

# Solving City Bus Scheduling Problems in Bangkok

H. G. Bock<sup>1</sup>, G. Reinelt<sup>2</sup>, and C. Surapholchai<sup>3</sup>

**Abstract:** The modeling of city bus scheduling problems is considered. The aim of this paper is to optimize the number of buses and their scheduling in the city. This leads to high-dimensional integer programming problems. The vehicle scheduling problem (VSP) can also be formulated through a graph-theoretical model, which is then transformed into an integer linear programming (ILP) model. There are two problem cases: the single-depot VSP (SDVSP), and the multiple-depot VSP (MDVSP). We try to solve these problems to obtain the optimal number of buses needed. The MDVSP can be solved by some heuristic algorithms. The disadvantage of these algorithms is that the solution quality decreases as the number of depots increases. Therefore, a new heuristic algorithm, namely the nearest bus-stop heuristic algorithm (NB) for solving the MDVSP is developed. The advantage of the NB is that the solution quality increases as the number of the depots grows. Moreover, in this paper, we develop the Eligen-algorithm, which uses the techniques of column elimination and column generation, for solving the MDVSP. This algorithm gives better solutions using fewer buses than the NB. For example problem instances, we use the modeling of city bus scheduling problems in Bangkok, Thailand.

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<sup>1</sup> Interdisciplinary Center for Scientific Computing (IWR)  
University of Heidelberg  
Im Neuenheimer Feld 368, 69120 Heidelberg, Germany  
*Bock@IWR.Uni-Heidelberg.De*

<sup>2,3</sup> Institute of Computer Science  
University of Heidelberg  
Im Neuenheimer Feld 368, 69120 Heidelberg, Germany  
*Gerhard.Reinelt@Informatik.Uni-Heidelberg.De*  
*Chotiros.Surapholchai@Informatik.Uni-Heidelberg.De*

<sup>3</sup> Department of Mathematics, Faculty of Science  
Chulalongkorn University  
Phayathai Road, Pathumwan, 10330 Bangkok, Thailand  
*Chotiros.S@chula.ac.th*