel sensing followed by random channel access. Unlike the majority of previous studies, which have considered CR networks with energy harvesting under a single user setting, the goal of this paper is to investigate the joint impact of sensing probability, access probability, and energy queue capacity on the maximum achievable throughput in a multiuser CR network incorporating energy harvesting. For two extreme cases, those where the energy queue capacity is either infinite or extremely small, we show that the maximum achievable throughput is not affected by the channel access probability if the channel sensing probability is chosen appropriately and the optimal sensing probability is derived as a function of network parameters such as the energy arrival rate, channel availability probability, and number of contending SUs.