Integrating dial-a-ride services and public transport

Yves Molenbruch*, Kris Braekers
Research Group Logistics
Hasselt University (UHasselt), Belgium

Patrick Hirsch, Marco Oberscheider
Institute of Production and Logistics
University of Natural Resources and Life Sciences (BOKU), Vienna, Austria

February 27, 2018

Dial-a-ride (DAR) services typically provide demand-responsive transport to people with reduced mobility. Contrary to general taxi services, users may be combined in the same vehicle, as long as their service level requirements (i.e. time windows, maximum ride time, etc.) are respected. Consequently, DAR providers face a complicated routing problem in their operational activities.

In a traditional mobility policy, DAR services are exploited separate from regular public transport (PT). Modern policy visions efficiently combine both systems. Regular PT is only maintained on a core network of (sub)urban and interurban lines, whereas DAR services provide on-demand transport in rural areas, both to people with and without reduced mobility.

Ambulant users in rural areas submit a single request for their entire trip, although this trip may involve a combination of DAR services and PT. The DAR provider needs to determine their itineraries and potential transfer locations such that operational costs are minimized, given the PT timetables. For this purpose, an LNS algorithm is introduced. Synchronization between routes is enforced by an exact procedure representing candidate solutions as a *simple temporal problem*, being a network of time constraints which is consistent for feasible solutions.

Tests on artificial data show that, depending on the demand characteristics and network structure, DAR providers integrating their services into PT can save up to 24% relative to a standalone system.