Algorithms for switches

Dr. Devavrat Shah

Massachusetts Institute of Technology, MA

Friday, April 22th, 3:00 PM, ENS 637

Abstract

High speed data networks, such as the Internet, present the algorithm designer with highly constrained problems: the algorithms need to work at a very high speed while providing good performance and accessing limited computing resources. Consequently, only the simplest algorithms are implementable. But such algorithms may perform rather poorly. This tension between implementability and goodness of performance is acutely experienced by the designer of switch scheduling algorithms.

In the first part of my talk I will show how randomization may be used to simplify the implementation of switch schedulers. Specifically, I will exhibit a simple randomized scheduling algorithm and prove that it delivers 100% throughput while providing low delay. The second part of my talk concerns a new approach for analyzing the packet delay induced by an algorithm. I shall explain why traditional approaches based, for example, on queueing and large deviation theories are inadequate, and advance a new approach based on Heavy Traffic Theory. This approach helps explain some intriguing observations other researchers have made about the delay of scheduling algorithms based on simulations. It also leads to the characterization of a delay-optimal scheduling algorithm.

Bio

Devavrat Shah is an Assistant professor with departments of EECS and ESD at MIT. He received his PhD in Computer Science from Stanford in 2004. His research interests are in the areas of network algorithms, network information theory and stochastic networks.
