# Reliability And Fault Tolerance Based Topological Optimization Of Computer Networks - Part I: Enumerative Techniques

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## Summary

Topological optimization of computer networks is concerned with the design of a network by selecting a subset of the available set of links such that the fault tolerance and reliability aspects are maximized while a cost constraint is met. A number of enumeration-based techniques were proposed to solve this problem. They are based on enumerating all possible paths (for terminal reliability) and all the spanning trees (for network reliability). Existing enumeration-based techniques for solving this network optimization problem ignore the fault-tolerance aspect in their solution. We consider fault tolerance to be an important network design aspect In this paper, we propose one algorithm for optimizing the terminal reliability and another for optimizing the network reliability while improving the fault tolerance aspects of the designed networks. Experimental results obtained from a set of randomly generated networks using the proposed algorithms are presented and compared to those obtained using existing techniques. It is shown that improving the fault tolerance of a network can be achieved while optimizing its reliability however at the expense of a reasonable increase in the overall cost of the network.

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