Assessing Tactical Scheduler Options for Time-Based Surface Metering

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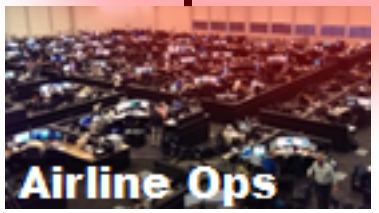
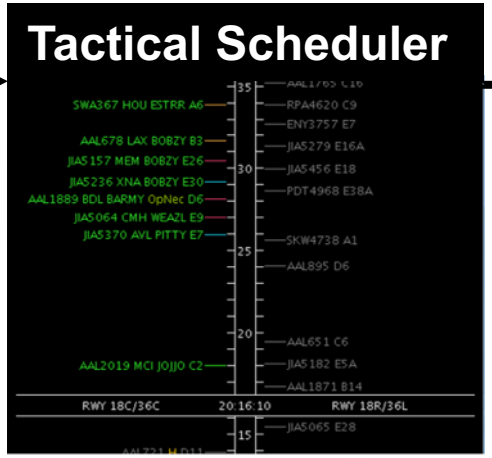
Time-Based Surface Metering



earliest pushback times

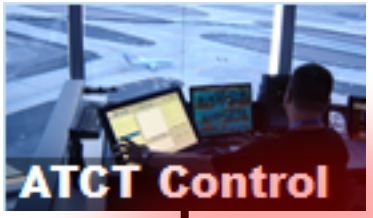


target pushback times

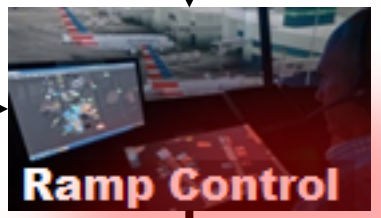
hold advisories

- Improve efficiency
- Improve predictability

UNCERTAINTY



taxi and departure clearances



ready for pushback

pushback clearance

ATD-2 Parallel Efforts

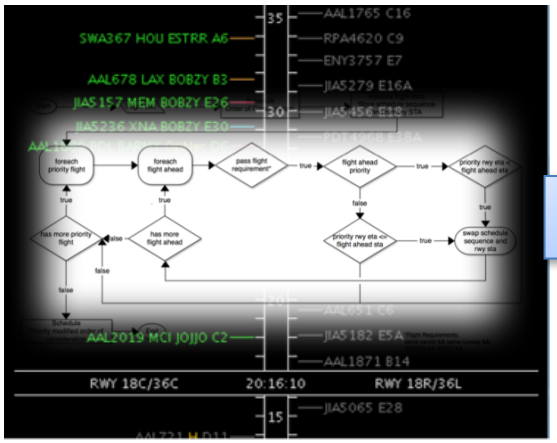
- Field Demonstration
  - Demonstrate viability of ATD-2 tools in the real operating environment
- Human-In-The-Loop simulation
  - Develop/test human factors interfaces and procedures
- Fast-time simulation
  - Extrapolate field results
  - Refine scheduler for future phases of field demonstration
  - Easily adapt concepts to other airports

Objective

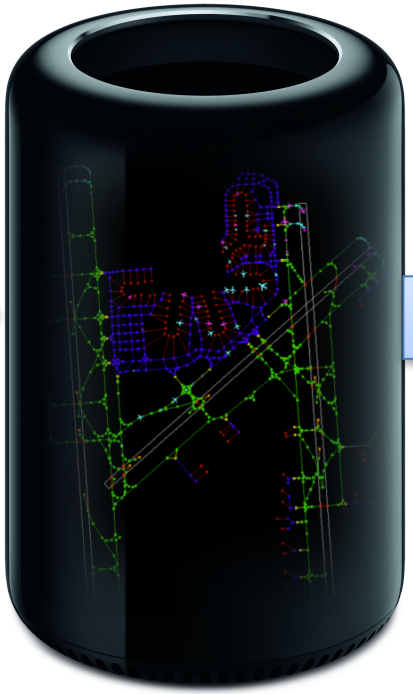
- **Benchmark evaluation of the ATD-2 tactical scheduler in fast-time simulation**
- **Parametric analysis of taxi time delay buffer mitigation of surface congestion uncertainty**

Outline

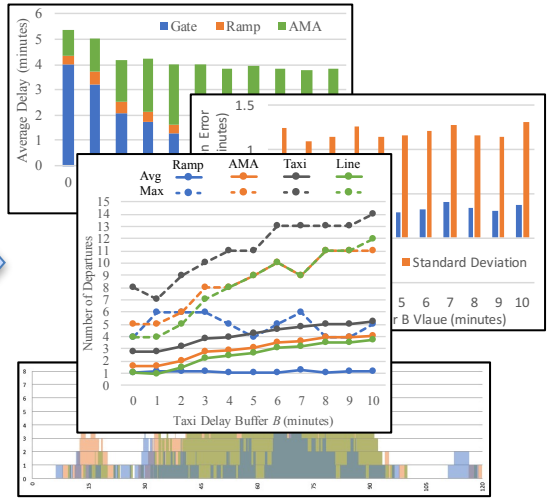
Tactical Scheduler



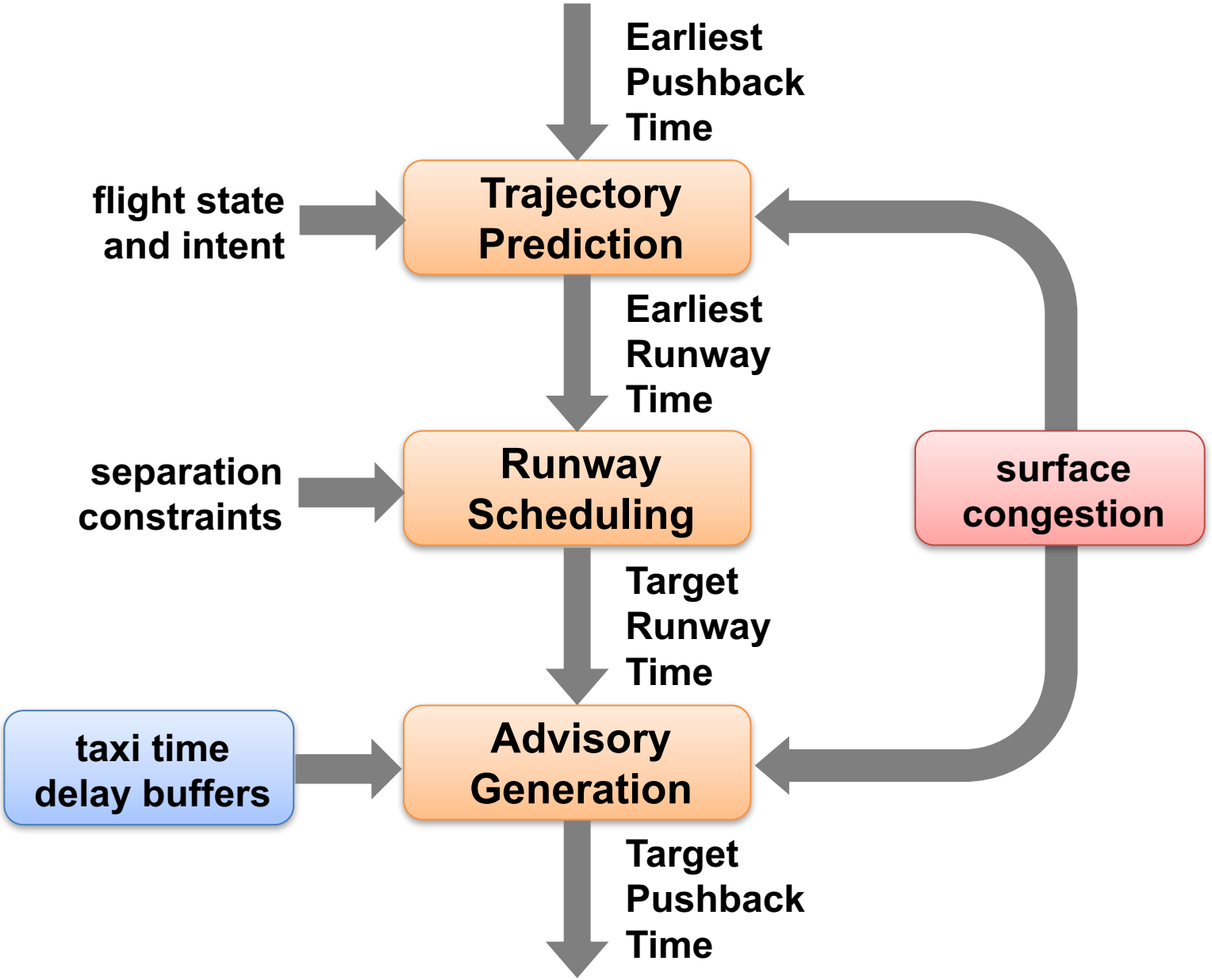
Fast-Time Simulation



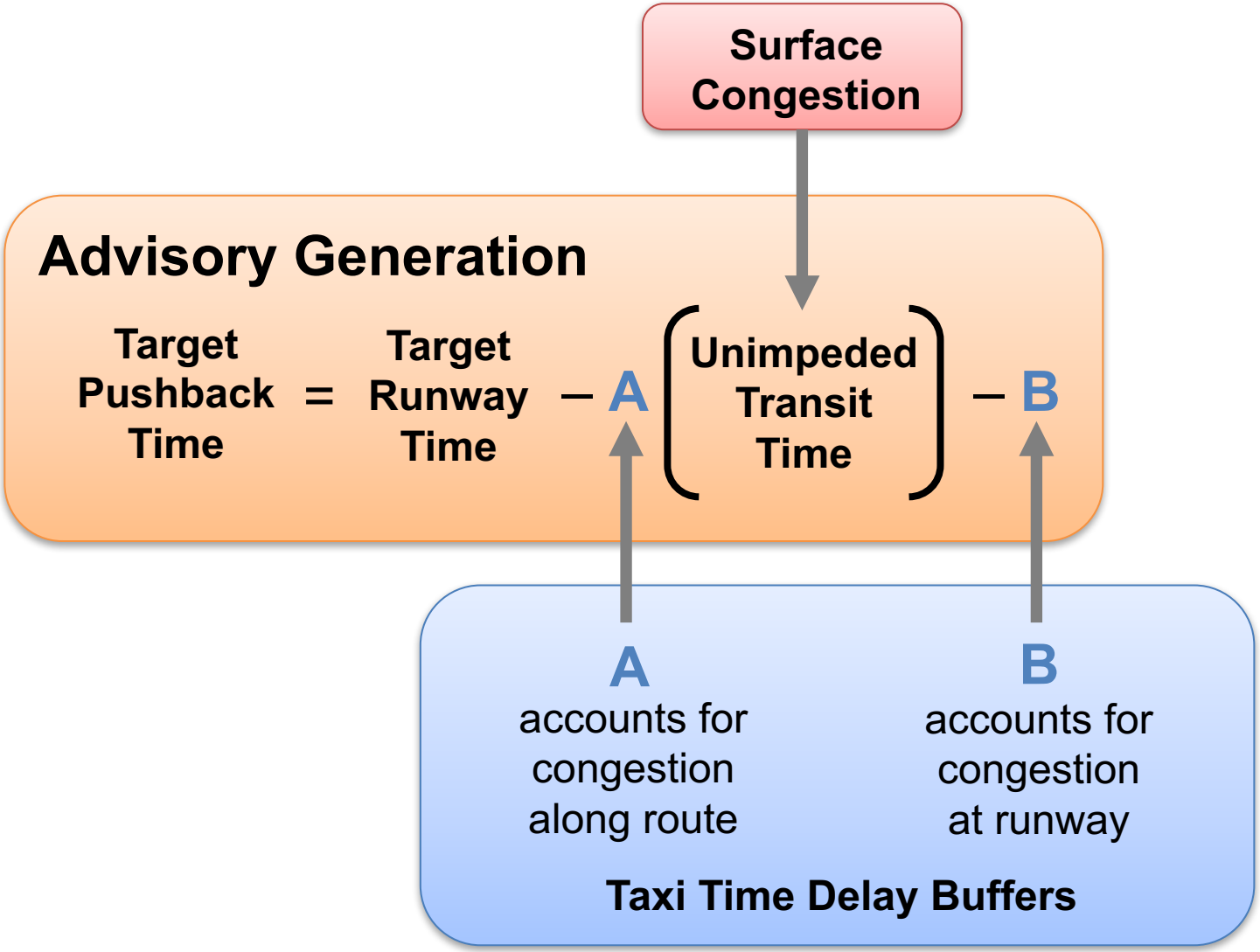
Evaluation Results



Tactical Scheduler



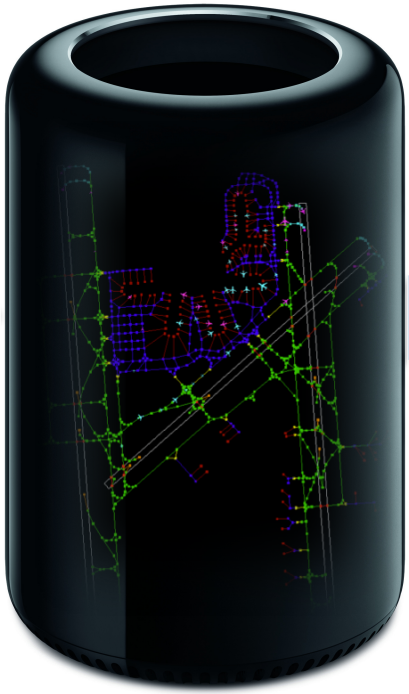
Advisory Generation



Outline

Tactical Scheduler

Fast-Time Simulation



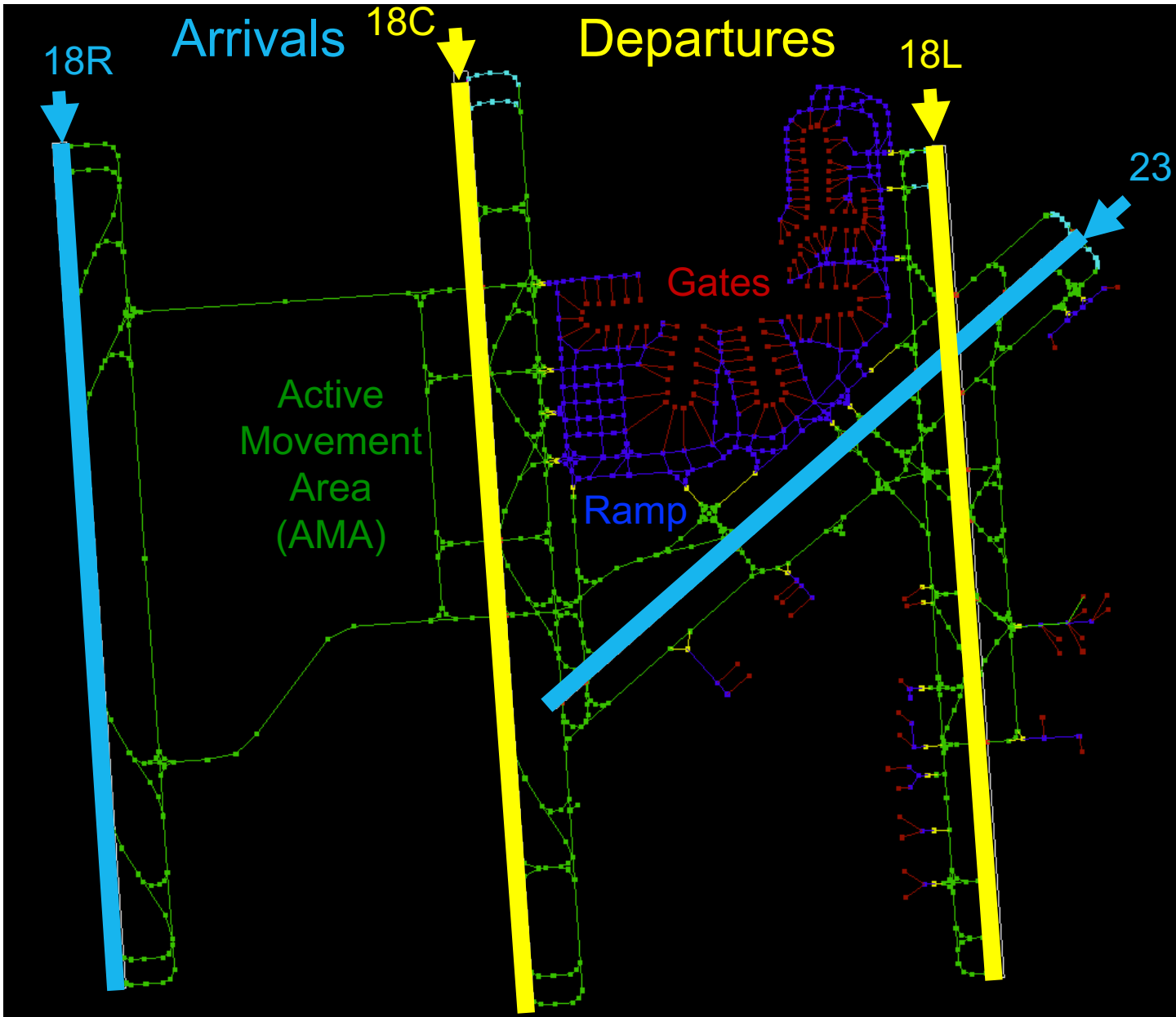
Evaluation Results

Fast-Time Simulation

Surface Operations Scheduler & Simulator (SOSS)

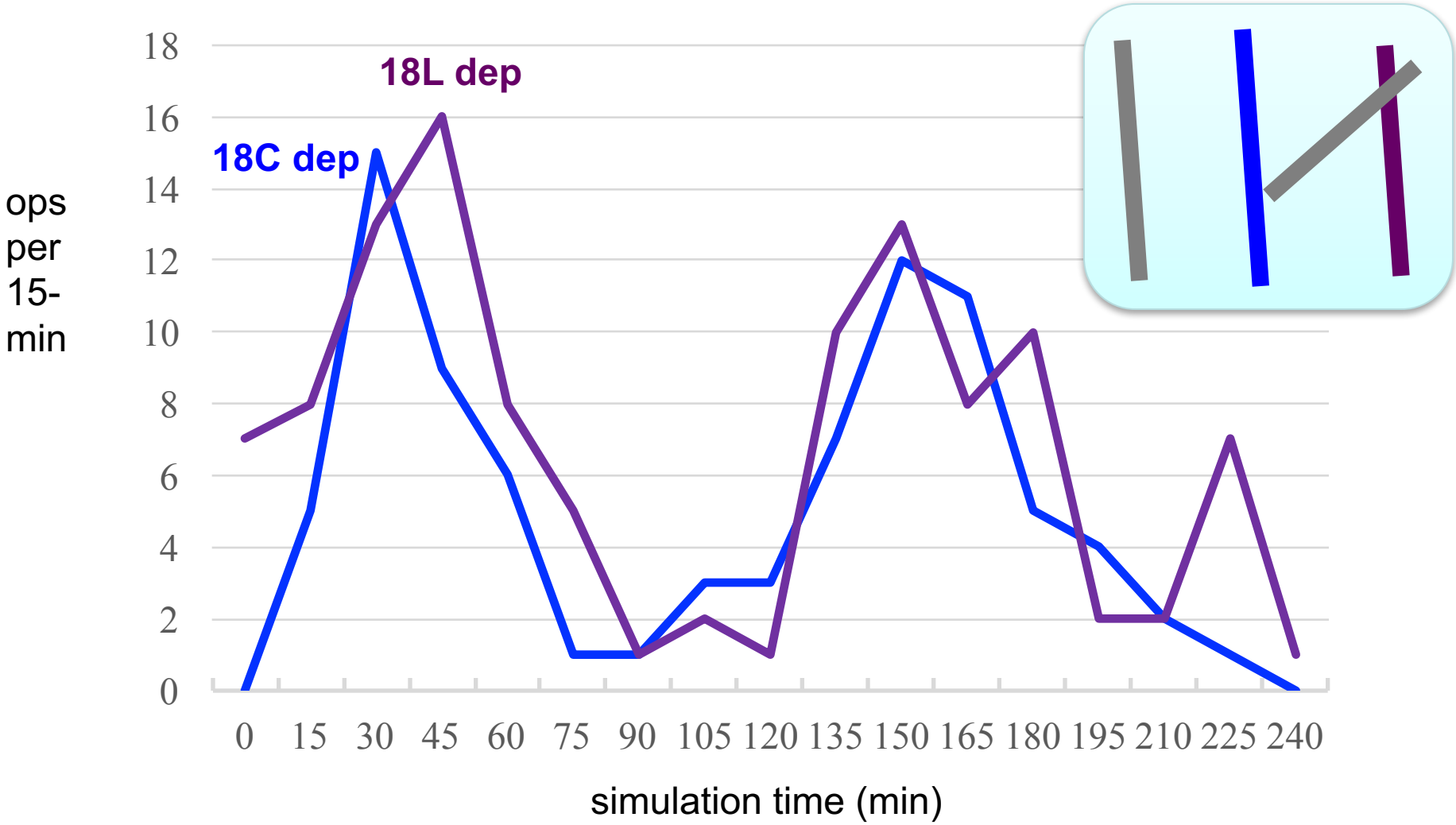
Charlotte Douglas International (CLT)

South flow configuration



Traffic Scenario

4 hours from 3/11/2016, high demand, low weather impact



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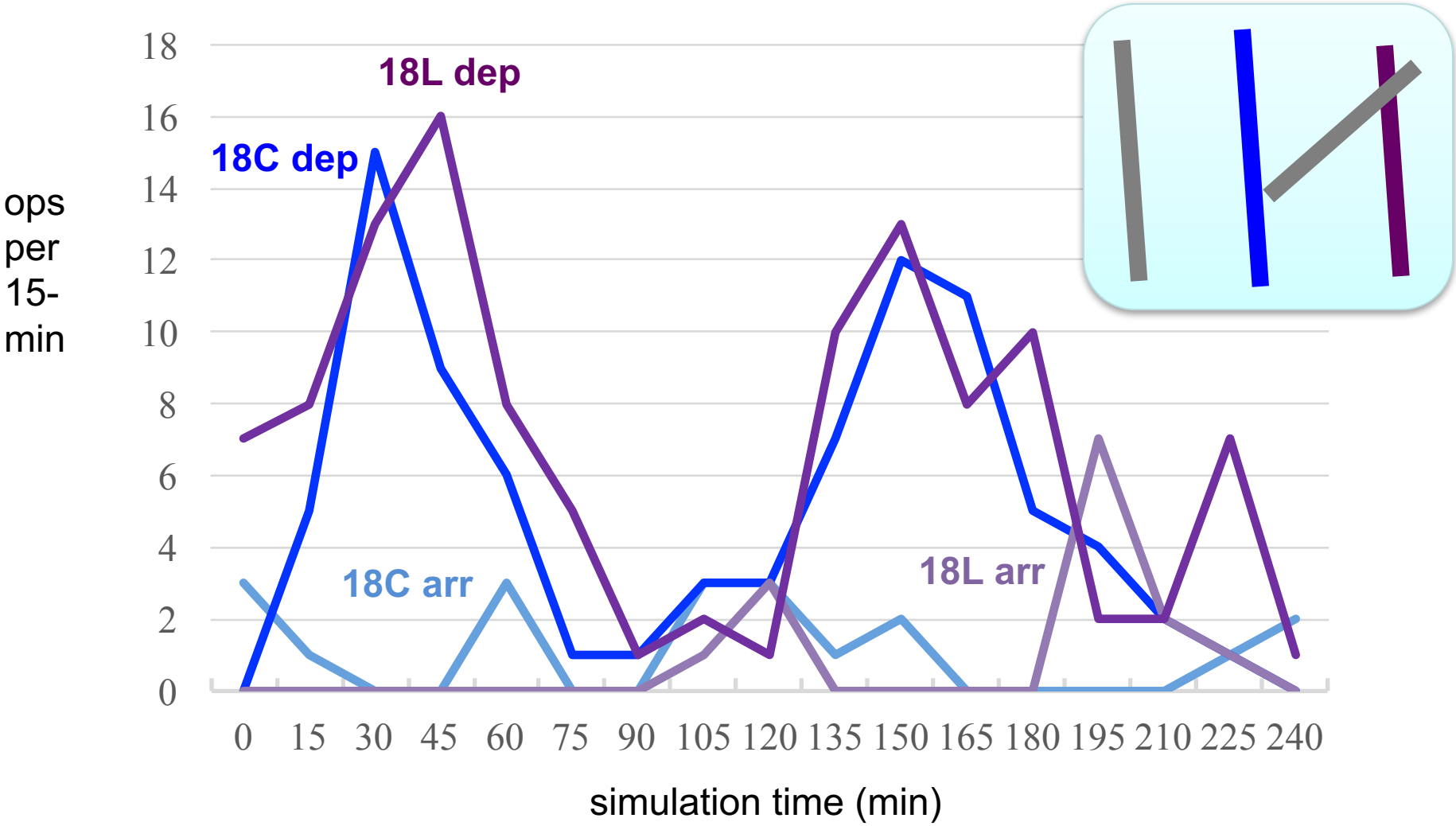

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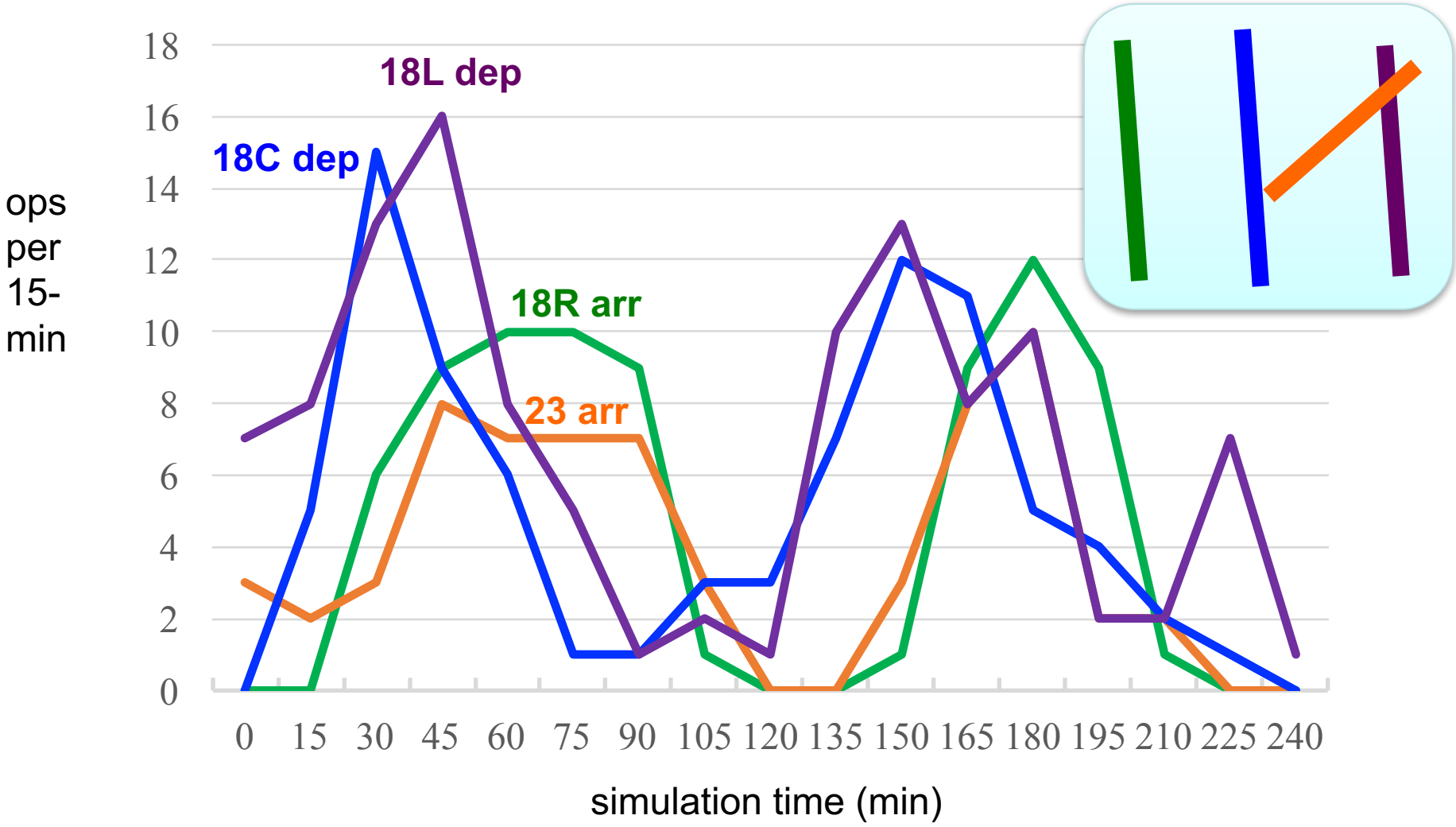
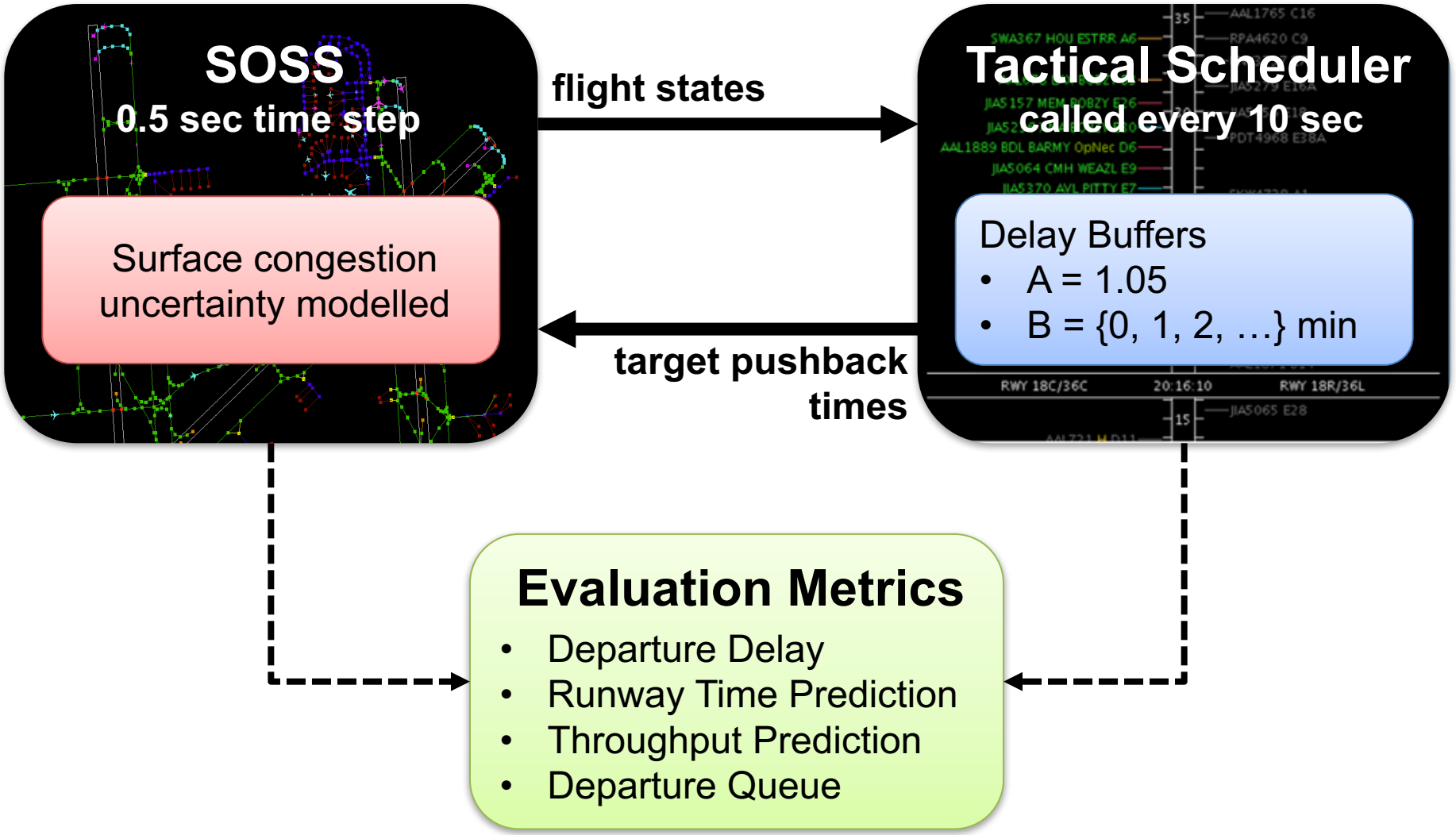
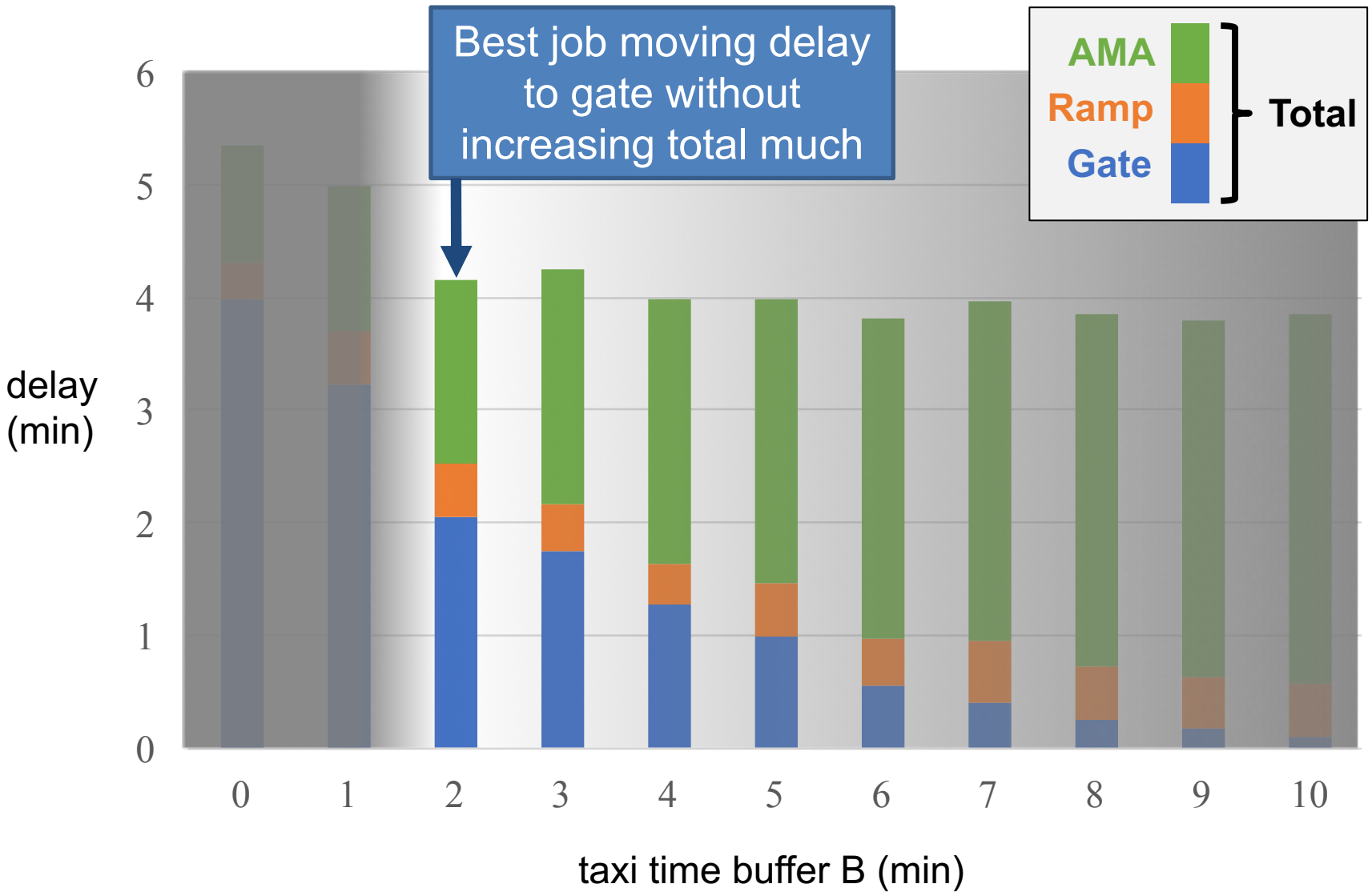


Simulation Parameters and Variables



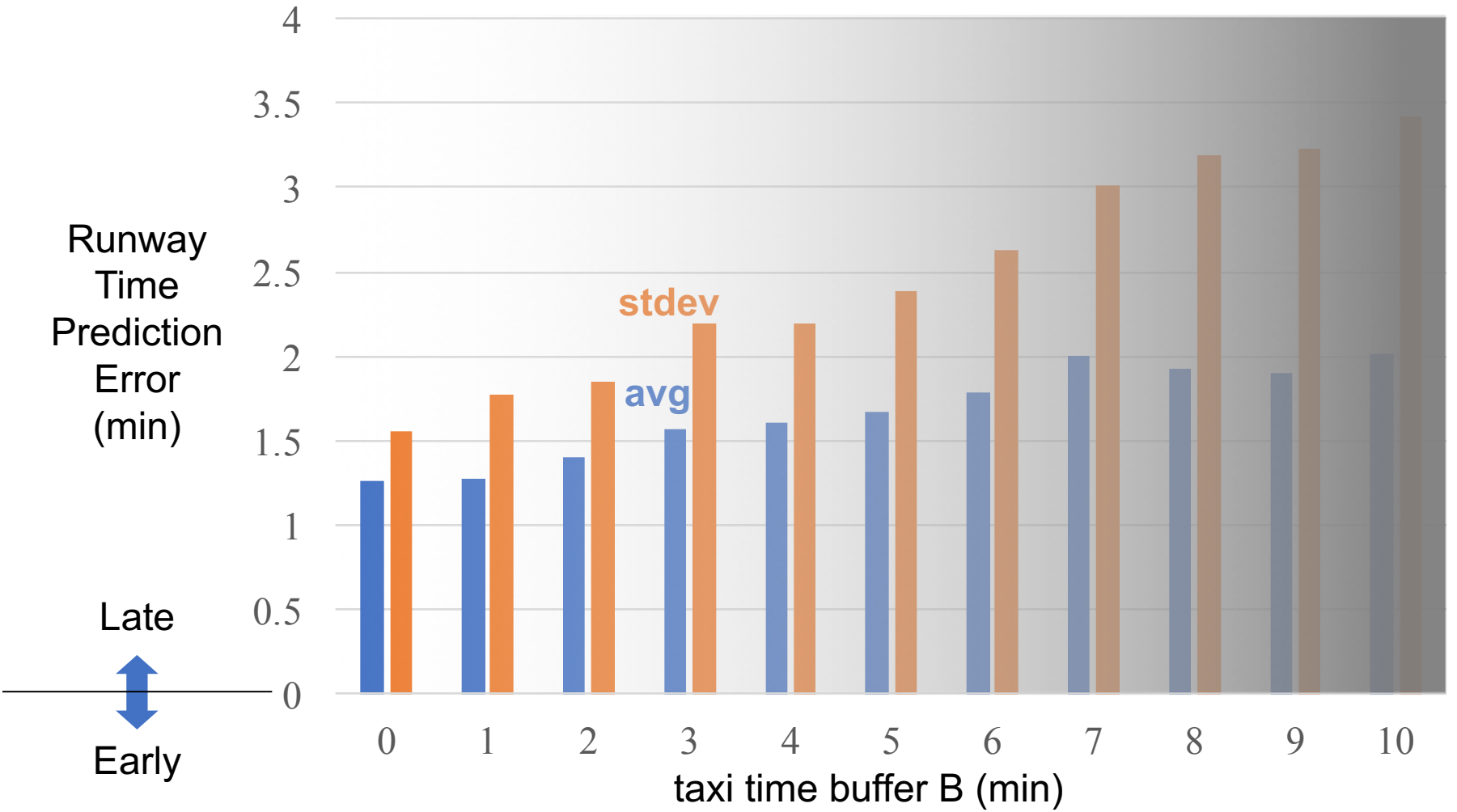
Departure Delay Results



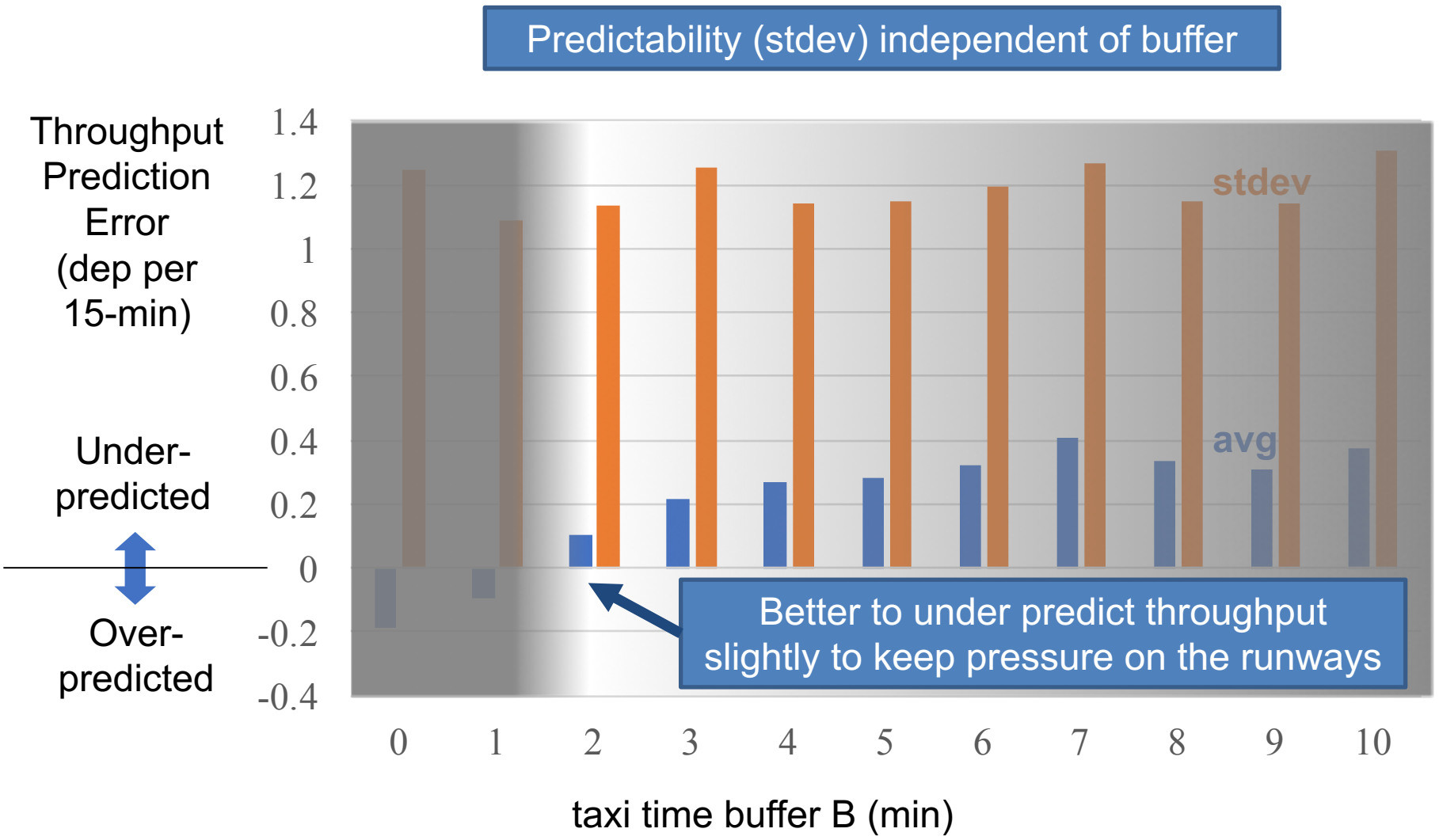
Runway Time Prediction Results

Departures are late on average

Predictability (stdev) worsens quickly as taxi time buffer is increased



Throughput Prediction Results

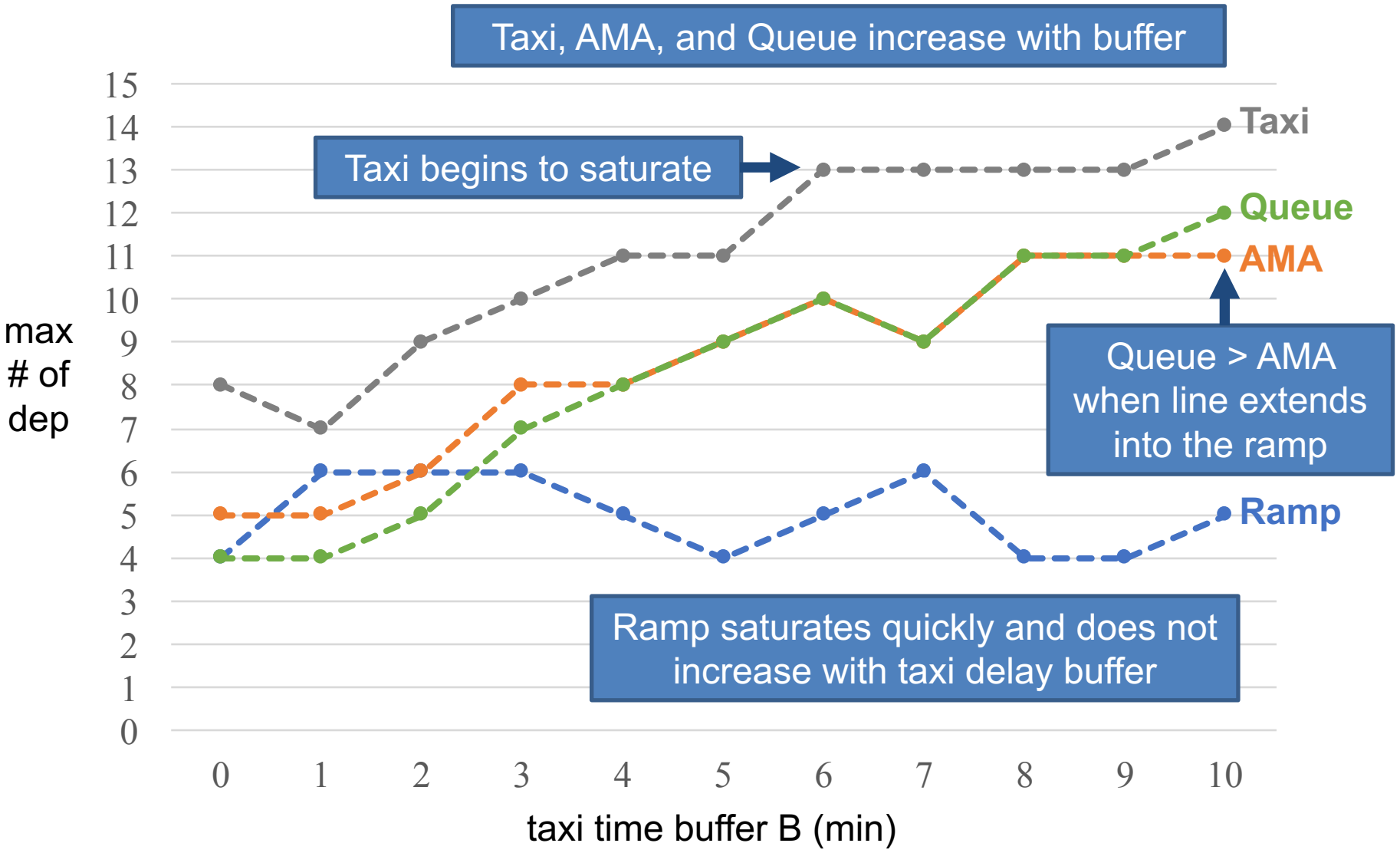


Departure Queue

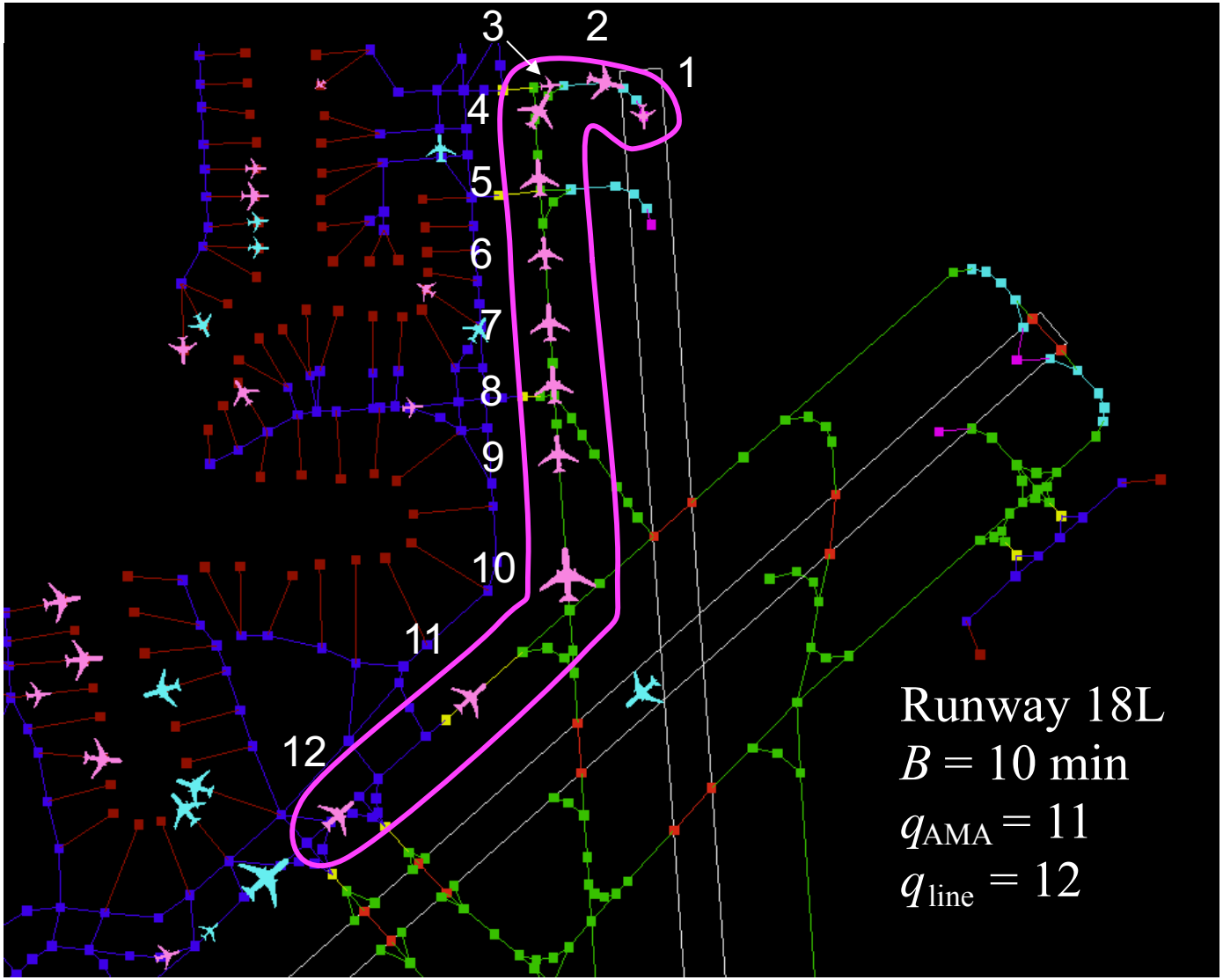
Departure queues	Number of departures:
Ramp	In ramp
AMA	In Active Movement Area (AMA)
Taxi = Ramp + AMA	In ramp and AMA
Queue	in line from runway within 200m of each other

Departure Queue Results

Maximum queue lengths for 18L (0-120 min)



Maximum Queue Length Example



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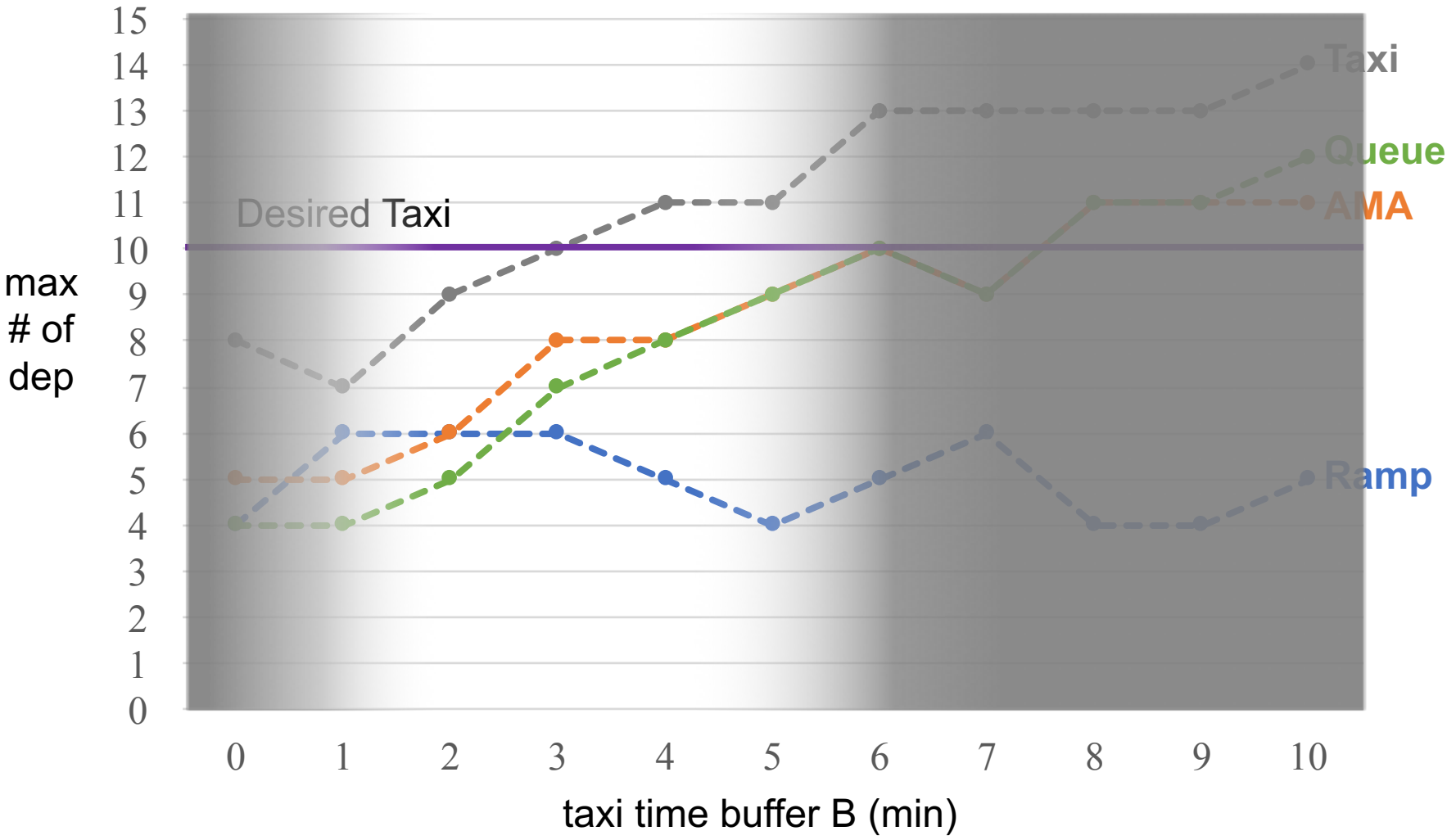

Summary and Conclusion

Departure Delay	Move as much delay to gate without increasing total
Runway Time Prediction	Keep buffers small for better predictability
Throughput Prediction	Under-predict slightly to maintain pressure on runways
Departure Queue	Avoid saturating the Taxi and AMA queues

Buffer B

0 1 2 3 4 5 6 7 8 9 10

Recommend buffers between 2 and 5 minutes for future simulations

Future Work

- Add other uncertainties
- Add traffic management initiatives
- Add airline priority

Questions

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