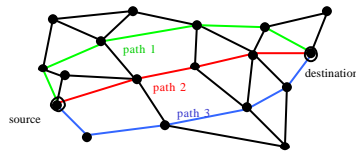


Survivable Multipath Routing Schemes for Connection-Oriented Communications

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Research Problem

- find a minimum number of routing paths such that
 - the sum of the bandwidths of all the channels on any link is less than or equal to the available bandwidth of the link, and
 - the failure probability of a realized session is less than or equal to a given threshold

Motivation

- requirements of communication service users
 - bandwidth (or number of channels) and survivability
- requirement of communication service providers
 - minimization of total bandwidth (or number of channels)

Expected Applications

- survivable and fault-tolerant communication services
- real-time performance-guaranteed multimedia communications
- load-balancing for congestion-free communication networks

Challenge

- complicated combinatorial optimization problem
- difficulty in finding an optimal solution
 - the contribution of a path toward the session failure probability depends on other paths sharing links

Related Prior Work

- Banerjee ('99) – fault recovery for guaranteed performance communications
- Hung ('98) – multipath routing for transmission time minimization
- Kawamura ('98) – fault-tolerant virtual path (FTVP) scheme
- Vutukury et al. (2000) – loop-free multi-path routing

Our Approaches (work in progress)

- separation of original problem into a combinatorial subproblem and an optimization subproblem
 - repetition of
 - finding a solution to the combinatorial subproblem for a fixed number of paths, and
 - checking the optimality of the solution to increase/decrease the number of paths
 - high complexity and high accuracy
- sequential selection of locally optimal paths
 - sequentially select and add a locally optimal path into a solution until the survivability constraint is satisfied
 - low complexity and low accuracy

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