



JOINT ROUTING AND RADIO RESOURCE MANAGEMENT IN MULTIHOP CELLULAR NETWORKS USING PARTICLE SWARM OPTIMIZATION¹

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ABSTRACT—Given a multihop cellular network with fixed relays, this paper considers the problem of jointly selecting (possibly multiple) routing paths for each communication session and allocating transmit powers and bandwidth across all network links, such that the total network utility (i.e., social welfare) is maximized. This paper focuses on quality of service (QoS-) sensitive applications that are captured by sigmoidal-like utility functions. The non-concavity of the user utility functions, the complex relation between routing decisions and network resource allocation, and the dependence of link capacities on all interfering powers render the problem non-convex, and extremely difficult to solve. However, we present a meta-heuristic based on particle swarm optimization that solves the problem successfully, efficiently and globally.

Key Words: Multihop cellular networks, relays, radio resource management, particle swarm optimization.