Modernization of Center-to-Center Data Communication Standards

Review the current Traffic Management Data Dictionary and National Transportation Communications for Intelligent Transportation Systems Protocol standards and make recommendations for modernization.

WHAT IS THE NEED?

The current Center-to-Center (C2C) data communications are based on National Transportation Communications for Intelligent Transportation Systems (ITS) Protocol (NTCIP) and Traffic Management Data Dictionary (TMDD) 3.0x data standards. These standards are based upon Simple Object Access Protocol (SOAP) web services, a method of communication first developed in 1998 and introduced as a World Wide Web Consortium specification in 2003. The latest proposed standard for TMDD, version 3.04, continues to use SOAP-based web services as its sole communication mechanism.

Future uses of C2C communications will demand high speed, high volume communication methods. The California Connected Corridors program’s need for real-time intersection signal status and detection information over a relatively small regional area (approximately 15 miles by 2 miles) is testing the limits of the SOAP based technology. Larger corridors, and the implementation of multiple corridors within a California Department of Transportation district will require a more modern set of communication technologies.

Furthermore, as future traffic management center systems’ need for new sources of data increases, such as the addition of vehicle-to-infrastructure related data, the ability to manage data at higher throughput and speed will become even more critical. The SOAP-based web services’ high verbosity and need for Extensible Markup Language parsing limit for both its speed and throughput, and adversely impact today’s modern traffic management center capabilities.
WHAT ARE WE DOING?

The objectives of the research is to review the current TMDD standard, the current state-of-the-art software and systems capabilities for high speed and volume communications, and the current and future transportation center requirements.

The research team will conduct a gap analysis, and they will make a set of recommended changes to the TMDD specification (and NTCIP specifications, if required). A reference implementation that provides example software using the recommended changes will be provided as well.

WHAT IS OUR GOAL?

The goal is to provide a specification proposal for the modernization of the TMDD and NTCIP specifications, including:

1. Use of more modern data transmission protocols suitable for high speed, high throughput data requirements.
2. Alignment of the specification with up-to-date standards of compatibility with existing software development methods, frameworks, and tools.
3. Selection of transmission methods and protocols suitable to a project's needs and budget.
4. Updating to include methods suitable for modern infrastructure environments, include cloud-based and hybrid infrastructures.
5. Inclusion of security standards and protocols specific to the communication methods selected.
6. A reference implementation of the communication standard proposal.

WHAT IS THE BENEFIT?

The research findings will provide public agencies useful information for the assessment of existing TMDD and NTCIP standards to plan for any upgrades needed to these standards for modernization of C2C data communication.

WHAT IS THE PROGRESS TO DATE?

The research proposal is under review for execution.