

Game Theoretic Approaches to Modelling Cooperative and Competitive Dynamics for Enhanced Routing and Resource Allocation

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Abstract: *The goal of the field of game theory is to simulate scenarios in which decision-makers must choose between courses of action that may or may not conflict and in which the choices made by one element may affect the choices made by other elements. Techniques from game theory have been widely used to solve a variety of engineering design issues. Game theory may be applied to wireless networks to create cooperative strategies between nodes, terminals and network providers, among other organizations. The majority of the time, game theory has been used in networking to address routing and resource allocation issues in competitive settings. Because radio communication channels are typically shared in wireless networks, the actions of one wireless device may have an impact on the communication capabilities of a neighboring device. Game theory may be used to simulate situations such as these. A multi-layered viewpoint is presented in Applications of Game Theory in Wireless Networking, highlighting the domains in which game theory might find practical application. This explains how different wireless network interactions may be represented as games and how game-theoretical methods can accurately mimic or forecast genuine user behavior in cooperative or competitive settings. Because of these similarities, it is possible to grasp the intricate relationships between nodes in this highly dynamic and dispersed environment by using a strong mapping between classical game theory components and network parts*

Keywords: Game theory, wireless networks, physical layer, SINR, resource allocation, power control, spectrum management, FDMA, jamming game