The Uncapacitated Hub Location Problem with multiple allocation involves transshipment or hub nodes, which collect commodities from their origin, transfer them to other hubs and distribute them to their final destination. The problem is to locate the hub nodes and to route the commodities through these hubs. As we allow multiple allocation, commodities having the same origin (or destination) may be allocated to different hubs. The objective is to minimize the total costs, which consist of transportation costs per unit and fixed charge costs for establishing hubs at nodes, under the constraint that all commodities have to be routed via one or two nodes.

During the last years, different kinds of hub location problems have been discussed in the literature. Most applications of hub location problems concern air passenger and cargo transportation, telecommunication and postal delivery services. The main types of problems which are dealt with are $p$-hub location, where the number of hubs to be located is fixed to $p$ and fixed charge hub location problems, where this number is part of the optimization problem, but a certain fixed cost has to be paid for establishing a hub facility. Furthermore, one distinguishes between problems with single allocation and with multiple allocation. In the single allocation case all commodities sharing the same origin (or destination, respectively) must be allocated to the first (or second, respectively) hub, while in multiple allocation they can be allocated to different hubs.

The first part of the presentation will be devoted to an overview of different hub location problems and their formulations. The remainder of the presentation will focus on the Uncapacitated Hub Location (UHL) Problem. Specifically, a mixed integer formulation of the problem is presented and the associated polytope is studied. Among others, we show how to exploit known results for the Uncapacitated Facility Location (UFL) Problem to derive facet defining inequalities for the UHL polytope. Some of these inequalities can be used to derive a tighter and more compact formulation of UHL. The efficiency of this new UHL formulation is shown by benchmarking it on a well-known data set and comparing its performance with different other formulations known from the literature.