



Vehicle-to-Everything Data Exchange Platform: Florida Department of Transportation's CAV Initiative

Raj Ponnaluri, PhD, P.E., PTOE, PMP
Manager of Emerging Technologies, FDOT

Edith Wong, P.E.
Statewide Arterial Management Engineer

In 2022, there were 3,256 fatal and 161,601 injury crashes officially reported within the State of Florida. For over 90% of these crashes, driver error could be a potential contributing factor. FDOT has invested greatly into infrastructure countermeasures, education, and enforcement efforts to reduce all crashes. FDOT is now exploring technology as a potential approach to alert and assist drivers via connected vehicle messaging by establishing a visionary connected and automated vehicles ([CAV](#)) and emerging technologies ([ET](#)) program. As part of that program, FDOT is developing a Vehicle-to-Everything Data Exchange Platform (V2X DEP) to exchange data from the CAV, Intelligent Transportation Systems (ITS) and Advanced Traffic Management Systems (ATMS) infrastructure with the original equipment manufacturers (OEM), navigation app providers, and other industry stakeholders.

With early planning in the years 2018-19, FDOT advertised an Invitation to Negotiate (ITN) procurement approach in 2020 and obtained numerous responses. Based on this competitive solicitation, FDOT selected a team with Southwest Research Institute (SwRI) as the lead to develop the V2X DEP.

FDOT's V2X DEP is a first-of-its-kind program in the United States which intends to encompass FDOT's operational, developing, and planned CAV project corridors while ingesting data feeds and other elements from legacy systems such as the SunGuide®, Advanced Traffic Management Systems (ATMS), Data integration and Video Aggregation Systems (DIVAS), FL511, and Florida's ITS Operations Network (FION). In addition to collecting data from field CAV devices, the system includes performing backend data

analytics to make real-time and predictive decisions and support the needs of the auto industry and other stakeholders, including research entities.

The Vehicle to Everything (V2X) Data Exchange Platform (DEP) adopted a staged development process with an extensive ideation process that included the developer and the FDOT team. The adopted development process provides FDOT flexibility to adapt and include newly emerged needs and incorporate them into the development process. As an Infrastructure Owner and Operator (IOO), FDOT took the lead in explaining to the development team the need for use cases and a visualization-centric platform to meet the Department's safety and mobility goals. After the project kick-off, the FDOT and the Platform developer laid the groundwork for the V2X DEP by holding ideations sessions with key stakeholders. These included FDOT District offices, local agencies, CAV implementors, first responders, university researchers, and consultant subject matter experts. The FDOT's team included representatives from the offices of Planning, Design, Operations, Maintenance, Safety, Information and Transportation Technology, Work Program and Budget, and General Counsel. This team developed more than 80 individual use cases, categorized under emergency response (including weather and wrong-way driver alerts), crash and congestion, work zones, and trend analysis.

Following the ideation process, a proof-of-concept (POC) was developed; the POC prioritized CAV safety messages, work zone data needs, and emergency weather notification use cases. With a year of contract issuance, the POC was delivered, tested, and deployed in the summer of 2022 on FDOT premises. The first production release of the Platform came in March of 2023. Initially, V2X DEP focused on the collection and presentation of data from existing CAV, and legacy ITS deployments, TSM&O applications, and ATMS systems. The ideation process helped identify adaptations necessary to account for existing system interfaces and capabilities. Since the successful POC, the focus has turned to developing the safety and mobility use cases of immediate interest to the Department, and to develop a visualization-centric platform. Understanding the needs of the industry, and fine-tuning the Data Exchange Platform is an immediate priority for FDOT before other public agencies can leverage the V2X DEP.

The V2X DEP is being structured to collect, store, and disseminate data and analytics on a wide range of feeds from CAV deployments and other systems, including but not limited to: SunGuide®, FL 511, DIVAS, and (ATMS). Data from third parties can also be ingested, including data from Original Equipment Manufacturers (OEM), INRIX, HERE, weather systems, and other sources. This FDOT's V2X DEP will also make data available to vehicles by providing alerts to SunGuide® and other external systems, which can then push the data to recipient systems.

V2X DEP has been developed to be agnostic to data sources and data disseminators. As a cloud-hosted solution, the V2X DEP can expand to meet the growing CAV deployments across the country. Understanding the institutional and resource considerations will also need to be studied and adjusted before initiating a similar program or scaling up. The V2X DEP has been demonstrating success through the sharing of data in the use cases supported with the first production release. Specifically, the Platform supports sharing Work Zone Data Exchange, traffic safety (crash, lane closure, etc.) conditions, congestion monitoring, infrastructure device status data, and the consumption of live data by external entities through APIs.

In summary, FDOT's V2X DEP is transforming the future through innovative, cutting-edge technology to improve the transportation experience for all road users. Prioritizing connected vehicle safety messages, work zone data, and emergency weather notification use cases, the V2X DEP is a major step

toward a fatality-free transportation system. The V2X DEP will provide situational alerts to the motorists on the roadways via vehicle's onboard system or navigation applications which will assist the driver and make a split-second difference between a serious crashes vs a crash prevented. Moreover, through partnerships with third-party vendors, the Platform also provides necessary tools to reduce congestion and travel times and improve safety.