

Jordan University of Science and Technology

Game Theoretic Power Control under Rician Slow-Flat Fading Channels in Cognitive Radios Networks

Authors: Mahmoud A Alayesh and Nasir Ghani

Abstract: Power control is an important resource management concern in wireless cognitive radio networks. In particular, the transmit powers of base stations and handsets must be carefully adjusted to help reduce interference between users and also improve cell capacity. Indeed, large gains can be achieved by taking into account primary user's behaviors and allowing secondary users to utilize the unused spectrum of idling primary users. Along these lines, this study presents a novel game-theoretic solution in which primary users are rewarded for sharing their spectrum with secondary users to help achieve energy-efficient transmission. Overall, this effort extends upon our earlier work on fast-flat fading channels by further analyzing Rician slow-flat fading channels. In particular, the presentation derives a closed-form expression for the average utility function and also shows the existence and uniqueness of the Nash equilibrium. Detailed simulation results are then presented to verify performance of the game-theoretic formulation under realistic slow-flat fading channels, and the findings compared against those with the simpler additive white Gaussian noise channel model.