Survivable Network Design II: Spare Channel Assignment for DCS Mesh-Restorable Networks

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ABSTRACT

We consider an integer programming based optimization algorithm to solve the Spare Channel Assignment Problem (SCAP) for the new synchronous transmission networks that use a DCS for each node of the network. Given predetermined working channels on each link of the network, the problem is to determine the spare capacity that should be added on each link to ensure rerouting of the traffic in case of a link failure. We propose an IP model which determines not only the spare capacity on each link but also the number of each link facility needed to be installed on each link to meet the aggregated requirements of working and spare channels. The objective is to minimize the total installation cost.

We propose a branch-and-cut algorithm to solve (SCAP). To solve the LP relaxation of the problem, an efficient constraint generation routine was devised. Moreover, some strong valid inequalities were found and used to strengthen the formulation. Computational results show that the algorithm can solve real world problems to optimality within reasonable time.