

Telecommunications Network Topological Design and Capacity Expansion

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ABSTRACT

This paper formulates the network topology and capacity expansion problem in a telecommunications network and suggests a family of heuristics and a dual-based lower bounding procedure for solving it. They include schemes exploiting special subproblem structures, decomposition of the problem using Lagrangian relaxation, and a global searching strategy. From carefully designed experiments, it is shown that the procedure generates solutions within forty percent of the lower bound in most cases. To evaluate the solution quality more accurately, additional experiments were performed using a random searching strategy for the topological variables with capacity expansion optimized. It is further shown that the solutions generated by the global heuristic are unlikely to be found using a random search. Further research areas and open problems are discussed.