Suwara Suraprasert 2012: Multicast Recovery and Oblivious Routing using Linear Programming. Doctor of Engineering (Computer Engineering), Major Field: Computer Engineering, Department of Computer Engineering Thesis Advisor: Assistant Professor Jittat Fakjaroenphol, Ph.D. 70 pages.

This thesis considers routing problems in multicast networks. There are two main parts. The first part considers the problem of finding the backup trees in multicast networks to handle the situation when the link failure occurs in the network. We study many recovery schemes that have been proposed before and compare their performance. In this work, we use throughput as the metric for evaluating their performance. We also propose the new recovery scheme called Path Restricted Recovery Scheme. To compare the performance of each recovery scheme, we perform experiments on random networks generated under the Barabasi-Albert model and the two real networks: Carrier Backbone Network and US Long Distance Network. The propose recovery scheme performs better than all other schemes except the Unrestricted Recovery Scheme (UR) that recomputed the whole multicast tree from scratch. However, the new propose scheme use less memory to keep the backup trees than the UR scheme.

The second part of this study is to find the oblivious routing in multicast networks. We prove a theorem that shows the equivalence between oblivious routing in unicast networks and in multicast networks. We also consider extending the oblivious routing framework to a more practical setting by limiting the demand space considered by the algorithm. We proposed to use real demand samples and apply the technique that solves the general oblivious routing problem to find the optimal oblivious routing in this setting. We prove a simple performance guarantee for the algorithm and from the experiments we conclude that this approach may be useful when a more fine-grain information is available.

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