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Game-Theoretic Approach for Primary-Secondary User Power Control Under Fast Flat Fading Channels

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Abstract: Power control is an important concern in cognitive radio networks in which secondary users compete to access spectrum allocated to primary users. However, most existing studies have ignored the impact of primary users and only considered the interactions between secondary users. Hence in this study a realistic primary-secondary game-theoretic scheme is proposed in which primary users are rewarded for sharing their spectrum. The proposed model is analyzed for Rician and Rayleigh fast flat fading channels. In addition, closed-form expressions are also derived for the average utility functions and the existence of a unique Nash equilibrium is also shown. Finally, detailed simulation results are presented to verify the realistic performance of the scheme under those new channel conditions.