

Online pricing for bandwidth provisioning in multi-class networks

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Abstract

We consider the problem of pricing for bandwidth provisioning over a single link, where users arrive according to a known stochastic traffic model. The network administrator controls the resource allocation by setting a price at every epoch, and each user's response to the price is governed by a demand function. We formulate this problem as a partially observable Markov decision process (POMDP), and explore two novel pricing schemes—reactive pricing and spot pricing—and compare their performance to appropriately tuned flat pricing. We use a gradient-ascent approach in all the three pricing schemes. We provide methods for computing unbiased estimates of the gradient in an on-line (incremental) fashion. Our simulation results show that our novel schemes take advantage of the known underlying traffic model and significantly outperform the model-free pricing scheme of flat pricing.

Joint work with Uday Savagaonkar and Robert Givan.