An Integrated Approach for Hub Location and Network Design Problem in Telecommunication Networks

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Abstract

This paper deals with a comprehensive problem for a hub location and network design which is typically found in a communication and a transportation network design studies. Our design study covers in an integrated framework all three major decision sets: locating hub facilities, placing arcs and selecting a path for each commodity. The complex problem is formulated as a mixed integer programming problem embedding a multicommodity flow problem. The model can be transformed into some well known problems such as hub-spoke network design, network hub location and tree-star network design problems. Exploiting its special structure, a dual-based heuristic is then developed, which yields near-optimal design plans. The computational experiments show that the performance of the proposed heuristic is satisfactory in both the speed and the quality of the design solutions generated.