

THE SITUATION DATA EXCHANGE SUMMARY

**Project 14.2: Apply Wyoming DOT Connected Vehicle Pilot Project
Results**

August 7, 2020

Prepared for:

North/West Passage Transportation Pooled Fund Study



Background and Need

Connected vehicles (CVs) are poised to transform our streets, communities, and personal lives. As part of this transformation, the USDOT supported the advancement of connected vehicle technology with a pilot deployment program. In 2015, WYDOT, along with Tampa and New York City, were chosen to deploy a real-world pilot project for CV technology. A large portion of this pilot program was dedicated to WYDOT and the I-80 corridor. Trihydro was the technical and application development lead for the WYDOT CV pilot project and worked to develop and deploy various applications to create and deliver Traveler Information Messages (TIMs) depicting events ranging from road conditions, to parking availability, and variable speed limits.

Through the course of this project, Trihydro took over management of a system known as the Situation Data Warehouse (SDW). The SDW was used to house TIM messages for third-party distribution. This includes messages sent to On Board Units (OBUs) via satellite communications. Trihydro pulled the SDW into a cloud environment and rebranded it as the Situation Data Exchange (SDX) to better convey its purpose. This rebranding also included updates to security, as well as the underlying coding framework to be a more solid product overall. The SDX is a system used to house TIMs for third-parties to pull from and allows WYDOT to deploy TIM messages throughout the state of Wyoming instead of just areas within range of Road Side Units (RSUs)

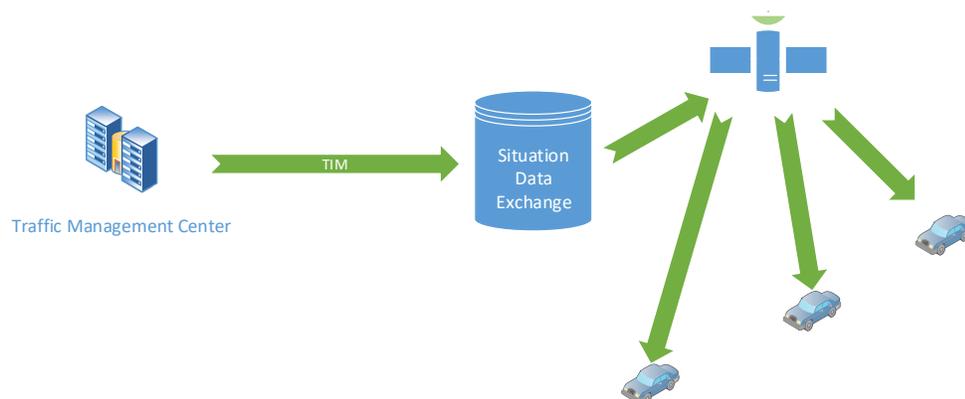
As states begin to develop more messages meant for connected vehicles on the roadway, they will need to harness the power of delivering these messages via third-party communication methods such as satellite or LTE. As a central exchange for TIMs, the SDX allows DOTs to immediately begin publishing messages across their state, without needing to build any additional, costly infrastructure.

Document Purpose

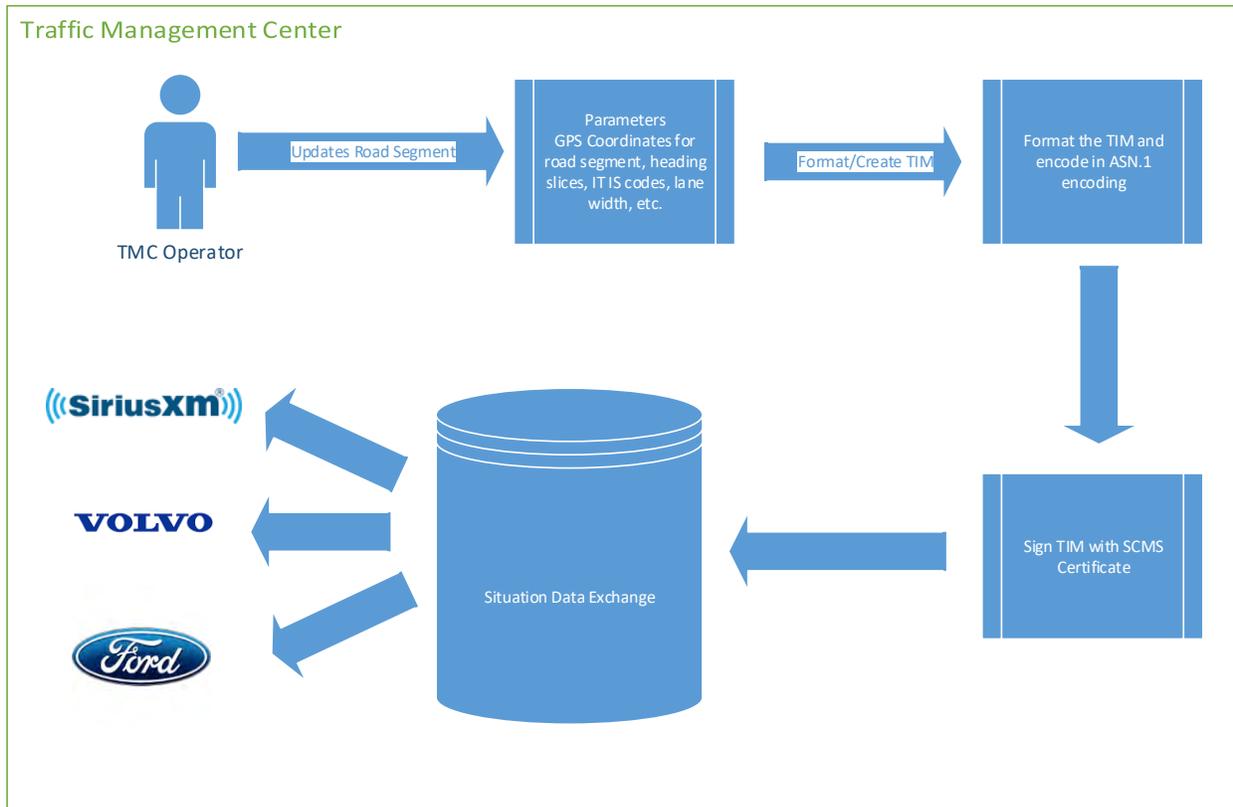
This document provides an overview of the services offered by the SDX and how a DOT may go about creating and distributing CV messages along roadways. This document is meant for DOTs to obtain an understanding of what the SDX is and how it operates as well as how a DOT can leverage the SDX to communicate with CVs on their roadways.

Situation Data Exchange Data Flow

The diagram below shows a simplified data flow for how WYDOT creates and distributes TIMs via the SDX.



Creating a TIM does require a DOT to know how to correctly build, encode, and sign a TIM with a valid certificate from one of the Security Credential Management Services such as Integrated Security Services (ISS) or Blackberry. This process can be seen in the diagram below:



SDX Features

Below is a short list of features that the SDX provides for DOTs.

- **TIM Validation:** TIMs are validated for correct formatting, if a TIM is not formatted correctly the SDX will return an error with what it believes is the issue.
- **Geographic Restrictions:** Users of the SDX are assigned a given geographic region that they are allowed to add TIMs to the SDX for. This prevents issues such as a Wyoming agency attempting to submit data for an agency in California.
- **Two-Factor Authentication:** Users are required to use two-factor authentication to access the SDX. This is used to increase overall security of the system.
- **SCMS Authentication Requirements:** TIMs pushed to the SDX are checked for a valid SCMS certificate. If none is present, the TIM is rejected with a validation error.
- **Region Specific Queries:** Consumers of the data are able to query based on a given location and radius, or by a defined geographic region.
- **High Availability/Uptime:** The SDX is built to be highly available with an uptime of at least 99.99%. Additionally, the system is built to be distributed over multiple regions with the added benefit of speed for consumers and depositors of data over a wide area.

- **API Key Integration:** API Keys are generated on a per user basis and allow DOTs to securely add TIMs to the SDX via the SDX Application Programming Interface (API).

Getting Started

Trihydro has built a Beta environment for DOTs to test their integration with the SDX. The beta site can be accessed at <https://sdxbeta.trihydro.com/>. Our production site is also free to register and query TIM information for users who wish. This site can be reached at <https://sdx.trihydro.com>. A sample application showing how to interact with the API is available at the following address: <https://github.com/Trihydro/sdx-sample-app>.