

# Design of the Interacting Two-hub System

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## ABSTRACT

This paper considers the discrete two-hub problem. Hubs are central facilities designed to act switching points for internodal flows and interconnected. In the discrete model, the locations of nodes (cities) are given and the hubs are to be selected in the given node set. Each node is assumed to be connected to one of two hubs. And, the flows between every pair of nodes are assumed to be known. Then, the flows between any pair of nodes are sent by using the hubs as intermediate switching points. The problem is to find the optimal locations of hubs and the optimal assignment of the remaining nodes to one of the hubs in order to minimize the total transportation cost.

We transform the quadratic integer programming formulation for the two-hub system into an LP formulation when the locations of hubs are given. Also, we provide a method to transform the problem into a minimum cut problem that can be solved efficiently by polynomial-time algorithms.