Simultaneous Routing and Resource Allocation in CDMA Wireless Data Networks

M. Johansson, L. Xiao, and S. Boyd

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The optimal routing of data in a wireless network depends on the link capacities, which, in turn, are determined by the allocation of transmit powers across the network. Thus, the optimal network performance can only be achieved by simultaneous optimization of routing and power allocation. In this paper, we study this joint optimization problem in CDMA data networks using convex optimization techniques. Although link capacity constraints of CDMA systems are not jointly convex in rates and powers, we show that coordinate projections or transformations allow the simultaneous routing and power allocation problem to be formulated as (in systems with interference cancellation) or approximated by (in systems without interference cancellation) a convex optimization problem which can be solved very efficiently. We also propose a heuristic link-removal procedure based on the convex approximation to further improve the system performance.