Optimal buffer size and dynamic rate control for a queueing network with reneging in heavy traffic

Arka P. Ghosh

Iowa State University

We address a rate control problem associated with a single server finite-buffer Markovian queueing system with customer abandonment in heavy traffic. The controller can choose and fix a buffer size of the queue and can dynamically control the arrival and/or the service rates depending on the current state of the network. We consider the infinite horizon discounted cost criterion, where the cost function includes a penalty for each rejected customers, a control cost related to the adjustment of the arrival and service rates as well as a penalty for each abandoned customer. Here we obtain an explicit solution of the approximating diffusion control problem (Brownian control problem or BCP) and using this solution, construct controls for the queueing network control problem. We also prove asymptotic optimality of this policy, using generalized regulator maps (Skorohod maps) and weak convergence techniques. In addition, we identify the parameter regimes where infinite buffer size is optimal.

This is a joint work with Ananda Weerasinghe.

`List of invited speakers` `Schedule for December 11`