Transit Connected Vehicle (CV) Projects Update

ITS America Annual Meeting
June 12, 2016

Steve Mortensen
Senior ITS Engineer, FTA
Topics

- Transit Safety Retrofit Package (TRP)
- CV Infrastructure - Urban Bus Ops Safety Platform (E-TRP)
- Transit Bus Stop Pedestrian Warning (TSPW) Application
- Integrated Dynamic Transit Operations (IDTO)
Transit Safety Retrofit Package (TRP)

- Applications included in the Safety Pilot Model Deployment
  - Pedestrian in Signalized Crosswalk Warning (PCW) (V2I)
  - Vehicle Turning Right in Front of Bus Warning (VTRW) (V2V)
  - Forward Collision Warning (V2V)
  - Emergency Electronic Brake Lights (V2V)
  - Curve Speed Warning (V2I)

Image Sources: Battelle and UMTRI, 2012
TRP Lessons Learned

• Transit drivers expressed acceptance of the TRP concept
• DSRC radios performed well – no TRP problems traced to DSRC performance
• Significant rate of false alerts for the PCW application
  – Doppler microwave-based detector technology is insufficient for the PCW application
  – WAAS-enabled GPS accuracy is insufficient for PCW application
• High rate of false alerts for the VTRW application due to GPS limitations

Project Report: FHWA-JPO-14-142
Independent Evaluation Report: FHWA-JPO-14-175
CV Infrastructure - Urban Bus Ops Safety Platform

• Design, build, and test an Enhanced TRP (E-TRP)
  – Enhanced Pedestrian in Crosswalk Warning (E-PCW)
  – Enhanced Vehicle Turning Right in Front of Bus Warning (E-VTRW)
  – Rear Camera Integration
  – Improved pedestrian detection sensing technology
  – Improved locational accuracy technology
  – DSRC radio remote management capability

• Greater Cleveland Regional Transit Authority (GCRTA)
  – 80 to 100 buses to be equipped
  – E-PCW at six locations

• Operations: September 2016 – June 2017

Image Source: Greater Cleveland Regional Transit Authority (GCRTA)
E-PCW Locations

Image Source: Google Maps
E-TRP Evaluation

- Evaluation Areas:
  - System performance
  - Driver response to alerts
  - Return on investment
  - Operational efficiency
  - Driver acceptance
  - Pedestrian perception
Transit Bus Stop Pedestrian Warning (TSPW) Application

• Design, build, test, and modify a prototype Transit Bus Stop Pedestrian Warning application:
  – Alerts pedestrians of buses approaching and departing stop (V2I & V2I2P)
  – Alerts bus drivers of pedestrians in roadway (I2V)
  – Alerts passengers alighting from buses about approaching motor vehicles (V2I2V)

• GCRTA
  – 80 to 100 buses to be equipped
  – Four bus stops to be equipped

• Operations: December 2016 – June 2017

ConOps: FHWA-JPO-16-332
SyRS: FHWA-JPO-16-360
Architecture & Design: FHWA-JPO-16-401

Image Source: Battelle
TSPW Evaluation

• Evaluation Areas:
  – Application Performance
    • Warning accuracy
    • Missed alerts
    • Bus driver response to warning
    • Pedestrian response to warnings
  – User Acceptance
    • Ease of use
    • Perceived safety benefits
    • Ease of learning
    • Willingness to use

Image Source: The Volpe Center
Integrated Dynamic Transit Operations (IDTO)

- Integrated bundle of three mobility applications:
  - Connection Protection (T-CONNECT)
    - Increases the likelihood of making successful transfers, particularly when these transfers are multi-modal or multi-agency
  - Dynamic Transit Operations (T-DISP)
    - Ability to access real-time information about available travel options, including costs and predicted time
    - Extends demand response services to support dynamic scheduling and routing based on traffic conditions, vehicle capacity, ridership and origin-destination
  - Dynamic Rideshare (D-RIDE)

Image Source: Battelle
IDTO Findings & Lessons Learned

• Proof-of-concept prototype was successfully demonstrated
• Lack of true standards and availability of reliable automatic vehicle location (AVL) data were the biggest technical challenges
• Data sharing, privacy, and operational impacts were the biggest institutional challenges
• T-CONNECT scenarios indicated average net travel time savings of:
  - ~4 minutes (for connections to services with 15-minute headways)
  - ~27 minutes (for 40-minute headways)
• T-CONNECT and T-DISP are cost-effective applications

Project Report: FHWA-JPO-16-276
Impacts Assessment Report: DOT-VNTSC-FHWA-16-11
For More Information

http://www.its.dot.gov/index.htm

Steve Mortensen
Senior ITS Engineer
Federal Transit Administration
Steven.Mortensen@dot.gov

Robert Sheehan, P.E, PTOE
ITS Multimodal Program Manager
USDOT ITS Joint Program Office
Robert.Sheehan@dot.gov