

Impact of primary networks on the performance of secondary networks

Hung Tran, Maarig Aregawi Hagos, Marshed Mohamed, Hans-Jürgen Zepernick

Abstract

In this paper, we investigate the performance of a single-input and multiple-output cognitive radio network over Rayleigh fading. In particular, we assume that secondary transmitter (SU-Tx) and primary transmitter (PU-Tx) are equipped with a single antenna while secondary receiver (SU-Rx) and primary receiver (PU-Rx) have multiple antennas. Additionally, the SU-Tx transmit power is subject to outage constraint of the primary network and peak transmit power of the secondary network. Given these settings, an adaptive transmit power allocation policy for the SU-Tx, a closed-form expression for outage probability, and an approximation for ergodic capacity are obtained. These formulas will be used to examine the impact of the PU-Tx transmit power, the number of antennas at receivers, and channel mean powers on the performance of the secondary network. More importantly, our results reveal that the SU-Tx using the power allocation policy can obtain optimal performance.