Resource Allocation via Sum-Rate Maximization in the Uplink of Multi-Cell OFDMA Networks

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Abstract

In this paper, we consider maximizing the sum-rate in the uplink of a multi-cell OFDMA network. The problem has a non-convex combinatorial structure and is known to be NP hard. Due to the inherent complexity of implementing the optimal solution, firstly, we derive an upper and lower bound to the optimal average network throughput. Moreover, we investigate the performance of a near optimal single cell resource allocation scheme in the presence of ICI which leads to another easily computable lower bound. We then develop a centralized sub-optimal scheme that is composed of a geometric programming based power control phase in conjunction with an iterative subcarrier allocation phase. Although, the scheme is computationally complex, it provides an effective benchmark for low complexity schemes even without the power control phase. Finally, we propose less complex centralized and distributed schemes that are well-suited for practical scenarios. The computational complexity of all schemes is analyzed and performance is compared through simulations. Simulation results demonstrate that the proposed low complexity schemes can achieve comparable performance to the centralized sub-optimal