

Initial Validation of a Simulation System for Studying Interoperability in Future Air Traffic Management Systems

Robert Windhorst, Shannon Zelinski, Todd Lauderdale, Alexander Sadosky, Yung-Cheng Chu, James Phillips, Yun Zheng, Tung Nguyen, and Joseph D'Amore

NASA Ames Research Center

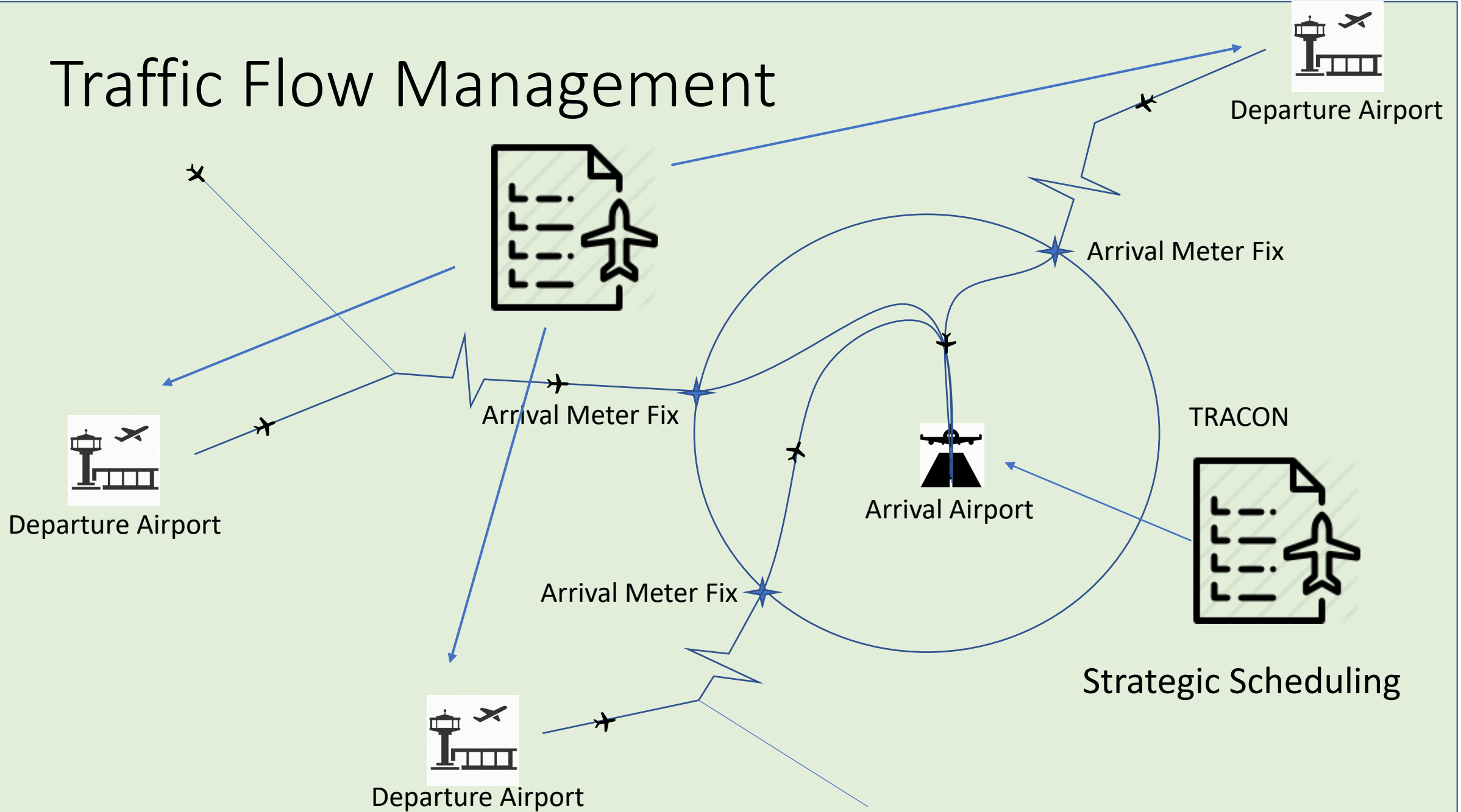
AIAA AVIATION Forum and Exposition, August 2-6, 2021

This material is a work of the U.S. Government and is not subject to copyright protection in the United States

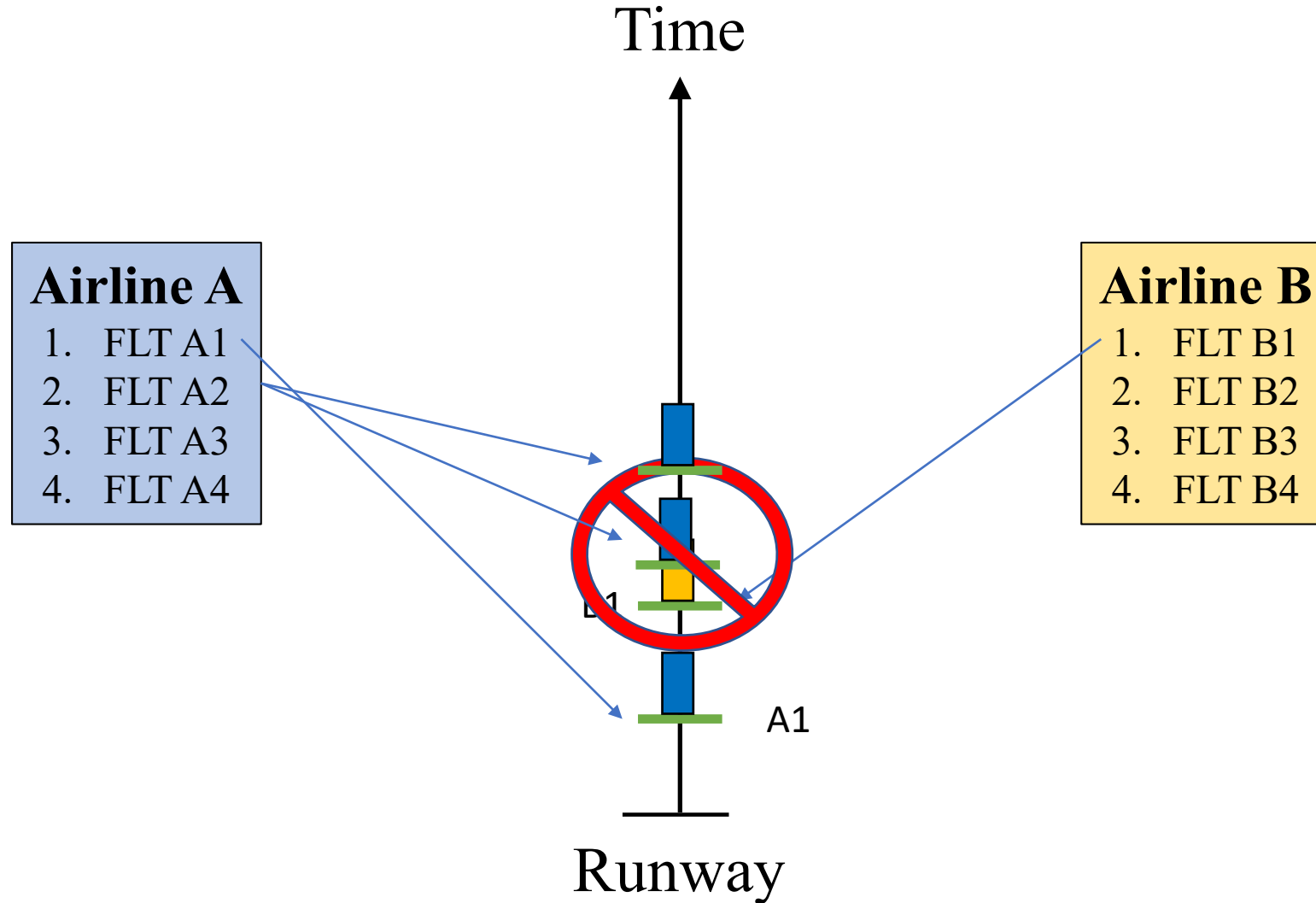
Motivation

- Government and industry are partnering to develop new approaches for transporting goods and people
- This is motivating research of autonomous air traffic management systems
- This research used fast-time simulation of an autonomous air traffic management system to study
 - Validating the simulation by studying runway capacity versus delay
 - Distributed approaches to planning flights while satisfying traffic flow management constraints

Traffic Flow Management



Strategic Runway Scheduling

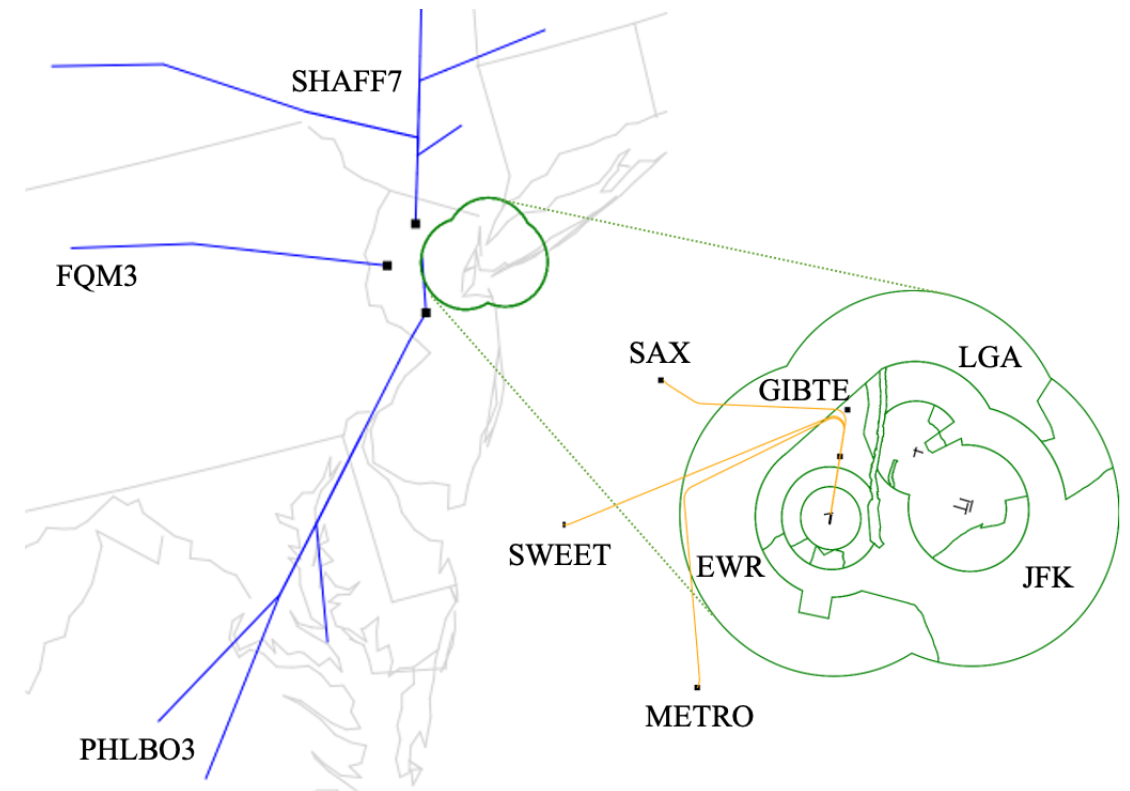


Simulate 54 Arrivals at Newark Liberty International Airport

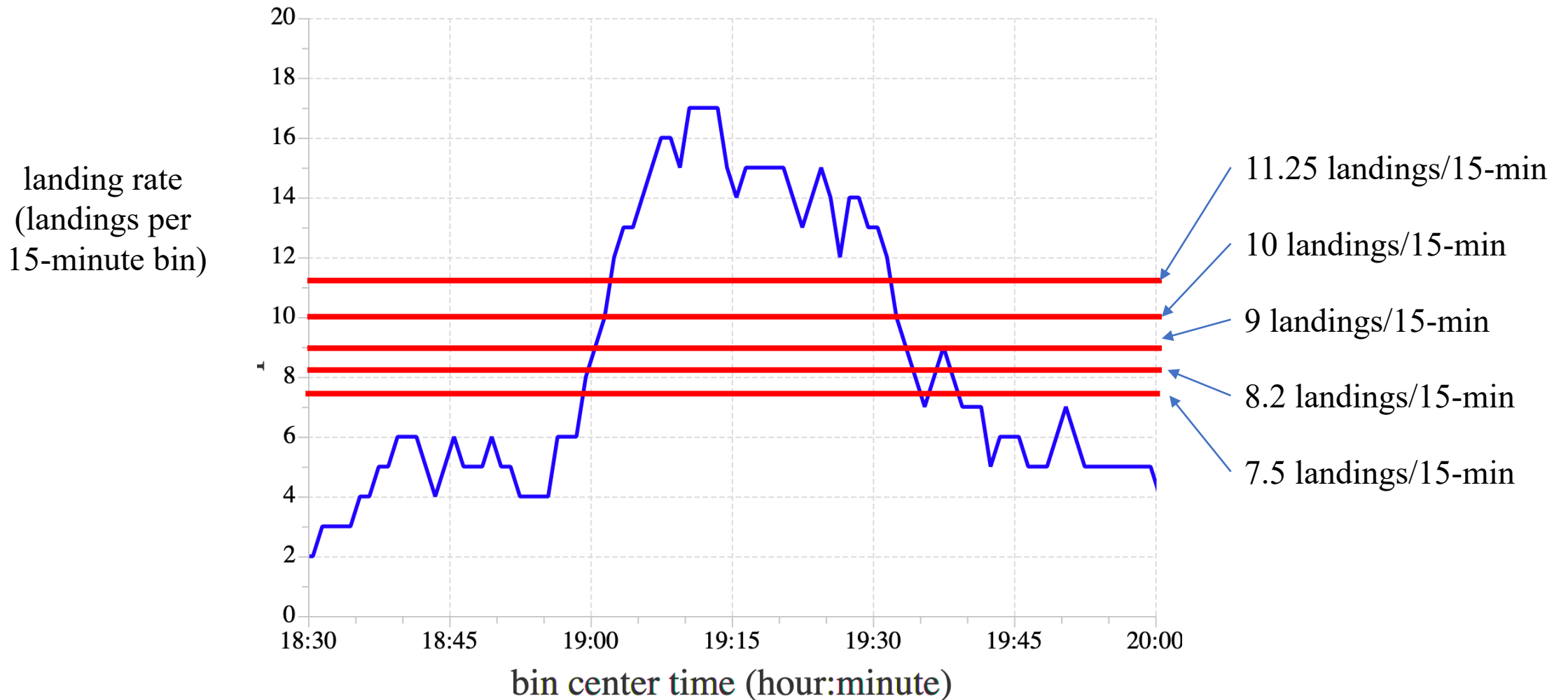
Routes Across the United States



Newark Arrival Routes and Airspace

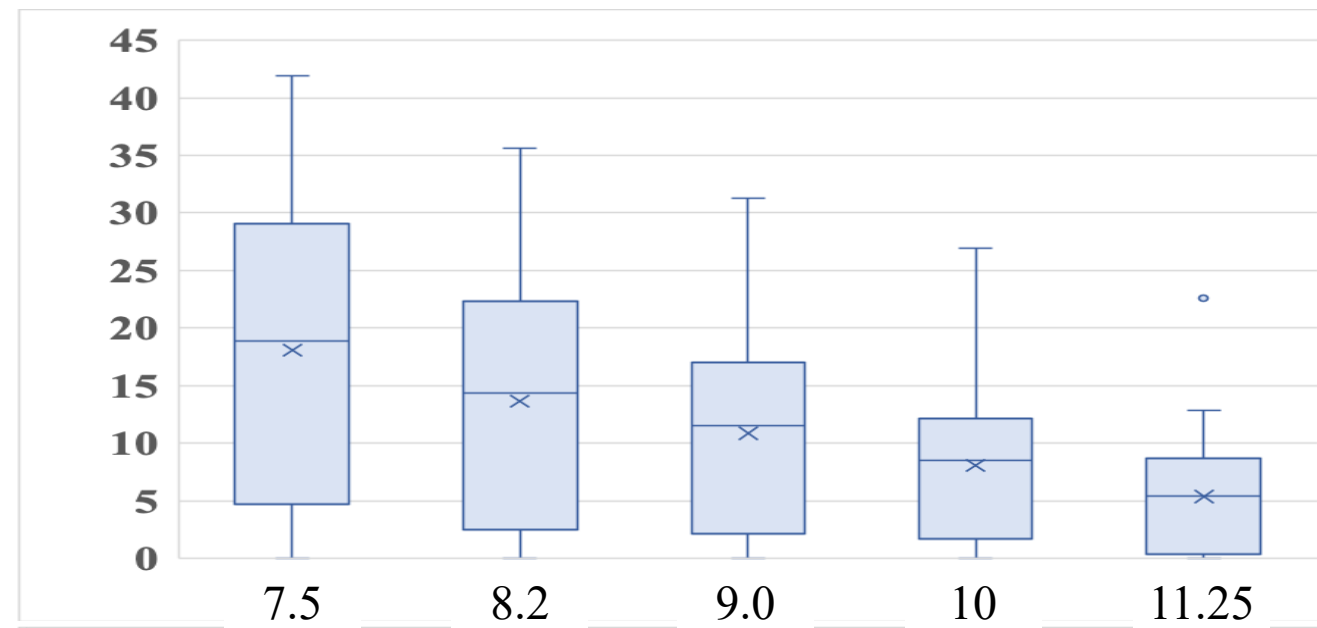


Adjusting Newark Liberty International Airport Landing Rate



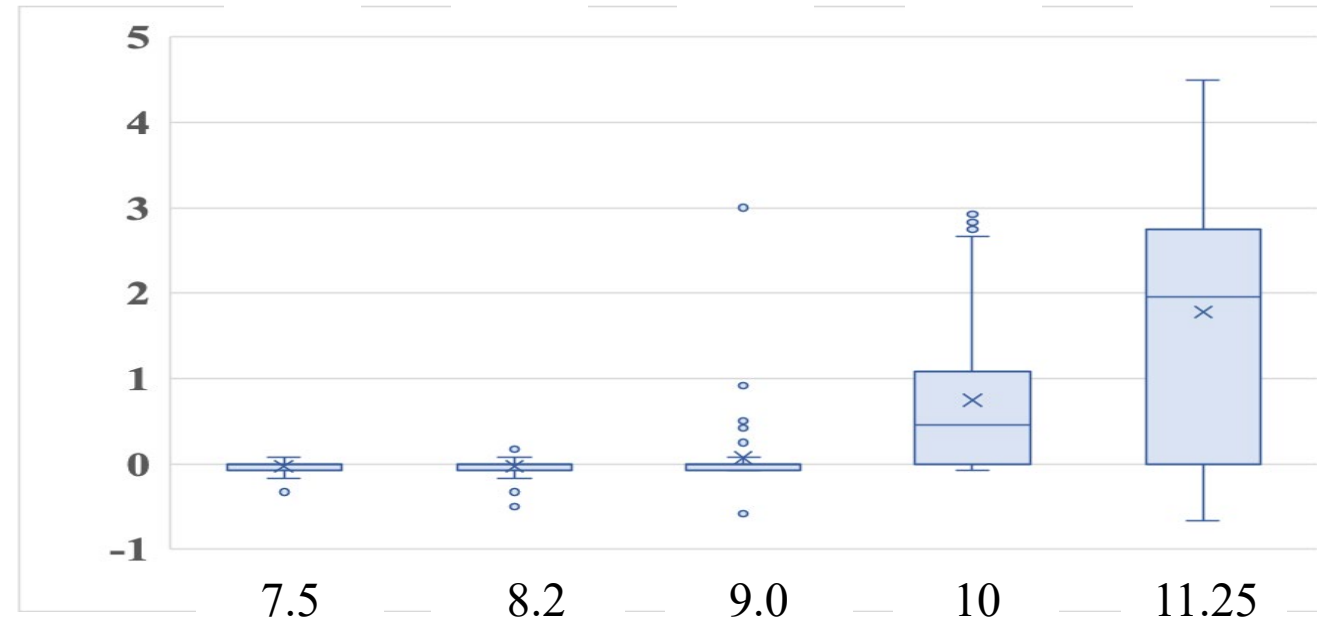
Results - Delay

Minutes



Departure Delay

Minutes



Airborne Delay

Landing Rate Limit (landings/15-minute bin)

Summary

- Composed a simulation system for studying distributed flight planning and autonomy in future air traffic management systems
- Conducted simulations of 54 flights arriving at Newark Liberty International Airport
- Showed that the simulation was able to correctly capture trends in departure and airborne delay