Routing Through Networks with Hierarchical Topology Aggregation

Baruch Awerbuch[*]   Yi Du[†]   Bilal Khan[‡]

Johns Hopkins University

Department of Computer Science

Baltimore, MD 21218

{baruch, yidu, bkhan}@cs.jhu.edu

Yuval Shavitt[§]

shavitt@lucent.com

Bell Laboratories, Lucent Technologies

101 Crawfords Corner Rd., room 4G-627

Holmdel, NJ 07733-3030

Abstract

In the future, global networks will consist of a hierarchy of subnetworks called domains. For reasons of both scalability and security, domains will not reveal details of their internal structure to outside nodes. Instead, these domains will advertise only a summary, or aggregated view, of their internal structure, e.g., as proposed by the ATM PNNI standard.

This work compares, by simulation, the performance of several different aggregation schemes in terms of network throughput (the fraction of attempted connections that are realized), and network control load (the average number of crankbacks per realized connection). The simulation emulate a connection oriented network with a PNNI-like hierarchical source routing algorithm.

Our main results are: • Minimum spanning tree is a good aggregation scheme; • Exponential link cost functions perform better than min-hop routing; • Our suggested *logarithmic update* scheme that determine when re-aggregation should be computed can significantly reduce the computational overhead due to re-aggregation with a negligible decrease in performance.

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