

**THE VEHICLE ROUTING PROBLEM:  
LATEST ADVANCES AND NEW CHALLENGES**

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## Preface

Theoretical research and practical applications in the field of vehicle routing started in 1959 with the *truck dispatching problem* posed by Dantzig and Ramser [1]: find the “...optimum routing of a fleet of gasoline delivery trucks between a bulk terminal and a large number of service stations supplied by the terminal.” Using a method based on a linear programming formulation, their hand calculations produced a near-optimal solution with *four routes* to a problem with *twelve service stations*. The authors proclaimed: “No practical applications of the method have been made as yet.”

In the nearly 50 years since the Dantzig and Ramser paper appeared, work in the field has exploded dramatically. Today, a Google Scholar search of the words *vehicle routing problem* (VRP) yields more than 21,700 entries. The June 2006 issue of *OR/MS Today* provided a survey of 17 vendors of commercial routing software whose packages are currently capable of solving average-size problems with 1,000 stops, 50 routes, and two-hour hard-time windows in two to ten minutes [2]. In practice, vehicle routing may be the single biggest success story in operations research. For example, each day 103,500 drivers at UPS follow computer-generated routes. The drivers visit 7.9 million customers and handle an average of 15.6 million packages [3].

While much has been documented about the VRP in major studies that have appeared from 1971 (starting with *Distribution Management* by Eilon, Watson-Gandy, and Christofides) to 2002 (ending with *The Vehicle Routing Problem* by Toth and Vigo), there are important advances and new challenges that have been raised in the last five years or so due to technological innovations such as global positioning systems, radio frequency identification, and parallel computing. The portfolio of techniques for modeling and solving the standard, capacitated VRP and its many variants has advanced significantly. Researchers and practitioners have developed faster, more accurate solution algorithms and better models that give them the ability to solve large-scale problems.

The papers in this edited volume seek to build on the legacy of published VRP studies in three ways. They summarize the most significant results for

the VRP and its variants since 2000. They present significant methodological advances or new approaches for solving existing vehicle routing problems. They present novel problems that have arisen in the vehicle routing domain and highlight new challenges for the field.

This volume is organized into three sections: overviews and surveys (nine papers), new directions in modeling and algorithms (eleven papers), and practical applications (five papers). We hope that the academic community (especially new and young researchers entering the field) and practitioners in industry will find all twenty-five papers in this volume interesting, informative, and useful.

We thank all of the authors for their participation in producing a first-rate volume. We also thank Gary Folven, senior editor at Springer, and Ramesh Sharda and Stefan Voß, series editors, for their encouragement and support.

College Park, MD and Washington, DC  
November 2007

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