

설비용량을 고려한 계층적 네트워크의 설계 및 분석

Design and Analysis of Hierarchical Network
with Node Capacity Constraints

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ABSTRACT

This paper deals with the capacitated network design problem of a hierarchical two-level network in which the upper-level hub network is of ring type and the lower-level local access networks are of star type: *Capacitated Ring-Star Network Design Problem (CRSNDP)* with node capacity constraints. The problem is formulated by a mixed 0-1 integer programming, and a heuristic procedure which consists of two phases is developed to find a good solution, in which the CRSNDP is decomposed into two subproblems, the capacitated facility location problem (CFLP) and the traveling salesman problem (TSP). In phase I, the ADD & VAM method selects the hub sites and their appropriate capacity from the candidate set and then assigns user nodes to the established hub nodes under node capacity constraints. In phase II, the selected hubs are interconnected to form a ring and a final design of the ring-star network is achieved. A numerical example is presented for easy comprehension of the heuristic. An analysis of the computational results on various types of problems which are randomly generated has shown that the heuristics in this paper can efficiently solve practically large CRSNDPs.