

Abstract

Nowadays, licensed users (primary users, PUs) can provide a means for offering internet service for unlicensed users (secondary users, SUs). We explore the ability of cognitive mesh network (CMN) to offer quality of service (QoS) required by real time services, streaming multimedia and other applications. We consider the approach where PUs rent the surplus spectrum to SUs to get some reward. However, when a PU rents more spectrum to SUs, its quality of service (QoS) is degraded due to a reduction of the spectrum. This complex contradicting requirement is embedded in our reinforcement learning (RL) model that is developed and implemented as shown in this paper. Available spectrum is managed by the PU which executes the extracted control policy. In this work, we propose a novel resource management scheme in the radio environment. RL is used as a means for extracting an optimal policy that helps a PU to adapt to the changing network conditions, so that the PU's profit is maximized continuously over time. The proposed scheme integrates different requirements such as rewards for PUs, QoS for PUs and the radio environment conditions. Performance evaluation of the proposed RL solution shows that the scheme is able to adapt to different network conditions and to guarantee the required QoS for PUs. Moreover, it is shown that CMN can support additional SUs traffic while still ensuring PUs QoS and maximizing PUs profits.