

## Characterizing the Internet Hierarchy from Multiple Vantage Points?

by Jennifer Rexford, AT&T Labs-Research, Florham Park NJ

**Date:** Mar. 27, 2003 (Thursday)  
**Time:** 6:15 p.m. (refreshments start at 6:00 p.m.)  
**Place:** Room 202, ECE Building, NJIT, Newark, NJ

### About the Talk

The delivery of traffic through the Internet depends on the complex interactions between thousands of Autonomous Systems (ASes) that exchange routing information using the Border Gateway Protocol (BGP). This talk investigates the topological structure of the Internet in terms of customer-provider and peer-peer relationships between ASes, as manifested in BGP routing policies. We describe a technique for inferring AS relationships by exploiting partial views of the AS graph available from different vantage points. Next we apply the technique to a collection of ten publicly-available BGP routing tables to infer the relationships between neighboring ASes. Based on these results, we analyze the hierarchical structure of the Internet and propose a five-level classification of ASes. Our analysis differs from previous characterization studies by focusing on the commercial relationships between ASes rather than simply the connectivity between the nodes.

This is joint work with Lakshminarayanan Subramanian, Sharad Agarwal, and Randy Katz at the University of California at Berkeley. A paper describing the work is available at <http://www.research.att.com/~jrex/papers/infocom02.ps>

### About the Speaker

Jennifer Rexford is a member of the Network Management and Performance department at AT&T Labs--Research in Florham Park, New Jersey. Her research focuses on routing protocols and traffic measurement, with the goal of developing new methods and tools for operating large IP networks. Jennifer serves on the steering committee for the Internet Measurement Workshop, the editorial board of IEEE/ACM Transactions on Networking, and the advisory boards of ACM SIGCOMM, Arbor Networks, and MentorNet. She is a senior member of the IEEE and is coauthor of the book "Web Protocols and Practice: HTTP/1.1, Networking Protocols, Caching, and Traffic Measurement" (Addison-Wesley, 2001) with Balachander Krishnamurthy. Jennifer received her BSE degree in electrical engineering from Princeton University in 1991, and her MSE and PhD degrees in computer science and electrical engineering from the University of Michigan in 1993 and 1996, respectively.

**Sponsors:** IEEE Communications Society North Jersey Chapter  
NJIT Electrical and Computer Engineering Department

For more information contact Nirwan Ansari (973) 596-3670, or check <http://web.njit.edu/~ieeenj/comm.html> for latest updates. Directions to NJIT can be found at: <http://www.njit.edu/University/Directions.html>.