Adaptive Bidding Mechanism for Service Providers in Wireless HetNets: Optimizing Resource Utilization with End-User Behavior

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Tentative Abstract

As the number of mobile users increases exponentially, it is crucial for service providers (SPs) to optimize the utilization of their limited resources to be able to cope with such an increasing demand, and serve more users. We formulate user association with SPs as a multiple leader Stackelberg game where each SP offers a data rate to each user with a certain service guarantee and at a certain price, while the user chooses the best offer among multiple such bids. Using prospect theory for modeling the end-users decision making, we show that whenever there are some forms of uncertainty in the offered services by SPs, then user decisions can impact the resource utilization of SPs. In fact, we show that if users underestimate the service guarantees advertised by SPs, they are more likely to reject the received offers from SPs which results in underutilization of resources for SPs and hence reducing their revenue. To prevent that, in this paper we present a novel learning mechanism for SPs to adaptively correct/update their bids by learning from previous records of users decisions, to increase the users acceptance rate for their offered services, and hence increase their resource utilization and revenue. Simulation results demonstrate the efficiency of our proposed method.