# Optimal Dynamic Multicast Scheduling for Cache-Enabled Content-Centric Wireless Networks


## Abstract:

Caching and multicasting at base stations are two promising approaches to support massive content delivery over wireless networks. However, existing scheduling designs do not fully exploit the advantages of the two approaches. In this paper, we consider the optimal dynamic multicast scheduling to jointly minimize the average delay, power, and fetching costs for cache-enabled content-centric wireless networks. We formulate this stochastic optimization problem as an infinite horizon average cost Markov decision process (MDP).By using relative value iteration and special structures of the request queue dynamics, we analyze the properties of the value function and the state-action cost function of the MDP for both the uniform and nonuniform channel cases. Based on these properties, we show that the optimal policy, which is adaptive to the request queue state, has a switch structure in the uniform case and a partial switch structure in the nonuniform case. Moreover, in the uniform case with two contents, we show that the switch curve is monotonically non-decreasing. Motivated by the switch structures of the optimal policy, we propose a low-complexity suboptimal policy, which exhibits similar switch structures to the optimal policy, and design a low-complexity algorithm to compute this policy.