

DRISI

CALTRANS DIVISION OF RESEARCH,
INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research

Notes

Research Support

MAY 2023

Project Title:
Connected and Automated
Vehicle (CAV) Infrastructure
Development

Task Number: 3904

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Maintenance, Operation and Enhancement of Cellular Vehicle to Infrastructure (C-V2X) Communication Infrastructure Phase III

California Connected Vehicle Test Bed Maintenance – Phase 3

WHAT IS THE NEED?

U.S. DOT, in the past, has provided financial and technical support to Caltrans for developing the, now defunct, DSRC communication infrastructure on its test-bed site along El Camino Real in Palo Alto. The test-bed is fully operational but needs to be maintained and supported so that it will be useful for other Caltrans projects, as well as for projects to be conducted by a variety of other public and private sector organizations in the region.

Dedicated Short Range Communication (DSRC) at 5.9 GHz (75 MHz Bandwidth) has been rendered obsolete by Federal Communication Commission (FCC) and a new standard has been introduced called Cellular- Vehicle to Everything (CV2X). This new standard has introduced new challenges for the test bed as the existing hardware now needs to be replaced and the new hardware needs to be purchased to replace the existing obsolete hardware. The new hardware also needs to be integrated to the existing traffic controllers which is quite challenging. The test bed provides a unique capability to deliver time-critical, safety-critical messages between the roadside infrastructure and vehicles with high reliability and low latency. This new 30 MHz band has been allocated by Federal Communication Commission (FCC) for Intelligent Transportation System (ITS) use. Caltrans, in conjunction with private and academia, is in the process of developing applications based on connected vehicle technology.

This task is a part of the Connected and Automated Vehicle (CAV) Infrastructure Development project. The primary goal of this project is to develop the hardware and applications and to keep the test bed fully functional so that various applications can be developed in the CAV area. These applications include, but not limited to, Curve Over speed Warning System, Traffic Probe Data



DRISI provides solutions and
knowledge that improves
California's transportation system

Processing, Intersection safety and mobility Applications etc.

WHAT ARE WE DOING?

This task will take care of the following activities.

1. Upgrade the test bed to the new C-V2X standard
2. Regular maintenance of the test bed including special setup requests from various users
3. Support to new users
4. Provide liaison to national network of test beds
5. Increase the awareness among the possible users of the test bed
6. Regular upgrades and enhancement of test-bed capabilities
7. Providing demonstrations to the other states and agencies.

WHAT IS OUR GOAL?

The end goal is to have a fully functional test-bed with complete support to its users.

WHAT IS THE BENEFIT?

This test-bed will provide a platform for software developers who will be developing transportation applications that will help drivers in cutting travel times, saving fuel and drive with augmented safety. Caltrans will be the primary beneficiary as the developed applications will help Caltrans to manage the traffic flows better while reducing the carbon footprint.

WHAT IS THE PROGRESS TO DATE?

Upgrade the Test Bed to the New C-V2X Standard:

- Obtained equipment purchase approval from the Contract Manager (CM) to upgrade the existing 16 DSRC RSUs to C-V2X and add 6 C-V2X RSUs for HAWK signals, got quotes, and placing purchase order
- Researchers provided locations of roadside

units (RSUs) for FCC experimental permits but more detailed information is needed for the submission process.

- Researchers completed test-bed MAPs with 31 signalized intersections and 6 HAWK signals. The researchers will load the MAPs to test-bed website once the test-bed with C-V2X RSU installed begin operating.

Test Bed Regular Maintenance including Special Setup Requests from Connected Vehicle Application Developers

- Worked with Traffic Technology Services (TTS) on standardized supplemental data feed
 - TTS is currently receiving real-time SPaT data from the test bed
 - The supplemental data feed is used to predict phase time-to-change
 - Renewing memorandum of understanding (MOU) with TTS
- Worked with Global Mobile Alert (GMA) on the use of the test bed
 - GMA is currently receiving real-time SPaT data from the test bed
 - Developing a MOU with GMA

Learn More:

<https://caconnectedvehicletestbed.org/>

IMAGES

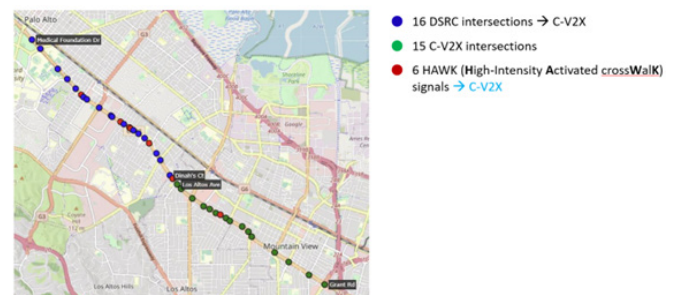


Image 1: ECR Test Bed Map with description of equipment updates/installs