

# Jordan University of Science and Technology

## Power Control Game-Theoretic Approach in Cognitive Radios Networks under Rician Fast-Flat Fading Channel with Pricing

**Authors:** Mahmoud Alayesh, Nasir Ghani and Min Peng

**Abstract:** Power control is a major concern in cognitive radio networks. Here secondary users compete in an opportunistic way to access idle spectrum of primary users. However, most existing studies have only looked at the interactions between secondary users, without considering the impact of primary user behaviors. In this study a novel realistic primary-secondary game-theoretic scheme with a linear pricing function is proposed to obtain a more energy-efficient solution, which rewards primary users for sharing their spectrum to allow secondary users to achieve more energy-efficient transmissions. The performance of the proposed realistic power control algorithm under Rician fast-flat fading channels is analyzed, where a closed-form expression is also derived for the average utility function. The existence of a unique Nash equilibrium is also shown and the numerical results are compared to both basic additive white Gaussian noise (AWGN) channels model without pricing and to the realistic power control game under Rayleigh fast-flat fading channels model with pricing.