



# TRANSPORTATION SEMINAR SERIES

*Friday, November 30, 2007*

*4 - 5 p.m. in 240 Bechtel Engineering Center*

## **Michael O. Ball, Ph.D.**

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### **Trading Off Equity and Expected Throughput in Air Traffic Flow Management**

**Abstract:** A principal objective in most air traffic flow management initiatives is to minimize delay or to maximize throughput. Recently, there has been an increasing awareness of the importance of treating competing flight operators equitably. In many cases, equity maximization and throughput maximization can be in conflict, so multi-objective approaches must be taken. When one considers deterministic approaches to the problem of planning ground delay programs (GDPs), these two objectives do not appear to be in conflict. Specifically, there are many solutions that maximize throughput and one can find the alternate optimal (throughput maximizing) solution that maximizes an equity metric. On the other hand, when one explicitly considers weather uncertainty, it can be seen that maximizing expected throughput and maximizing equity metrics can be in conflict. In this paper, we investigate these issues on several levels. While ration-by-schedule is the agreed upon “standard” for equity maximization, we show that a similarly simple rationing scheme, ration-by-distance (RBD), in fact, maximizes expected throughput. In order to generate solutions that effectively trade off both equity and expected efficiency, we further propose “Equity-Based RBD”, (E-RBD) that employs the RBD principle while guaranteeing a certain level of equity. Computational experiments show that E-RBD can produce solutions that dominate solutions produced by the tools used in practice today in that sense that they have both better equity and better expected throughput. Joint work with R. Hoffman and A. Mukherjee.

**Bio:** Michael Ball is the Orkand Corporation Professor of Management Science in the Robert H. Smith School of Business at the University of Maryland. He also holds a joint appointment within the Institute for Systems Research (ISR) in the Clark School of Engineering. He is co-director of NEXTOR, the National Center of Excellence for Aviation Operations and is currently Vice President/President Elect of the INFORMS Transportation Science and Logistics Society. In 2004, he was named a Fellow of INFORMS. Dr. Ball received his PhD in Operations Research in 1977 from Cornell University. He is currently a Visiting Professor in ITS, Berkeley.

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