

Automated Bus Testing at the Port Authority of NY & NJ: Lincoln Tunnel Exclusive Bus Lane (XBL) Project

Florida Automated Vehicle Summit

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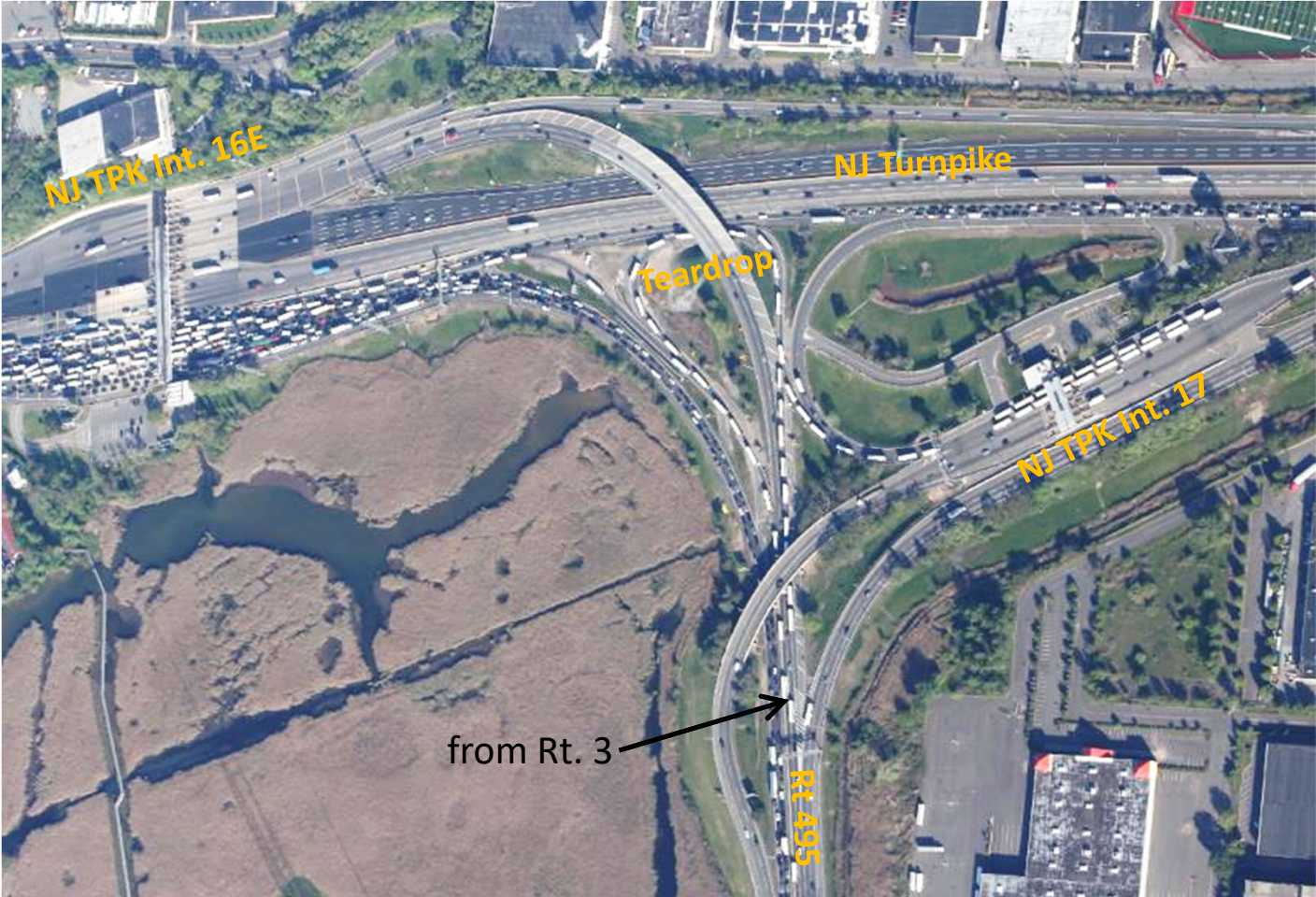
**LT XBL Connected
Automated Bus
Proof of Concept
Demonstration**



Lincoln Tunnel Exclusive Bus Lane (XBL)



XBL Teardrop

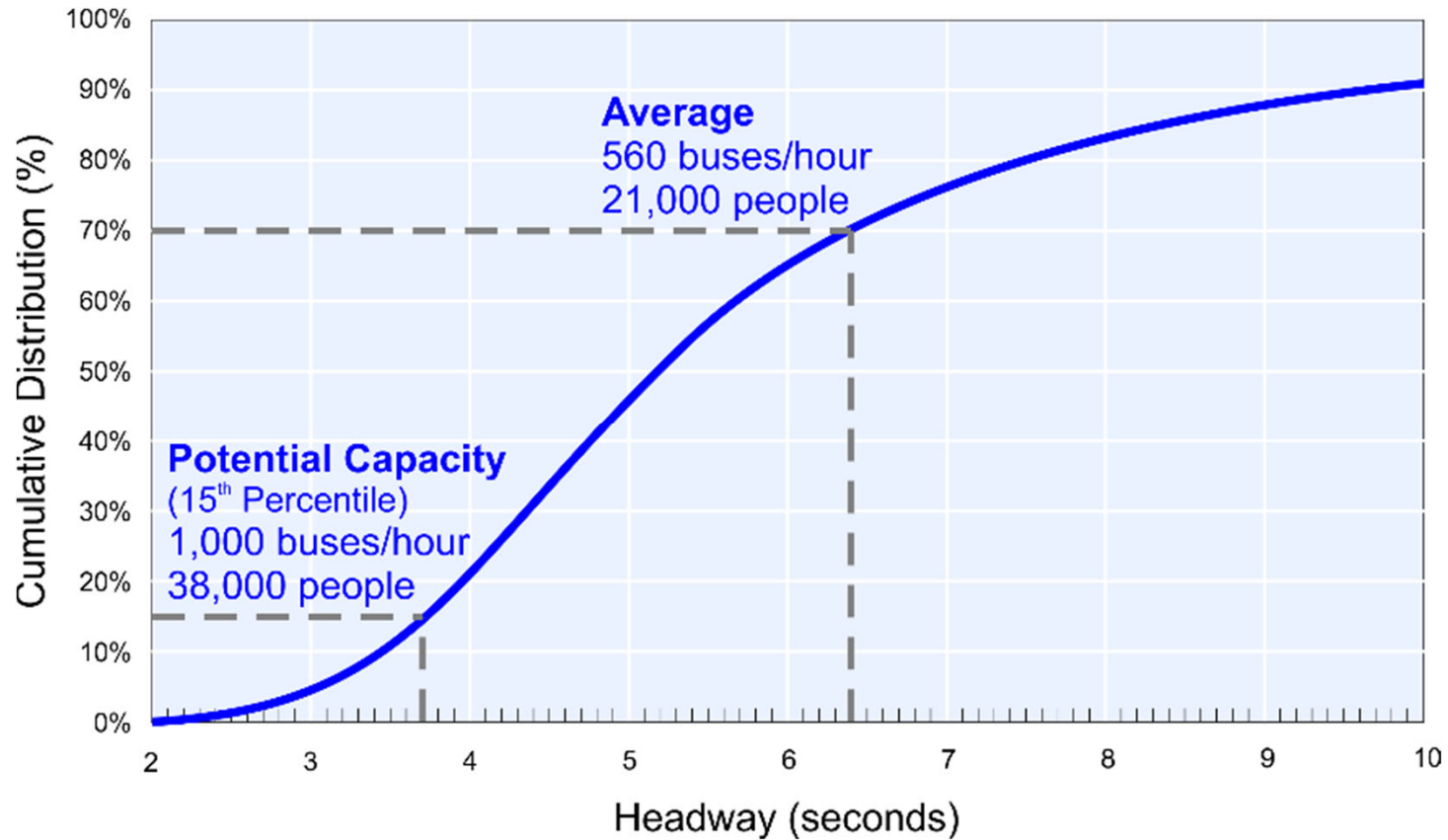


Factors Affecting Travel Time Reliability and Throughput

- Speed Differential
- XBL Delineator Hits
- Crashes
- Mechanical Failures
- Weather
- Security Incidents
- Sick Passengers

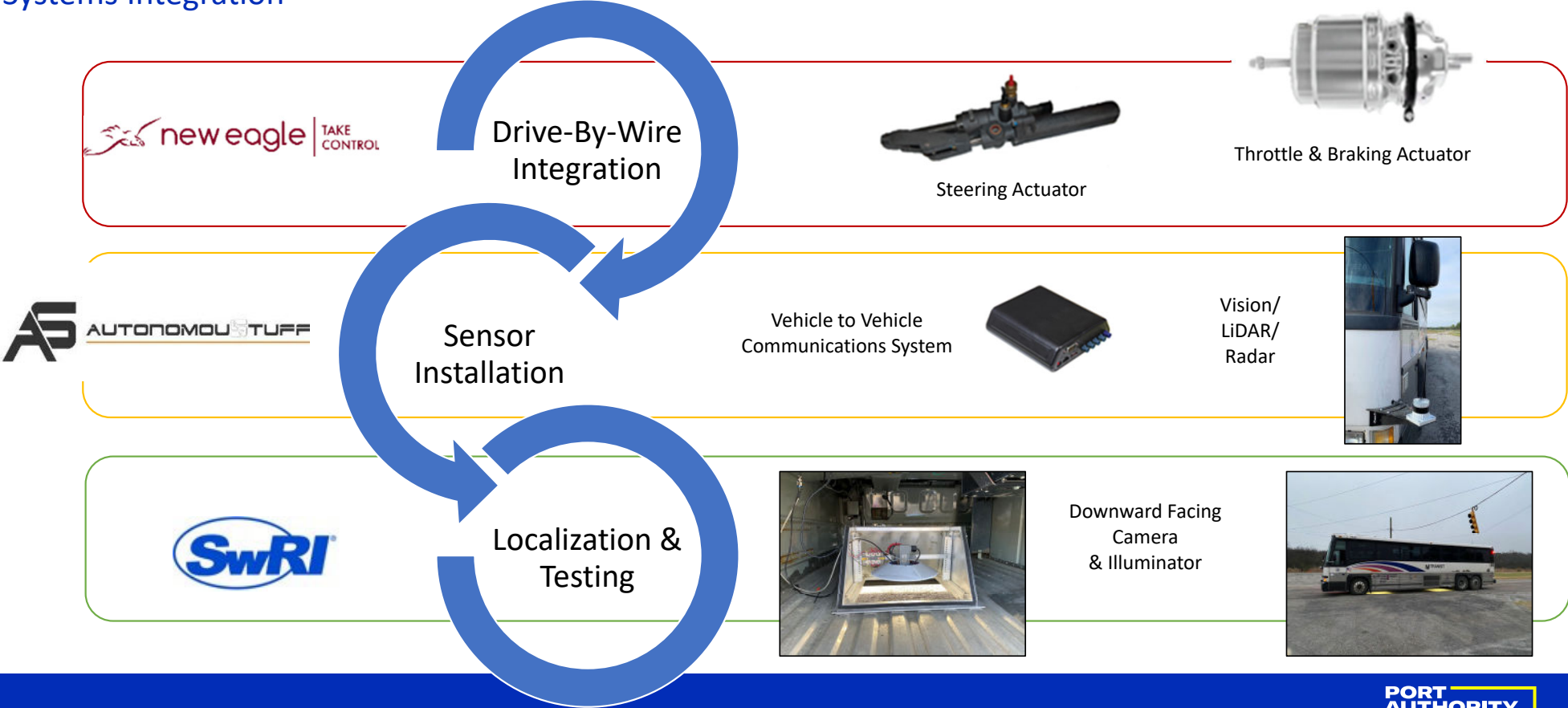


Observed Distribution of Headways in XBL



Technology Overview




Systems Integration



Devices



XBL Driver-Assist Applications and Benefits

Technology Application	Benefits		
	Safety	Throughput	Operational
 Forward Collision Warning Lane Keeping	✓	✓	✓
 Adaptive Cruise Control Automatic Emergency Braking	✓	✓	✓
 Platooning Automated Merging	✓	✓	✓

XBL Proof of Concept Demonstration Activities

- Driver Training w/NJ TRANSIT Driver Instructors at Port Newark (July 6-8, 2022)
- Route Mapping and Calibration on XBL (July 10-11, 2022)
- XBL In-Lane Testing (July 16-17, 2022)
- XBL Proof of Concept Demonstration (July 23-24, 2022)
 - Lane Keeping, Emergency Braking, Speed Harmonization
 - Automated Merging (3 Vehicle Merge at the Lincoln Tunnel Teardrop)
 - Platooning (Automated loops from the Teardrop to the Toll Plaza)

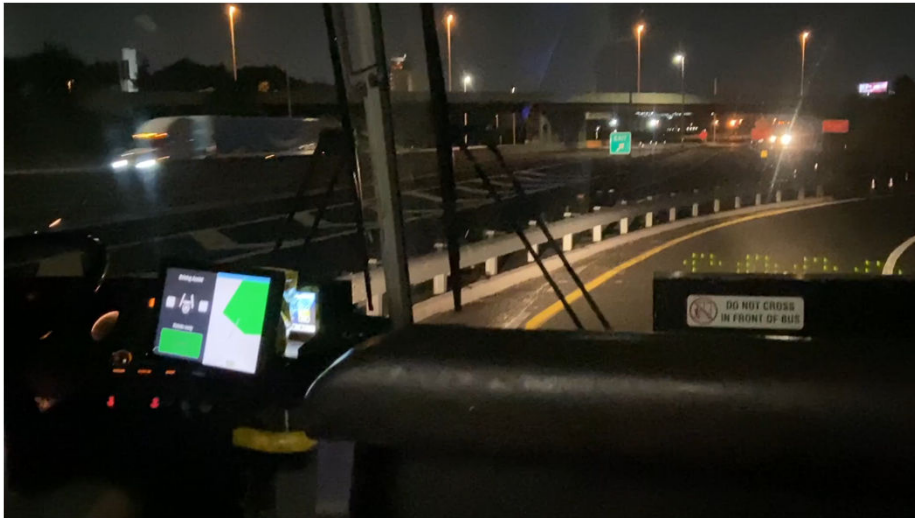
Demonstration Videos

3 Vehicle Merge, Platooning



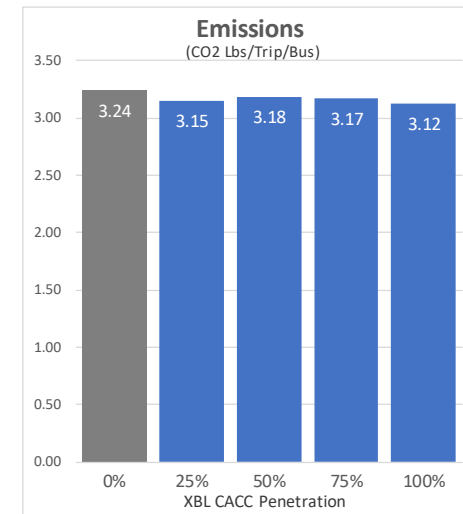
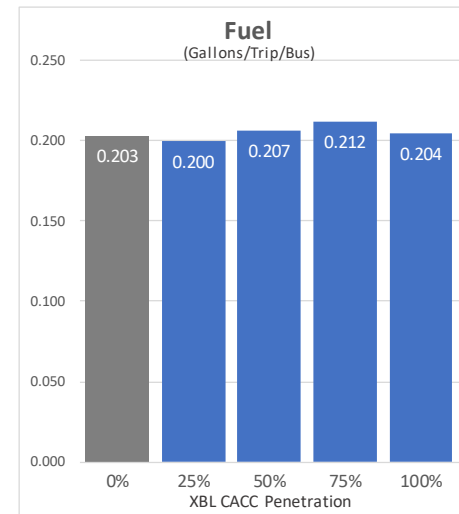
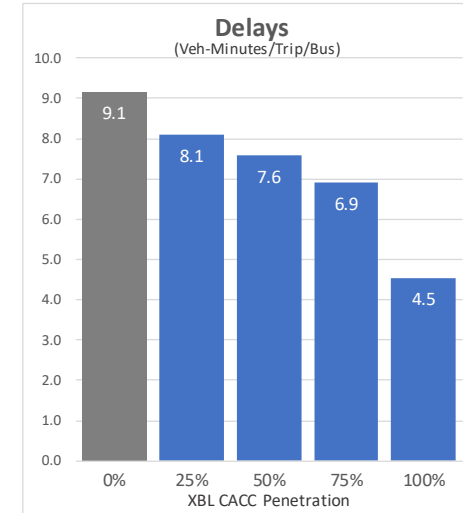
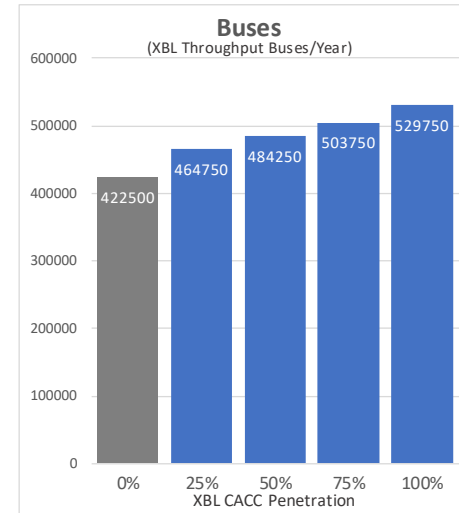
Driver's Perspective

3 Vehicle Merge, Platooning



Simulation Modeling

		XBL Throughput (Buses)	Passengers	Average Headways (sec.)
	Existing Observed Capacity (2019)	650	20,150	5.5
Proof-of-Concept Simulation Modeled at 2 Second Gap, 2040 Forecast Demand	25% - ADAS Equipped Buses	715	22,165	5.0
	50% - ADAS Equipped Buses	745	23,095	4.8
	75% - ADAS Equipped Buses	775	24,025	4.6
	100% - ADAS Equipped Buses	815	25,265	4.4
	2040 Forecast Demand	840	26,040	



Next Steps

- Continue to evaluate and plan for CAV technology on the XBL
 - Determine desired technology applications
 - Align with fleet lifecycles and new procurements
 - Evaluate optimal deployment scenario
 - Investigate funding opportunities
- Ensure technology to support future Connected Automated buses is incorporated into planned capital projects

Thank You!

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