

**MULTICOMMODITY NETWORK FLOW PROBLEMS WITH OVERLAPPING
CAPACITIES FOR SEVERAL PRODUCTS**

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Typically the models described in the literature for multistage multicommodity distribution-systems assume, that features combining different commodities only occur in the objective. Therefore, in the case of linear or linearized distribution-system design problems the masterproblem decomposes into as many independent subproblems as there are different commodities. Therefore, each of these subproblems can be solved by known standard optimizing algorithms. Contrary to these assumptions real-life applications usually show a lot of constraints concerning two or more products. Frequently, each client has to be assigned to exactly one distribution center (single-source constraint) or there are capacitated resources at the facilities for production and throughput for all commodities or only subsets of the different commodities. Considering these constraints it's no longer possible to solve the original masterproblem as a sequence of independent one-product subproblems.

For a 3-stage distribution-system design problem we will consider joint capacities in the distribution centers for not overlapping subsets of the commodities. The problem formulation used is a multicommodity network flow problem. In addition to the capacitated distribution centers we have to find unique distribution center - client assignments. Considering a real-life application we will compare different methods for solving the resulting assignment-problems. The techniques used are algorithms for transportation problems with split resolution, heuristics for the GAP as well as penalty costs methods.

The application is concerned with the evaluation of implications on the traffic due to decentralised locations for distribution centers in the surrounding of conurbations. The main objective is to avoid the heavy duty truck traffic in the innercity-regions as much as possible and to bundle today's individual traffic for delivery by means of cooperations of the interested companies. Therefore, we have to compare the performance of transportation in the long-distance traffic and the local-traffic at the present situation with the expected values in the case of decentralized locations. The present situation is characterized by a lot of different and usually central distribution centers.