Feasibility Study and Assessment of Communications Approaches for Real-Time Traffic Signal Applications

Data Management Plan

DEPARTMENT OF TRANSPORTATION: FEDERAL HIGHWAY ADMINISTRATION

Intelligent Transportation Systems Joint Program Office

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Data Management Plan Authorization Memorandum

I have carefully assessed the Data Management Plan for *Feasibility Study and Assessment of Communications Approaches for Real-Time Traffic Signal Applications*. This document has been completed in accordance with ITS JPO requirements.

MANAGEMENT CERTIFICATION - Please check the appropriate statement.

_____ The document is accepted.

_____ The document is accepted pending the changes noted.

_____ The document is not accepted.

We fully accept the changes as needed improvements and authorize initiation of work to proceed.

_____ _____

NAME DATE

ITS JPO COR

_____ _____

NAME DATE

Task Manager

Revision History

Revision Number	Date	Description
Ver. 1.0	12/05/2018	Initial draft
Ver 2.0	01/25/2019	Addresses review comments

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1. OVERVIEW

1.1 PURPOSE

This document provides an overview of description of data collected and how it is managed during the execution of this task order. It captures the plan for:

- The research data that will be collected and produced during the course of the project
- The standards to be used for data and metadata format
- Where data and final project report are available for access and sharing.
- Policies for re-use, redistribution and derivatives.
- Data archival and preservation policies.

1.2 OBJECTIVE

This task order will focus on collecting and analyzing the characteristics and communications attributes (e.g., latency) of these data feeds and assess the feasibility of supporting different types of applications (safety, mobility, environmental, etc.) that utilize traffic signal data from infrastructure systems. The data collection will occur in the Northern Virginia area in cooperation with and the involvement of Virginia Department of Transportation (VDOT).

In Northern Virginia, VDOT has equipped several signalized intersections with roadside equipment (RSE) that broadcasts the SAE J2735 SPaT messages. These initial intersections are on Route 7, and VDOT has expanded the system to additional locations, as part of the Virginia Connected Corridor (VCC) effort. This VCC effort also provides for alternative means, using the "VCC Cloud," for accessing and using these types of data sources, such as through the "VCC Mobile" smartphone app that is capable of accessing and displaying real-time traffic signal timing data using cellular transmission.

1.3 PROJECT OVERVIEW

The objective of this project is to characterize and assess the Real-Time Traffic Signal data and document the feasibility and extent of supporting differing connectivity-based safety, mobility, and environmental applications that use this data. The results from this project will provide representative measures (accuracy, latency, reliability, etc.) that quantify the real time traffic signal data and show what it can support (application potential).

VDOT currently provides real-time traffic data through three related communications approaches:

- SPaT through DSRC broadcast at several intersections
- VCC Cloud/Mobile App
- SmarterRoads portal for the wider signal data covering the Northern Virginia traffic operations district.

Where an Internet portal (SmarterRoads) or smartphone app (VCC Cloud/Mobile) provides infrastructure-based traffic signal data to vehicle devices, the expectation is that applications in vehicles and on mobile devices access this information through a cellular data connection. This information can help agencies (VDOT and others) and developers realize better alternatives for decision-making and investment planning. The measures, processes, and analysis approach will be developed and documented to enable, with tailoring, their potential use at other agencies beyond VDOT.

The primary outcomes from this project include:

- Characterization (including quantitative measures and supporting data) of real-time traffic signal data being provided by VDOT through DSRC and via SmarterRoads portal and VCC Cloud/Mobile app
- Relating findings (for data provided using each approach) to applications requiring traffic signal data – identification of the feasibility and extent that differing applications can be supported by each feed provided by VDOT
- Dissemination of process and results to other agencies considering real-time traffic signal data distribution

2. DATA DESCRIPTION

2.1 TYPES OF DATA COLLECTED

The data collected will be Signal Phasing and Timing (SPaT), MAP, and TIM data as defined in SAE J2735 standard. Additionally, data such as test period times, RSU and logging vehicle locations etc. will be logged to capture the companion field data. Research team will collect data packets in the pcap standard format using a GPS timestamp.

3. DATA FORMAT AND METADATA STANDARDS

Data collected will primarily be Signal Phasing and Timing (SPaT), MAP, and TIM data as defined in SAE J2735 standard. As defined in the standard, the data is uses UPER encoding and is in ASN.1 format.

The MAP message defines the topological configuration of lanes within an Intersection or a road-segment for a connected vehicle environment. The ASN.1 representation of the MAP message includes timestamp (MinuteOfTheYear), msgIssueRevision (MsgCount), layerType (LayerType), layerID(LayerID), intersections (IntersectionGeometryList), roadSegments (RoadSegmentList).

The SPaT message includes the current movement state of each active phase in the system, including the values of what states are active and the time at which a state has begun or the earliest it will begin and the time at which a state is expected to end or the latest it will end. This message type may also include the current signal preemption and priority status values (when present or active). The ASN.1 representation of the SPaT Message includes timestamp (MinuteOfTheYear), name (DescriptiveName) and intersections (IntersectionStateList).

The TIM message includes roadway conditions and attributes, such as speed limits, geometry, lane closure, or upcoming traveler services. The ASN.1 representation of the TIM includes timestamp (MinuteOfTheYear), packetID (UniqueMSGID), urlB (URL-Base), and dataFrames (TravelerDataFrameList).

The metadata for SPaT, MAP, and TIM messages are defined in SAE J2735 standard.

The data as collected will be made available in digital form as pcap or spreadsheet tables.

Derived data will include aggregated or interpreted data in digital format (e.g. spreadsheets) and visual charts. The project reports will be submitted to the COR and TOCOR in Word and/or PDF format in accordance with the Statement of Work.

4. ACCESS AND SHARING

All data collected at the test sites is already accessible to approved users via VDOT's SmarterRoads (https://smarteroads.org) data portal. Therefore, there is no benefit in making this raw data available again on a different portal. Upon review and approval of both FHWA and VDOT, derived data and final project reports will be available on data.transporation.gov and National Transportation Library portals respectively complying with Federal, USDOT and ITS JPO data access policies.

The raw data collected will be preprocessed to obfuscate any sensitive data in order to respect any proprietary, sensitive data such as IP addresses or any Personally Identifiable Information (PII). Therefore, the derived data that will be accessible to the public will not contain any PII data.

During the project execution, raw data will be stored temporarily in secure STOL Data Resource Test Bed (DRT) for final analysis that is only available to authorized USDOT users.

5. RE-USE, REDISTRIBUTION, DERIVATIVES

All work conducted under this task order must comply with Federal, USDOT, and ITS JPO data access policies. VDOT will make the raw data available to approved users via VDOT SmarterRoads data portal. The derived data will be owned by USDOT and VDOT. Public access to project data will be regulated by ITS JPO Data Access policies.

6. ARCHIVING AND PRESERVATION

ITS JPO Data Access and Retention Policies will govern project data stored in the ITS JPO public repositories. The STOL DRT data archival and retention policies will govern project data stored temporarily in the STOL DRT data repository during project execution.