Policy Primer

POLICY BRIEF

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AI Powered Dynamic Pricing Pilot for Public Transit to Reduce Traffic Congestion

The Office of Artificial Intelligence Policy (OAIP) should partner with the State of Utah's transportation agencies to pilot an AI driven transit pricing system to ease traffic congestion in Salt Lake City.

EXECUTIVE SUMMARY

The Office of Artificial Intelligence Policy (OAIP) should partner with the Utah Department of Transportation (UDOT) and the Utah Transportation Authority (UTA) to pilot an AI driven dynamic pricing and optimization system for public transit to reduce traffic congestion in the Salt Lake City metropolitan area. By integrating historical and real-time commuter data with predictive analytics, an AI powered system would forecast peak congestion periods and optimize public transit routes and schedules for Salt Lake City commuters. Dynamic fare pricing could incentivize commuters to shift to public transit during congested hours or highly polluted days, reducing the number of drivers on the road. Over time, this approach could reduce traffic as well as enhance public transit efficiency, reduce emissions, and improve commuter satisfaction.

BACKGROUND

Traffic congestion in the Salt Lake City metropolitan area contributes to prolonged commute times, elevated emissions, and deteriorating urban air quality. Although public transit options such as UTA buses, TRAX light rail, and FrontRunner commuter rail are available, ridership is still too low to alleviate road congestion. Static schedules, routes, and pricing models limit public transit's ability to respond to dynamic peak demand or varied commuter preferences.

Utah has already taken steps to reduce traffic congestion, such as adopting cutting-edge traffic analytics and intelligent transportation systems. For example, UDOT uses predictive AI software and light detection and ranging (LiDAR) to analyze vehicle movement patterns and prioritize transit at intersections using edge computing devices.

While new technologies like LiDAR and edge devices are being introduced, they have not yet been deployed citywide, nor are they fully leveraged for dynamic fare or routing decisions. In addition, data fragmentation across agencies limits the effectiveness of AI tools; existing systems would benefit from data sharing across UDOT, UTA, and city systems, further enriching predictions and insights. Commuter behavior also remains a challenge—despite improvements to public transit services, many commuters still prefer private vehicles because of the convenience and cost. Finally, real-time data utilization and dynamic pricing models remain underdeveloped in Salt Lake City, leaving much of the AI potential untapped.

Emerging technologies—including AI, predictive analytics, and dynamic pricing—have helped overcome these obstacles in other cities, leading to reduced traffic congestion and more optimized transit operations. In New York City, the Congestion Relief Zone program reduced the number of commuting vehicles by more than 219,000 in the first week and increased travel speeds by 30% to 40%. San Francisco's SF*park* pilot uses real-time data to manage parking demand, reducing the traffic caused by drivers searching for parking by 50%. While New York City's congestion relief program is punitive and San Francisco's solution focuses on parking-related traffic, dynamic pricing and real-time data could be applied to reduce traffic congestion in Salt Lake City. UTA saw notable growth in ridership in 2024, particularly for UTA On Demand (+36.8%) and FrontRunner (+6.8%) services. Continued investments in new transit stops across Salt Lake City could help expand commuter options and reduce road dependency. These initiatives have achieved measurable success in improving travel times and encouraging public transit use. With support from OAIP, Utah could harness AI-powered transit solutions in the Salt Lake City metro area to predict traffic trends, reduce congestion, and deliver a commuter-first transit system.

RECOMMENDATIONS

OAIP should partner with UDOT and UTA to leverage existing data systems and enable new AI optimization to pilot public transit improvements across the Salt Lake City metro area. This partnership could use AI to analyze live vehicular movements tracked by existing equipment, supplemented by historical public transit data via the UTA Data Portal. This pilot would align with the broader goals of environmental sustainability, smart cities, and equitable infrastructure access (building on SB 149 and existing infrastructure).

The proposed system would integrate historical commuter data with real-time traffic, ridership, and environmental condition data to dynamically adjust public transit fares. The system would be designed to predict and incentivize optimal ridership patterns, particularly during peak congestion hours, high-occupancy periods, city events, and environmentally vulnerable days (e.g., when there are elevated smog levels).

By offering real-time fare reductions or incentives during these periods, the model would encourage more commuters to choose public transit, alleviating traffic burdens across key corridors. This would, in turn, reduce emissions and enhance service reliability. Over time, as more real-time data are collected and analyzed, the AI system would continually refine fare adjustments and optimize route capacity, making public transit a more attractive, efficient, and financially sustainable model that responds to the needs of Utah's commuters and aligns with environmental goals.

> *"This pilot presents a cost-effective, privacy-focused initiative that would avoid the need for new data collection and maximize the use of existing infrastructure."*

This pilot presents a cost-effective, privacy-focused initiative that would avoid the need for new data collection and maximize the use of existing infrastructure. The proposed pilot program offers several benefits:

- **Low-risk, privacy first pilot:** Unlike many high tech mobility solutions that rely on extensive new data collection, raising privacy concerns and implementation issues, this model would leverage existing infrastructure and anonymized historical public transit and real-time traffic data collected by UDOT and UTA, making it both minimally invasive and highly efficient.
- **Quick and cost-effective to deploy:** The AI powered analytics tool—the only new component—would be designed to process real-time traffic, ridership, and environmental data to dynamically adjust fare pricing. This pilot could be quickly deployed with minimal upfront investment by leveraging SB 149 funds and OAIP grants, and cost-sharing with UTA and UDOT.
- **Maximization of existing transit resources:** This pilot could improve ridership and efficiency without the cost or time associated with expanding physical infrastructure to address traffic congestion. This targeted intervention would guide commuter behavior without needing physical expansion of transit systems.
- **Adaptable and scalable:** A successful pilot in Salt Lake City would offer a replicable, low-cost model for other growing regions in Utah, such as Provo, Ogden, or Logan, helping to scale solutions equitably. By first deploying the model on a limited route in the Salt Lake City metro area, agencies could observe real-world commuter responses to dynamic pricing and optimize the system accordingly. These insights would offer a proof of concept for broader applications across other regions.
- **Support for environmental goals:** The system would encourage commuters to shift from private vehicles to public transit on high-emission days, aligning with Utah's clean air and smart city initiatives. Additionally, by offering dynamic fare reductions during high-smog periods, the system would incentivize travel behavior that reduces emissions and gridlock, supporting the state's environmental goals.

- **Real-time, actionable insights:** As more data are analyzed, the system would become increasingly more accurate and responsive, supporting more reliable transit systems and offering capabilities beyond what static systems can provide.

By leveraging the momentum of Utah's public transit investments and AI policy innovation, this pilot offers a timely opportunity to test a scalable, cost-effective solution with real-world impact. It would address the urgent need to solve traffic congestion in a rapidly growing region while ensuring that Utah remains at the forefront of using emerging AI for transportation governance.

We recommend a 3-phase approach to AI driven transit optimization:

Phase 1: Improve Data Quality and Integration

1. Integrate datasets across UTA and UDOT platforms, combining bus, TRAX, FrontRunner, and other historical public transit data (via the UTA Data Portal) with real-time traffic data (using new and existing contracts, such as, Econolite) to build a comprehensive, multimodal transit data system.
2. Launch a supplemental research study on commuter engagement (in partnership with UTRAC, the annual research prioritization workshop of UDOT's Research and Innovation Division) in which commuters would voluntarily share real-time public transit and scheduling data (leveraging existing platforms, such as, the UTA On Demand app).
    a. A pilot implementation with a small, targeted group, combined with regular public transparency reports, would ensure that all deployed AI systems adhere to the principles of privacy by design, using anonymized data and incorporating clear opt-out mechanisms.
3. Apply AI systems (e.g., predictive modeling, dynamic pricing, and optimization algorithms) to historical and real-time commuter data (leveraging existing intelligent analytics, such as, Econolite).

Phase 2: Optimize Transit and Incentivize Commuters

1. Use AI generated predictions to identify peak congestion periods, popular transit areas, and transit areas with latent demand and to forecast rider demand.
2. Develop a dynamic pricing model to offer financial incentives, such as discounted fares, during peak congestion periods or high-emission days, thereby encouraging mode shift.
3. Deploy the pilot with the initial commuter research study group to enhance commuter engagement and foster public trust in AI applications.
    a. Deploy this interactive commuter system with research participants for real-time fare adjustments and rewards (e.g., discounts, loyalty points for peak travel, mode switching).

b. Create a gamified interface to nudge commuter behavior toward public transit options. This would also provide analytic insights for future transit planning to improve the commuter experience.

Phase 3: Measure Impact and Enable Scalability

1. Set up a public-private evaluation committee with OAIP, UDOT, UTA, academic researchers (e.g., Utah State University, University of Utah), and industry tech partners (e.g., Flow Labs, Econolite), potentially leveraging interested groups through the AI Learning Lab.
2. Track outcomes such as:
    a. Reduction in single-occupancy vehicle use
    b. Public transit ridership changes
    c. Air quality improvements
    d. Transit service efficiency gains
3. Use pilot learnings to scale the program statewide:
    a. Suggest optimized routes and fares in real time
    b. Provide alerts about congestion, air quality, or route changes
    c. Collect commuter feedback and integrate it into analytics for iterative improvements

For more information on this proposal, see the Case Study Comparison, which can guide policymakers in making informed decisions that are tailored to their unique circumstances and objectives. This analysis highlights similarities and differences between the problems faced by Salt Lake City and other cities regarding traffic congestion. Furthermore, the case study showcases how other cities addressed the shared problem of traffic congestion by utilizing AI powered solutions, their outcomes, and impacts.

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