UCLA INSTITUTE OF TRANSPORTATION STUDIES

Transit Applications of Vehicle-to-Vehicle and Vehicle-to-Infrastructure Technology

Strategies for Improving Transit in the Connected City

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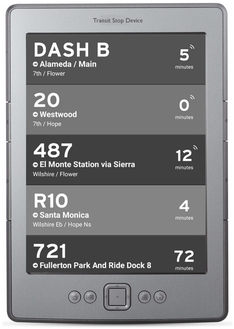
INTRODUCTION

Transit vehicles offer a unique platform to implement V2V and V2I innovations. They have broad geographic and temporal coverage, and already engage in richer and more dynamic communication with transportation infrastructure than most private vehicles do.

Connectivity can bring many benefits to both transit riders and agencies, such as increased reliability and improved operational efficiency. Transit vehicles can provide a testing ground for early deployment of connected systems, especially distributed traffic and pollution sensors

TRANSIT STOP DEVICE

- **Low-cost, low-energy,** connected device for displaying real time information
- **Two-way communications**: passengers can request a specified route, buses operating on routes not requested can bypass the stop.



A mockup of a Transit Stop Device, displaying The Transit App. See www.transitapp.com.

DYNAMIC ROUTING

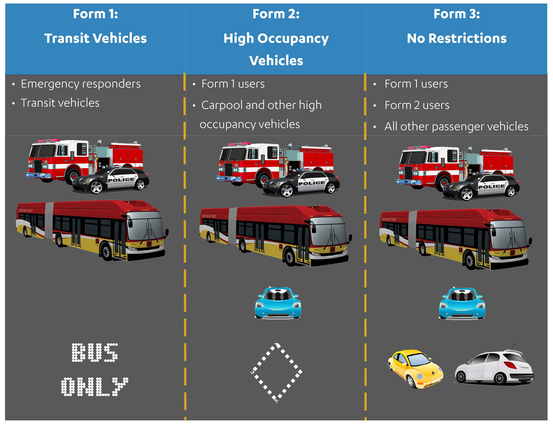
- V2V communications can mitigate the impacts of nonrecurring congestion, by relaying **delay information to passengers** waiting at stops and suggesting alternative routes to operators.
- In the **case of rerouting**, operators can quickly inform riders within the affected vehicles of the new route and schedule, while V2I communications can relay and display this information on transit stop devices.

ANTI-BUNCHING FEEDBACK

- An algorithm based on bus occupancy, boarding and alighting requests, and vehicle location information could enable **automated instructions for operators** to skip stops, hold at stops, or to infrastructure to increase transit signal priority windows in order to separate vehicles on the same route which have bunched together.

Bus Bunching. From the **Greater** Greater Washington Blog (www.greatergreaterwashington.org)

- Stop bypass and real-time information for boarding passengers at a stop to be skipped can aid in increasing vehicle separation.



DYNAMICALLY MANAGED LANES

- Dynamic lanes can change directionalities and restrictions in response to real-time demand and congestion.
- Dynamic lanes would allow for **greater flexibility and optimization of managed lanes**, making them especially useful in unexpected situations and emergencies.

CRASH PREVENTION

Two-way V2V data communication and on-vehicle sensors could augment existing visual communication to reduce the risk of collisions between transit vehicles and other vehicles

TRANSITION TO CONNECTED TRANSIT VEHICLES

- Transit fleets are **well positioned to be early-adopters** of 5.9GHZ connected vehicle technology. Transit fleets are centrally managed, typically operate in congested conditions, and agencies can leverage capital funding to recover costs from improvements operating efficiency.
- A twelve-year vehicle replacement cycle means that **a retrofit option is necessary** to achieve a high saturation of vehicles in the near term.
- New connected vehicle equipment or adaptations of existing equipment would be relatively inexpensive, although creating dynamic lanes and installing transit stop devices would be much costlier.

GOVERNMENT AGENCIES' ROLE

- The federal government has an important role to play in **setting standards and providing funding** and resources, as do state governments.
- The FTA can produce **guidance on system deployment**, covering information on device requirements and standards, costs, and strategies for integrating the new technology and data flows into service

LOOKING FORWARD

- Transit deserves increased focus because of its inherent advantages for the implementation of connected vehicle and infrastructure applications.

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