

Power Allocation for D2D Communications in Heterogeneous Networks

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Abstract—In this paper, we study power allocation for D2D communications in heterogeneous networks utilizing game theory approach to improve the performance of the whole system. Given D2D's underlay status in the system, Stackelberg game framework is well suited for the situation. In our scheme, macrocell system and femtocell system are considered as two leaders and D2D pairs are considered as the follower, forming a two-leader-one-follower Stackelberg game. The leaders act first, charging some fees from the follower for using the channel and causing interference to jeopardize their communication equality. The follower observes the leaders' behavior and develops its strategy based on the prices offered by the leaders. We analyse the procedure and obtain the Stackelberg equilibrium, which determines the optimal prices for the leaders and optimal transmit power for the follower. In the end, simulations are executed to validate the proposed allocation method, which significantly improves data rate of user equipment.

Keyword—Device-to-device, femtocell, heterogeneous networks, power allocation, LTE-A



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