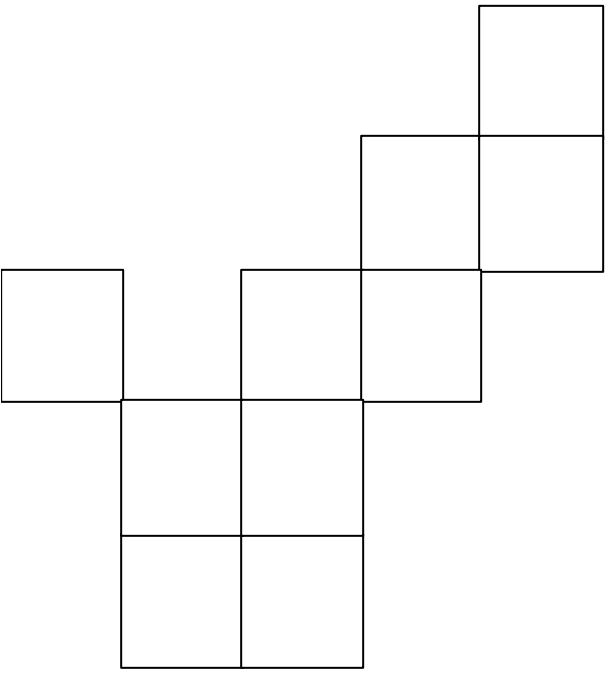

Internet Pricing and Network Management

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Outline

- Summary of Ex-Post Charging Findings
- Extensions to Analytical Modeling
- Empirical Research on Internet Pricing
- Optical Network Design
- Status of Research Papers

Objectives of Internet Pricing

- Create a link between network management and pricing
- Understand different models of charging that affect incentives for network management
- Extend this research to new technology areas for an analysis of new business models

Summary of Ex-Post Charging Findings

- Charging at a relatively high level has many advantages
  - Combine congestion costs of utilization and burstiness into one charge
  - Able to determine charge with little overhead
- Creation of an incentive mechanism
  - Better choice of buffer sizes
  - Incentives for network monitoring and filtering

Extensions of Analytical Modeling

- Negotiation between ISP and user to maximize utility
- Understanding of “filtered” traffic flows
- Examine the positive externality affect and switching behavior of other users

Empirical Analysis on Internet Pricing

- Analysis of different markets
  - ISPs in the United States
  - Internet2
  - Global Internet
- Current findings indicate that there is a fair amount of consolidation in this industry with greater emphasis on price discrimination

Integrated Logical Topology Design for WDM Optical Networks

- Optical Networks prevalent. Several issues in optical network design. Lightpath topology design (embedded on a physical network). Routing and wavelength assignment of traffic. Problems are related.
- We wish to develop optimization techniques that solve the integrated problem.
- Summary of research so far.
  - Literature review.
  - Integer Programming Formulations.
  - Too difficult to solve (using CPLEX) with more than 10 nodes.
  - Instead can use our formulations as a heuristic/approximation (i.e., choose subset of possible lightpaths and find optimal). Focus of our future research.

Research Publications

- “Ex-Post Internet Charging,” J. Bailey, I. Gamvros, and S. Raghavan, ACM Transactions on Internet Technology, revise and resubmit status.
- “Heuristic Search for the Generalized Minimum Spanning Tree Problem,” B. Golden, S. Raghavan, and D. Stanojevic, submitted for publication, INFORMS Journal on Computing.
- “Long Distance Access Network Design,” R. Berger and S. Raghavan. Revised version under review at Management Science.
- “The Multi-Level Capacitated Minimum Spanning Tree Problem,” Ioannis Gamvros, Bruce Golden, and S. Raghavan, submitted to INFORMS Journal of Computing.
- “Strong Formulations for Network Design Problems with Connectivity Requirements,” T. L. Magnanti and S. Raghavan. Revision under review at Networks.