CAT Coalition
Strategic Initiatives Technical Working Group
July 22, 2021 Webinar
Notes and Summary of Discussions

Welcome

Blaine Leonard welcomed approximately 42 members and guests to the webinar. A list of those in attendance is provided at the end of these notes.

Ongoing Commitment to Outreach and Knowledge Transfer

Blaine invited members to share anything that would be of interest to this group and reminded members that if they think of something after this webinar that could be shared next quarter, they can contact Blaine Leonard or Dean Deeter with their input and ideas.

Connecticut Automated Bus Deployment

Pete Calcaterra, CTDOT, discussed the CTfastrak automated bus in central Connecticut along the I-91 corridor. CTfastrak includes a fixed guideway bus-only road for bus rapid transit (BRT) owned and maintained by CTDOT over 9.4 miles. There are approximately 5.3 million riders each year along the Fastrak corridor with about 3.4 million on the fixed guideway. Downtown Hartford is located at the end of the fixed guideway. The guideway is used by a variety of different buses with a maximum speed limit of 45 mph. Along the route speed limits change 19 times so the automated bus must also follow the rules of the road and change speeds as the speed limit changes. Each station has a raised platform, crosswalks, and is ADA accessible. There are 5 intersections, two parallel to a live railroad line. During a weekday there are 350-500 crossings. For most intersections buses rarely stop.

Pete described the current effort underway to begin using automated buses on CTfastrak. CTDOT is in the process of procuring three 40 ft New Flyer Xcelsior Charge automated buses (SAE level 4) that can travel up to 40 mph. These buses will be used for revenue service operations. In addition to being automated, the buses are electric. The automated driving capabilities will include:

- Steering;
- Braking;
- Lane keeping;
- Pedestrian and object detection.

Advantages that CTDOT are expecting from this project and the automated buses include:

- **Precision docking.** Pete noted that as the buses approach the elevated platforms, the drivers do excellent jobs at parking next to the platform. But, even with trained professionals, there are

times when the bus is too close or too far away from the platform and the anticipation is that the automated buses will dock the bus correctly every time.

- **Bus platooning.** Pete noted that eventually CTDOT may explore the use of automated vehicles for bus platooning, perhaps allowing two smaller buses to platoon during peak periods, freeing up the second bus during off-peak periods. Platooning could also allow increased capacity during special events.
- **Bus Electrification.** CTDOT is building a charging infrastructure and will be testing the performance of testing on the new electric buses.

The buses will operate autonomously on the fixed guideway at all times of the day and in all weather conditions. A safety driver will be on-board and available to take over if needed and buses will be manually driven in the downtown Hartford area. Pete described the need to equip the intersections that the fixed guideway crosses with SPaT/MAP broadcasts as back-up information for the automated buses to use as they approach the intersection. Pete noted that they will deploy dual-mode roadside units (RSUs). On the guideway there are Naztec controllers which will be replaced as part of the automated bus project. Loop detectors along the fixed guideway detect when buses are approaching intersections, providing a call to the signal controller which gives priority to the fixed guideway and therefore serve as de facto transit signal priority. The backhaul to/from the intersections will be cellular on day-one and eventually will be converted to fiber communications.

Volpe is doing human factors research including a multi-phase driver study and the University of Connecticut is working to survey riders and drivers before and during deployment. CTDOT expects to complete vehicle design, build, and testing as well as infrastructure improvements in 2021-2022. On-site tests are scheduled at CTfastrak for late 2022 and operations are expected to go live in 2023.

Automated Bus Consortium

Suzanne Murtha discussed the Automated Bus Consortium. In Fall 2019, AECOM realized that it was difficult for transit manufacturers to invest in automation without a commitment from transit agencies to buy automated vehicles. AECOM met with automated bus manufacturers who determined that they would need a commitment for purchase of 80-100 buses to achieve economies of scale. AECOM approached transit agencies about pooling funds to reach this goal and looked to create deployments across the country in different environments. The consortium established two phases with many partners.

On September 12, 2019, the Automated Bus Consortium held a forum with 120 attendees. Transit and automation personnel shared their expertise and one-on-one meetings with 21 companies were conducted. After a second round of vendor meetings, AECOM expects 2-4 bus vendors to respond to the RFP. The three best value proposals will be accepted. Specifications for the base bus will be available at the end of August 2021. These specifications will be based on the APTA White Book, with additional specifications for bus electrification and an automated driving system (ADS).

AECOM tracked input from industry and made changes to their metrics. It is challenging to execute all automation in a single timeframe so it will be developed in 3 stages which all vendors agreed is a good approach. Most operational design domain (ODD) elements can be achieved in stage 1. CV/AV road readiness analysis is being developed based on NCHRP best practices for all routes. Service is scheduled to begin in 2024 with analysis occurring between 2024 and 2026.

Utah AV Shuttle Testing of V2I Data Exchange

Blaine introduced Utah's AV Shuttle Testing project that tested an Easy Mile Level 4 automated shuttle leased by UDOT. Over 15 months, UDOT held 11 deployments on 8 different sites to reach broad demographics. Among the project goals was to test the readiness of the automated shuttle to communicate with traffic signal infrastructure using V2I communications.

Jonny Turner and Ralph Koeber went on to explain that the UDOT project established communication between the OBU and RSU and tested communications at UDOT's test track, hoping to get the shuttle to appropriately handle the intersection. Along the roadside, UDOT placed an RSU to handle messages, a signal controller to broadcast the SPaT message, and a signal command module to create the MAP message file. UDOT completed two phases of testing and Easy Mile configured the shuttle to operate on a predetermined route. Onboard LiDAR provided collision safety for other vehicles and pedestrians.

Additional information is available on the project website at http://www.avshuttleutah.com and in final report published at https://transportationtechnology.utah.gov/automated-shuttle-pilot-project/.

Other Updates

Blaine mentioned that a subgroup has been meeting to develop a resource to support agencies in responding to the changes in allocations for the 5.9 GHzs spectrum, recognizing that many agencies that participated in the SPaT Challenge must now modify the infrastructure they have deployed. The subgroup has created a document that they are currently in the process of vetting. It will soon be available for public distribution.

Close

The next CAT Coalition Strategic Initiatives Working Group webinar is scheduled for Thursday, October 28, 2021, at 2 pm Eastern.

TWG 1 July 22, 2021 Webinar Participants

Blaine Leonard (Chair)
Barry Einsig
Bryan Lee
Christian Kulus
Cliff Heise
Dean Deeter
Deborah Curtis
Frank Provenzano
Gary Strack
Iouri Nemirovski
Jeff Stewart
Jeffrey Bergsten
Joe Avekamp
John Corbin
John Lower

Jon Riehl
Jonny Turner
Ken Moshi
Ken Yang
Kyle Garrett
Leila
Liana Mortazavi
Marisa Adams
Marthand Nookola
Matt Smith
Mauricio Guerra
Mike Stelts
Mohammed Hadi
Nagham Mafont

Pat Zelinski
Peter Calcaterra
Ralph Koeber
Robert Dingess
Shane McKenzie
Stan Caldwell
Steve Kuciemba
Steve Misgen
Steve Sawyer
Suzanne Murthy
Tom Kern
Tom Timcho
William Martin