

AIRLINE NETWORK-BASED MODELING ASPECTS AND METHODOLOGIES FOR MULTIDISCIPLINARY OPTIMIZATION

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ABSTRACT

The current airline environment is very competitive and dynamic. Maintaining consistent profitability requires that appropriate tradeoffs be made between the often-competing objectives within planning, marketing and operations. Problems abound in airline scheduling, aircraft routing, market and strategy evaluation, pricing and revenue maximizing, fleet composition and assignment, and network modeling. Airlines have led other industries in the application of operations research and multidisciplinary optimization to deal with these issues. The real-time solution of large-scale optimization models has played a significant role in shaping today's airline industry. This role will increase as the industry becomes more competitive and flight characteristics change due to the implementation of new technologies. Airline fleet planning and scheduling represents an excellent examples of the application of operations research and mathematical modeling to solve complex and real industry problems. The presentation outlines the most common strategic and tactical airline problems and discusses some of the analytical approaches that can be used to tackle these problems. It explores multiple network-based models, and development of optimization and modeling techniques to support the decision making process for: air travel demand forecast, airline networks development, flexible fleet planning, robust airline operations schedule development, dynamic aircraft assignment and routing planning. A case study using real data for an airline based in Africa is also presented.