

Next Generation Traffic Management Data Dictionary

Volume I – ConOps and Requirements

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of Transportation

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In addition to the TMDD Steering Committee, many others contributed to the development of this standard, and their input and assistance were critical to the final product. The following list includes those volunteers and others who gave their time to help the consultant and the committee ensure that the resulting standard met their needs. In addition, the new version of the TMDD has been expanded to support exchanges involving roadway weather and archived data user services.

Finally, the committee acknowledges the assistance and input provided by Deborah Curtis of the USDOT Turner-Fairbank Highway Research Center, as well as the guidance and assistance provided by Robert Sheehan of the FHWA Intelligent Transportation Systems Joint Program Office, Architecture, and Standards Program.

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Foreword

This Next Generation Traffic Management Data Dictionary (ngTMDD) was developed by engaging with stakeholders representing the broader industry, including but not limited to infrastructure owners/operators, systems integrators, data producers, and end users of data and services. The work was supported by the United States Department of Transportation (USDOT) Intelligent Transportation Systems (ITS) Joint Program Office (JPO). Several associations such as the American Association of State Highway and Transportation Officials (AASHTO), the ITE—A Community of Transportation Professionals (ITE), the National Electrical Manufacturers Associations (NEMA), and SAE International were involved in ensuring effective stakeholder representation and adherence to standards development processes as Standards Development Organizations (SDOs).

This ngTMDD Standard was developed following a systems engineering process and includes a Needs to Requirements Traceability Matrix (NRTM) and a Requirements Traceability Matrix (RTM). Users of this ngTMDD standard should consult the NRTM and RTM to determine how to design a C2C Interface that satisfies their specific needs.

More information on this effort can be found on the [ITE website](#).

The Standards Development Organizations (SDOs) supporting this standard include the following:

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A User Comment should be submitted to this address:

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Standard Publication Number and Version:
Section, Paragraph:
Editorial or Substantive:
Suggested Alternative Language:
Reason:

Please include your name, organization, and email address in your correspondence.

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Executive Summary

Project Objectives

The primary objective of this effort is to develop and publish a non-proprietary, industry-based consensus standard for a new Traffic Management Data Dictionary for traffic center-to-center communication.

This Next Generation Traffic Management Data Dictionary (ngTMDD) standard supports center-center (C2C) communications and interfaces between traditional Traffic Management Centers (TMC) and is updated to support other data centers, including third-party data providers, connected vehicle data sources, and systems aligned with traffic incident management metrics and work zone data. This ngTMDD standard is also updated to support efficient C2C communication using common data exchange methods.

Background

The original scope of the Traffic Management Data Dictionary (TMDD), established more than 20 years ago, focused on supporting coordinated TMC operations. The standard included a common set of Information Layer messages and dialogs that enabled TMCs to share information about roadway events and device status and to coordinate with National Transportation Communications for Intelligent transportation systems Protocol (NTCIP) standards to define how that information could be carried at the Application, Transport, and Subnetwork Level Layers.

The current TMDD (TMDD v3.1) is a mature standard but needs to evolve to address new and emerging operational needs and industry trends. The most notable of these trends is the emergence and role of private non-infrastructure owner/operators that collect and manage real-time transportation data. There is a need to share more granular data through a systems-to-systems approach that enables multiple entities to achieve common operational goals. One gap, however, is locational accuracy when lane-specific details about an event or device are required in addition to a map (sometimes provided by a third party) that provides high precision position information about the transportation infrastructure. Early electronic maps were rudimentary at the onset compared to today's maps, and operations staff had to know the road network well to compensate for limited resolution and data gaps. TMDD messages and data elements were originally designed to share general information on roadway event types (e.g., incidents, construction) rather than share information on the specific details of an event, such as identifying the specific lane where an incident occurred on a map.

Other industry and agency concerns with the current TMDD include:

- TMDD does not align with the Traffic Incident Management model;
- TMDD is unable to define the complexity of work zone data (such as temporal details and geographic accuracy);
- TMDD is unable to exchange discrete microscopic data at the unit vehicle level as the TMDD is designed to exchange aggregate (macroscopic) data;

New encoding and protocol technologies are available to help address these concerns. JSON (JavaScript Object Notation) for example, is a relatively new text-based encoding technology similar to eXtensible Markup Language (XML), but simpler to implement and use with Java and JavaScript objects. JSON is frequently used in conjunction with REST (Representational State Transfer) as a protocol technology that uses Hypertext Transfer Protocol (HTTP). New initiatives, such as the Work Zone Data Exchange (WZDx) and Connected Vehicle Pooled Fund Study (CVPFS) have started using these technologies. Recently, JSON and REST (JSON/REST) have largely replaced XML/Web Services, while GeoJSON can be used to describe roadway geometry impacted by impediments such as incidents, construction, and work zones. These new protocols for information sharing have evolved to address exchanging large quantities of data in real-time.

Enhancements to the ngTMDD Standard

The ngTMDD standard addresses industry and agency concerns with the following new features:

- Use of JSON encoding, superseding XML
- Use of GeoJSON for sharing locations
- Support for response plans for event management
- Use of SAE J2540 ITIS codes for events consistent with other standards
- Support for data from mobile sources (such as roadway weather data from snowplows), probe data, mobile/portable dynamic message signs, and connected vehicles
- Support for command of external center ITS devices when permitted
- Support for sharing CCTV image links
- Support for viewing ITS Device Data consistent with the latest NTCIP standards
- Support for RSU monitoring based on NTCIP 1218
- Streamlined ability to restrict dissemination of information to the public

Who Should Read this Document?

Stakeholders from multiple sectors may benefit from this ngTMDD standard. These industries include IOOs, third-party traffic data providers, multimodal partners, and end users of data and services.

Document Overview

In addition to this Executive Summary, this document is organized into four main sections. Following the systems engineering process, those sections are as follows:

- **Executive Summary.** This section provides a high-level overview of the entire document.
- **Section 1, General Information.** This section discusses the scope of the ngTMDD, references to other documentation, and terms used in this document along with terms and definitions.
- **Section 2, Concept of Operations.** This section presents the Concept of Operations, including the user needs for the ngTMDD and the operational scenarios to which those needs apply. A tutorial is also included.
- **Section 3, Functional Requirements.** This section includes the Functional Requirements that satisfy the user needs for the ngTMDD. A Needs to Requirements Traceability Matrix (NRTM) is provided.
- **Section 4, Needs To Requirements Traceability Matrix.** This section identifies which Functional Requirements in Section 3 are mandatory or optional to support the user needs defined in Section 2.

ngTMDD Volume II provides the system design details on how each Functional Requirement from Section 3 should be met and includes a Requirements Traceability Matrix.

The ngTMDD standard also includes the following Annexes that provide additional background information on various topics:

- **Annex A, Future User Needs.** This informative annex identifies user needs, requirements, and design details that were identified and considered by the ngTMDD Steering Committee but were ultimately not included in this version of the ngTMDD standard. The rationale for excluding these needs, requirements, and design details is also provided.

Section 1

General Information [Informative]

1.1 Scope

The ngTMDD standard is an informational-level standard that can be used to develop a standard-based system interface for information exchange between one center and another. Prior versions of TMDD (v3.x) included high-level definitions of data concepts written using the ISO 14817 standard, which provided a protocol-independent, high-level definition of how the services will be provided via a systems interface (SI). A project deployment then needs to select a protocol-specific application profile to implement the TMDD-based SI.

1.2 References

1.2.1 Normative References

Normative references contain provisions that, through references in this text, constitute provisions of this ngTMDD standard. Other references in this document provide additional information. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this ngTMDD standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed.

Standard Identifier	Title	Status	Publication Date	Major / Minor Draft #
IETF RFC 3339	Date and Time on the Internet: Timestamps	Published Standard	July 2002	
IETF RFC 4122	A Universally Unique Identifier (UUID) URN Namespace	Published Standard	July 2005	
IETF RFC 8259	The JavaScript Object Notation (JSON) Data Interchange Format	Published Standard	December 2017	
IETF RFC 9110	HTTP Semantics	Published Standard	June 2022	
IETF RFC 3986	Uniform Resource Identifier (URI): Generic Syntax	Published Standard	January 2005	
IETF RFC 7946	The GeoJSON Format	Published Standard	August 2016	
ISO 14817	Transport information and control systems — Requirements for an ITS/TICS central data registry and ITS/TICS data dictionaries, First Edition	Balloted Standard	December 2002	
NTCIP 1201 v03	Global Object (GO) Definitions – Version 03	Published Standard	March 2011	v03.15
NTCIP 1202 v04	Object Definitions for Actuated Traffic Signal Controller (ASC) – Version 04	Balloted Standard	May 2025	v04.11
NTCIP 1203 v03	Object Definitions for Dynamic Message Signs (DMS)	Published Standard	September 2014	v03.05
NTCIP 1204 v03	Environmental Sensor Station (ESS) Interface Protocol	Published Standard	October 2009	v02.24r
NTCIP 1205:2001	Object Definitions for Closed Circuit Television (CCTV) Camera Control	Published Standard	December 2001	v01.08
NTCIP 1207:2001	Object Definitions for Ramp Meter Control (RMC) Units	Published Standard	November 2001	v01.17

Standard Identifier	Title	Status	Publication Date	Major / Minor Draft #
NTCIP 1209 v02	Object Definitions for Transportation Sensor Systems (TSS)	Published Standard	May 2014	v02.18
NTCIP 8004 v02	Structure and Identification of Management Information (SMI)	Published Standard	June 2010	v02.17
SAE-J2266	Location Referencing Message Specification (LRMS)	Balloted Standard	October 2004	
SAE-J2353	Data Dictionary for Advanced Traveler Information Systems (ATIS)	Published Standard	October 1999	
SAE-J2540-2	(R) ITIS Phrase List (International Traveler Information)	Balloted Standard	December 2020	

1.2.2 Other References

The following documents and standards may provide the reader with a more complete understanding of the traffic management C2C environment; however, they do not contain direct provisions required by the ngTMDD standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the ngTMDD standard are encouraged to investigate the possibility of applying the most recent editions of the standard listed.

Identifier	Title
U.S. Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT)	Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT), USDOT, https://arc-it.net
IEEE Std 610.12-1990	IEEE Standard Glossary of Software Engineering Terminology, IEEE, 1990.
IEEE Std 829-2008	IEEE Std 829 IEEE Standard for Software and System Test Documentation, IEEE, 2008.
IEEE Std 1362-1998	IEEE Guide for Information Technology System Definition – Concept of Operations (ConOps) Document, IEEE, 1998.
The NTCIP Guide (NTCIP 9001, v04)	The NTCIP 9001, The NTCIP Guide, v04, AASHTO / ITE / NEMA, published July 2009.

1.2.3 Contact Information

1.2.3.1 Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT)

The Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) may be viewed online at:

<https://arc-it.net>

ARC-IT is the US ITS reference architecture.

1.2.3.2 Federal Highway Administration (FHWA) Documents

U.S. Department of Transportation FHWA documents (with designations FHWA-JPO-...) are available at the U.S. Department of Transportation's National Transportation Library, Repository & Open Science Access Portal (ROSA P):

<https://rosap.ntl.bts.gov/>

1.2.3.3 IEEE Standards

IEEE standards can be purchased online in electronic format or printed copy from the following:

Techstreet
6300 Interfirst Drive
Ann Arbor, MI 48108
(800) 699-9277
www.techstreet.com/ieee

1.2.3.4 Internet Documents

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www.rfc-editor.org
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1.2.3.5 ITE Standards

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1.2.3.6 NTCIP Standards

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1.3 Terms

The following terms, definitions, acronyms, and abbreviations are used in this document.

Agency: An agency is the administrative organization that owns centers and center entities or assets in a center-to-center environment.

Center: In the context of this standard, a center is a connection point on a network capable of exchanging messages with other centers. The information published in an ngTMDD data feed may be gathered from many types of systems, ranging from large multi-computer environments that include cloud services, on-premise computers, or hybrid configurations to a simple laptop, and may be associated with a similar wide range or span of command and control in any given local government agreement or incident deployment.

Center-to-Center (C2C): Communications between two or more central management systems is called C2C. This includes peer-to-peer communications between any number of system computers in a many-to-many network.

Center Active Verification: This refers to a check to determine whether a center is still active on a communications network, such as a C2C infrastructure. A center is considered active if it receives and responds to messages that are sent to it.

Contact: A contact is a concept that fits either an individual person or a specific named role at an organization or center. Examples of named roles would be the key operator at a TMC or a police dispatcher for a city.

Current Event: A current event is defined broadly to include any set of on-going travel circumstances an agency may wish to report. This includes incidents, descriptions of road and traffic conditions, road closures, recommended detours, weather conditions, current construction, and current special events, whether expected or unexpected.

Data Owner: A data owner is an organization that generates and owns the information.

Data Users: Data users are the operators or subsystems that receive information via the C2C infrastructure for the purpose of decision making, internal control (i.e. control strictly within the TMC), analysis, and/or dissemination.

Dialog: A dialog is defined as a sequence of data exchanges between two different parts of a message-passing system that connect and communicate with each other.

Entity: The abstract objects managed by a system are called entities. The C2C entities include event reports, devices, agencies, and response plans.

External Center (EC): An external center is a unique combination of an organization name and center name that uses the C2C services provided by another center.

Filter: A filter represents the criteria to be used by an Owner Center (OC) in preparing an information response specified by an EC request. When multiple filter criteria are specified in an information request, they are ANDed together.

Event: An event is any situation that may impede movement across the transportation network.

Forecast Event: A forecasted event is a predicted event, such as weather forecasts or roadway conditions, based on an estimation or calculation of conditions.

Interoperability: Interoperability is the ability of two or more systems or components to exchange information and use the information that has been exchanged.

Inventory: For the purposes of this standard only, data elements whose values are not expected to change more than once in a 24-hour period are classified as inventory data elements. Otherwise, the data element is classified as a status data element.

Linear Reference: A location reference marker along a roadway, generally on a shoulder, indicating its location along a route is referred to as a linear reference. An example of a marker is a milepost.

Link: A link is defined as a roadway or transit right-of-way between two nodes.

Matrix Signs: A matrix sign is a dynamic message sign that uses an array of pixels to display a message or part of a message (e.g., a line or character). Matrix signs are typically variable message signs because the pixel array allows for a large variety of possible displays, including full-color graphic displays.

Message Pattern: A message pattern describes how two different parts of a message-passing system connect and communicate with each other. For TMDD, the message-passing system consists of an OC and an EC (See 2.3, Figure 1).

Node: A node is a point within a network. Nodes provide a geographic location that can represent the beginning and end points of a link, location of a device, intersection, or location of an event.

Object Class: An object class is a description of a set of objects that share the same properties, relationships, and semantics within a given domain of discourse about which there is a need to represent some information.

Operations Users: Operations users are those operators or subsystems that participate in the OC operations that use and process information and control exchanges with external centers.

Organization: An organization is an entity that is an owner, operator, maintainer or is responsible for a center, a system, or a device. An organization is a critical concept in C2C as most identifiers are created and allocated at the organization level. Examples of an organization include a state department of transportation (DOT) district or a city transportation department.

Organization Identifier: An organization identifier is a unique identifier for organizations.

Owner Center (OC): An Owner Center is a center, such as a TMC, that provides information developed or stored within it (e.g. event information) to another center and/or has direct control of field devices. In the context of the most common dialogs used by this standard, the Owner Center publishes information or provides responses to a request from an EC.

Owner Organization: An owner organization is the organization that operates, maintains, or manages the center, system, or devices, even if they were paid for by another agency.

Planned Event: A planned event is a construction event or special event that is projected to occur and may include timeline schedule elements.

Publish/Subscribe: Publish/subscribe is an asynchronous messaging paradigm where senders (publishers) of messages are not programmed to send their messages to specific receivers (subscribers). Rather, published messages are characterized into classes. Subscribers express interest in one or more classes and only receive messages that are of interest. Subscribers may also constrain when messages are delivered—on an event-driven basis (such as only when information is updated), periodic basis (such as weekly), or a scheduled basis (on specified dates and times).

Request/Response: Request/response, also known as request/reply, is a message exchange pattern in which a requestor sends a request message to a replier system that receives and processes the request, ultimately returning a message in response.

Route: A route is a collection of links. It is assumed that the collection of links are contiguous. That is, all links except for the first and last link are “joined” by one other link within the collection on both ends.

Route Designator: A route designator is an alpha-numerical assignment for a route. Examples include interstate routes, U.S. routes, and state routes.

Status: For the purposes of this standard only, data elements whose values are expected to change more than once in a 24-hour period are classified as a status data element. Otherwise, the data element is classified as an inventory data element.

Subscribe: See Publish/Subscribe.

System Interface: A shared boundary across which information is passed.

Traffic Management Center: The traffic management center is the combination of the hardware and software located in the center, including operators and maintenance personnel, policies and procedures, and other entities.

1.4 Abbreviations

The abbreviations and acronyms used in this document are defined below.

AASHTO	American Association of State Highway and Transportation Officials
AES	Advanced Encryption Standard
ARC-IT	Architecture Reference for Cooperative and Intelligent Transportation
ATIS	Advanced Traveler Information Systems
BOS	Blank Out Sign
BSM	Basic Safety Message

C2C	Center-to-Center
CFR	Code of Federal Regulations
CMS	Changeable Message Sign
ConOps	Concept of Operations
CRC	Cyclic Redundancy Check
CRUD	Create, Read, Update, and Delete
CSF	Cybersecurity Framework
CV	Connected Vehicle
CVPFS	Connected Vehicle Pooled Fund Study
DMS	Dynamic Message Sign
DNS	Domain Name System
DOT	Department of Transportation
DSRC	Dedicated Short Range Communication
DTLS	Datagram Transport Layer Security
EC	External Center
ECLA	External Control Local Application
ESS	Environmental Sensor System
FCC	Federal Communications Commission
FHWA	Federal Highway Administration
FIPS	Federal Information Processing Standard
FO	Functional Object
FTP	File Transfer Protocol
GeoJSON	Geospatial JSON (see JSON)
GNSS	Global Navigation Satellite System
GO	Global Object
GPS	Global Positioning System
HAR	Highway Advisory Radio
HOV	High Occupancy Vehicle
ICT	Incident Clearance Time
IEEE	Institute of Electrical and Electronics Engineers
IOO	Infrastructure Owner/Operator
IP	Internet Protocol
ISO	International Organization for Standardization
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
JPO	Joint Program Office
JSON	JavaScript Object Notation
LCS	Lane Control Signal
MPH	Miles per Hour
MU	Mobile Units
MUTCD	Manual of Uniform Traffic Control Devices
NEMA	National Electrical Manufacturers Association

NIST	National Institute of Standards and Technology
NRTM	Needs to Requirements Traceability Matrix
NTCIP	National Transportation Communications for Intelligent Transportation Systems Protocol
OBE	Onboard Equipment
OC	Owner Center
OEM	Automotive Original Equipment Manufacturers
PATH	Partners for Advanced Transportation Technology
PER	Packet Error Rate
PKI	Public Key Infrastructure
PPP	Precise Point Positioning
PTZ	Pan, Tilt, and Zoom
RCT	Roadway Clearance Time
RFC	Request for Comment
RMC	Ramp Meter Control
RSU	Roadside Unit
RTM	Requirements Traceability Matrix
SAE	SAE International
SCMS	Security Credentials Management System
SDO	Standards Development Organizations
SEP	Systems Engineering Process
SI	Systems Interface
SME	Subject Matter Expert
SMI	Structure and Identification of Management Information
SSL	Secure Socket Layers
TBC	Time Based Change
TIM-PM	Traffic Incident Management Performance Measures
TLS	Transport Layer Security
TMC	Traffic Management Center
TSC	Traffic Signal Controller
TMDD	Traffic Management Data Dictionary Standard for Center-to-Center Communications
TSCBM	Traffic Signal Controller Broadcast Message
URL	Uniform Resource Locator
USDOT	United States Department of Transportation
UTC	Coordinated Universal Time
V2I	Vehicle-to-Infrastructure
VRU	Vulnerable Road User
WWW	World Wide Web
XML	Extensible Markup Language

Section 2

Concept of Operations [Normative]

Section 2 defines the user needs addressed by subsequent sections of this ngTMDD standard. Accepted system engineering processes detail that requirements should only be developed to fulfill well-defined user needs. The first stage in this process is to identify the ways in which the system is intended to be used. In the case of the ngTMDD standard, this first stage entails identifying the needs that centers have to share traffic management information in a consistent, interoperable manner.

This concept of operations provides the reader with the following:

- a) A detailed description of the scope of the ngTMDD document;
- b) An identification of the key capabilities and interfaces for ngTMDD; and
- c) An understanding of the perspective of the developers of this document.

Section 2 is intended for all readers and users of the ngTMDD standard, including the following:

1. **Transportation Managers.** IOO personnel responsible for making decisions about operational strategies to implement and managing transportation field devices.
2. **Transportation Operators.** IOO personnel responsible for monitoring and controlling the transportation infrastructure and implementing transportation strategies.
3. **Transportation Engineers.** IOO personnel responsible for planning or designing the transportation infrastructure.
4. **Maintenance Personnel.** IOO personnel responsible for ensuring that transportation field devices operate as intended.
5. **Third-Party Data Providers.** Other entities that provide traffic, device, vehicle, or event data.
6. **System Integrators.** Entities that bring together different components or subsystems into a whole system that functions together.
7. **Application Developers.** Developers providing applications that run from a central server, cloud service, or back-office location.
8. **Testers.** Entities that develop test procedures to verify the traffic management data is consistently and reliably provided by IOOs or third-party providers, and properly used by applications.

For the first five categories of readers, Section 2 is useful to understand what traffic management data should be provided.

For the last three categories of readers, Section 2 provides a more thorough explanation of why the more detailed requirements appear later in the standard.

2.1 Tutorial [Informative]

A concept of operations describes a proposed system from the users' perspective. Typically, a concept of operations is used to ensure that system developers understand the users' needs. Within the context of this ngTMDD standard, the concept of operations documents the intent of each capability that the standard provides.

The terms "Normative" and "Informative" are used to distinguish parts of this ConOps that must be conformed to (Normative) and those that are there for informational purposes (Informative). It is possible for a section to be identified as Normative but have subsections that are identified as Informative. If a section is Normative then all of its subsections are Normative unless identified otherwise. This entire ConOps section is Normative unless otherwise indicated.

The concept of operations documents key aspects of the proposed system, including the following:

- **Current Situation, Problem Statement and Goals (Section 2.2).** This section describes the current usage of the TMDD, the problems that this next generation version of the standard seeks to address and key goals the ngTMDD update effort will attempt to address.
- **Reference Physical Architecture (Section 2.3).** The reference physical architecture (view) defines the overall context of the traffic management C2C system and defines what components and interfaces are addressed by this ngTMDD standard. The reference physical architecture is supplemented with one or more samples that describe how the reference physical architecture may be realized in an actual deployment.
- **Needs (Section 2.4).** The needs identify and describe the various capabilities that users want for sharing of traffic management data between centers. These needs are refined and organized into a manageable structure that forms the basis of the traceability tables contained in Section 3.
- **Operational Scenarios (Section 2.5).** The operational scenarios allow a reader to understand the different parts of the proposed capabilities of the standard and how they interact; and may highlight situations where an ambiguity or gap currently exists with current TMDD.

The other sections of this ConOps are as follows:

- **Operational Policies and Constraints (Section 2.6).** A narrative description of specific policies or constraints relative to the operational environment that have a direct impact on the implementation of this ngTMDD standard.
- **Relationship to the Architecture Reference for Cooperative and Intelligent Transportation [Informative] (Section 2.7).** This section describes how a ngTMDD implementation fits into the ITS National Architecture.

Section 3, Requirements, uses the needs identified in the analysis of the system to define the various requirements for the ngTMDD standard. Each user need traces to one or more requirements, and each requirement is derived from at least one need. This traceability is documented in a needs to requirements traceability matrix (NRTM) where each user need will map to all the requirements that fulfill that need.

Like user needs, the requirements are identified by a collaboration of a broad base of stakeholders and some are drawn from existing documents. Each requirement is formally captured in Section 3, along with the rationale for its inclusion. Each requirement identified is then presented in the Requirements Traceability Matrix (RTM) in ngTMDD Volume 2, which defines how the requirement is fulfilled.

2.2 Current Situation, Problem Statement and Goals [Informative]

2.2.1 Current Situation and Problem Statement

The current TMDD (TMDD v3.1) is a mature standard, but needs to evolve to address new and emerging operational needs and industry trends. The most notable of these trends is the emergence and role of private non-infrastructure owner/operators that collect and manage real-time transportation data. There is a need to share more granular data through a systems- to-systems approach to support multiple entities in achieving common operational goals. One keygap, however, is locational accuracy where lane-specific details about an event or device are required in addition to having a map (sometimes provided by a third party) that provides high precision position information about the transportation infrastructure. Early electronic maps were rudimentary at the onset compared to today's maps, and operations staff had to know the road network well to compensate for limited resolution and data gaps. TMDD messages and data elements were originally designed to share general information on roadway event types (e.g., incidents, construction) rather than share information on the specific details of an event, such as identifying the specific lane where an incident occurred on a map. Other industry and agency concerns to be addressed by ngTMDD include:

- TMDD does not align with the Traffic Incident Management model;
- TMDD is unable to exchange discrete microscopic data at the unit vehicle level as the TMDD is designed to exchange aggregate (macroscopic) data;
- TMDD is not designed for data from mobile sources (such as roadway weather data from snowplows), probe data, mobile/portable DMS, or connected vehicles.

- TMDD does not easily support simpler, more streamlined standard open file formats such as JSON
- TMDD does not easily provide the capability for local agencies to participate in publishing TMDD data

2.3 Reference Physical Architecture [Informative]

The TMDD standard defines the interface communications from an Owner Center (OC) to an External Center (EC), who can consolidate information from multiple owner centers and distribute it to other centers. Figure 1 shows a conceptual picture for the operational environment that surrounds the C2C interface covered by this standard. Where the information transfer relates to field devices or vehicles (as shown in the figure), the owner center will often be a TMC, but can be a third party that collects data from field devices. For other types of information transfers (e.g., event information) the owner center is the center that originates (and therefore “owns”) the information.

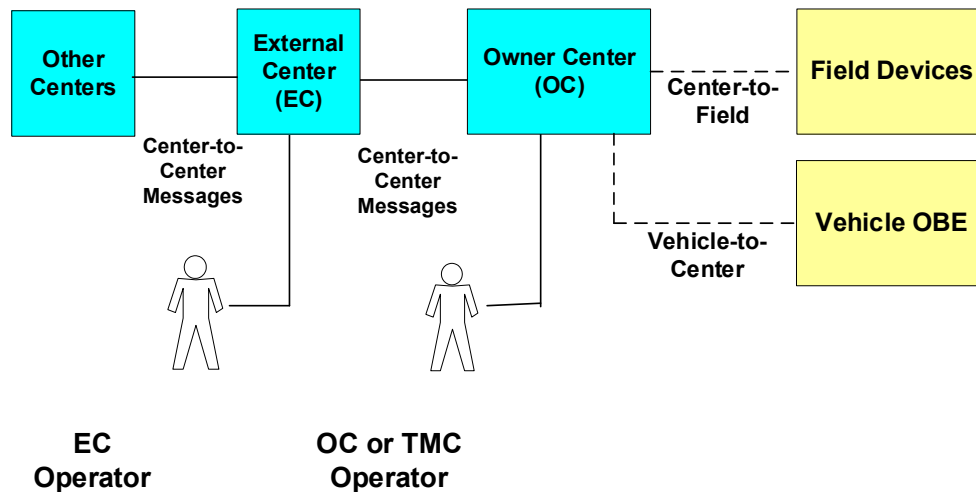


Figure 1 External TMC Communications Environment.

Based on Figure 1, this standard is concerned with identifying the communication needs between centers. This communication may be between two individual centers, between multiple centers, or between individual centers and a regional center (or data hub). Based on current practice, these may be physical locations or cloud-based environments.

The components that interact to provide the benefits of the TMDD are described below.

- **External Center.** Any center, whether virtual, mobile, or stationary, interacting with an Owner Center. Typically used to describe a third-party center, such as a back-office or cloud.
- **Owner Center.** Whether mobile, or stationary – as in a building – this represents the centers that directly collect information from Field Devices or Vehicles in order to generate a composite view of conditions on the roadway.
- **Other Center.** Any center, whether virtual, mobile, or stationary, interacting with an External Center. This additional center has been added to clearly show that the standard is meant to cover the case where information is shared with centers that do not originate the information.
- **Field Device.** Devices and electronic systems that inform travelers, monitor, or control operations on a roadway. Examples include traffic detectors or roadside units (for connected vehicle environments).
- **Vehicle On-Board Equipment (OBE).** Vehicle On-board Equipment represents electronic systems in vehicles that can receive roadway status information from center systems (either directly or via roadside equipment)

The TMDD supports communications among centers regarding the centers themselves, their owning organizations, and the entities they manage. TMDD supports many types of center-to-center (C2C) connections as shown in Figure 2, which is meant to be representative, and not exhaustive of the types of interfaces covered by the standard.

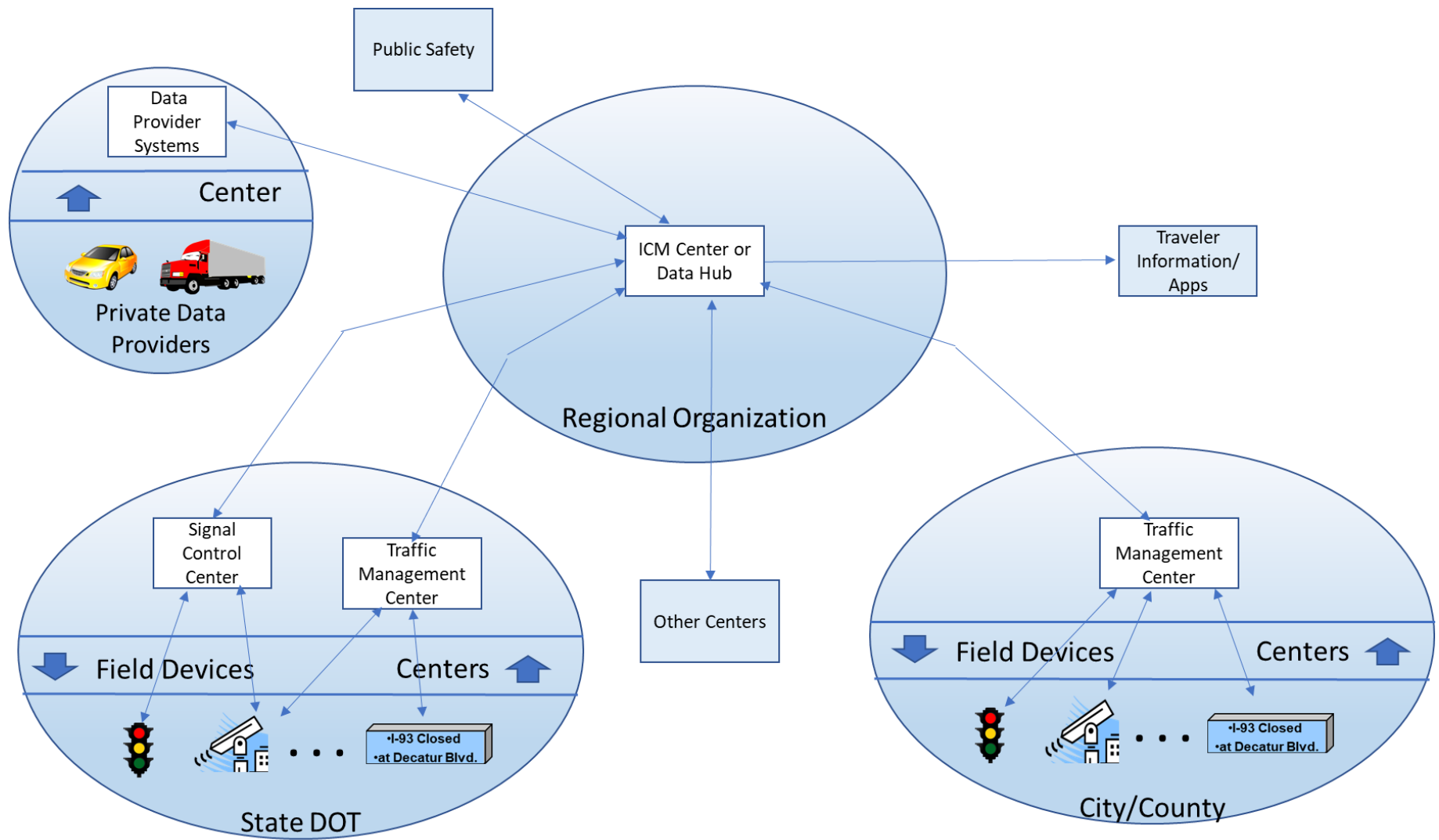


Figure 2 C2C Interfaces supported by TMDD.

2.4 Needs [Normative]

The needs for the next generation TMDD are organized as follows:

- Architectural Needs. These needs identify and describe the various interactions between components using the standard, and higher-level needs that apply to all components and most, if not all, interactions.
- Data Exchange Needs. These needs describe the needs relating to the actual data exchanged between components.

2.4.1 Architectural Needs

2.4.1.1 Architectural Need – Compatibility with related standards data elements [Constraint]

Because centers may want to send other data streams, (e.g., work zone information) in addition to the data provided by ngTMDD (e.g., road network and device data), ngTMDD must support compatibility with the data element definitions used in the other standards. For example, this would allow deployments that support both ngTMDD and work zone information.

2.4.1.2 Architectural Need – Data Hub

Centers need a mechanism to allow aggregation of data from multiple data providers.

Rather than just connecting one center to another, the standard must support centers that collect data from multiple centers and then distribute that information to other centers.

2.4.1.3 Architecture Need – Connection Management

The following sections describe the needs for connection management – verifying that a connection is alive and establishing the message patterns for exchanging information.

2.4.1.3.1 Need to Identify Type of Connection

External centers need to be able to identify the type of connection (e.g., request/response, subscription, and type of subscription) supported by an owner center.

2.4.1.3.2 Need to Identify Time Domains Supported

External centers need to identify the time domains supported for each dialog.

This could include the frequency of communications or the frequency of updates for the information.

2.4.1.3.3 Need to Verify Active Connection

Centers need to verify that a connection with another center is alive or active. If the connection between centers is alive then the information between centers is flowing.

2.4.1.3.4 Need to Support Requests

Centers need to respond to requests for information or changes to information. This message pattern is the ability of an owner center to respond with a single message response to a single message request sent from an external center.

2.4.1.3.5 Need to Support Subscriptions

Centers need to publish information to other centers that have subscribed to receive the information. External centers do not have the ability to determine when information at an owner center has been collected or updated. But by subscribing to information (or information updates), the external center can receive updated information at regular intervals or when the information is updated.

2.4.1.3.6 Need to Identify Active Subscriptions

Centers need to know what subscriptions are currently active between the external center and owner center, the identifiers for that subscription (dialog, data type, and identifier), and subscription parameters (update rate, source and target endpoint, etc.).

To support a subscription capability, it is important for centers to understand which subscriptions are active as well as the parameters relevant to the subscription.

2.4.1.3.7 Need to Identify Failed Subscriptions

Centers need to identify subscriptions that have been interrupted due to system error or other issues.

2.4.1.3.8 Need to Describe Active Subscription Status

Centers need to describe the status of active subscriptions, including message counts within a fixed time period, the most recent transmission date and time, the first transmission date and time, message size for a specific transmission, and list of errors within a fixed time period.

2.4.1.3.9 Support Confirmation Receipts

Centers need data exchanges to contain a confirmation receipt that documents proof of delivery when a data provider sends data to a data consumer. This capability does not necessarily apply to all exchanges but is important for certain types of data (e.g. event responses).

2.4.1.3.10 Support Change-Driven Updates

Centers need to support sending asynchronous updates on data that has changed, and only when it changes (i.e., change-driven updates, or sometimes referred to as event-driven updates).

One benefit of change-driven updates is the resulting smaller packet-size transmissions. A secondary benefit is that change-driven data exchange architectures scale well, thus able to support growing numbers of data consumers and data providers.

2.4.1.4 Architectural Need – Security

2.4.1.4.1 Need to Provide Secure Communications

Centers exchanging data need to have secure communication links on which to share data.

2.4.1.4.2 Need to Verify Authentication for Access

Data providers need a mechanism for authenticating the connection to data consumers.

2.4.1.4.3 Need to Verify Trusted Source of Information

Centers exchanging data need to verify whether a data provider is a trustworthy source.

For example, one mechanism to accomplish this is verification of a trusted sources using security certificates and signing of data.

2.4.2 Data Exchange Needs

2.4.2.1 Data Needs Relating to Organizations, Centers, and Contacts

To support the exchange of other types of data it is important to share information about the organization, centers, and contacts that are connected. Additionally, this information can be used to help operations personnel contact the other centers with which they do not often coordinate. Also, the contact information for each center is important as a prerequisite for shared control.

2.4.2.1.1 Need to Provide Information Relating to Organization and Centers

Centers need to exchange organization, center, and contact information.

This includes:

- Organization name and identification;
- Center site-level information; and
- Contact personnel who contribute to or use C2C data.

2.4.2.1.2 Need to Identify Organization that Originates Information

Centers need to identify the organization (or center) that is the data owner, meaning the organization (or center) which created the information that is distributed to external centers.

Centers share information that they own, but they also share information that originates in other centers. It is important that the receiving center understands which organization originated (and may own) the information received. For example, information related to a shared, multi-jurisdictional incident response should include information identifying all of the organizations involved in the response and the level of involvement (such as information only, activation of owned assets, routing through organization road network, traveler notification responsibilities, etc.) and the ownership of transportation assets involved within the response. Centers that provide information received from other sources (with appropriate permission) should identify the organization that originated the information. Usually, the originator of the information is also the data owner of the information. Key to this identification will be an Organization Identifier, which will provide a unique ID for the source of the data.

2.4.2.1.3 Need to Identify Level of Confidentiality of Information

Centers need to be able to identify the level of confidentiality on the information shared with other centers.

Information that is shared between centers may have different levels of confidentiality. A designation could be included within the record indicating if the information must remain private, can be shared within a specific regional agreement, or is public. The data owner (or originator) assigns the level of confidentiality associated with the information.

2.4.2.2 Data Needs to Share Event Information

Centers need to share event information to support situational awareness and to facilitate the coordination of activities and resources. Event information can include incidents, road closures, recommended detours, obstructions, traffic conditions, weather conditions, evacuations, security events, and natural and man-made disasters.

Event information includes data entered manually by the operations staff as well as data automatically collected. Based on the center's use of the data and the type of data, a center may desire constant updates on virtually all entities (for example, a traveler information system), or may only desire status information for selected entities upon request (for example, a geographically remote center may only be interested in major status changes or major events, or the center may only be able to handle a certain amount of data).

2.4.2.2.1 Need for an Index of Events

Centers need an index of events that provides a short synopsis of all events currently being tracked by a center.

Centers may be tracking multiple events at any one time. Once an event is entered into a center's system, it will remain as a tracked event until the event is terminated or the duration has ended.

2.4.2.2.2 Need for Current Event Information

External centers need to obtain current event information from owner centers such as a description, location, severity, hazardous materials involved, and status of the event.

Current event information is exchanged between centers so that events can be known to other centers that may need situational awareness or need to react operationally with internal response plans.

2.4.2.2.3 Need for Planned Event Information

External centers need to obtain planning information about events from owner centers, including projected start and end times, location and extent.

Planned event information is exchanged between centers so that events can be known to other centers, which may need to react operationally with internal coordination plans.

2.4.2.2.4 Need for Forecasted Event Information

External centers need to obtain forecasted information about events from owner centers, including forecast start and end times, and the conditions forecasted.

Forecasted event information (e.g., weather and roadway conditions) is also critical to event management so that forecasts can be known to other centers, which may need to react operationally.

2.4.2.2.5 Need to Share the List of Events

Centers need to track and share a list of events including changes in status and associated times.

Organizations may respond to queries from other organizations about how a current event was managed; the timeline of activities related to the event; and what information was communicated when and with what centers. Event status can be shared between centers (e.g., detected, confirmed, reported, cleared, closed, updates to ITS devices, planned, and forecast).

2.4.2.3 Data Needs for Event Response Plans

Event response often occurs across a range of organizations who must coordinate their responses to different types of events or incidents. Coordination of a response across multiple jurisdictions can significantly improve conditions for travelers and the organizations involved in ways that are not possible for individual responses. As automated implementation of these responses become the norm and advanced decision support systems and other tools become more widespread, the sharing of response plan information across organizations becomes important. These response plans are a way to minimize traffic impacts and improve safety when events occur, whether planned or unplanned.

Response plans contain information linking the response(s) to an event, actions being suggested for implementation, timing for the actions being taken, organizations and centers involved, approvals required and given by different organizations, and selection criteria. Response plans, as used in the needs below, represent both planning and actual response activities. The following user needs address the management of event response plans.

2.4.2.3.1 Need to Distribute a Set of Proposed Response Plans to an Event

Centers need to exchange a set of possible response plans relating to an event. The response plans can be for a specific current event or for an event category (e.g., one direction of highway is completely blocked).

Coordination of a response often requires approval by multiple organizations. Alternatives may need to be presented in order to select a response that meets the approval criteria for all organizations involved in the response. Each response plan may also provide selection criteria or ranking information to assist organizations in selection or approval processes.

2.4.2.3.2 Need to Correlate Response Plan with an Event

Centers need to correlate the identity of the event with the response plan or plans that have been generated for that event.

Centers need to share a list of potential responses to an event along with selection criteria or ranking information to allow participating organizations to select and approve a response plan for a specific event.

2.4.2.3.3 Need to Share Response Plan List of Organizations

Centers need to share a list of the active participants that are responsible for implementing elements of the response plan as well as the informational actors that receive response plan information but are not active in execution of the response plan.

Organizations can be participating in the response, implementing aspects of the response, or may have an active role in dispensing information regarding the response.

2.4.2.3.4 Need to Share Response Plan Assets and Activities

Centers need to share information about which assets and activities are involved within the response plan.

Assets and activities are involved in the implementation of any event response plan. These include signal timing changes, traffic rerouting, messages on DMS, ramp meters and metering changes, and other actions required for implementation of a response plan.

2.4.2.3.5 Need to Share Status of Response Plans

Centers need to share the status of a response plan, including its selection status, approval status, and implementation status.

A response plan must be selected from a set of alternatives, approved by the relevant organizations, and then implemented. It is important that all relevant organizations understand the status of the response plan to understand their roles and responsibilities.

2.4.2.3.6 Need to Share a Log of Response Plan Activities

Centers need to be able to share a log of response plan activities, including the results of individual actions and their command results.

A response plan involves a series of activities or actions. Creating a log of the activities and the time of their implementation is important to both the response itself, and to any after action review of the response.

2.4.2.3.7 Need to Request Approval of a Response Plan

Centers need to be able to request approval from another center to implement that center's portion of the response plan.

Response plans that involve multiple organizations may require approval from the individual organizations for their implementation.

2.4.2.3.8 Need to Provide Approval of a Response Plan

Centers need to be able to provide approval to implement their organization's portion of the response plan or be able to reject a portion of the response plan.

Just as centers must be able to request approvals for portions of the response plan, these approvals must be disseminated so that each organization is aware of the portions of the response plan being implemented.

2.4.2.3.9 Need to Update a Response Plan

Centers need to be able to distribute updated response plans for approval and implementation.

Response plans are not static, particularly for long-lived events and due to changing conditions often require updating. Sometimes an event results in secondary or additional events.

2.4.2.3.10 Need to Cancel a Response Plan

Centers need to be able to indicate cancellation of a response plan or response activities.

Organizations will need the ability to indicate the end of event response activities, either when the event response activities are complete and conditions have returned to normal, or in the event of a failure of the

response activities or other emergency. In a multi-jurisdiction or multi-organization situation, this can include the need to get the approval to terminate response activities, as different jurisdictions may be in different situations and different points in the response life cycle.

2.4.2.3.11 Need to Request Cancellation of Event Response Plan Activities

Centers need to be able to request cancellation of a response plan or of their portion of the response plan.

The cancellation of response activities may rely on coordination activities across organizations and may be terminated only by another organization.

2.4.2.3.12 Need to Indicate Cancellation of Event Response Plan Activities

Centers need to be able to indicate to other centers that their response plan activities (or portions of their activities) have terminated.

When each center's activities relating to the response plan are terminated is an important point in the event timeline that must be shared across coordinating centers.

2.4.2.4 Data Needs Relating to Roadway Network Data

A traffic network represents a collection of roadway nodes, links and routes. A node is the smallest data element that is unique within a network. Nodes provide a geographic location that can represent the beginning and end points of a link, location of a device, intersection, or location of an incident. A route is a collection of links.

When a center elects to participate in a C2C environment, it may make available to other centers its traffic network information, which it uses to reference location of its center entities.

2.4.2.4.1 Need for Roadway Network Inventory

The traffic network inventory sharing provides operation centers within the C2C network a list of nodes (points), links (line segments), and routes that compose the roadway network.

2.4.2.4.1.1 Need for Node Inventory

Centers need to share node inventory using a standardized road or map referencing, including a description, unique identification, and spatial information for all nodes in the traffic network.

2.4.2.4.1.2 Need for Link Inventory

Centers need to share link inventory using a standardized road or map referencing, including a description, unique identification, and spatial information for all links in the traffic network.

2.4.2.4.1.3 Need for Route Inventory

Centers need to share route inventory using a standardized road or map referencing, including a description, type, unique identification, and spatial information for all routes in the traffic network. Example route types include travel routes (typically used to create travel times), transit routes, alternate routes, and detour routes.

2.4.2.4.1.4 Need to Share Vehicle Inventory

Centers need to share vehicle inventory, including vehicle identifiers and vehicle types (e.g., transit, public safety, and maintenance).

2.4.2.4.2 Need to Share Node, Link and Route Status

Centers share current status information about the traffic network they operate, which may help other centers perform route planning or traffic management within their jurisdiction.

2.4.2.4.2.1 Need to Share Node State

Centers need to share the state of a node as: open, closed, or restricted. An example of a restricted state

is an intersection open to emergency vehicles only.

2.4.2.4.2 Need to Share Link State

Centers need to share the state of a link: open, closed, or restricted. An example of a restricted state is a high-occupancy vehicle lane. Another example would be where a single lane is closed due to an incident.

2.4.2.4.3 Need to Share Route State

Centers need to share the state of a route as: open, closed, or restricted. An example of a restricted state is a bus rapid transitway.

2.4.2.4.3 Need to Share Link Data

Centers need to share link data including volume, occupancy, speed, and travel time. Link data sharing provides operations centers within the network a general status of links in the traffic network. Link data can be derived from multiple sources and is defined by the field detection that is supporting operations for the operations center. Link data can be fused from many sources and applied to the appropriate links or roadways on the traffic network to provide information to TMCs to assist in reporting incidents or slowdowns.

2.4.2.4.4 Need to Share Route Data

Centers need to share route data.

Route data when combined with other information allows calculation of route travel time. Centers exchange route travel time with other centers, which in turn may be provided to travelers and other public organizations to help them plan routes.

2.4.2.4.5 Need for Fleet Vehicle Information

Centers need to share data about fleet vehicles, including location and speed.

This is relevant for snowplows and service patrol vehicles where centers want to share the location and speed data that can indicate where these key assets are and what they are doing.

2.4.2.5 Data Needs Relating to Device Data and Device Control

This section describes three types of data relating to devices:

- Sharing of device data;
- Requesting device control; and
- Control of devices by an external center.

The specific needs associated with each type of device are identified in the following sections. An external center may desire to receive data from devices under the control of an owner center or may need to request device control actions for devices connected to the owner center.

Regarding a request for device control, the data dictionary standard should allow a mechanism by which an external center may make a request for controlling a field device and receive a response for this request; however, the standards are neutral as to the institutional policies that a specific organization may wish to put in place in order to approve or deny the request.

Regarding direct remote control of field devices, a key reason an external center may wish to do this (and an owner center may wish to allow it) is that many traffic control centers do not stay open 24 hours a day, 7 days a week, and a second center would take over control when the first center is not in operation. Most traffic operations centers are scheduled to be open when the value of the operations is high compared to the cost of keeping them closed. For some centers, this means that they are closed during the night and/or during weekends. Nonetheless, conditions may arise during these periods that require use of the field equipment. In these cases, the center may wish to allow another external center to have control of some of the field equipment.

Due to the various liability concerns involved with controlling traffic control devices, each organization will need to establish its own institutional policies defining under what conditions an external center may exert control upon a device. These policies may include:

- An operator to manually process the request;
- A computer to automatically approve/deny the request; and
- Some combination of operator and computer to process the request.

2.4.2.5.1 Need to Share Traffic Detector Data

Traffic detectors measure traffic volume, occupancy and speed. Traffic detector data are used by centers to:

- monitor the surface transportation system;
- support toll collection;
- determine system performance; and
- quantitatively measure how well an ITS system helps to improve incident response.

2.4.2.5.1.1 Need to Share Detector Inventory

Centers need to exchange traffic detector inventory information so that detection devices that are operated by a center can become known to other centers. Inventory information includes static device attributes such as:

- Location (including lane information); and
- Type of detector (technology).

2.4.2.5.1.2 Need to Share Updated Detector Inventory

Centers need to exchange updated inventory information as detection devices are added, removed, or changed. As centers add, remove, or change traffic detection devices, the updated inventory should be provided to other centers, without requiring operator intervention. Changes may include the traffic detector device location, or technology.

2.4.2.5.1.3 Need to Share Detector Status

Centers need to exchange status information for each detector device. Status information includes:

- Communications status (connected, disconnected, failed);
- Operational status (available, not-available); and
- Current operational state information (presence/pulse, etc.).

2.4.2.5.1.4 Need for Detector Metadata

Centers need to exchange detector metadata. Metadata about traffic detectors and sensors needs to be captured to aid in determining the quality of the traffic detector and sensor information and to describe how the data was collected.

2.4.2.5.1.5 Need for Detector Data Correlation

Detector information needs to be correlated with roadway geography (links and nodes) and a specific lane. This allows an external center to relate detector data to specific routes, links and nodes of the traffic network.

2.4.2.5.1.6 Need for Detector Data Sharing

Centers need to exchange current traffic data from the detectors. This traffic data includes volume, occupancy and the speed of the vehicles associated with the detector. Depending on the availability and needs, the subject data could be provided as raw or processed data.

2.4.2.5.1.7 Need for Detector History

Centers need to exchange data about the maintenance history of traffic detectors to check the quality of the data collected as defined by the metadata. The maintenance history may include when a detection device was installed, its historical operational status and when a detector device was under repair.

2.4.2.5.2 Need to Share CCTV Camera Status and Control

Closed circuit television (CCTV) cameras are used by centers to help view the surface transportation system. CCTV devices can be used by centers to:

- Verify the existence of reported traffic congestion;
- Determine what assistance may be needed by the incident;
- Monitor the progress of incidents, construction, and special events;
- Determine when the residual congestion from an incident is cleared;
- Provide visual images to the public as to the state of the roadway; and
- Determine what type of emergency services need to be dispatched.

2.4.2.5.2.1 Need to Share CCTV Device Inventory

Centers need to exchange CCTV inventory information so that CCTV devices that are operated by a center can become known to other centers. This feature allows the capabilities of the CCTV devices operated by the owner center to become known to external centers. Inventory information includes static CCTV device attributes such as:

- Location;
- Capabilities (pan, tilt, zoom, focus, BW/Color); and
- Limits (tilt).

2.4.2.5.2.2 Need to Share Updated CCTV Device Inventory

Centers need to exchange updated inventory information as CCTV devices are added, removed, or changed. As centers add, remove, or change CCTV devices, the updated inventory should be provided to other centers, without requiring operator intervention. Changes may include the CCTV device location or technology.

2.4.2.5.2.3 Need to Share CCTV Device Status

Centers need to exchange status information for each CCTV device. Status information includes:

- Communications status (connected, disconnected, failed);
- Operational status (available, not-available); and
- Current operational state information (orientation of the CCTV camera (direction), if current view is available for public dissemination, etc.).

2.4.2.5.2.4 Need to Request Control of a Remote CCTV Device

Centers need to be able to request a change to the parameters of a CCTV device, such as the camera position, operated by another center.

When a control request is received the center that controls the CCTV device needs to determine if the requested control will be implemented, queued, or rejected. Then, the center that controls the CCTV device needs to send a response to the center that originated the request describing the status (action taken) on the control request.

2.4.2.5.2.5 Need to Verify CCTV Control Status

The center that sends a control request for a CCTV device operated by another center needs to verify the status of the control request. The status may be that the request was implemented, was queued, or was rejected.

2.4.2.5.2.6 Need to Cancel CCTV Control Requests

Centers need to be able to “cancel” a CCTV control request so the owner center knows that the control is no longer required.

2.4.2.5.2.7 Need to Share CCTV Image Links

Centers need to be able to share the link (e.g. Uniform Resource Locator (URL)) at which CCTV images are displayed.

CCTV images (either streaming or snapshots) are often put on-line and the URL information can be shared with centers to allow them to access camera images across a region.

2.4.2.5.2.8 Need to Control a Remote CCTV Device

Centers need to be able to send control commands to remotely control a CCTV that is normally managed by an external center.

In the case that one center must take over operation of a remote center, then that center must be able to directly control a CCTV device controlled by the remote center.

2.4.2.5.3 Need to Share DMS Status and Control

DMS are used by centers to help manage the surface transportation system. They can be used to:

- Provide travelers with information that helps the travelers select routes;
- Inform travelers about traffic congestion;
- Inform travelers about travel times;
- Inform travelers about roadway or traffic conditions;
- Inform travelers about planned activities that may affect traffic conditions;
- Provide information about transportation alternatives;
- Provide other public service announcements;
- Provide information about truck parking space availability; and
- Park and Ride (part of mobility hubs).

2.4.2.5.3.1 Need to Share DMS Inventory

Centers need to exchange DMS inventory information so that DMSs operated by a center can become known to other centers. Centers need to exchange DMS device attributes so that the capabilities of the DMS devices operated by the owner center can become known to external centers.

Inventory information includes static DMS device attributes such as:

- Location (including direction of traffic the DMS is facing);
- Size (physical dimensions, characters per line, number of lines); and
- Type (technology, permanent, portable, or virtual).

2.4.2.5.3.2 Need to Share Updated DMS Inventory

Centers need to exchange updated inventory information as DMSs are added, removed, or changed. As centers add, remove, or change DMSs, the inventory should be provided to other centers, without requiring operator intervention. Changes may include the DMS location or technology.

2.4.2.5.3.3 Need to Share DMS Status

Centers need to exchange status information for each DMS. Status information includes:

- Communications status (connected, disconnected, failed);
- Operational status (available, not-available); and
- Current operational state information (contents of the display on the sign, etc.).

2.4.2.5.3.4 Need to Request to Display a Message on a Remote DMS

Centers need to request that a specific message be displayed on a DMS controlled by another center. Messages may be either freeform text messages, in MULTI-string format; in the form of a graphical image representing the suggested display; or from a library associated with the DMS.

When a control request is received the center that controls the DMS needs to make a determination if the message will be implemented, queued, or rejected. Then, the center that controls the DMS needs to send a response to the center that originated the request describing the status (action taken) on the control request.

2.4.2.5.3.5 Need to Verify DMS Message Request Status

The center that sends a request to display a specific message on a DMS operated by another center needs

to confirm if the message was displayed. Possible statuses include that the message request was implemented, was queued, or was rejected.

2.4.2.5.3.6 Need to View DMS Message Queue

The center that sends a request to display a specific message on a DMS operated by another center needs to view the message queue for that DMS device if the request has been queued.

This control model assumes that there may be competing priorities for the use of a DMS and that a center may implement a queue or priority list of the control requests received, whether from the owner center itself or external centers, and their priority. External centers thus need to be able to read this queue to determine where their specific request to display a message currently “sits.”

2.4.2.5.3.7 Need to Cancel DMS Message Requests

Centers need to be able to “cancel” a request to display a message on a DMS operated by another center. Once a message displayed on another center’s DMS is no longer needed, a center should be able to cancel the message.

2.4.2.5.3.8 Need to Share DMS Message Appearance

Centers need to exchange information on how a message actually appears on the active face of a DMS operated by another center. Centers should properly confirm how a message will look on a DMS controlled by another center. How a message appears on a DMS may vary based on the physical attributes of the DMS (color, number of lines, number of characters per line, physical size, etc.) and its capabilities (fonts supported, MULTI-tags support, default values, etc.). Centers should send either freeform text messages, in MULTI-string format, or from a library associated with the DMS. The responding center may also send a graphic file of the predicted display.

2.4.2.5.3.9 Need to Share DMS Message Inventory

Centers need to exchange the contents of a message library from a DMS operated by another center. This message library may be at the DMS itself or at the center. The contents of the message library are needed so that a center may know what messages are available for the DMS.

2.4.2.5.3.10 Need to Share DMS Font Table

Centers need to exchange the contents of the font table for a DMS operated by another center. The contents of the font table are needed so a center may know how a message will appear on the face of the DMS.

2.4.2.5.3.11 Need to Share DMS Graphics Table

Centers need to exchange the contents of the graphics table for a DMS operated by another center. The contents of the graphics table are needed so a center may know how a message will appear on the face of the DMS.

2.4.2.5.3.12 Need to Control a DMS

Centers need to be able to send control commands to a DMS that is normally managed by an external center.

In the case that one center must take over operation of a remote center, then that center must be able to directly control a DMS controlled by the remote (owner) center.

2.4.2.5.4 Need to Share Environment Sensor Data

ESS data are used by centers to assess environmental conditions using atmospheric, surface and subsurface observations, pavement conditions, visibility, and air/water quality. ESSs are generally located near a roadway but may be located in an area that the environmental conditions affect the roadway such as avalanche control. ESS data may be used independently or combined with modeling algorithms for enhancements such as predicting future conditions for fog or roadway icing.

ESS data can be used by centers to:

- Monitor weather conditions;

- Direct maintenance activities;
- Provide weather information to travelers and third-party weather service providers;
- Provide pavement conditions, such as icing and flooding that may reduce roadway capacity;
- Direct traffic operations; and
- Predict future weather conditions.

2.4.2.5.4.1 Need to Share ESS Inventory

Centers need to exchange ESS inventory information with other centers. Centers need to exchange static ESS device attributes so that the capabilities of the ESS sensors operated by the owner center can become known to external centers. Inventory information includes static ESS device attributes such as:

- Station and sensor location (including Global Positioning System (GPS) coordinates and lane information); and
- Type of sensor.

2.4.2.5.4.2 Need to Share Updated ESS Inventory

Centers need to exchange updated ESS inventory information as stations and/or sensors are added, removed, or changed. As centers add, remove, or change stations, or sensors, the updated ESS inventory should be provided to other centers, without requiring operator intervention. This would include mobile ESS devices where location must be routinely updated. Changes may include the ESS device location or technology.

2.4.2.5.4.3 Need to Share ESS Device Status

Centers need to exchange status information for each ESS device. Status information includes:

- Communications status (connected, disconnected, failed); and
- Operational status (available, not-available).

2.4.2.5.4.4 Need to Share ESS Environmental Observations

Centers need to exchange environmental observations collected by the ESS. The ESS environmental observations are needed to assess weather conditions, determine proactive and reactive maintenance and traffic operations and publish appropriate information to consumers.

2.4.2.5.4.5 Need to Share ESS Environmental Observation Metadata

Centers need to exchange environmental observation metadata collected by the ESS. The ESS environmental observation metadata is needed to identify the reporting station, the timestamp of the observation and the type of observation. The ESS environmental and hydrological observation metadata should accompany the observation.

2.4.2.5.4.6 Need to Receive a Qualified ESS Report

Centers need to receive a Qualified ESS Report. Weather service providers process ESS environmental observations with their associated real-time and static metadata, assess the quality of the information, apply quality flags indicating the test results, and disseminate the aggregated data.

2.4.2.5.4.7 Need to Share ESS Organizational Metadata

Centers need to share metadata describing the organization contributing the environmental observation data, access to the data and the ESS sites, stations, and sensors.

2.4.2.5.4.8 Need to Control Remote ESS Devices

Centers need to be able to control a remote ESS device that is normally managed by an external center.

In the case that one center must take over operation of a remote center, then that center must be able to directly control ESS devices controlled by the remote center.

2.4.2.5.5 Need to Share Lane Closure Gate Control

Lane closure gate controls are used by centers to help manage the surface transportation system. Lane closure gates can be used by centers to:

- Allow or deny access to facilities that may periodically close due to road/weather conditions, conflicting operations (such as reversible flow or draw-bridge), or other reasons; and
- Allow or limit traffic flow on specific links based on congestion and/or incidents on the roadways or on adjoining roads.

2.4.2.5.5.1 Need to Share Gate Inventory

Centers need to exchange inventory information so that traffic gates operated by a center can become known to other centers. Centers need to exchange gate device attributes so that the capabilities of the gate devices operated by the owner center can become known to external centers. Inventory information includes static gate device attributes such as:

- Location; and
- Number of lanes.

2.4.2.5.5.2 Need to Share Updated Gate Inventory

Centers need to exchange updated inventory information as gates are added, removed or changed. As centers add, remove, or change gate devices, the updated inventory should be provided to other centers without requiring operator intervention. Changes may include the gate device location or technology.

2.4.2.5.5.3 Need to Share Gate Status

Centers need to exchange status information for each lane closure control gate. Status information includes:

- Communications status (connected, disconnected, failed);
- Operational status (available, not-available); and
- Current operational state information (open or closed, direction of traffic, etc.).

2.4.2.5.5.4 Need to Request a Change for a Remote Gate Control Device

Centers need to be able to request a change in status to a gate control device operated by another center.

When a control request is received, the center that controls the gates need to make a determination if the request will be implemented, queued, or rejected. Then, the center that controls the gate control device needs to send a response to the center that originated the request describing the status (action taken) on the control request.

2.4.2.5.5.5 Need to Verify Gate Control Request Status

The center that sends a request to control a gate device operated by another center needs to verify the status of such a request. The status may be that the control request was implemented or was rejected.

2.4.2.5.5.6 Need to Cancel Gate Control Device Requests

Centers need to be able to “cancel” a gate control device control request so the owner center knows that the control request is no longer required.

2.4.2.5.5.7 Need to Share Gate Control Schedule

Centers need to exchange information about the operational schedule of control of traffic gates. This allows centers to exchange gate control time-of-day schedules.

2.4.2.5.5.8 Need to Control Remote Gate Control Devices

Centers need to be able to control a remote lane closure gate control device that is normally managed by an external center.

In the case that one center must take over operation of a remote center, then that center must be able to directly control remote lane closure gate control devices controlled by the remote center.

2.4.2.5.6 Need to Share Lane Control Signal Status and Control

Lane control signal devices are used by centers to close, change the direction, or open a lane in order to properly manage traffic conditions.

Some uses of this type of control would be to enhance egress from a special event, handle additional congestion from a nearby incident, or close traffic to protect construction crews. These lane control signals are typically used to show if a lane is open or closed.

2.4.2.5.6.1 Need to Share Lane Control Signal Inventory

Centers need to exchange inventory information so that controllable lanes being operated by a center can become known to other centers. Centers should exchange lane control device attributes so that the capabilities of the lane control devices operated by the owner center can become known to external centers. Inventory information includes static lane control device attributes, such as:

- Location of the controllable lanes and orientation (direction);
- Location of the lane control devices; and
- Number of lanes controlled.

2.4.2.5.6.2 Need to Share Updated Lane Control Signal Inventory

Centers need to exchange updated inventory information as lane control devices are added or removed. As centers add, remove, or change lane control devices, the updated inventory should be provided to other centers, without requiring operator intervention. Changes may include the lane control device location or technology.

2.4.2.5.6.3 Need to Share Lane Control Signal Status

Centers need to exchange status information for each lane control signal device. Status information includes:

- Communications status (connected, disconnected, or failed);
- Operational status (available, not-available); and
- Current operational state information (direction of traffic, lane closed, etc.).

2.4.2.5.6.4 Need to Request a Change for a Remote Lane Control Signal Device

Centers need to be able to request a change in the status of a lane control signal device operated by another center.

When a control request is received, the center that controls the lane control signal device should determine if the request will be implemented, queued, or rejected. Then, the center that controls the lane control signal device should send a response to the center that originated the request describing the status (action taken) on the control request.

2.4.2.5.6.5 Need to Verify Lane Control Signal Device Control Status

The center that sends a request to control a lane control signal device operated by another center needs to verify the status of the request. The status may be that the control request was implemented or was rejected.

2.4.2.5.6.6 Need to Cancel Lane Control Signal Device Control Requests

Centers need to be able to “cancel” a lane control signal device control request so the owner center knows that the control request is no longer required.

2.4.2.5.6.7 Need to Share Lane Control Signal Schedule

Centers need to share schedule information related to controllable lanes. This allows centers to share lane control signal time-of-day schedules.

2.4.2.5.6.8 Need to Control Lane Control Signal Devices

Centers need to be able to control a lane control signal device that is normally managed by an external center.

In the case that one center must take over operation of a remote center, then that center must be able to directly control remote lane control devices controlled by the remote center.

2.4.2.5.7 Need to Share Ramp Meter Status and Control

Ramp meters are used by centers to help manage highway traffic flow. Ramp meters can be used by centers to:

- Move traffic efficiently; and
- Manage traffic during an incident or event to alleviate congestion.

2.4.2.5.7.1 Need to Share Ramp Meter Inventory

Centers need to exchange inventory information so that ramp controllers operated by a center can become known to other centers. Centers should exchange ramp meter device attributes so that the capabilities of the ramp meter devices operated by the owner center can become known to external centers. Inventory information includes static ramp meter device attributes, such as:

- Location (including which lane);
- Lane type; and
- Controller information.

2.4.2.5.7.2 Need to Share Updated Ramp Meter Inventory

Centers need to exchange updated inventory information as ramp meter devices are added, removed, or changed. As centers add, remove, or change ramp meter devices, the updated inventory should be provided to other centers, without requiring operator intervention. Changes may include the ramp meter device location or technology.

2.4.2.5.7.3 Need to Share Ramp Meter Status

Centers need to exchange status information for each lane-by-lane ramp metering. Status information includes:

- Communications status (connected, disconnected, or failed);
- Operational status (available, not-available);
- Current operational state information (metering rate, etc.);
- Current operational mode information (fixed rate, traffic responsive, etc.); and
- On/ off state.

Centers need to be able to verify in real-time the ramp metering synchronization, and for maintenance purposes, diagnostic information.

2.4.2.5.7.4 Need to Request a Metering Plan for a Remote Ramp Meter Device

Centers need to be able to request a metering plan or metering mode for a ramp meter device operated by another center.

When a control request is received the center that controls the ramp meter is to determine if the request will be implemented, queued, or rejected. Then, the center that controls the ramp meter device should send a response to the center that originated the request describing the status (action taken) on the request.

2.4.2.5.7.5 Need to Verify Ramp Meter Control Request Status

The center that sends a control request for a ramp meter device operated by another center needs to verify the status of the control request. The status may be that the control request was implemented, queued, or rejected.

2.4.2.5.7.6 Need to Cancel Ramp Meter Control Requests

Centers need to be able to “cancel” a ramp meter control request so the owner center knows that the control request is no longer required.

2.4.2.5.7.7 Need to View Ramp Metering Plan Queue

The center that originates a request to control a ramp meter device operated by another center needs to view the plan queue for that ramp meter device if the control request has been queued.

This control model assumes that there may be competing priorities for the use of a ramp meter device and that a center may implement a queue or priority list of the requests received, whether from the owner center itself or external centers, and their priority. External centers thus should be able to read this queue for multiple devices to determine the status of their specific control request.

2.4.2.5.7.8 Need to Share Ramp Metering Schedule

Centers need to exchange ramp metering schedule information, including the schedule of when a metering plan will be in effect and current real-time metering plan activation.

2.4.2.5.7.9 Need to Share Ramp Metering Plans

Centers need to exchange ramp metering plans available for a ramp meter device. This includes ramp metering parameters such as metering plans, rates, and thresholds.

2.4.2.5.7.10 Need to Control Ramp Metering Devices

Centers need to be able to control a ramp metering device that is normally managed by an external center.

In the case that one center must take over operation of a remote center, then that center must be able to directly control ramp metering devices controlled by the remote center.

2.4.2.5.8 Need to Share Traffic Signal Control and Status

Traffic signals are used by centers to help manage the street and arterial transportation system. Traffic signals can be used by centers to:

- Monitor signal system operations within an area;
- Improve traffic signal coordination to move traffic more efficiently;
- Manage traffic at specific areas or intersections based on congestion and/or incident on the roadways; and
- Execute mitigation plans for construction and special event congestion and reacting to traffic incidents.

2.4.2.5.8.1 Need to Share Signal System Inventory

Centers need to exchange inventory information so that traffic signals operated by a center can become known to other centers. Centers should exchange traffic signal device attributes so that the capabilities of the traffic signal devices operated by the owner center can become known to external centers. Inventory information includes static traffic signal device attributes such as:

- Location;
- Signal controller information; and
- Intersection name.

2.4.2.5.8.2 Need to Share Signal Section Inventory

Centers need to exchange section inventory information so that traffic signal sections operated by a center can become known to other centers. Centers should exchange traffic signal device attributes so that the capabilities of the traffic signal devices operated by the owner center can become known to external centers. Inventory information includes static traffic signal device attributes such as:

- Location;
- Signal controller information; and
- Intersection name.

2.4.2.5.8.3 Need to Share Updated Signal System Inventory

Centers need to exchange updated inventory information as traffic signals are added, removed, or changed. As centers add, remove, or change traffic signal devices, the updated inventory should be provided to other

centers without requiring operator intervention. Changes may include the traffic signal controller location, technology, or section assignments.

2.4.2.5.8.4 Need to Share Intersection Status

Centers need to exchange status information for each traffic signal. Status information includes:

- Communications status (connected, disconnected, or failed);
- Operational status (available, not-available); and
- Current operational state information (control mode, signal timing parameters, timing pattern number, etc.).

2.4.2.5.8.5 Need to Request a Change to Control of a Remote Traffic Signal Controller Plan or Mode

Centers need to be able to request a signal timing pattern or signal timing mode for a traffic signal controller operated by another center.

When a control request is received, the center that controls the traffic signal controller should determine if the request will be implemented, queued, or rejected. Then, the center that controls the traffic signal controller should send a response to the center that originated the request describing the status (action taken) on the control request.

2.4.2.5.8.6 Need to Verify Traffic Signal Controller Control Request Status

The center that sends a request to control a traffic signal controller device operated by another center needs to verify the status of the control request. The status may be that the control request was implemented, queued, or rejected.

2.4.2.5.8.7 Need to View Traffic Signal Controller Plan Queue

The center that originates a request to control a traffic signal controller operated by another center needs to view the controller plan queue for that traffic signal controller if the control request has been queued.

This control model assumes that there may be competing priorities for the use of a traffic signal controller and that a center may implement a queue or priority list of the request received, whether from the owner center itself or external centers, and their priority. External centers thus must be able to read this queue for multiple devices to determine the status of their specific control request.

2.4.2.5.8.8 Need to Cancel Traffic Signal Controller Control Requests

Centers need to be able to “cancel” a traffic signal controller control request so the owner center knows that the control is no longer required.

2.4.2.5.8.9 Need to Share Controller Timing Patterns

Centers need to exchange signal timing patterns available for a traffic signal. This includes signal timing parameters such as offsets, splits and phases.

2.4.2.5.8.10 Need to Share Controller Schedule

Centers need to exchange timing pattern schedule information to provide coordination across a region (outside a TMC boundary). This includes the schedule of when a signal timing pattern will be in effect and current real-time timing pattern activation (phase/movement).

2.4.2.5.8.11 Need to Share Turning Movement and Intersection Data

Centers need to exchange turning movement data and intersection layout information. Centers exchanging intersection details need to have a standardized naming convention for turning movement numbering and intersection layout information (phase/movement assignment conventions).

2.4.2.5.8.12 Need to Share Time Synchronization Information

Centers need to exchange time reference information to properly establish traffic signal coordination across a region and between TMC boundaries. Centers use a time reference point to establish the time to synchronize the signal timing patterns in use.

2.4.2.5.8.13 Need to Share Section Status

Centers need to exchange status information for each coordinated section. A section is any user-defined group of any number of intersections in any physical arrangement working in a coordinated fashion. Status information includes:

- *Communications status of each traffic signal within the section (connected, disconnected, failed);*
- *Operational status of each traffic signal within the section (available, not-available); and*
- *Current operational state information of each traffic signal within the section, including the section timing pattern information (control mode, signal timing parameters, timing pattern number, etc.).*

2.4.2.5.8.14 Need to Control a Section

Centers need to be able to control a traffic signal section operated by another center.

When a control request is received, the center that controls the section of traffic signals should determine if the request will be implemented, queued, or rejected. Then, the center that controls the traffic signal section should send a response to the center that originated the request describing the status (action taken) on the control request. It should be noted that an intersection can only be associated with a single section at any given time. Alternatively, in some cases a center must perform direct control activities (rather than just making a request for control).

2.4.2.5.8.15 Need to Verify Section Plan Status

The center that sends a request for a signal timing pattern for a traffic signal section operated by another center needs to verify the status of the request. The status may be that the requested timing pattern was implemented, queued, or rejected.

2.4.2.5.8.16 Need to View Section Plan Queue

The center that originates a request to control a traffic signal section operated by another center needs to view the plan queue for that traffic signal section if the request has been queued.

This control model assumes that there may be competing priorities for the use of a traffic signal section and that a center may implement a queue or priority list of the commands received, whether from the owner center itself or external centers, and their priority. External centers thus need to be able to read this queue for multiple devices to determine the status of their specific control request.

2.4.2.5.8.17 Need to Cancel Traffic Signal Section Control Requests

Centers need to be able to “cancel” a traffic signal section control request so the owner center knows that the control request is no longer required.

2.4.2.5.8.18 Need to Share Section Timing Pattern Schedule

Centers need to exchange timing pattern schedule information to provide coordination across a region (outside a TMC boundary). This includes the schedule of when a signal timing pattern will be in effect.

2.4.2.5.8.19 Need to Share Section Timing Patterns

Centers need to exchange signal timing patterns available for a signal section. This includes signal timing parameters such as offsets, splits, and phases.

2.4.2.5.8.20 Need to Control a Remote Traffic Signal Controller

Centers need to be able to implement through the ngTMDD interface a signal timing pattern or signal timing mode for a traffic signal controller operated by another center.

2.4.2.5.9 Need to Share Roadside Unit Status

Roadside Units are used by centers to help manage the surface transportation system.

Roadside Units:

- Allow for Traffic Signal Controller Infrastructure to communicate messages directly with vehicles with onboard units.
- Allow for centers to communicate messages directly with vehicles with onboard units.

2.4.2.5.9.1 Need to Share RSU Device Inventory

Centers need to exchange RSU inventory information so that RSU devices that are operated by a center can become known to other centers. Inventory information includes RSU device attributes such as:

- Location
- Device identifier

2.4.2.5.9.2 Need to Share Updated RSU Device Inventory

Centers need to exchange updated inventory information as RSU devices are added, removed, or changed. As centers add, remove, or change RSU devices, the updated inventory should be provided to other centers, without requiring operator intervention.

2.4.2.5.9.3 Need to Share RSU Device Status

Centers need to exchange status information for each RSU device. Status information includes:

- Communications status (connected, disconnected, or failed);
- Operational status (on, standby); and
- Certificate enrollment status

2.4.2.5.9.4 Need for RSU Data Sharing

Centers need to exchange current message data from RSUs. This message data from RSUs include:

- The message content;
- The connected vehicle message type (TIM, RSM, SPaT, MAP, SSM, RTCM); and
- The type of storage of the message on the RSU (store and repeat message, immediate forward message, received messages from V2X, transmitted messages over V2X interface, wave service advertisement).

2.4.2.6 Data Needs Relating to Shared Data for Archiving

Archiving data is generally applied to the areas of traffic monitoring, roadway characteristics, and event data. The archiving of data is also concerned with how that data is collected. The archived data, once collected, can also be exchanged between centers. These centers may be data archives or operational centers.

2.4.2.6.1 Need for Traffic Monitoring Data

Centers exchange traffic monitoring data, such as volume, occupancy and speed for archival purposes. This data may be used to augment other transportation data for traffic data analyses and transportation planning.

2.4.2.6.1.1 Need for Direct Measurements of Traffic Flow and Conditions

Centers seeking archival data need direct measurements of traffic flow and conditions on roadways. The following data types for direct traffic measurements are needed as archived data: volume, speed, occupancy, travel time, intersection turning movements, queue length, and vehicle classification. Direct measurement implies direct access to the traffic flow data.

2.4.2.6.1.2 Need for Original Source Data for Traffic Monitoring Measurements

Centers seeking archival data need to preserve original source data as received by the first center (in this case, the traffic management center) from the field or other external sources. This is the finest resolution of data in terms of temporal and spatial characteristics available. Examples include data on individual vehicles and per lane summaries for short time intervals. Original source data has not had the traffic measurements altered or transformed in any way by a center.

2.4.2.6.1.3 Need for Processed Traffic Monitoring Data

Centers seeking archival data need traffic monitoring data that has been processed (edited, imputed, transformed, or aggregated) by traffic management center (or other center) functions. Processed traffic monitoring data includes computed or transformed statistics regarding traffic flow and conditions, if these data are created by normal center functions. (Archive data collection does not require that processed traffic monitoring data be created, but if it is, it should be passed to the archive.) Examples include travel time (when derived from device-measured “spot speeds”), “smoothed” traffic measurements, density (when computed from occupancy), capacity, headway and delay as well as bicycle and pedestrian data.

2.4.2.6.1.4 Need for Data Collection System Metadata

Centers seeking archival data need data collection system metadata on field devices used to provide traffic monitoring data. These are data about the conditions and procedures under which original source data were observed, surveyed, measured, gathered, or collected, as well as about the equipment that was used. This includes information about the calibration and maintenance history of field devices; the “health” of detectors; and the situational or contextual characteristics of field devices (e.g., location, lanes monitored, relation to roadway). The information could also include video analytics information.

2.4.2.6.1.5 Need for Processing Documentation Metadata

Centers seeking archival data need processing documentation metadata for any traffic monitoring data that has been altered or extended by applying quality control, editing, imputation, transformation, and aggregation functions.

2.4.2.6.1.6 Need for Roadway Characteristics Data

Centers seeking archival data need attribute data associated with roadway links and intersections. These data include information on roadway alignment, cross-section, restrictions, lane configuration, and lane use.

2.4.2.6.1.7 Need for Event Data

Centers seeking archival data need data associated with planned and unplanned events, including location, extent, type, severity, lane and shoulder closures, and lifecycle.

2.4.2.6.1.8 Need for Event Response Plan Data

Centers seeking archival data need data associated with the response to planned and unplanned events including, actions being suggested for implementation, timing for the actions being taken, organizations and centers involved, approvals required and given by different organizations, and selection criteria.

2.4.2.6.1.9 Need for Direct Measurements of Fleet Vehicle Data

Centers seeking archival data need direct measurements of fleet vehicle data collected on roadways. The following data types for direct traffic measurements are needed as archived data: vehicle location, vehicle speed, vehicle heading, and vehicle acceleration. Direct measurement implies direct access to the vehicle data.

2.5 Operational Scenarios [Informative]

A scenario is a step-by-step description of how the proposed set of system interfaces should operate under a given set of conditions. Operational scenarios help readers understand how all the components of a system interact to provide operational capabilities. [Adapted from IEEE 1362-1998]

For the purposes of this project, the proposed system is a set of interconnected centers. The operational scenarios allow a reader to understand the different component actors of the C2C environment, proposed functions, and data exchanges under a given set of conditions. Preconditions are described, and a narrative is provided to guide the reader through the sequence of events and data exchanges that lead to a desired end state or condition.

These scenarios are intended to illustrate representative examples of interactions between component actors. They are not intended to be all-encompassing or to serve as a design.

Table 1. Operational Scenario Template

Title	Operational Scenario Title. Shortest possible problem statement, usually stating the desired end-condition.
Problem Aspect	Some situation of concern, for example Coordination of Event Response Plan.
Description	A description of the scenario. For example, the purpose of this scenario is to provide advisories, warnings, or alerts to a driver...
Pre-Conditions	A listing of factors, attributes, or measures about the environment/conditions describing the beginning state of the operational scenario.
Optional Diagram	A sequence diagram showing centers and a numbered sequence of interactions and events to demonstrate how to step between pre-condition and end-condition states.
Narrative and Sequence of Steps	A narration that usually describes the steps shown in the sequence diagram.
End Conditions or State	A listing of factors, attributes, or measures about the environment/conditions describing the end state of the operational scenario.
User Needs	Identifies the user needs (from section 2.4.1) that map to the scenario.

2.5.1 Exchange of Event Information

Title	Exchange of Event Information
Problem Aspect	Events can impact the roadways of multiple agencies. Each agency needs an accurate picture of the event so they can understand how it impacts them and their users or data consumers.
Description	An Owner Center provides event information to an External Center, which can further distribute the information to Other Centers.
Pre-Conditions	- Information about the event has been collected by the owner center from field devices or via communications with personnel at the event location. - Connectivity between the centers has been established. The External Center has the information to uniquely identify each organization, each center, and each asset owned by each center that sends data to it.
Optional Diagram	<pre> graph LR OC((Owner Center(s))) -- 1 --> EC((External Center (Third Party Back Office))) EC -- 2 --> OTC((Other Centers)) </pre> The diagram illustrates the exchange of event information. It features three light blue circular nodes. On the left is a node labeled 'Owner Center(s)'. At the top center is a node labeled 'External Center (Third Party Back Office)'. On the right is a node labeled 'Other Centers'. An arrow labeled '1' points from the 'Owner Center(s)' node to the 'External Center' node. Another arrow labeled '2' points from the 'External Center' node to the 'Other Centers' node.
Narrative and Sequence of Steps	1) The Owner Center(s) provides event information to an External Center. 2) The External Center combines information about an event from one or more Owner Centers and provides the consolidated individual information to additional centers.
End Conditions or State	Event information is distributed C2C across a region.
User Needs	2.4.2.2 Data Needs to Share Event Information (and defined subsections)

2.5.2 Coordination of Event Response Plans

Title	Coordination and Execution of Event Response Plans
Problem Aspect	Event response can involve multiple agencies and can evolve over the course of an event. The problem is how best to exchange event response plans and information across all the relevant agencies.
Description	Event response plans may involve multiple organizations (centers) who must coordinate across the centers regarding the response plan.
Pre-Conditions	- Agencies have developed multijurisdictional event response plans for different kind of events that can be put into action when an event occurs. - An event occurs necessitating the implementation of an event response plan. - Event information is shared between centers per the previous scenario. - Connectivity between the centers has been established. - Centers have implemented communications security that supports coordination of event response plans, which are not subject to general distribution.
Optional Diagram	<pre> graph TD OC((Owner Center(s))) EC((External Center (Third Party Back Office))) AC((Additional Centers)) OC -- 1 --> EC EC -- 2 --> OC EC -- 3 --> AC AC -- 4 --> EC </pre>
Narrative and Sequence of Steps	1) The originating center provides to other centers (External Center) information about the response plan they intend to implement for a current event 2) The External Center provides to the originating center an approval of their portion of the response plan. 3) The External Center provides the coordinated response plan to Additional Centers for coordination on their participation in the response, or for the Additional Center to provide response plan information to other users. 4) The Additional Centers provide to the External Center an approval of their portion of the response plan
End Conditions or State	- An approved coordinated response plan is implemented by the agencies in the region. - Information about the response plan is disseminated to relevant centers and users in the region.
User Needs	2.4.2.3 Data Needs for Event Response (and the subsections)

2.5.3 Provide Traffic Data

Title	Provide Traffic Data
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Problem Aspect	Distributing information about road network conditions to all relevant centers and to the public.
Description	A center may want to collect current traffic information from other centers that are responsible for managing traffic in different jurisdictions and use it to manage traffic in its own jurisdiction and relay that information to public information systems.
Pre-Conditions	- The originating center collects road network condition information (e.g. speed, volume, occupancy, and travel time) from roadside devices, third party systems, or directly from vehicles. - Connectivity between the centers has been established. - The Additional Centers the information to uniquely identify each organization, each center, and each asset owned by each center that sends data to it. - Centers have implemented communications security that allows centers to verify that the information comes from a trusted source.
Optional Diagram	<pre> graph LR A((External Center (Third Party))) -- 1 --> B((Owner Center)) B -- 2 --> C((Additional Centers)) </pre>
Narrative and Sequence of Steps	1) Third-party centers provide traffic data to the center with responsibility for that portion of the road network. 2) Owner Center combines traffic data from the External Center with data collected from the Owner Center's field devices and provides combined traffic data to additional centers in the region.
End Conditions or State	Traffic data (e.g. speed, volume, occupancy, and travel time) is distributed to centers and other users who want it.
User Needs	2.4.2.4 Data Needs Relating to Roadway Network Data (and subsections)

2.5.4 Provide Device Data

Title	Provide Device Data
Problem Aspect	Centers collect a wide array of device data that is used to monitor the road network (such as traffic detectors and ESS devices). They also collect data about the operation of signals and other systems used to control traffic or provide traveler information. A key problem is how to share this possibly voluminous device data on a near real-time basis with other centers who may have to assume a role in the operation of the owner center.

Description	Data from each type of field device is provided by the owner center to an external center. Field devices covered by ngTMDD include traffic detectors, CCTV information, DMS, ESS, ramp meters, lane control devices, and traffic signal control devices.
Pre-Conditions	• Device data is collected by the owner center from the field devices that it operates. • Connectivity between the centers has been established. • The External Center has the information to uniquely identify each organization, each center, and each asset owned by each center that sends data to it. • Centers have implemented communications security that allows centers to verify that the information comes from a trusted source.
Optional Diagram	<pre> graph LR OC((Owner Center(s))) -- 1 --> EC((External Center)) EC -- 2 --> AC((Additional Centers)) </pre>
Narrative and Sequence of Steps	1) The Owner Center sends device data to an external center. 2) The External Center can distribute some of the device data to additional centers. Not all device data will likely be widely distributed, but some data, such as DMS data or ESS data may be important for regional traffic management.
End Conditions or State	Device data is distributed to centers regionwide.
User Needs	2.4.2.5 Data Needs Relating to Device Data and Device Control (and subsections)

2.5.5 Request for Control of Devices

Title	Request for Control of Devices
Problem Aspect	Under certain conditions an External Center may want to request control actions be taken by an Owner Center. For example, an External Center may want to have a CCTV moved to a certain PTZ, or may request that a specific message be applied to a DMS.
Description	An External Center requests control actions of the owner center (e.g., place a message on a DMS). Once requested the External Center needs to know that the request has been processed.
Pre-Conditions	• The External Center is aware of the inventory of owner center devices that it might request control actions. • Connectivity between the centers has been established. • The centers have implemented communications security that allows them to verify that the information comes from a trusted source.

Optional Diagram	<pre> sequenceDiagram participant EC as External Center participant OC as Owner Center EC->>OC: 1 OC-->>EC: 2 </pre>
Narrative and Sequence of Steps	1) The External Center sends a request for device control to the Owner Center 2) The Owner Center provides the status of the control request.
End Conditions or State	Successful device control changes at the Owner Center.
User Needs	2.4.2.5.1.8 Need to Request Control a Remote CCTV Device 2.4.2.5.1.9 Need to Verify CCTV Control Status 2.4.2.5.1.10 Need to Cancel CCTV Control Requests 2.4.2.5.3.4 Need to Request Display a Message on a Remote DMS

2.5.6 Remote Control of Devices

Title	Remote Control of Devices
Problem Aspect	Under certain conditions an external center must take control of the operations of an Owner Center. The most common reason for this to happen is due to the Owner Center not being staffed 24/7.
Description	This scenario addresses the case where an external center will send actual control commands (e.g. pan/tilt/zoom for a CCTV) to the Owner Center.
Pre-Conditions	- The External Center is aware of the inventory of Owner Center devices that it might control, or request control actions. - The Owner Center has relinquished device control to the External Center. - The centers have implemented communications security that allows centers to ascertain that the information comes from a trusted source.
Optional Diagram	<pre> sequenceDiagram participant EC as External Center participant OC as Owner Center EC->>OC: 1 OC-->>EC: 2 </pre>
Narrative and Sequence of Steps	3) The External Center sends device control commands to an owner center. 4) The Owner Center systems provide device status, allowing the External Center to know that its commands have been correctly interpreted.
End Conditions or State	Successful device control from the External Center.

User Needs	2.4.2.5.1.8 Need to Control Remote Traffic Detectors (and other 2.4.2.5.2.x subsections related to direct control of devices)
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2.5.7 Remote Control of Traffic Signals

Due to the unique issues associated with remote control of traffic signals, an additional operational scenario has been generated to provide additional information about this use case.

Title	Remote Control of Traffic Signals
Problem Aspect	Under certain conditions an External Center must take control of the operations of an Owner Center. The most common reason for this to happen is due to the Owner Center not being staffed 24/7.
Description	This scenario addresses the case where an external center will send actual commands to an Owner Center for the control of traffic signals. The signal control commands that can be sent are limited to changes in signal timing mode or signal timing patterns.
Pre-Conditions	- The External Center is aware of the inventory of Owner Center traffic signal devices that it might control. - The Owner Center has relinquished traffic signal device control to the External Center. - The centers have implemented communications security that allows centers to ascertain that the information comes from a trusted source.
Optional Diagram	<pre> graph LR EC((External Center)) -- "1a 1b" --> OC((Owner Center)) OC -- "2" --> EC </pre>
Narrative and Sequence of Steps	- The External Center sends device control commands to an owner center. The two types of commands that can be sent regarding traffic signal devices are: - Signal timing mode - Signal timing pattern - The Owner Center systems provide device command status, allowing the External Center to know that its commands have been correctly interpreted.
End Conditions or State	Successful traffic signal device control from the External Center.
User Needs	2.4.2.5.8.20 Need to Control a Remote Traffic Signal Controller

2.6 Operational Policies and Constraints [Informative]

The following operational policies and constraints apply to the use of this ngTMDD Standard document.

2.6.1 Security

This standard defines the data concepts for sharing data between centers. Some of this data is meant for general distribution (e.g., traffic data), but some of the data has a higher restriction on its distribution (e.g. event response plans). An operational constraint for any deployment of the standard will be to provide the appropriate level of security for the data stream using standards-based security measures. Industry-based security standards should be used to provide the trust required for data providers and data consumers using security practices identified by National Institute of Standards and Technology (NIST) Cybersecurity

Framework (CSF). This security could be provided via secure communication links, or through the verification of trusted sources using security certificates and signing of data.

2.7 Relationship to the Architecture Reference for Cooperative and Intelligent Transportation [Informative]

This section describes which portions of the Architecture Reference for Cooperative and Intelligent Transportation, known as ARC-IT, are addressed by the ngTMDD Standard.

At the highest level of abstraction, the physical architecture consists of center components, field components, vehicle components and personal components. The Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) defines these components as follows:

- **Center.** An entity that provides application, management, administrative, and support functions from a fixed location not in proximity to the road network. The terms "back office" and "center" are used interchangeably. Center is traditionally a transportation-focused term, evoking management centers to support transportation needs, while back office generally refers to commercial applications.
- **Field.** These are intelligent infrastructure elements distributed near or along the transportation network which perform surveillance (e.g., traffic detectors, cameras), traffic control (e.g., traffic signal controllers), information provision (e.g., DMS) and local transaction (e.g., tolling, parking) functions. Typically, their operation is governed by transportation management functions running in back offices. Field also includes Roadside Unit (RSU) and other non-Dedicated Short-Range Communication (DSRC) wireless communications infrastructure that provides communications between mobile elements and fixed infrastructure.
- **Personal.** Equipment used by travelers to access transportation services pre-trip and en-route. This includes mobile/handheld as well as desktop equipment owned and operated by the traveler.
- **Vehicle.** Vehicles, including driver information and safety systems applicable to all vehicle types.

Service Packages and associated diagrams show the key interfaces and flow of information exchanged between components.

The two primary service packages of ARC-IT addressed by ngTMDD are TM07 Regional Traffic Management, and SU03 Data Distribution.

2.7.1 ARC-IT Regional Traffic Management Service Package

TM07: Regional Traffic Management. This service package provides for the sharing of information and control among traffic management centers to support regional traffic management strategies. Regional traffic management strategies that are supported include inter-jurisdictional, real-time coordinated traffic signal control systems and coordination between freeway operations and traffic signal control within a corridor. This service package advances the TM03-Traffic Signal Control and TM05-Traffic Metering service packages by adding the communications links and integrated control strategies that enable integrated, interjurisdictional traffic management. The nature of optimization and extent of information and control sharing is determined through working arrangements between jurisdictions. This package relies principally on roadside instrumentation supported by the Traffic Signal Control and Traffic Metering service packages and adds hardware, software, and fixed-point communications capabilities to implement traffic management strategies that are coordinated between allied traffic management centers. Several levels of coordination are supported from sharing of information through sharing of device control between traffic management centers.

The ngTMDD standard will address the information flows on the interface between a Traffic Management Center and Other Traffic Management Centers. All of the information flows are covered by ngTMDD with one exception:

- **Traffic images**– ngTMDD does not support transmission of the actual images, but it does provide URL information regarding where the images are available on the web.

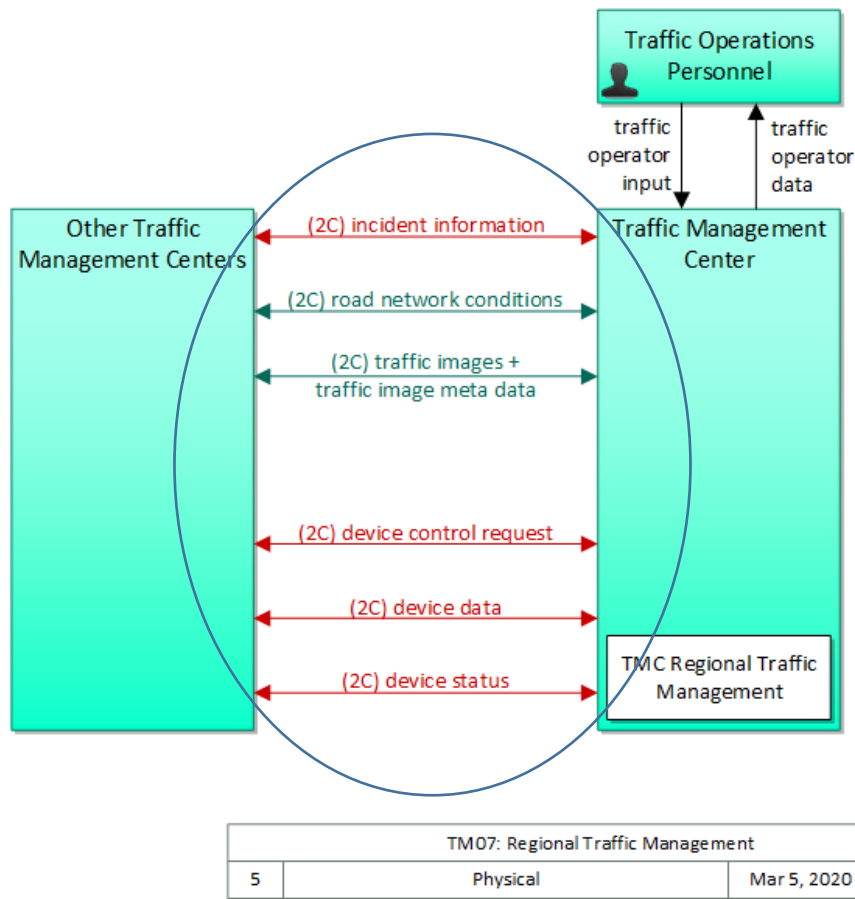


Figure 3: Regional Traffic Management Service Package Diagram.

2.7.2 ARC-IT Data Distribution Service Package

SU03: Data Distribution: This service package manages the distribution of data from data providers to data consumers and protects those data from unauthorized access. It informs data providers of how to provide data, manages data subscriptions, and provides data forwarding capabilities. The service package also maintains a directory of System Users that want data and supports multiple distribution mechanisms including publish-subscribe and directly from data provider to data consumer. It allows data consumers to specify (and change the specification of) data they wish to receive.

The ngTMDD standard addresses the interface between Data Distribution System and Center shown in Figure 4 below. This interface addresses the connection management aspect of the standard.

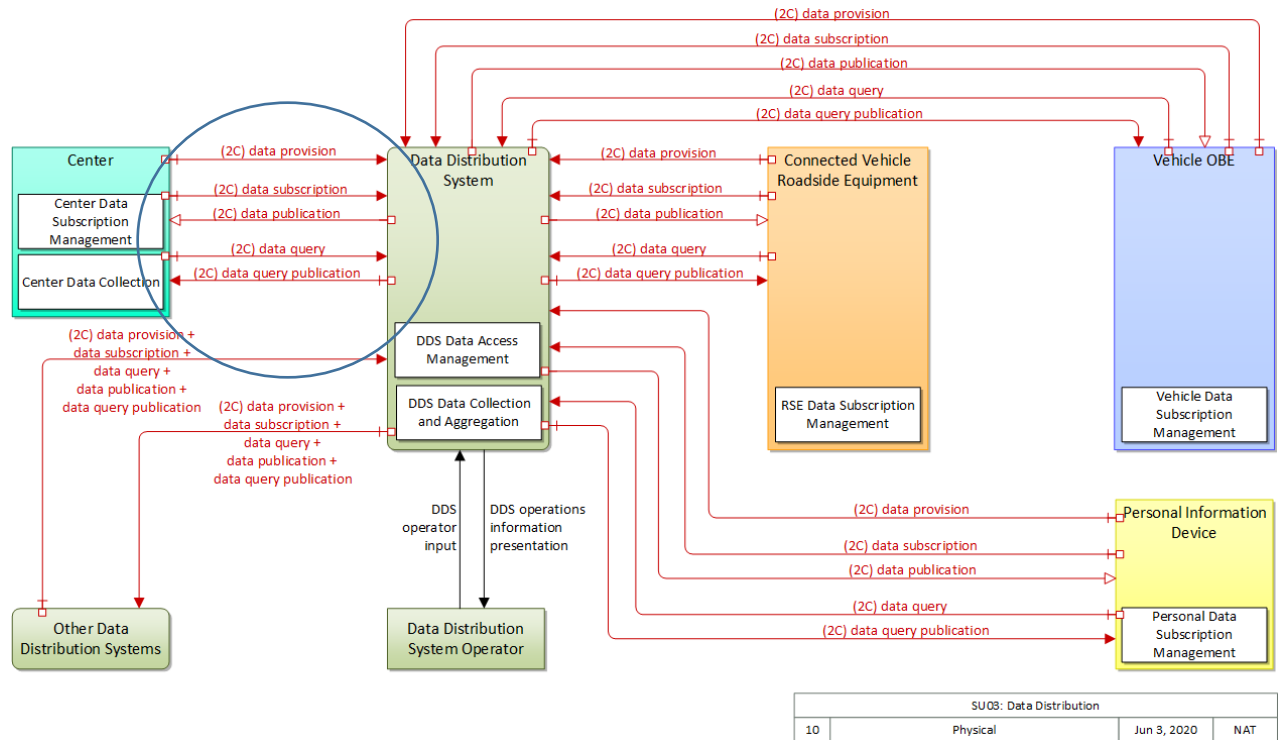


Figure 4: Data Distribution Service Package Diagram.

Section 3

Functional Requirements [Normative]

3.1 Introduction

This chapter defines the requirements based on the user needs identified in the Concept of Operations (Section 2) of this document. The requirements describe what information is and how these operations are exchanged with external center subsystems through a system interface. The requirements also describe what functionality is supported across the interface. It is assumed that an external center is an authorized center in the center-to-center (C2C) network and has the proper privileges to send or receive the information described in these requirements.

It should be noted that before performing any of these operations, the requesting center must log into the owner center's system and be properly authenticated based on requirements discussed below in the section on Authentication.

Section 3 is intended for all readers, including the following:

- a) Transportation Managers
- b) Transportation Operators
- c) Transportation Engineers
- d) System Integrators
- e) Device Manufacturers
- f) Application Developers

For the first four categories of readers, Section 3 is useful in understanding the details of the ngTMDD standard. For the next two categories of readers, this section is useful to fully understand what is required for conformance to this ngTMDD standard. For application developers, this section is useful to understand the data provided by the C2C interface and what the data represents.

3.2 Mandatory and Optional Requirements

All requirements are classified either as mandatory or optional. Each requirement in this section satisfies some aspect of a user need identified in the Concept of Operations. The tracing between the user need and the formal requirements is presented in the NRTM in Section 4.

The classification of mandatory or optional for a requirement is based upon whether that particular requirement is determined to be a necessary component to satisfy the user need(s) to which it traces. If the requirement is determined to be necessary to support the corresponding user need, that requirement is classified as a mandatory requirement. If the requirement is determined to support the user need but is not essential, that requirement is classified as an optional requirement. These classifications can be found in the NRTM in Section 4.

For project implementations, if a user need (from Section 2) is identified as a need for the project, then the mandatory requirements that trace to the need selected must be supported by the project implementation for that implementation to claim conformance with this standard. As a part of the implementation, some optional requirements (associated with the user need) may be selected by the project. Once these are selected, they form (along with all the mandatory requirements) the project implementation specification (relating to the need).

3.3 Detailed Requirements

The requirements to share traffic management data between centers are as follows:

3.3.1 Connection Management

The requirements to manage the interface connections between centers are as follows:

3.3.1.1 Exchange Center Connection Information

Each center that is part of the C2C network supports the exchange of center information with the following requirements.

3.3.1.1.1 Send Center Connection Information Upon Request

An owner center shall respond to an authorized external center requesting center connection information from the owner center with a message containing the owner center's connection information.

3.3.1.1.2 Publish Center Connection Information

An owner center shall publish a message containing its center connection information to all authorized subscribing external centers.

3.3.1.1.3 Subscribe to Center Connection Information

An external center shall send a subscription message to an owner center requesting center connection information from the owner center.

3.3.1.1.4 Contents of the Center Connection Information Request

An external center shall send a center connection information request to an owner center.

3.3.1.1.4.1 Required Center Connection Information Request Content

The center connection information request sent from an external center to an owner center shall include: the requesting organization information (See 3.3.2.5.1 and 3.3.2.5.2);

3.3.1.1.5 Contents of Center Connection Information

An owner center shall send center connection information to external centers.

3.3.1.1.5.1 Required Center Connection Information

The center active information sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Center name as assigned by the owner organization;
- c. Unique identifier of the center as assigned by the owner organization;
- d. Indication that center connection is active; and
- e. List of type of connections supported by center.

3.3.1.1.5.2 Optional Center Connection Information

The following are optional requirements that an owner center may include in the center connection information sent to an external center.

3.3.1.1.5.2.1 Center Information Distribution Restrictions

The owner center may impose restrictions on the dissemination of information shared with external centers, including its relay to third parties. The requirements for the restrictions placed on information distribution are found in "Section 3.3.1.9.1 Information Access Restrictions – Response Message Content.."

3.3.1.1.5.2.2 Version Identifier

The owner center shall indicate what version of the ngTMDD data dictionary standard the system is conformant to. Valid values are: ngTMDD 1.0 and ngTMDD V1.1.

3.3.1.1.5.2.3 Time Domains Supported

The owner center shall provide to an external center the frequency of communications updates provided by the owner center as part of the connection. This enables the owner center to make it known what frequency/rate of communication will be supported by the connection.

3.3.1.2 Support Request-Response

An owner center shall send a response message to an authorized external center's request message.

3.3.1.3 Support Subscription-Publication

The requirements to support subscription-publication of messages between centers are as follows:

3.3.1.3.1 Support Periodic Updates

An owner center shall send information messages at fixed time intervals to an authorized external center requesting information updates on a periodic basis.

3.3.1.3.2 Support Event-Driven Updates

An owner center shall send information messages containing updated information after an action, a change in status, or a change in the data, to an authorized external center requesting information updates on an event-driven basis.

3.3.1.4 Exchange Subscription Information

The following are requirements for exchanging information about subscriptions such as the list of available dialogs, subscription types, and their behaviors.

3.3.1.4.1 Send Subscription Information Upon Request

An owner center shall respond to an authorized external center requesting information about a subscription including dialogs supported, subscription types, and behaviors.

3.3.1.4.2 Contents of the Subscription Information Request

An external center shall send a subscription information request to an owner center.

3.3.1.4.2.1 Required Subscription Information Request Content

The subscription information request sent from an external center to an owner center shall include requesting organization information (See 3.3.2.5.1 and 3.3.2.5.2);

3.3.1.4.3 Contents of the Subscription Information

An owner center shall send subscription information to external centers.

3.3.1.4.3.1 Required Available Dialog Information

- a. Owner organization information;
- b. Center name as assigned by the owner organization;
- c. Dialog name;
- d. Supported subscription types (one-time, periodic, on-change), if a subscription dialog; and
- e. Supported data types if subscription is a generic subscription with multiple data type support (e.g. inventory, status, or control along with device type). The recommendation is that a single dialog should cover only a single device, which will allow simplifying the complexity of the data interchange.

3.3.1.4.3.2 Required Dialog Behavior Information

For each dialog the following are required behavior information:

- a. An inventory dialog if full inventory list is supported within subscriptions;
- b. An inventory dialog if incremental inventory list is supported with CRUD actions support within subscriptions (if not, full inventory list must be supported);
- c. Supported periodic subscription time intervals and field element polling intervals or polling event;
- d. Change trigger fields for on-change subscriptions; and
- e. Limitations on the number of devices supported.

NOTE: Periodic subscriptions should always publish on the agreed upon period within the subscription parameters and should include all assets in each message.

3.3.1.5 Exchange List of Currently Active Subscriptions

The following are requirements for exchanging information about currently active subscriptions.

3.3.1.5.1 Send List of Currently Active Subscriptions Upon Request

A center shall respond to an authorized center requesting a list of currently active subscriptions with the requesting center providing a list of active subscriptions. The list shall include subscriptions sending data as well as those receiving data.

3.3.1.5.2 Publish List of Currently Active Subscriptions

Centers shall publish a list of currently active subscriptions.

3.3.1.5.3 Subscribe to List of Currently Active Subscriptions

Centers shall be able to subscribe to a list of currently active subscriptions.

3.3.1.5.4 Contents of the List of Currently Active Subscriptions Request

Centers shall send a request for a list of all active subscriptions with another center that includes both sending and receiving subscriptions.

3.3.1.5.4.1 Required List of Currently Active Subscriptions Request Content

The center list of currently active subscriptions request shall include:

- a. Requesting organization information;
- b. Security credentials; and
- c. Start date and time, in UTC, for reporting of failed subscriptions.

3.3.1.5.5 Contents of the List of Currently Active and Failed Subscriptions

Centers shall send a list of currently active subscriptions and subscriptions that have failed after successful initiation.

3.3.1.5.5.1 Required List of Currently Active Subscriptions Content

The currently active subscriptions list content shall include:

- a. Center name as assigned by the owner organization;
- b. Unique identifier of the center as assigned by the owner organization or by regional agreement;
- c. List of active subscriptions currently sending data to the requesting center to include:
 - 1) Subscription request dialog
 - 2) Data update dialog
 - 3) Data type included within the update
 - 4) Subscription type
 - 5) Subscription parameter list
 - 6) Subscription identifier
- d. List of active subscriptions currently receiving data from the requesting center to include:
 - 1) Subscription request dialog
 - 2) Data update dialog
 - 3) Data type included within the update
 - 4) Subscription type
 - 5) Subscription parameter list
 - 6) Subscription identifier

3.3.1.5.5.2 Optional List of Currently Active Subscriptions Sending Content

The following are optional requirements that a sending center may include in the list of currently active subscriptions sent to a receiving center.

3.3.1.5.5.2.1 Subscription update source endpoint

The sending center shall send the subscription update source endpoint to the receiving center. The source endpoint provides information that identifies the source of the subscription data (e.g. address or port number of the computer sending the information).

3.3.1.5.5.2.2 Owner center subscription request endpoint

The sending center shall send the subscription request endpoint to the receiving center. The subscription request endpoint provides information that identifies the source of the subscription request (e.g. address or port number of the computer sending the request).

3.3.1.5.5.2.3 Subscription update target endpoint

The sending center shall send the subscription update target endpoint to the receiving center. The subscription update target endpoint provides information that identifies where the subscription is sending the data (e.g. address or port number of the computer to which the data is sent).

3.3.1.5.5.2.4 Subscription Name

The sending center shall send a subscription name to the receiving center.

3.3.1.5.5.2.5 Subscription request received date and time

The sending center shall send to the receiving center the date and time, in UTC, that a subscription request was received.

3.3.1.5.5.2.6 Subscription first message sent date and time

The sending center shall send to the receiving center the date and time, in UTC, that the first message of the subscription was sent.

3.3.1.5.5.2.7 Most recent update message send date and time

The sending center shall send to the receiving center the date and time, in UTC, that the most recent update of the subscription was sent.

3.3.1.5.5.2.8 Most recent update message size

The sending center shall send to the receiving center the size in bytes of the most recent update of the subscription.

3.3.1.5.5.2.9 Total number of messages sent

The sending center shall send to the receiving center the total number of subscription messages sent within a specified time interval.

3.3.1.5.5.2.10 Time interval for the total number of messages sent

The sending center shall send to the receiving center the time interval for the total number of subscription messages sent.

3.3.1.5.5.2.11 List of errors encountered

The sending center shall send to the receiving center the list of errors encountered within a specified time interval time for the subscription messages sent.

3.3.1.5.5.2.12 Time interval for the list of errors

The sending center shall send to the receiving center the time interval for the list of errors encountered within a specified time interval.

3.3.1.5.5.3 Required List of Currently Failed Subscriptions Content

The currently failed subscriptions list content shall include:

- a. Subscription request dialog;
- b. Data update dialog;
- c. Data type included within the update;
- d. Subscription type;
- e. Subscription parameter list;
- f. Subscription identifier;
- g. Failure date and time in UTC;

- h. Failure code or reason;
- i. Failure description; and
- j. Receiving or sending flag.

3.3.1.5.5.4 Optional List of Currently Failed Subscriptions Content

The following are optional requirements that a sending center may include in the list of failed subscriptions sent to a receiving center.

3.3.1.5.5.4.1 Subscription update source endpoint

The sending center shall send the subscription update source endpoint to the receiving center.

3.3.1.5.5.4.2 Owner center subscription request endpoint

The sending center shall send the subscription request endpoint to the receiving center.

3.3.1.5.5.4.3 Subscription update target endpoint

The sending center shall send the subscription update target endpoint to the receiving center.

3.3.1.6 Confirmation Receipts

The following are requirements for providing a confirmation of receipt of a response message during the exchange of information between centers.

3.3.1.6.1 Contents of Confirmation Receipt

An external center shall be able to send a confirmation receipt indicating receipt of a response message.

3.3.1.6.1.1 Required Confirmation Receipt Content

The confirmation receipts content shall include:

- a. Center organization information
- b. Center name as assigned by the owner organization

3.3.1.7 Support Error Handling Report

The following are requirements for reporting errors encountered during the exchange of information between centers.

3.3.1.7.1 Contents of the Error Report

A receiving center shall report errors in messages received from a sending center.

3.3.1.7.1.1 Required Error Report Contents

The error report sent from a receiving center to a sending center shall include:

- a. Receiving organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Sending organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- c. Unique error identifier (Unknown processing error; the receiving center does not support processing of the sending center's message; the message from the sending center is incomplete or information is missing that prevents the message from being processed; message is not well formed or cannot be parsed; message is not valid – out of range values; authorization permission not granted for this request; authorization not recognized; and message is valid but no valid data is available); and
- d. Error text.

3.3.1.7.1.2 Optional Error Report Contents

The following are optional requirements that an owner center may include in the error report information sent to an external center.

3.3.1.7.1.2.1 Information Access Restrictions – Error Report

The owner center shall provide restrictions on the dissemination of the information as part of the error report information sent to an external center. An owner center may place restrictions on the dissemination of this information provided to external centers, including relaying information to third parties. Valid values for

forwarding restrictions to third parties include Unrestricted, Not to Public, Restricted to Law Enforcement, or Restricted to Recipient Organization Only.

3.3.1.8 Support Operator Identification

3.3.1.8.1 Authorization Information – External Centers

The external center shall provide authentication information using OAuth 2.0 digital certificates as part of the organization information request. OAuth 2.0 is a standards-based authorization protocol that allows owning centers to grant access to their devices and information without sharing their individual credentials with external centers. It provides a secure way for applications to access user data from various providers,

3.3.1.8.1.1 Valid certificates

The external center shall provide a valid certificate in order to be authenticated. A valid certificate is defined as one that

- a. Has not expired;
- b. Has not been revoked;
- c. Matches the domain name of the service; and
- d. Been issued by a trusted provider.

Note that external center authentication and owner center authentication are two separate authentication processes. In general, they will use the same authentication method. Basic authentication should not be utilized.

The authentication information is sent to establish the identity of a remote operator for the purpose of granting access to a protected service. If the owner center requires it, the external center may also provide the unique identifier of the operator making the request as part of the authentication information sent to an owner center.

Most organizations have well-defined security policies and procedures covering a variety of system security issues. Some of the data and operations available via the C2C interface are quite sensitive and need to be protected against improper use. Authentication to verify the identity of a user making a request from an external center is needed as described above.

3.3.1.8.2 Operator Identifier – Requests

The external center shall provide the unique identifier of the operator making the request message.

3.3.1.8.3 Operator Identifier – Responses

The owner center shall provide the unique identifier of the owner operator who acknowledged the request message as part of the response message.

3.3.1.9 Support Restrictions on Message Content

Centers may place restrictions on the dissemination of the information provided in the messages that they send.

3.3.1.9.1 Information Access Restrictions – Response Message Content

The owner center shall provide restrictions on the dissemination of the information as part of the response message sent to an external center. An owner center may place restrictions on the dissemination of this information provided to external centers, including relaying information to third parties. Valid values for forwarding restrictions to third parties include Unrestricted, Not to Public, Restricted to Law Enforcement, or Restricted to Recipient Organization Only.

3.3.1.10 Security

The following are requirements for providing a secure connection for the exchange of information between centers.

3.3.1.10.1 Connection Security

Centers exchanging data shall provide connection security using Secure Socket Layer (SSL) / Transport Layer Security (TLS) Public Key Infrastructure (PKI) as the cybersecurity protocol to establish secure connections between two systems. This approach utilizes public key encryption and digital certificates to ensure the confidentiality and integrity of data transmitted between systems. In simple terms, SSL/TLS PKI works by generating a pair of unique keys, a public key and a private key, for each system or device. The public key is used to encrypt data before it is transmitted over the internet, while the private key is used to decrypt the data once it reaches its destination. This ensures that only authorized parties can access and read the transmitted data while in transit. In particular the SSL/TLS protocol can be used to encrypt the connection between the owning center and the external centers.

3.3.1.10.2 Encryption

All data in transit to or from the owning center shall be encrypted through a standards-based communications medium using HTTPS, SSH, or other means that utilizes a minimum of NIST Advanced Encryption Standard (AES) 128-bit encryption

3.3.2 Provide Information on Organizations, Centers and Contacts

This section covers the topic of organizations and people that own, operate and maintain the centers in the C2C network. Maintaining relationships between said organizations and people is important in order to meet organizational and regional objectives. The administrative data, identified in these requirements, enable said C2C relationships. The requirements that support the exchange of information about organizations, centers, and the people for each organization and center in the C2C network are described below.

3.3.2.1 Send Organization Information Upon Request

An owner center shall respond to an authorized external center requesting its organization information with a message containing the owner center's organization information.

3.3.2.2 Publish Organization Information

An owner center shall publish a message containing its organization information to all authorized subscribing external centers.

3.3.2.3 Subscribe to Organization Information

An external center shall send a subscription message to an owner center requesting its organization information.

3.3.2.4 Contents of the Organization Information Request

An external center shall send an organization information request to an owner center.

3.3.2.4.1 Required Organization Information Request Content

The organization information request sent from an external center to an owner center shall include:

- a. Unique identifier of the requesting organization; and
- b. Organization information type (organization, center).

3.3.2.4.2 Optional Organization Information Request Content

The following are optional requirements that an external center may include in the organization information request sent to an owner center.

3.3.2.4.2.1 Authentication – Organization Information

The requirements for the authentication from an external center to an owner center as part of organization information request are found in "3.3.1.8.1 Authentication."

3.3.2.4.2.2 Owner Organization Identifier

The external center shall provide the unique identifier of the organization requested as part of the organization information request.

3.3.2.4.2.3 Owner Center Identifier

The external center shall provide the unique identifier of each center requested as part of the organization information request.

3.3.2.5 Contents of the Organization and Centers Information

An owner center shall send organization information to an external center.

3.3.2.5.1 Required Organization Information Content

The organization information sent from a sending center to a receiving center shall include the unique identifier of the organization requested.

3.3.2.5.2 Optional Organization Information Content

The following are optional requirements that a sending center may include in the organization information sent to a receiving center.

3.3.2.5.2.1 Organization Name

The sending center shall provide the organization name as part of the organization information sent to a receiving center.

3.3.2.5.2.2 Organization Location

The sending center shall provide the location of the organization as part of the organization information sent to a receiving center.

3.3.2.5.2.3 Organization Contact Information

The sending center shall provide the information of the default contact group for the organization or center as part of the organization information sent to a receiving center.

3.3.2.5.2.3.1 Required Organization Contact Information

The sending center shall provide the unique identifier of the default contact group for the organization or center as part of the organization contact information sent to a receiving center.

3.3.2.5.2.3.2 Optional Organization Contact Information

If an organization contact group or center contact information is included in the organization information, the following are optional requirements that a sending center may include in the organization information sent to a receiving center.

3.3.2.5.2.3.2.1 Contact Group Name

The sending center shall provide the name of the group or point of contact for the organization as part of the organization information sent to a receiving center.

3.3.2.5.2.3.2.2 Contact Group Role

The sending center shall provide a description of the job or role that the contact group fulfills at the organization as part of the organization information sent to a receiving center.

3.3.2.5.2.3.2.3 Work Phone Number

The sending center shall provide the work telephone number of the contact group as part of the organization information sent to a receiving center.

3.3.2.5.2.3.2.4 Alternate Phone Number

The sending center shall provide an alternate phone number of the contact group as part of the organization information sent to a receiving center.

3.3.2.5.2.4 Organization Center Information

The sending center shall provide information about a center owned or operated by the organization as part of the organization information sent to a receiving center. Multiple instances of centers may be sent.

3.3.2.5.2.4.1 Required Organization Center Information

The sending center shall provide the unique identifier of a center owned or operated by the organization as part of the organization center information sent to a receiving center. Multiple instances of centers may be sent.

3.3.2.5.2.4.2 Optional Organization Center Information

If the sending center sends organization center information, the following are optional requirements that a sending center may include in the organization center information sent to a receiving center.

3.3.2.5.2.4.2.1 Organization Center Name

The sending center shall provide the name of the center as part of the organization center information sent to a receiving center.

3.3.2.5.2.4.2.2 Organization Center Location

The sending center shall indicate the geographic location (as a GeoJSON Point) of the center as part of the organization center information sent to a receiving center.

3.3.2.5.2.4.2.3 Organization Center Description

The sending center shall provide a textual description of the center as part of the organization center information sent to a receiving center. The description may include the functions performed by the center.

3.3.2.5.2.4.2.4 Organization Center Type

The sending center shall indicate if the center is a “fixed” or “mobile” center as part of the organization center information sent to a receiving center.

3.3.2.5.2.4.2.5 Organization Center Contact Information

The sending center shall provide the unique identifier of the default contact group for the center owned or operated by the organization as part of the organization center information sent to a receiving center (See 3.3.2.5.2.3).

3.3.2.5.2.5 Date and Time Change Information —Organization Information

The sending center shall provide the date and time, in UTC, of the last change to the organization information as part of the organization information sent to a receiving center.

3.3.3 Events Information Sharing

The event information message, also known as the full event update message, is used to open, update and close events. The requirements for exchanging event information between centers are as follows:

3.3.3.1 Send Event Information Upon Request

An owner center shall respond to an authorized external center requesting event information with a message containing the owner center’s event information.

3.3.3.2 Publish Event Information

An owner center shall publish a message containing its event information to all authorized subscribing external centers.

3.3.3.3 Subscribe to Event Information

An external center shall send a subscription message to an owner center requesting its event information.

3.3.3.4 Contents of Event Information Request

An external center shall send an event information request to an owner center.

3.3.3.4.1 Required Event Information Request Content

The event information request sent from an external center to an owner center shall include:

- a. Unique identifier of the requesting organization;

- b. Event message type version (ngTMDD v1.0);
- c. Unique Event message ID;
- d. The date and time, in UTC, the request was sent; and
- e. Request filter limit (specific events, specific response plans, all current events, all event updates, all response plans, no filtering). Specific events are defined by event ID and specific response plans are defined by response plan ID.

3.3.3.4.2 Optional Event Information Request information

The following are optional requirements that an external center may include in the event information request sent to an external center.

3.3.3.4.2.1 Authorization – Event Information

The requirements for the authorization information as part of the event index request are found in “Section 3.3.1.8.1 Authorization Information – External Centers..”

3.3.3.4.2.2 Operator Identifier – Events

The requirements for the operator identifier from an external center to an owner center are found in “Section 3.3.1.8.2 Operator Identifier – Requests..” This operator identifier is sent if the user name and the identifier of the operator are different values.

3.3.3.4.2.3 Requesting Organization – —Events

The external center shall provide its organization information (See 3.3.2.5.1 and 3.3.2.5.2) as part of the event information request.

3.3.3.5 Contents of the Event Information

An owner center shall send event information to an external center.

3.3.3.5.1 Required Event Information Content

- a. Multiple instances of event information may be sent. The event information sent from an owner center to an external center shall include:
 - b. Event Message Header;
 - c. Event Reference; and
 - d. Event Element Details.

The requirements for each aspect of the event information are given below.

3.3.3.5.1.1 Event Message Header

The following are requirements for the contents of the event message header information sent from an owner center to an external center.

3.3.3.5.1.1.1 Required Event Message Header Information

The event message header information sent from an owner center to an external center shall include:

- a. Organization information for the organization originating the event (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Event message type version;
- c. Event message number; and
- d. The date and time, in UTC, when the message was sent.

3.3.3.5.1.1.2 Optional Event Message Header Information

The following are optional requirements that an owner center may include in the event message header information sent to an external center.

3.3.3.5.1.1.2.1 External Center Organization – Events

The owner center shall provide the organization information (See 3.3.2.5.1 and 3.3.2.5.2) of the organization requesting the event information as part of the event message header information. (

3.3.3.5.1.1.2.2 Message Expiry Time

The owner center shall provide the date and time, in UTC, when the message should be considered invalid as part of the event message header information.

3.3.3.5.1.2 Event Reference

The following are requirements for the contents of the event reference information sent to an external center.

3.3.3.5.1.2.1 Required Event Reference Information

The event reference information sent from an owner center to an external center shall include:

- a. Unique identifier for the event;
- b. Event update number; and
- c. The date and time, in UTC, when the message was updated.

3.3.3.5.1.3 Event Element Details

The following are requirements for the contents of the event element details information sent to an external center. There may be multiple instances for the event element details information.

Note: The event element details information is optional IF and ONLY IF the event information message is sent to close an open event.

3.3.3.5.1.3.1 Event Time

The event details information sent from an owner center to an external center shall include event time information.

3.3.3.5.1.3.1.1 Required Event Time Information

The event time information sent from an owner center to an external center shall include the date and time, in UTC, the event was updated.

3.3.3.5.1.3.1.2 Optional Event Time Information

The following are optional requirements that an owner center may include in the event time information sent to an external center.

3.3.3.5.1.3.1.2.1 Event Valid Period

The event valid period information sent from an owner center to an external center shall include:

- a) The date and time the event is expected to end; or
- b) For event category "current," the estimated remaining duration of event (minutes), measured from the last update time; or
- c) Effective periods including the days of the week that the event is valid.

3.3.3.5.1.3.1.2.2

Effective Period Qualifier

If the event valid period is defined by an effective period, the owner center shall indicate any effective period qualifiers as part of the effective period information. Supported values include not-specified, morning, afternoon, evening, night, daytime, off-peak periods, at-peak periods, until further notice, morning peak, afternoon peak, and midday periods.

3.3.3.5.1.3.1.2.3

Days Event Not In Effect

If the event valid period is defined by an effective period, the owner center shall provide each day of the month that a holiday falls on when the event is not in effect as part of the effective period information.

3.3.3.5.1.3.1.2.4 Planned Event Schedule Element Identifier

If the event category type is "planned," the owner center shall provide each event schedule element identifier as part of the event time information.

3.3.3.5.1.3.1.2.5 Sequence Date/Time

The owner center shall provide the date and time, in UTC, of each element in the sequence as part of the event time information. The sequence of events may be used to comprise a forecast “snapshot” of an event, such as a mesoscale weather model predicting road weather conditions.

3.3.3.5.1.3.1.2.6 Event Start Date/Time

If the event category type is “current,” the owner center shall provide the date and time, in UTC, that the event started as part of the event time information.

3.3.3.5.1.3.1.2.7 Expected Start Date/Time

If the event category type is “planned,” the owner center shall provide the date and time, in UTC, when the event is expected to start as part of the event time information.

3.3.3.5.1.3.1.2.8 Expected End Date/Time

If the event category type is “planned,” the owner center shall provide the date and time, in UTC, when the event is expected to end as part of the event time information.

3.3.3.5.1.3.1.2.9 Recurrent Times Event in Effect

The owner center shall provide the recurrent times when an event is in effect as part of the effective period information. This may include peak period congestion periods, and unusual conditions associated with other event elements such as roadwork, incidents, special events. Multiple instances of recurrent times may be sent.

3.3.3.5.1.3.1.2.10 Planned Event Continuous Flag

If the event category type is “planned,” the owner center shall indicate if the schedule is continuous between the expected start date/time and expected end date/time as part of the event time information.

3.3.3.5.1.3.1.2.11 Roadway Clearance Time

If the event category type is “current,” the owner center shall provide the date and time, in UTC, the event ended as part of the event time information. This is measured as the time that all lanes of traffic are available for normal traffic flow.

3.3.3.5.1.3.2 Event Source

If the owner center supports event source, the elements details information sent from an owner center to an external center shall include the event source information as described in the following.

3.3.3.5.1.3.2.1 Information Source Organization

The owner center shall provide information on the organization (See 3.3.2.5.1 and 3.3.2.5.2) that is the source of the event information as part of the event source information.

3.3.3.5.1.3.2.2 Event Detection Method

The owner center shall indicate how the event was detected as part of the event source information.

3.3.3.5.1.3.3 Event Description

If the owner center supports event description information capabilities, the event details information sent from an owner center to an external center shall include event description information described by the following:

- a) ITIS Codes (an array of numeric ITIS Code values as defined in SAE J2540; if an ITIS Code cannot be used, then ITIS Text values must be used instead as defined in SAE J2540)
- b) Location Reference (an unstructured text string representing a location consistent with the ITIS items described above.)

Each event may support multiple instances of event description information.

3.3.3.5.1.3.3.1 Event Quantity

The event quantity information sent from an owner center to an external center shall be described by:

- a) Extent (length affected, proportion affected, above altitude, below altitude); or
- b) Link state (delay, peak-delay, alternate route delay, detour-peak-delay, headway, travel time, existing capacity, travel time increase, average speed, estimated vehicle speed, description time, density, occupancy, volume);
- c) Link Lane State (open, closed, shift-left, shift-right, merge-left, merge-right, alternating-flow.)
- d) Incident details (vehicles involved count, cars involved count, trucks involved count, buses involved count, human fatalities count, human injuries count, human major injuries count, and human minor injuries count); or
- e) Road weather (average wind direction, average wind speed, average gust wind speed, air temperature, dewpoint temperature, maximum temperature, minimum temperature, relative humidity, atmospheric pressure, precipitation rate, snowfall accumulation rate, visibility, uv-index, probability); or
- f) Surface conditions (water depth, adjacent snow depth, roadway snow depth, roadway snow pack depth, ice thickness, surface temperature, pavement temperature, surface water depth, surface salinity, surface freeze point, mobile friction); or
- g) Link restrictions (advisory speed limit, speed limit, truck speed limit, vehicle length restriction, vehicle height restriction, vehicle width restriction, vehicle weight restriction, vehicle axle weight restriction, vehicle axle count restriction).
- h) Vehicle Count number of vehicles for the selected enumeration.

3.3.3.5.1.3.3.2 Detour Information

The owner center shall send detour type information as part of the event description information. Supported values shall include proposed alternate route, confirmed alternate route, required detour, alternate route for destination, alternate destination, and no recommended detour.

3.3.3.5.1.3.4 Event Location

If the owner center supports Event Location information, the event element details information sent from an owner center to an external center shall include event location information described by:

- a) Area location; or
- b) Link location; or
- c) Landmark location; or
- d) Geographic location .

Multiple instances of event location information may be sent.

3.3.3.5.1.3.4.1 Area Location Information

If area location is used to describe the event location, then the following are optional requirements that an owner center may include in the event location information sent to an external center.

3.3.3.5.1.3.4.1.1 Area Identifier

The owner center shall provide the unique identifier of the defined area as part of the event location information.

3.3.3.5.1.3.4.1.2 Name of Area

The owner center shall provide the name of the area as assigned by the owner organization as part of the event location information.

3.3.3.5.1.3.4.1.3 Area Location Rank

The owner center shall provide the location rank of the area as assigned by the owner organization as part of the event location information. Location rank is defined as the relative importance of a location, where a location with the highest value is most important. For example, New York, NY would have the highest value

and No Name, CO 81601 having the lowest value. A value of 0 is reserved for area location names used by the owner organization only.

3.3.3.5.1.3.4.1.4 Secondary Area Location Reference

If a secondary identifier for the area exists, the owner center shall provide the secondary identifier as part of the event location information.

3.3.3.5.1.3.4.2 Required Link Location Information

If link location is used to describe the event location, then the event location information sent from an owner center to an external center shall include a primary Point on a Link Location (See 3.3.3.5.1.3.4.4).

3.3.3.5.1.3.4.3 Optional Link Location Information

If link location information is used to describe event location, then the following are optional requirements that an owner center may include in the event location information sent to an external center.

3.3.3.5.1.3.4.3.1 Link Ownership

The owner center shall indicate the name of the organization that “owns” the link as part of the event location information.

3.3.3.5.1.3.4.3.2 Route Designator

The owner center shall provide the route designator information as part of the event location information.

3.3.3.5.1.3.4.3.3 Second Route Designator

The owner center shall provide a second route designator information as part of the event location information.

3.3.3.5.1.3.4.3.4 Link Identifier

The owner center shall provide the unique identifier of the link as part of the event location information.

3.3.3.5.1.3.4.3.5 Link Name – Events

The owner center shall provide the name of the link as assigned by the owner organization as part of the event location information.

3.3.3.5.1.3.4.3.6 Link Lane- Events

The owner center shall provide the lane number (See 3.3.3.5.1.3.6.1.5) where the event occurred as part of the event location information.

3.3.3.5.1.3.4.3.7 Secondary Point

If a secondary point on a link exists, the owner center shall provide the secondary point on a link location information (See 3.3.3.5.1.3.4.4) as part of the event location information.

3.3.3.5.1.3.4.3.8 Link Direction

The owner center shall provide the direction of travel on the link as part of the event location information. Supported values shall include northbound, northeast bound, eastbound, southeast bound, southbound, southwest bound, westbound, northwest bound, not directional, positive direction, negative direction, both directions and any other.

3.3.3.5.1.3.4.3.9 Link Alignment

The owner center shall provide the link alignment information as part of the event location information. Supported values shall include northbound, eastbound, southbound, westbound, inner loop and outer loop.

3.3.3.5.1.3.4.3.10 Linear Reference Version – Events

The owner center shall provide the linear reference version information that the link is located on as part of the event location information.

3.3.3.5.1.3.4.3.11 Alternate Link Location

If an alternate link location exists, the owner center shall provide the alternate link location information as part of the event location information. Multiple instances of alternate link location information may be sent.

3.3.3.5.1.3.4.4 Required Point on a Link Location Information

If a point on a link is used to describe the event location, then the event location information sent from an owner center to an external center shall include the geographic location (as a GeoJSON Point).

3.3.3.5.1.3.4.5 Optional Point on a Link Location Information

If point on a link location information is used to describe event location, then the following are optional requirements that an owner center may include in the event location sent to an external center.

3.3.3.5.1.3.4.5.1 Linear Reference Location

The owner center shall provide the linear reference location as part of the event location information.

3.3.3.5.1.3.4.5.2 Link Name – Event Point

The owner center shall provide the name of the roadway on which the event is located as part of the event location information.

3.3.3.5.1.3.4.5.3 Point Name

The owner center shall provide the name of a point along the roadway as part of the event location information.

3.3.3.5.1.3.4.5.4 Cross Street Identifier

The owner center shall provide the unique identifier of each cross street as part of the event location information.

3.3.3.5.1.3.4.5.5 Cross Street Name

The owner center shall provide the unique name of each cross street as part of the event location information.

3.3.3.5.1.3.4.5.6 Signed Destination

The owner center shall provide each signed destination information as part of the event location information. Signed destinations may include nearby cities or landmarks.

3.3.3.5.1.3.4.5.7 Point Location Rank

The owner center shall include the location rank for the point on a link as assigned by the owner organization as part of the event location information. Supported values shall include 0 to 10, where 10 is the highest relative importance and 1 is the lowest relative importance. A value of 0 is reserved for location names used by the owner organization only.

3.3.3.5.1.3.4.5.8 Landmark Type

The owner center shall include the landmark type information as part of the event location information.

3.3.3.5.1.3.4.5.9 Secondary Link Location

If a secondary link location exists, the owner center shall provide the secondary link location as part of the event location information.

3.3.3.5.1.3.4.6 Required Landmark Location Information

If landmark location is used to describe the event location, then the landmark location information sent from an owner center to an external center shall include:

- a) Landmark location type; and
- b) Landmark name.

3.3.3.5.1.3.4.7 Optional Landmark Location Information

If landmark location is used to describe the event location, then the following are optional requirements that an owner center may include in the event location information sent to an external center.

3.3.3.5.1.3.4.7.1 Landmark Point Name

The owner center shall provide the name of a point within a landmark as part of the event location information.

3.3.3.5.1.3.4.7.2 Landmark Location Rank

The owner center shall provide the location rank of the landmark as assigned by the owner organization as part of the event location information. Location rank is defined as the relative importance of a location, where a location with the highest value is most important. For example, New York, NY would have the highest value and No Name, CO 81601 having the lowest value. A value of 0 is reserved for landmark names used by the owner organization only.

3.3.3.5.1.3.4.7.3 Landmark Location

The owner center shall provide the geographic location (as a GeoJSON Point) of the landmark as part of the event location information.

3.3.3.5.1.3.4.7.4 Secondary Landmark Location

If a secondary landmark location exists, the owner center shall provide the secondary landmark location as part of the event location information.

3.3.3.5.1.3.4.8 Event Geographic Location

The owner center shall provide the geographic location as a GeoJSON LineString, Polygon, or Point. of the event as part of the event location information.

LineString allows specifying the entire road event path or the encompassing area and should be used when at least the start and end coordinates are known. The order of coordinates is meaningful: the first coordinate is the first (furthest upstream) point a road user encounters when traveling through the road event.

Polygon allows specifying an area and should be used when the start and end coordinates of the boundary surrounding the event area are the same and the event location is the encompassed area.

Point should be used when only one coordinate is known.

3.3.3.5.1.3.5 Event Name

If the owner center supports event names, the event element details information sent from an owner center to an external center shall include a short text description of the event.

3.3.3.5.1.3.6 Event Lane

If the owner center supports event lane information, the event element details information sent from an owner center to an external center shall include event lane information. Multiple instances of event lane information may be sent.

3.3.3.5.1.3.6.1 Optional Event Lane Information

The following are optional requirements that an owner center may include in the event lane information sent to an external center.

3.3.3.5.1.3.6.1.1 Lane Type

The owner center shall provide the type of lane as part of the event lane information from a predefined list using camelCase format for all the enumerations.

3.3.3.5.1.3.6.1.2 Direction of Travel

The owner center shall provide the direction of travel on the link as part of the event lane information. Supported values shall include northbound, northeast bound, eastbound, southeast bound, southbound, southwest bound, westbound, northwest bound, not directional, positive direction, negative direction, both directions and any other.

3.3.3.5.1.3.6.1.3 Total Number of Lanes

The owner center shall provide the total number of lanes at the event location as part of the event lane information.

3.3.3.5.1.3.6.1.4 Number of Lanes Affected

The owner center shall provide the total number of lanes affected by the event as part of the event lane information.

3.3.3.5.1.3.6.1.5 Lane Number Affected

The owner center shall provide the lane number of each lane affected by the event as part of the event lane information.

3.3.3.5.1.3.6.1.6 Lane Status

The owner center shall describe the status of the lane affected by the event as part of the event lane information.

3.3.3.5.1.3.7 Event Description Confidence Level

If the owner center supports it, the owner center shall include event description confidence level information as part of the event element details information sent to an external center. Supported values shall include unconfirmed report, two unconfirmed reports, three unconfirmed reports, four or more unconfirmed reports, provisional plan, firm plan, official report from scene, detailed official report from scene, detailed official reports covering whole area and legally enforced decision.

3.3.3.6 Optional Event Information Content

The following are optional requirements that an owner center may include in the full event update information sent to an external center.

3.3.3.6.1 Information Access Restrictions – Events

The requirements for the owner center to place restrictions on the event information distribution are found in “Section 3.3.1.9.1 Information Access Restrictions – Response Message Content.”

3.3.3.6.2 Event Indicator

An owner center shall include event indicator information in the event information sent to an external center. Multiple instances of event indicator information may be sent. Each instance of event indicator information consists of one of the following:

3.3.3.6.2.1 Event Status

The owner center shall provide the incident status as part of the event indicator information. Supported values shall include planned, forecast, contingency plan, response plan activated, reported, confirmed, responding, current, updated, clearing, ended, delete, cancelled, postponed, and reopened.

3.3.3.6.2.2 Event Duration Exceeded Flag

The owner center shall indicate as part of the event indicator information when the event duration is exceeded or the planned/forecasted event's expected end date/time is exceeded.

3.3.3.6.2.3 Event Impact Level

The owner center shall provide the impact of an event on the roadway as part of the event indicator information. Supported values shall include 0 to 10, where 10 is the highest relative impact and 1 is the lowest relative impact. A value of 0 is reserved for the owner organization only.

3.3.3.6.2.4 Event Active Flag

The owner center shall indicate if the event represents an active schedule as part of the event indicator information.

3.3.3.6.2.5 Event Class

If the event category is “planned,” the owner center shall provide the event class as part of the event indicator information. Supported values shall include incident, construction, and special event.

3.3.3.6.3 Other References

Center can associate one event with another event, regardless whether the other event was originated by the owner center or by an external center. Two separate centers may enter the same event into their own systems (each event having a unique event identifier), or a single event, such as a crash, may cause a secondary crash nearby. In these situations, it is helpful to associate one event with another event to obtain a complete picture of a situation. An owner center shall send such reference information in the event information sent to an external center. Multiple instances of other reference information may be sent. Each instance of other reference information consists of one of the following:

3.3.3.6.3.1 Trip Reference

The owner center shall provide the trip reference information related with the event as part of the event information sent to an external center.

3.3.3.6.3.2 Responsible Reference

The owner center shall provide the event reference information of the responsible event as part of the event information sent to an external center.

3.3.3.6.3.3 Related Event

The owner center shall provide the event reference information of a related event as part of the event information sent to an external center.

3.3.3.6.3.4 Previous Event

The owner center shall provide the event reference information of a previous event as part of the event information sent to an external center.

3.3.3.6.3.5 Split Event

The owner center shall provide the event reference information of a split event as part of the event information sent to an external center.

3.3.3.6.3.6 Merged Event

The owner center shall provide the event reference information of a merged event as part of the event information sent to an external center.

3.3.3.6.3.7 Sibling Event

The owner center shall provide the event reference information of a sibling event as part of the event information sent to an external center.

3.3.3.6.3.8 Associated Device

The owner center shall provide the device reference information of a device related to the event as part of the event information sent to an external center.

3.3.3.6.3.9 Associated URL

The owner center shall provide a Uniform Resource Locator (URL) as part of the event information sent to an external center. The URL is a network-retrievable document that in this context provides additional information about the event. Examples of documents include a copy of an official incident report or a map image showing the location of the event. Optionally, the owner center may also provide a text field to indicate the file type or medium that the URL reference points to as part of the URL information.

3.3.3.6.4 Event Comments

An owner center shall include the event comments information in the event information sent to an external center.

3.3.3.6.4.1 Required Event Comments

The event comments sent from an owner center to an external center shall include:

- a. Date/time of comment
- b. Operator identifier. The requirements for the operator identifier are found in "Section 3.3.1.8.4 Operator Identifier – Responses."
- c. Comment text. The comment text provides additional notes supplemental to the description of a specific roadway event that are internal and not to be shared with the public as part of the event comments information.

3.3.3.7 Event Index

The event index message is used to determine a list of events that an owner center is currently tracking. The requirements for exchanging event index information between centers are as follows:

3.3.3.7.1 Send Event Index Information Upon Request

An owner center shall respond to an authorized external center requesting event index information with a message containing the owner center's event index information.

3.3.3.7.2 Publish Event Index Information

An owner center shall publish a message containing its event index information to all authorized subscribing external centers.

3.3.3.7.3 Subscribe to Event Index Information

An external center shall send a subscription message to an owner center requesting event index information.

3.3.3.7.4 Contents of Event Index Request

An external center shall send an event index request to an owner center.

3.3.3.7.4.1 Required Event Index Request Content

The event index request sent from an external center to an owner center shall include:

- a) Unique identifier of the requesting organization;
- b) Event message type identifier (event information, event index);
- c) Event message type version (ngTMDD v1, ngTMDD v1.1);
- d) The date and time, in UTC, the request was sent; and
- e) Request filter limit (specific events, specific response plans, all current events, all event updates, all response plans, no filtering). Specific events are defined by event id and specific response plans are defined by response plan ID.

3.3.3.7.4.2 Optional Event Index Request Information

The following are optional requirements that an external center may include in the event index request sent to an external center.

3.3.3.7.4.2.1 Authorization – Event Index

The requirements for the authorization information as part of the event index request are found in “Section 3.3.1.8.1 Authorization Information – External Centers..”

3.3.3.7.4.2.2 Operator Identifier – Event Index

If the external center provides authorization information as part of the event index request, the requirement for operator identifier is found in. “3.3.1.8.2 Operator Identifier Requests.”

3.3.3.7.4.2.3 Requesting Organization – Event Index

The external center shall provide its organization information (See 3.3.2.5.1 and 3.3.2.5.2) as part of the event index request.

3.3.3.7.5 Contents of the Event Index Information

An owner center shall send event index information to an external center.

3.3.3.7.5.1 Required Event Index Information Content

The event index information sent from an owner center to an external center shall include:

- a. Associated URL;
- b. The date and time, in UTC, when the event was last updated;
- c. Unique identifier of the event;
- d. Event update number; and
- e. Event status (updated, delete, ended).

3.3.3.8 Event Response Plan

The requirements to share one or more proposed responses to an event are provided below

3.3.3.8.1 Send Response Plan Information Upon Request

An owner center shall respond to an external center requesting a response plan for an event with a message containing any response plans defined for the event. A message with zero response plans will indicate that no appropriate response plan exists to meet the request.

3.3.3.8.2 Publish Response Plan Information

An owner center shall publish a message containing zero or more response plans to all authorized subscribing external centers.

3.3.3.8.3 Subscribe to Response Plan Information

An external center shall send a subscription message to an owner center requesting response plan information.

3.3.3.8.4 Content of Response Plan Information Request

An external center shall send a response plan information request to an owner center

3.3.3.8.4.1 Required Response Plan Information Request Content

The response plan information request sent from the external center to the owner center shall contain:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2)
- b. External organization information
- c. Request identifier

3.3.3.8.4.2 Optional Response Plan Information Request Content

The following are optional requirements that an external center may include in the response plan information request sent to an owner center:

3.3.3.8.4.2.1 Authorization Information

The requirements for the authorization information as part of the response plan request are found in “Section 3.3.1.8.1 Authorization Information – External Centers.”

3.3.3.8.4.2.2 Request Time

The response plan information request shall include the time of the response plan request.

3.3.3.8.4.2.3 Corridor Identifier

The response plan information request shall include an identifier of the transportation corridor affected by the event and response plan

3.3.3.8.4.2.4 Response Plan Request Filter

The response plan information request shall include a response plan filter that allows the response plan request to be filtered based on the following criteria:

- a. Event ID
- b. An evaluation cycle list
- c. A response plan rank list
- d. A response plan ID list
- e. A plan type
- f. A response plan status list

3.3.3.8.5 Response Plan Information

The contents of the Response Plan are provided below:

3.3.3.8.5.1 Response Plan Information Content

The response plan information sent from an owner center to an external center shall include:

- a. Response plan header
- b. Evaluation cycle information
- c. Response plan details

3.3.3.8.5.2 Required Response Plan Header Content

The owner center shall send to an external center the response plan header.

3.3.3.8.5.2.1 Required Response Plan Header Content

The response plan header shall contain the following required information:

- a. Event identifier
- b. Response plan identifier
- c. Plan type

3.3.3.8.5.2.2 Optional Response Plan Header Content

The following are optional requirements that an owner center may include in the response plan header sent to an owner center:

3.3.3.8.5.2.2.1 Response Plan Ranking

The response plan header shall include a ranking of the response plan within the response plan list sent for the evaluation cycle.

3.3.3.8.5.2.2.2 Submission Time

The response plan header shall include the submission time of the response plan for approval

3.3.3.8.5.3 Evaluation Cycle

3.3.3.8.5.3.1 Required Evaluation Cycle Content

Response plan evaluation cycles indicate the order of response plans within an event response lifecycle. Each evaluation cycle shall include the following information:

- a. Evaluation cycle identifier
- b. Evaluation cycle reason
- c. Evaluation start time
- d. Evaluation cycle duration
- e. Ranked response plan count
- f. Submitted response plan count
- g. Event identifier

3.3.3.8.5.3.2 Optional Evaluation Cycle Content

The following are optional requirements that an owner center may include in the evaluation cycle content sent to an external center:

3.3.3.8.5.3.2.1 Link State

The evaluation cycle content sent from an owner center to an external center shall include link state information as defined in Section 3.3.4.3.2.5 Contents of the Link Status Information.

3.3.3.8.5.3.2.2 Response Plan List

The evaluation cycle content sent from an owner center to an external center shall include a list of active response plans

3.3.3.8.5.4 Response Plan Details

3.3.3.8.5.4.1 Required Response Plan Details

The response plan details sent from the owner center to the external center shall Contain:

- a. Activity start time
- b. Projected activity end time
- c. List of agencies participating in the response plan activities

3.3.3.8.5.4.2 Optional Response Plan Details

The following are optional requirements that an owner center may include in the response plan details sent to an external center:

3.3.3.8.5.4.2.1 Detour List

The owner center shall send to the external center the list of detours included within the response plan.

3.3.3.8.5.4.2.2 Ramp Meter Actions

The owner center shall send to the external center a list of ramp meter control actions included within the response plan.

3.3.3.8.5.4.2.3 Intersection Signal Control Actions

The owner center shall send to the external center a list of intersection signal control actions included within the response plan.

3.3.3.8.5.4.2.4 DMS Control Actions

The owner center shall send to the external center a list of DMS control actions included within the response plan.

3.3.3.8.5.4.2.5 HAR Message Control Actions

The owner center shall send to the external center a list of HAR message control actions included within the response plan.

3.3.3.8.5.4.2.6 Other Messaging

The owner center shall send to the external center a list of other informational messages included within the response plan such as 511 messaging or connected vehicle messaging.

3.3.3.8.5.4.2.7 LCS Schedule Changes

The owner center shall send to the external center a list of LCS schedule cancellations included within the response plan.

3.3.3.8.5.4.2.8 Speed Restrictions

The owner center shall send to the external center the speed reduction actions included within the response plan.

3.3.3.8.5.4.2.9 Road Closure Actions

The owner center shall send to the external center the road closure actions included within the response plan.

3.3.3.8.5.4.2.10 Personnel Deployment Actions

The owner center shall send to the external center a list personnel deployment actions included within the response plan.

3.3.3.8.5.4.2.11 Device Control Cancellations

The owner center shall send to the external center a list of device control cancellations included within the response plan.

3.3.3.8.5.4.2.12 Aggregate Approval Decisions

The owner center shall send to the external center the aggregate approval decision for the response plan as a result of individual organization approvals.

3.3.3.8.5.4.2.13 Individual Approval Decisions

The owner center shall send to the external center the list of individual approval decisions from all participating agencies.

3.3.3.8.6 Response Plan Status

Response plans may be in different states within their lifecycle. They may be in one of the following states:

- a. Generated – A response plan has been created, but no further action has been taken.
- b. Submitted-for-approval – A response plan has been submitted for an approval process defined by the project stakeholders.
- c. Being-implemented – A response plan has begun implementation, but implementation is not yet complete.
- d. Implemented – All response plan actions have been completed, and the response plan is active.
- e. Completed – All response plan activities have been completed, and the response plan has been terminated or replaced with a subsequent response plan.
- f. Rejected – A response plan has been rejected during the approval process.

3.3.3.8.6.1 Send Response Plan Status Upon Request

An owner center shall respond to an authorized external center requesting response plan status with a message containing response plan status.

3.3.3.8.6.2 Publish Response Plan Status

An owner center shall publish a message containing response plan status information to all authorized subscribing external centers.

3.3.3.8.6.3 Subscribe to Response Plan Status

An external center shall send a subscription request message to an owner center requesting response plan status.

3.3.3.8.6.4 Contents of the Response Plan Status Information Request

An external center shall send a response plan status information request to an owner center. The contents of the response plan status request are provided below:

3.3.3.8.6.4.1 Required Response Plan Status Request Content

The response plan status request sent from the external center to the owner center shall contain:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2)
- b. External organization information
- c. Request identifier

3.3.3.8.6.4.2 Optional Response Plan Status Request Content

The following are optional requirements that an external center may include in the response plan status request details sent to an owner center:

3.3.3.8.6.4.2.1 Authorization information

The requirements for the authorization information as part of the response plan status request are found in "Section 3.3.1.8.1 Authorization Information – External Centers."

3.3.3.8.6.4.2.2 Request time

The response plan information request shall include the time of the response plan request.

3.3.3.8.6.5 Contents of the Response Plan Status Response

An owner center shall send the response plan status to an external center. The contents of the response plan status response:

3.3.3.8.6.5.1 Required Response Plan Status Content

The response plan status response shall contain the following elements:

- a. A response plan header (see 3.3.3.9.5.2).
- b. The response status. The response plan status shall be one of the following: generated, submitted-for-approval, being implemented, implemented, completed, or rejected.
- c. Date and time, in UTC, the status was last updated.

3.3.3.8.7 Response Plan Approval

Response plans involving multiple centers or organizations are generally governed by an agreement between the parties which may require approval by multiple agencies, perhaps all agencies within the agreement or all agencies affected by the response plan. The details are dictated by the specifics of the agreement between the agencies. The requirements for the exchange of requests for approval and the response to those requests (either approval or disapproval) are defined below.

3.3.3.8.7.1 Send Response Plan Approval Upon Request

An owner center shall respond to an authorized external center requesting response plan approval with a message containing response plan approval information.

3.3.3.8.7.2 Publish Response Approval

An owner center shall publish a message containing response plan approval information to all authorized subscribing external centers.

3.3.3.8.7.3 Subscribe to Response Plan Approval

An external center shall send a subscription message to an owner center requesting response plan approval information.

3.3.3.8.7.4 Contents of the Response Plan Approval Request

The response plan approval request shall contain the following:

- a. A response plan header (See 3.3.3.9.5.2):
- b. A response plan request filter (See 3.3.3.9.4.2.4); and

- c. Authorization information (See 3.3.1.8.1).

3.3.3.8.7.5 Contents of the Response Plan Approval Response

The owner center shall send to the external center their response plan approval response.

3.3.3.8.7.5.1 Required Response Plan Approval Response Content

The response plan status response shall contain the following elements:

- a. A response plan header (See 3.3.3.9.5.2); and
- b. A response plan approval decision (See 3.3.3.9.7.5.2).

3.3.3.8.7.5.2 Contents of the Response Approval Decision

An owner center shall send to an external center their response approval decision regarding response plan activities.

3.3.3.8.7.5.2.1 Required Response Approval Decision Content

The response plan approval decision shall contain the following elements:

- a. The organization providing the decision;
- b. The decision made (approved, rejected, or decision not received); and
- c. An indication of the method of approval (automated, manual).

3.3.3.8.7.5.2.2 Optional response plan approval decision details

The following are optional requirements that an owner center may include in the response approval decision sent to an external center:

3.3.3.8.7.5.2.2.1 Decision Time

The response plan approval decision sent from the owner center to the external center shall contain the time of the approval decision.

3.3.3.8.8 Response Plan Cancellation

3.3.3.8.8.1 Send Response Plan Cancellation Acknowledgement Upon Request

An owner center shall respond to an authorized external center requesting response plan cancellation with a message containing response plan cancellation information.

3.3.3.8.8.2 Contents of the Response Plan Cancellation Request

An external center shall send to an owner center a request to cancel a response plan.

3.3.3.8.8.2.1 Required Response Plan Cancellation Request Requirements

The response plan cancellation request shall contain the following:

- a) A response plan header (See 3.3.3.9.5.2)
- b) An event identifier; and
- c) Authorization information (See 3.3.1.8.1 Authorization Information – External Centers).

3.3.3.8.8.2.2 Optional Response Plan Cancellation Request Requirements

The following are optional requirements that an external center may include in the response plan cancellation request sent to an owner center:

3.3.3.8.8.2.2.1 List of Response Plans to be Cancelled

The response plan cancellation request shall include a list of response plans to be terminated. If the list is blank, all response plans for the specified event are requested to be cancelled.

3.3.3.8.8.3 Contents of the Response Plan Cancellation Response

The owner center shall respond to the external center regarding the external center's request for response plan cancellation.

3.3.3.8.8.3.1 Required Response Plan Cancellation Response Content

The response plan cancellation response shall contain a list of response plan cancellations that include the following elements:

- a. The response plan header (See 3.3.3.9.5.2);
- b. The event identifier;
- c. The identifier of the response plan being terminated; and
- d. The status of the request (did you agree to cancel it?).

3.3.3.8.8.3.2 Optional Response Plan Cancellation Response Content

The following are optional requirements that an owner center may include in the response plan cancellation response sent to an external center:

3.3.3.8.8.3.2.1 Time of Status Update

The owner center shall send to the external center the time of the last request status update as part of the response plan cancellation.

3.3.3.8.8.3.2.2 Cancellation Plan Details

The owner center shall send to the external center cancellation plan including the sequence of actions to be taken to end all response activities.

3.3.3.9 Activity Logs

Activity logs are used to provide information about the actions taken as part of a response to an event, as well as providing a timeline for the event where each action log element represents a change to an event, or a free text description that describes an operator or device function that is associated with an event.

3.3.3.9.1 Send Activity Logs Upon Request

An owner center shall respond to an authorized external center requesting activity logs with a message containing the owner center's activity log information.

3.3.3.9.2 Publish Activity Log Information

An owner center shall publish message containing its action logs to all authorized subscribing external centers.

3.3.3.9.3 Subscribe to Activity Log Information

An external center shall send a subscription message to an owner center requesting activity logs.

3.3.3.9.4 Contents of the Activity Log Request

An external center shall send an activity log request to an owner center. The contents of the Response Plan Request are provided below:

3.3.3.9.4.1 Required Activity Log Request Content

The response plan activity log request sent from the external center to the owner center shall contain:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. External organization information; and
- c. Request identifier.

3.3.3.9.4.2 Optional Activity Log Request Content

The following are optional requirements that an external center may include in the activity log request sent to an external center:

3.3.3.9.4.2.1 Authorization Information

The requirements for the authorization information as part of the activity log request are found in “Section 3.3.1.8.1 Authorization Information – External Centers.”

3.3.3.9.4.2.2 Request Time

The activity log request sent from the external center shall include the time of the request.

3.3.3.9.5 Contents of Activity Log Information

An owner center shall send activity logs to an external center. The activity logs contain two types of information- events and event response- that are specified below.

3.3.3.9.5.1 Required Event Activity Log Information Content

The activity log of event information sent from an owner center to an external center shall include:

- a) Event identifier;
- b) Activity log element identifier;
- c) Date and time in UTC;
- d) Activity type (system new, system update, system ended, user activity, user pager activity); and
- e) Description of change.

3.3.3.9.5.2 Optional Event Activity Log Information Content

The following are optional requirements that an owner center may include in the activity log information sent to an external center.

3.3.3.9.5.2.1 Restrictions – Event Activity Logs

The owner center shall provide restrictions on the dissemination of the information as part of the activity log information. An owner center may place restrictions on the dissemination of this information provided to external centers, including relaying information to third parties. Valid values for forwarding restrictions to third parties include Unrestricted, Not to Public, Restricted to Law Enforcement, or Restricted to Recipient Organization Only.

3.3.3.9.5.3 Contents of the Response Plan Activity Log Response

An owner center shall send the response plan activity log to an external center. The contents of the response plan activity log are given below.:

3.3.3.9.5.3.1 Required Response Plan Activity Log Content

The response plan status response shall contain the following elements:

- a. The response plan header (See 3.3.3.9.5.2); and
- b. A list of response plan activity log details (See 3.3.3.9.5.4).

3.3.3.9.5.4 Contents of the Response Plan Activity Log Details

The owner center shall send to the external center the response plan log details.

3.3.3.9.5.4.1 Required Response Plan Activity Log Details Content

The response plan activity log details shall contain the following elements:

- a. The device type involved in the response plan;
- b. The ID of the device involved in the response plan;
- c. The command sent to the device involved in the response plan;
- d. The response plan command status for each command sent; and
- e. The text of any acknowledgement sent in response to a command.

3.3.3.9.5.4.2 Optional Response Plan Log Details

The following are optional requirements that an owner center may include in the response plan activity log information sent to an external center.

3.3.3.9.5.4.2.1 Command Send Time

The response plan activity log details shall contain the command send time and command acknowledgement received time.

3.3.4 Provide Roadway Network Data

This section of requirements covers the sharing of GIS-based traffic network inventory and location attributes including linear reference and geographic coordinates to support the location of devices and the location of events between operational centers. This includes requirements for the sharing of traffic data and traffic detector-based link status, which can be attributed to the underlying link and route-based traffic network.

The requirements to exchange traffic network inventory and status information between centers are as follows:

3.3.4.1 Share Traffic Network Information

The requirements to exchange traffic network information between centers are as follows:

3.3.4.1.1 Contents of the Traffic Network Information Request

An external center shall send a traffic network information request to an owner center.

3.3.4.1.1.1 Required Traffic Network Information Request Content

The traffic network information request sent from an external center to an owner center shall include:

- a. Requesting organization information (see 3.3.2.5.1 and 3.3.2.5.2); and
- b. Network information type requested (network inventory, node inventory, node status, link inventory, link status, route inventory, route status, fleet vehicle inventory, or fleet vehicle data).

3.3.4.1.1.2 Optional Traffic Network Information Request Content

If the owner center supports it, the following are optional requirements that an external center may include in the traffic network information request sent to an owner center.

3.3.4.1.1.2.1 Authorization – Network

The requirements for the authorization information as part of the traffic network information request are found in “Section 3.3.1.8.1 Authorization Information – External Centers.”

The following are optional requirements that an external center may include in the authorization information sent to an owner center:

3.3.4.1.1.2.1.1 Operator Identifier – Network

The requirements for the operator identifier from an external center to an owner center are found in “Section 3.3.1.8.2 Operator Identifier – Requests.” This operator identifier is sent if the user name and the identifier of the operator are different values.

3.3.4.1.1.2.2 Roadway Network Identifier

The external center shall provide the unique identifiers of each roadway network for which traffic network information is requested as part of the traffic network information request.

3.3.4.1.1.2.3 Traffic Network Identifier

The external center shall provide a list of identifiers for which traffic network information is requested as part of the traffic network information request. Traffic network identifiers may be node identifiers, link identifiers, or route identifiers.

3.3.4.2 Share Node Information

The requirements to exchange node information between centers are as follows:

3.3.4.2.1 Share Node Inventory Information

The requirements to exchange node inventory information between centers are as follows:

3.3.4.2.1.1 Send Node Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting node inventory with a message containing the owner center's node inventory information.

3.3.4.2.1.2 Publish Node Inventory Information

An owner center shall publish a message containing its node inventory information to all authorized subscribing external centers.

3.3.4.2.1.3 Subscribe to Node Inventory Information

An external center shall send a subscription message to an owner center requesting node inventory information.

3.3.4.2.1.4 Contents of the Node Inventory Request

The requirements for a node inventory request from an external center are found in Section 3.3.4.1.1, "Contents of the Traffic Network Information Request," with the network information type set to "node inventory."

3.3.4.2.1.5 Contents of the Node Inventory Information

An owner center shall send node inventory information to an external center.

3.3.4.2.1.5.1 Required Node Inventory Information Content

The node inventory information sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the roadway network;
- c. Unique identifier of each node; and
- d. Geographic location of each node (as a GeoJSON Point).

3.3.4.2.1.5.2 Optional Node Inventory Information Content

The following are optional requirements that an owner center may include in the node inventory information sent to an external center.

3.3.4.2.1.5.2.1 Information Access Restrictions – Node Inventory

The requirements for the owner center to place restrictions on the dissemination of the information that is part of the node inventory are found in "Section 3.3.1.9.1 Information Access Restrictions – Response Message Content."

3.3.4.2.1.5.2.2 Roadway Network Name – Node Inventory

The owner center shall provide the name of the roadway network as part of the node inventory information for each node.

3.3.4.2.1.5.2.3 Node Name – Node Inventory

The owner center shall provide the name of the node as assigned by the owner organization as part of the node inventory information for each node.

3.3.4.2.1.5.2.4 Node Description

The owner center shall provide a textual description of the node as part of the node inventory information for each node.

3.3.4.2.1.5.2.5 Route Designator – Node Inventory

The owner center shall provide the route designator information that the node is located on as part of the node inventory information for each node.

3.3.4.2.1.5.2.6 Node Direction

The owner center shall provide the direction of travel that is associated with the node as part of the node inventory information for each node. Supported values shall include northbound, northeast bound, eastbound, southeast bound, southbound, southwest bound, westbound, northwest bound, not directional, positive direction, negative direction, both directions, and any other.

3.3.4.2.1.5.2.7 Linear Reference – Node Inventory

The owner center shall provide the linear reference location information that the node is located on as part of the node inventory information for each node. The linear reference version information may also be included.

3.3.4.2.1.5.2.8 Node Type

The owner center shall indicate the node type as part of the node inventory information for each node. Supported values shall include freeway interchange, arterial with secondary cross street, arterial with crossing arterial, frontage road with arterial, railroad crossing, transit crossing, bus route node, train route node, wharf ferry node, transfer point, and pedestrian crossing.

3.3.4.2.1.5.2.9 Number of Links

The owner center shall provide the number of links associated with the node as part of the node inventory information for each node.

3.3.4.2.1.5.2.10 Node Inventory Date and Time Change Information

The owner center shall provide the date and time, in UTC, of the last change to the node inventory as part of the node inventory information for each node.

3.3.4.2.2 Share Node Status Information

The requirements to exchange node status information between centers are as follows:

3.3.4.2.2.1 Send Node Status Information Upon Request

An owner center shall respond to an authorized external center requesting node status with a message containing the owner center's node status information.

3.3.4.2.2.2 Publish Node Status Information

An owner center shall publish a message containing its node status information to all authorized subscribing external centers.

3.3.4.2.2.3 Subscribe to Node Status Information

An external center shall send a subscription message to an owner center requesting node status information.

3.3.4.2.2.4 Contents of the Node Status Request

The requirements for a node status request from an external center to an owner center are found in Section 3.3.4.1.1, "Contents of the Traffic Network Information Request," with network information type set to "node status."

3.3.4.2.2.5 Contents of the Node Status Information

An owner center shall send node status information to an external center.

3.3.4.2.2.5.1 Required Node Status Information Content

The node status information sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the roadway network;
- c. Unique identifier of each node requested; and
- d. State of each node (no determination, open, restricted, or closed).

3.3.4.2.2.5.2 Optional Node Status Information Content

The following are optional requirements that an owner center may include in the node status information sent to an external center.

3.3.4.2.2.5.2.1 Information Access Restrictions – Node Status

The requirements for the owner center to place restrictions on the dissemination of the information that is part of the node status are found in “Section 3.3.1.9.1 Information Access Restrictions – Response Message Content.”

3.3.4.2.2.5.2.2 Roadway Network Name – Node Status

The owner center shall provide the name of the roadway network as part of the node status information for each node.

3.3.4.2.2.5.2.3 Node Name – Node Status

The owner center shall provide the name of the node as assigned by the owner organization as part of the node status information for each node.

3.3.4.2.2.5.2.4 Node Status Date and Time Change Information

The owner center shall provide the date and time, in UTC, of the last change to node status as part of the node status information for each node.

3.3.4.3 Share Link Information

The requirements to exchange link information between centers are as follows:

3.3.4.3.1 Share Link Inventory Information

The requirements to exchange link inventory information between centers are as follows:

3.3.4.3.1.1 Send Link Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting link inventory with a message containing the owner center’s link inventory information.

3.3.4.3.1.2 Publish Link Inventory Information

An owner center shall publish a message containing its link inventory information to all authorized subscribing external centers.

3.3.4.3.1.3 Subscribe to Link Inventory Information

An external center shall send a subscription message to an owner center requesting link inventory information.

3.3.4.3.1.4 Contents of the Link Inventory Request

The requirements for a link inventory request from an external center to an owner center are found in Section 3.3.4.1.1, “Contents of the Traffic Network Information Request,” with network information type set to “link inventory.”

3.3.4.3.1.5 Contents of the Link Inventory Information

An owner center shall send link inventory information to an external center.

3.3.4.3.1.5.1 Required Link Inventory Information Content

The link inventory information sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the roadway network;
- c. Unique identifier of each link;
- d. Link type (freeway, arterial, collector, local, service road, tunnel, detour, dedicated link, military road, railroad link, air link, ferry, on ramp, off ramp, dedicated HOV lane, toll road, unknown, or other) for each link;
- e. Unique identifier of the beginning node for each link;
- f. Geographic location of the beginning node (as a GeoJSON Point) for each link;
- g. Unique identifier of the end node for each link; and
- h. Geographic location of the end node (as a GeoJSON Point) for each link.

3.3.4.3.1.5.2 Optional Link Inventory Information Content

The following are optional requirements that an owner center may include in the link inventory information sent to an external center.

3.3.4.3.1.5.2.1 Information Access Restrictions – Link Inventory

The requirements for the owner center to place restrictions on the dissemination of the information that is part of the link inventory are found in “Section 3.3.1.9.1 Information Access Restrictions – Response Message Content.”

3.3.4.3.1.5.2.2 Roadway Network Name – Link Inventory

The owner center shall provide the name of the roadway network as assigned by the owner organization as part of the link inventory information for each link.

3.3.4.3.1.5.2.3 Link Name – Link Inventory

The owner center shall provide the name of the link as assigned by the owner organization as part of the link inventory information for each link.

3.3.4.3.1.5.2.4 Alternate Names – Link Inventory

The owner center shall provide the other names by which the link is known as part of the link inventory information for each link.

3.3.4.3.1.5.2.5 Route Designator – Link Inventory

The owner center shall provide the route designator information that the link is located on as part of the link inventory information for each link.

3.3.4.3.1.5.2.6 Secondary Route Designators

The owner center shall provide alternative route designator in an array that the link(s) are located on as part of the link inventory information for each link.

3.3.4.3.1.5.2.7 Linear Reference – Link Inventory

The owner center shall provide the linear reference location information that the link is located on as part of the link inventory information for each link. The linear reference version information may also be included.

3.3.4.3.1.5.2.8 Link Length

The owner center shall provide the length of the link, in meters, as part of the link inventory information for each link.

3.3.4.3.1.5.2.9 Link Capacity

The owner center shall provide the capacity of the link, in vehicles per hour, as part of the link inventory information for each link.

3.3.4.3.1.5.2.10 Link Lane Information

The owner center shall provide information on the lanes that make up the link. This Information includes the number of lanes, their order, and the type of each lane.

3.3.4.3.1.5.2.11 Link Speed Limit – Link Inventory

The owner center shall provide the posted speed limit along the link as part of the link inventory information for each link. Unless indicated otherwise by the Speed Limit Units data element, the units for posted speed limit is in kilometers per hour.

3.3.4.3.1.5.2.12 Link Truck Speed Limit – Link Inventory

The owner center shall provide the posted speed limit for trucks along the link as part of the link inventory information for each link. Unless indicated otherwise by the Speed Limit Units data element, the units for posted speed limit is in kilometers per hour.

3.3.4.3.1.5.2.13 Speed Limit Units – Link Inventory

The owner center shall indicate the units by which the Link Speed Limit and Link Truck Speed Limit are measured as part of the link inventory information for each link. Supported values shall include kilometers per hour or miles per hour.

3.3.4.3.1.5.2.14 Link Law Enforcement Jurisdiction

The owner center shall provide the name of the law enforcement agency with jurisdiction over the link as part of the link inventory information for each link.

3.3.4.3.1.5.2.15 Designated Owner

The owner center shall provide the name of the designated owner of the link as part of the link inventory information for each link.

3.3.4.3.1.5.2.16 Left Shoulder Width

The owner center shall provide the width of the left shoulder of the link, in centimeters, as part of the link inventory information for each link.

3.3.4.3.1.5.2.17 Right Shoulder Width

The owner center shall provide the width of the right shoulder of the link, in centimeters, as part of the link inventory information for each link.

3.3.4.3.1.5.2.18 Median Type

The owner center shall provide the type of median along the link as part of the link inventory information for each link. Supported values shall include curbed, concrete barrier, concrete barrier with visibility screen, guard rail, open grass, open sand, painted median no access, separated roadways, and unprotected.

3.3.4.3.1.5.2.19 Link Inventory Date and Time Change Information

The owner center shall provide the date and time, in UTC, of the last change to this link inventory as part of the link inventory information for each link.

3.3.4.3.1.5.2.20 Next Link

The owner center shall provide the next link as part of the link inventory information for each link.

3.3.4.3.1.5.2.21 Previous Link

The owner center shall provide the previous link as part of the link inventory information for each link.

3.3.4.3.2 Share Link Status Information

The requirements to exchange link status information between centers are as follows:

3.3.4.3.2.1 Send Link Status Information Upon Request

An owner center shall respond to an authorized external center requesting link status with a message containing the owner center's link status information.

3.3.4.3.2.2 Publish Link Status Information

An owner center shall publish a message containing its link status information to all authorized subscribing external centers.

3.3.4.3.2.3 Subscribe to Link Status Information

An external center shall send a subscription message to an owner center requesting its link status information.

3.3.4.3.2.4 Contents of the Link Status Request

The requirements for a link status request from an external center to an owner center are found in Section 3.3.4.1.1, "Contents of the Traffic Network Information Request," with network information type set to "link status."

3.3.4.3.2.5 Contents of the Link Status Information

An owner center shall send link status information to an external center.

3.3.4.3.2.5.1 Required Link Status Information Content

- a. The link status information sent from an owner center to an external center shall include:
- b. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- c. Unique identifier of the roadway network;
- d. Unique identifier of each link requested; and
- e. State of each link (no determination, open, restricted, or closed).

3.3.4.3.2.5.2 Optional Link Status Information Content

The following are optional requirements that an owner center may include in the link status information sent to an external center.

3.3.4.3.2.5.2.1 Information Access Restrictions – Link Status

The requirements for the owner center to place restrictions on the dissemination of the information that is part of the link status are found in “Section 3.3.1.9.1 Restrictions – Response Message Content.”

3.3.4.3.2.5.2.2 Link Name – – Link Status

The owner center shall provide the name of the link as assigned by the owner organization as part of the link status information for each link.

3.3.4.3.2.5.2.3 Link Direction – – Link Status

The owner center shall provide the direction of travel on the link as part of the link status information for each link. Supported values shall include northbound, northeast bound, eastbound, southeast bound, southbound, southwest bound, westbound, northwest bound, not directional, positive direction, negative direction, both directions, and any other.

3.3.4.3.2.5.2.4 Lanes Open

The owner center shall provide the number of lanes currently open or available on the link as part of the link status information for each link.

3.3.4.3.2.5.2.5 Link Priority

The owner center shall provide the roadway priority assignments for which the link is restricted from general traffic as part of the link status information for each link. Supported values are special events, snow ice clearance, weather evacuation, defense movements, hazmat, agricultural access. and none.

3.3.4.3.2.5.2.6 Link Restrictions – – Axles

The owner center shall provide the maximum axle count restriction on the link as part of the link status information for each link.

3.3.4.3.2.5.2.7 Link Restrictions – – Height

The owner center shall provide the vehicle height restriction on the link as part of the link status information for each link. Unless indicated otherwise by the Link Restrictions Units data element, the units for the vehicle height restrictions are in centimeters.

3.3.4.3.2.5.2.8 Link Restrictions – – Length

The owner center shall provide the vehicle length restriction on the link as part of the link status information for each link. Unless indicated otherwise by the Link Restrictions Units data element, the units for the vehicle length restrictions are in centimeters.

3.3.4.3.2.5.2.9 Link Restrictions – Weight

The owner center shall provide the maximum gross vehicle weight restriction on the link, in kilograms, as part of the link status information for each link.

3.3.4.3.2.5.2.10 Link Restrictions – Width

The owner center shall provide the vehicle width restriction on the link as part of the link status information for each link. Unless indicated otherwise by the Link Restrictions Units data element, the units for the vehicle width restrictions are in centimeters.

3.3.4.3.2.5.2.11 Link Restrictions –Axle Weight

The owner center shall provide the vehicle axle weight restriction on the link, in kilograms, as part of the link status information for each link.

3.3.4.3.2.5.2.12 Link Restrictions Units

The owner center shall indicate the units by which Link Restrictions – Length, Link Restrictions – Width, and Link Restrictions – Height are measured as part of the link status information for each link. Supported values are centimeters or inches.

3.3.4.3.2.5.2.13 Link Surface Conditions

The owner center shall provide the roadway surface condition of the link as part of the link status information for each link. Supported values are dry, wet, snow or slush, ice, oil, debris, rocks, salted, broken pavement, power lines down, material spill, chemical spill, and none.

3.3.4.3.2.5.2.14 Link Saturation

The owner center shall indicate if the link is currently saturated as part of the link status information for each link. Supported values are not oversaturated or oversaturated.

3.3.4.3.2.5.2.15 Link Saturation Threshold

The owner center shall provide the threshold as a percentage of the link capacity above which the link is determined to be oversaturated over a user specified time period as part of the link status information for each link.

3.3.4.3.2.5.2.16 Link Level of Service

The owner center shall provide the current level of service on the link as part of the link status information for each link. Supported values are level of service A, B, C, D, E, and F.

3.3.4.3.2.5.2.17 Lane Numbers

The owner center shall provide the lane numbers that the detector is monitoring as part of the link status information for each link.

3.3.4.3.2.5.2.18 Link Data Stored Type

The owner center shall provide the types of roadway data stored for the link as part of the link status information for each link. Supported values are current link volume, current occupancy, current average speed, current delay time, current travel time, roadway status, daily peak volume, and hour of peak volume.

3.3.4.3.2.5.2.19 Roadway Event Source

The owner center shall indicate how a roadway event on the link was detected as part of the link status information for each link. Supported values are transit agency, traffic agency, commercial traffic service, unknown motorist observer, commercial fleet operator, DOT, automobile club patrol, spotter aircraft, private breakdown service, camera observation, non-police emergency service patrol, inductive loop monitoring station, microwave monitoring station, mobile platform measurement, mobile telephone caller previously unknown, police patrol, public and private utilities, road condition model, registered motorist observer, roadside telephone caller, snowplow report, traffic monitoring station, video processing monitoring station, vehicle probe measurement, and weather model.

3.3.4.3.2.5.2.20 Traffic Data Type

The owner center shall indicate the type of traffic algorithm applied to the data for the link as part of the link status information for each link. Supported values shall include actual, reconstructed, historical, predicted, smoothed, averaged, and estimated.

3.3.4.3.2.5.2.21 Link Stops

The owner center shall provide the average number of stops for travel, in vehicles per hour, along the link as part of the link status information for each link.

3.3.4.3.2.5.2.22 Link Delay Time

The owner center shall provide the delay time for travel along the link, in seconds, as part of the link status information for each link.

3.3.4.3.2.5.2.23 Link Delay Time – Alternate Route

The owner center shall provide the delay time for travel along the alternate route, in seconds, as part of the link status information for each link.

3.3.4.3.2.5.2.24 Link Headway

The owner center shall provide the headway between vehicles along the link, in seconds, as part of the link status information for each link.

3.3.4.3.2.5.2.25 Link Travel Time

The owner center shall provide the current average travel time along the link, in seconds, as part of the link status information for each link.

3.3.4.3.2.5.2.26 Link Existing Capacity

The owner center shall provide the percentage of existing capacity along the link as part of the link status information for each link.

3.3.4.3.2.5.2.27 Link Travel Time Increase

The owner center shall provide the current percentage increase in travel time relative to normal conditions along the link as part of the link status information for each link.

3.3.4.3.2.5.2.28 Link Average Speed

The owner center shall provide the current average speed of vehicles along the link, in kilometers per hour, as part of the link status information for each link.

3.3.4.3.2.5.2.29 Link Estimated Speed

The owner center shall provide the estimated or expected speed of a vehicle along the link, in kilometers per hour, as part of the link status information for each link.

3.3.4.3.2.5.2.30 Link Speed Limit – Link Status

The owner center shall provide the posted speed limit along the link as part of the link status information for each link. Unless indicated otherwise by the Speed Limit Units data element, the units for the link speed limit is in kilometers per hour.

3.3.4.3.2.5.2.31 Link Current Advisory Speed

The owner center shall provide the current advisory speed limit along the link as part of the link status information for each link. Unless indicated otherwise by the Speed Limit Units data element, the units for the current advisory speed limit is in kilometers per hour.

3.3.4.3.2.5.2.32 Link Truck Speed Limit – Link Status

The owner center shall provide the posted speed limit for trucks along the link as part of the link status information for each link. Unless indicated otherwise by the Speed Limit Units data element, the units for the link truck speed limit is in kilometers per hour.

3.3.4.3.2.5.2.33 Speed Limit Units – Link Status

The owner center shall indicate the units by which the Link Current Advisory Speed, Link Speed Limit and Link Truck Speed Limit are measured as part of the link status information for each link. Supported values shall include kilometers per hour or miles per hour.

3.3.4.3.2.5.2.34 Link Density

The owner center shall provide the average link density along the link, in vehicles per kilometer, as part of the link status information for each link.

3.3.4.3.2.5.2.35 Link Occupancy

The owner center shall provide the average percentage link occupancy along the link as part of the link status information for each link.

3.3.4.3.2.5.2.36 Link Volume

The owner center shall provide the current volume along the link, expressed in vehicles per hour, as part of the link status information for each link.

3.3.4.3.2.5.2.37 Event Description Time – Link Status

The owner center shall provide the time of the day and day of the week associated with an event description as part of the link status information for each link. The event may be a current, planned, or forecasted event. Measured in minutes of the week.

3.3.4.3.2.5.2.38 Link Lane Status

The owner center shall provide the status of each lane defined in the link. This includes the status for each lane-by-lane order.

3.3.4.3.2.5.2.39 Link Lane Direction Status

The owner center shall provide the status of each link lane identifying if the link direction is normal or contraflow.

3.3.4.3.2.5.2.40 Link Status Date and Time Change Information

The owner center shall provide the date and time, in UTC, of the last change to the link status as part of the link status information for each link.

3.3.4.4 Share Route Information

An owner center shall send route inventory information to an external center.

The requirements to exchange route information between centers are as follows:

3.3.4.4.1 Share Route Inventory Information

The requirements to exchange route inventory information between centers are as follows:

3.3.4.4.1.1 Send Route Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting route inventory with a message containing the owner center's route inventory information.

3.3.4.4.1.2 Publish Route Inventory Information

An owner center shall publish a message containing its route inventory information to all authorized subscribing external centers.

3.3.4.4.1.3 Subscribe to Route Inventory Information

An external center shall send a subscription message to an owner center requesting its route inventory information.

3.3.4.4.1.4 Contents of the Route Inventory Request

The requirements for a route inventory request from an external center to an owner center are found in Section 3.3.4.1.1, "Contents of the Traffic Network Information Request," with network information type set to "route inventory."

3.3.4.4.1.5 Contents of the Route Inventory Information

An owner center shall send route inventory information to an external center.

3.3.4.4.1.5.1 Required Route Inventory Information Content

The route inventory information sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the roadway network;
- c. Unique identifier of each route;
- d. Unique identifier of each link that forms the route; and
- e. Route type (travel, transit, detour, alternate, evacuation, snow, emergency vehicles, managed lanes, flood, scenic, hazmat, truck, bicycle, walking) for each route.

3.3.4.4.1.5.2 Optional Route Inventory Information Content

The following are optional requirements that an owner center may include in the route inventory information sent to an external center.

3.3.4.4.1.5.2.1 Information Access Restrictions – Route Inventory

The requirements for the owner center to place restrictions on the dissemination of the information that is part of the route inventory are found in “Section 3.3.1.9.1 Information Access Restrictions – Response Message Content..”

3.3.4.4.1.5.2.2 Roadway Network Name – Route Inventory

The owner center shall provide the name of the roadway network as assigned by the owner organization as part of the route inventory information for each route.

3.3.4.4.1.5.2.3 Route Name – Route Inventory

The owner center shall provide the name of the route as assigned by the owner organization as part of the route inventory information for each route.

3.3.4.4.1.5.2.4 Alternate Route Names – Route Inventory

The owner center shall provide the other names by which the route is known as part of the route inventory information for each route.

3.3.4.4.1.5.2.5 Route Length

The owner center shall provide the total length of the route, in meters, as part of the route inventory information for each route.

3.3.4.4.1.5.2.6 Node List

The owner center shall provide the unique identifier of each node that is part of the route in sequential order as part of the route inventory information for each route.

3.3.4.4.1.5.2.7 Route Image URL

The owner center shall provide a uniform resource locator (URL) that references the graphical image containing a geometric map tracing the route as part of the route inventory information for each route.

3.3.4.4.1.5.2.8 Route Image URL Reference Medium

The owner center shall provide the file type or medium that the URL reference points to as part of the URL reference information.

3.3.4.4.1.5.2.9 Route Inventory Date and Time Change Information

The owner center shall provide the date and time, in UTC, of the last change to this route inventory as part of the route inventory information for each route.

3.3.4.4.2 Share Route Status Information

The requirements to exchange route status information between centers are as follows:

3.3.4.4.2.1 Send Route Status Information Upon Request

An owner center shall respond to an authorized external center requesting route status with a message containing the owner center's route status information.

3.3.4.4.2.2 Publish Route Status Information

An owner center shall publish a message containing its route status information to all authorized subscribing external centers.

3.3.4.4.2.3 Subscribe to Route Status Information

An external center shall send a subscription message to an owner center requesting its route status information.

3.3.4.4.2.4 Contents of the Route Status Request

The requirements for a route status request from an external center to an owner center are found in Section 3.3.4.1.1, “Contents of the Traffic Network Information Request,” with network information type set to “route status.”

3.3.4.4.2.5 Contents of the Route Status Information

An owner center shall send route status information to an external center.

3.3.4.4.2.5.1 Required Route Status Information Content

The route status information sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the roadway network;
- c. Unique identifier of the route; and
- d. State of the route (no determination, open, restricted, closed).

3.3.4.4.2.5.2 Optional Route Status Information Content

The following are optional requirements that an owner center may include in the route status information sent to an external center.

3.3.4.4.2.5.2.1 Information Access Restrictions – Route Status

The requirements for the owner center to place restrictions on the dissemination of the information that is part of the route status are found in “Section 3.3.1.9.1 Information Access Restrictions – Response Message Content.”

3.3.4.4.2.5.2.2 Route Name – Route Status

The owner center shall provide the name of the route as assigned by the owner organization as part of the route status information for each route.

3.3.4.4.2.5.2.3 Route Detour Status Flag

The owner center shall indicate whether a detour route is in effect as part of the route status information for each route.

3.3.4.4.2.5.2.4 Route Surface Conditions

The owner center shall provide the roadway surface condition of the route as part of the route status information for each route. Supported values are dry, wet, snow or slush, ice, oil, debris, rocks, salted, broken pavement, power lines down, material spill, chemical spill, and none.

3.3.4.4.2.5.2.5 Route Existing Capacity

The owner center shall provide the current percentage of existing capacity on the route as part of the route status information for each route.

3.3.4.4.2.5.2.6 Route Level of Service

The owner center shall provide the current level of service on the route as part of the route status information for each route. Supported values are level of service A, B, C, D, E, and F.

3.3.4.4.2.5.2.7 Route Saturation

The owner center shall indicate if the route is currently saturated as part of the route status information for each route. Supported values shall include not oversaturated or oversaturated.

3.3.4.4.2.5.2.8 Route Data Stored Type

The owner center shall provide the types of roadway data stored for the route as part of the route status information for each route. Supported values shall include current route volume, current occupancy, current average speed, current delay time, current travel time and roadway status.

3.3.4.4.2.5.2.9 Route Traffic Algorithm Data Type

The owner center shall indicate the type of traffic algorithm applied to the data for the route as part of the route status information for each route. Supported values shall include actual, reconstructed, historical, predicted, smoothed, and averaged.

3.3.4.4.2.5.2.10 Route Delay Time

The owner center shall provide the delay time for travel along the route, in seconds, as part of the route status information for each route.

3.3.4.4.2.5.2.11 Route Delay Time – Alternate Route

The owner center shall provide the delay time for travel along the alternate route, in seconds, as part of the route status information for each route.

3.3.4.4.2.5.2.12 Route Headway

The owner center shall provide the headway between vehicles along the route, in seconds, as part of the route status information for each route.

3.3.4.4.2.5.2.13 Route Travel Time

The owner center shall provide the current average travel time along the route, in seconds, as part of the route status information for each route.

3.3.4.4.2.5.2.14 Route Travel Time Increase

The owner center shall provide the current percentage increase in travel time relative to normal conditions along the route as part of the route status information for each route.

3.3.4.4.2.5.2.15 Route Volume

The owner center shall provide the current volume along the route, expressed in vehicles per hour, as part of the route status information for each route.

3.3.4.4.2.5.2.16 Route Average Speed

The owner center shall provide the current average speed of vehicles along the route, in kilometers per hour, as part of the route status information for each route.

3.3.4.4.2.5.2.17 Route Density

The owner center shall provide the average route density along the route, in vehicles per kilometer, as part of the route status information for each route.

3.3.4.4.2.5.2.18 Route Occupancy

The owner center shall provide the average route occupancy along the route, in percentage, as part of the route status information for each route.

3.3.4.4.2.5.2.19 Route Current Advisory Speed

The owner center shall provide the current advisory speed limit along the route, in kilometers per hour, as part of the route status information for each route.

3.3.4.4.2.5.2.20 Speed Limit Units – Route Status

The owner center shall indicate the units by which the Link Current Advisory Speed, Link Speed Limit, and Link Truck Speed Limit are measured as part of the route status information for each link. Supported values shall include kilometers per hour, or miles per hour.

3.3.4.4.2.5.2.21 Event Description Time – Route Status

The owner center shall provide the time of the day and the day of the week associated with an event description as part of the route status information for each route. The event may be a current, planned, or forecasted event. Measured in minutes of the week.

3.3.4.4.2.5.2.22 Route Status Date and Time Change Information

The owner center shall provide the date and time, in UTC, of the last change to the route status as part of the route status information for each route.

3.3.4.5 Fleet Vehicle Data

An owner center shall send fleet vehicle status information to an external center.

The requirements to exchange route information between centers are as follows:

3.3.4.5.1 Share Fleet Vehicle Inventory Information

The requirements to exchange fleet vehicle inventory information between centers are as follows:

3.3.4.5.1.1 Send Fleet Vehicle Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting fleet vehicle inventory with a message containing the owner center's fleet vehicle inventory information.

3.3.4.5.1.2 Publish Fleet Vehicle Inventory Information

An owner center shall publish a message containing its fleet vehicle inventory information to all authorized subscribing external centers.

3.3.4.5.1.3 Subscribe to Fleet Vehicle Inventory Information

An external center shall send a subscription message to an owner center requesting its fleet vehicle inventory information.

3.3.4.5.1.4 Contents of the Fleet Vehicle Inventory Request

The requirements for a fleet vehicle inventory request from an external center to an owner center are found in Section 3.3.4.1.1, "Contents of the Traffic Network Information Request," with network information type set to "fleet vehicle inventory.."

3.3.4.5.1.5 Contents of the Fleet Vehicle Inventory Information

An owner center shall send fleet vehicle inventory information to an external center.

3.3.4.5.1.5.1 Required Fleet Vehicle Inventory Information Content

The fleet vehicle inventory information sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the fleet vehicle; and
- c. Vehicle type (transit, public safety, or maintenance vehicle).

3.3.4.5.2 Share Fleet Vehicle Information

The requirements to exchange fleet vehicle information between centers are as follows:

3.3.4.5.2.1 Send Fleet Vehicle Information Upon Request

An owner center shall respond to an authorized external center requesting link status with a message containing the owner center's link status information.

3.3.4.5.2.2 Publish Fleet Vehicle Information

An owner center shall publish a message containing its link status information to all authorized subscribing external centers.

3.3.4.5.2.3 Subscribe to Fleet Vehicle Information

An external center shall send a subscription message to an owner center requesting its link status information.

3.3.4.5.2.4 Contents of the Fleet Vehicle Request

The requirements for a link status request from an external center to an owner center are found in Section 3.3.4.1.1, "Contents of the Traffic Network Information Request," with network information type set to "fleet vehicle data."

3.3.4.5.2.5 Contents of the Fleet Vehicle Information

An owner center shall send link status information to an external center.

3.3.4.5.2.5.1 Required Fleet Vehicle Information Content

The link status information sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the fleet vehicle; and

- c. Fleet vehicle information (location and speed).

3.3.4.5.2.5.2 Optional Fleet Vehicle Information Content

The following are optional requirements that an owner center may include in the link status information sent to an external center.

3.3.4.5.2.5.2.1 Fleet Vehicle Driver

The owner center shall provide the identifier of the driver as part of the link status information.

3.3.4.5.2.5.2.2 Fleet Vehicle Occupancy

The owner center shall provide the average percent vehicle occupancy, in tenths of a percent, as part of the link status information.

3.3.5 Provide Device Inventory, Status, and Control

The requirements to exchange device information and provide device command/control capabilities between centers are as follows:

3.3.5.1 Generic Devices

This section contains requirements to share device information between centers, regardless of the device type. Additional requirements to share device information between centers specific to a device are provided in the appropriate section(s).

The requirements to share device information between centers are as follows:

3.3.5.1.1 Share Device Information

The following should be considered when exchanging device information between centers:

- It is not necessary to send the device inventory when organization, center, or contact information is updated, unless the unique identifier changes; and
- The object IDs should be unique within the TMC but concatenating with NTCIP 1104 naming convention (use as prefixes) in a regional environment. NTCIP 1104 naming convention uses the following: country ID, state ID, agency ID, center ID, entity kind, entity type, and entity instance.

The requirements for a device information request are as follows:

3.3.5.1.1.1 Contents of Device Information Request

The following are requirements for the Device Information Request for an external center to send to an owner center.

3.3.5.1.1.1.1 Required Device Information Request Content

The device information request sent from an external center to an owner center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Device type (detector, CCTV camera, dynamic message sign, environmental sensor station, gate, lane control signal, ramp meter, signal controller, signal section, and roadside unit); and
- c. Device information type (device inventory, device status, device schedule, device plan, device maintenance history, device data, device metadata, message appearance, device font table, device graphic table, image link, and device enrollment certificates).

3.3.5.1.1.1.2 Optional Device Information Request Filter

If the owner center supports it, the following are optional requirements for a device information filter that an external center may send to an owner center in a request to refine the list of devices the owner center will respond with. These optional parameters described below form a filter by a logical “and” applied to all the parameters provided.

3.3.5.1.1.1.2.1 Device Identifier Filter

If the owner center supports it, an external center shall include a list of unique identifiers for devices in the device information request.

3.3.5.1.1.1.2.2 Roadway Network Identifier Filter

If the owner center supports it, an external center shall include a list of unique identifiers for roadway networks in the device information request.

3.3.5.1.1.1.2.3 Link Identifier Filter

If the owner center supports it, an external center shall include a list of unique identifiers for links in the device information request.

3.3.5.1.1.1.2.4 Route Designator Filter

If the owner center supports it, an external center shall include a list of route designators in the device information request.

3.3.5.1.1.1.2.5 Linear Reference Filter

If the owner center supports it, an external center shall include a range between two linear reference locations in the device information request [along the same roadway].

3.3.5.1.1.1.2.6 Section Identifier Filter

If the owner center supports it, an external center shall include a list of unique identifiers for sections in the device information request.

3.3.5.1.1.1.2.7 Center Identifier Filter

If the owner center supports it, an external center shall include a list of unique identifiers for centers in the device information request.

3.3.5.1.1.1.2.8 Time Range Filter

If the owner center supports it, an external center shall include a valid time period in the device information request. The valid time period is used to specify a start time and a time duration that data is requested for, such as detector data.

3.3.5.1.1.1.3 Optional Required Device Information Request Content

The following are optional requirements for a device information request to be sent from an external center to an owner center.

3.3.5.1.1.1.3.1 Authorization Information – Device Information Request

The requirements for the authorization information as part of device information requests are found in “3.3.1.8.1 **Authorization Information – External Centers.**”

3.3.5.1.1.1.3.2 Operator Identifier – Device Information Request

The requirements for the operator identifier which can be sent as part of device information request from an external center to an owner center are found in “3.3.1.8.2 **Operator Identifier – Requests.**”

3.3.5.1.1.2 Contents of Device Inventory Response Header

The requirements for an owner center response header to external center request for device information follow:

3.3.5.1.1.2.1 Required Device Inventory Response Header Content

The device inventory header sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of each device;
- c. Name of each device; and
- d. Geographic location of each device (as a GeoJSON Point)

3.3.5.1.1.2.2 Optional Device Inventory Content

The following are optional requirements that an owner center may include in the device inventory information sent to an external center.

3.3.5.1.1.2.2.1 User Device Description

The owner center shall provide a textual description of the device as part of the device inventory information for each device.

3.3.5.1.1.2.2.2 Device Control Type

The owner center shall provide the control type information as part of the device inventory information for each device. Supported values shall include status only; command only; status and command; and not specified.

3.3.5.1.1.2.2.3 System Description

The owner center shall provide information about the device controller as part of the device inventory information for each device. Controller information may include the manufacturer, the model number, the firmware, and the firmware version.

3.3.5.1.1.2.2.4 Roadway Network Identifier – Device Inventory

The owner center shall provide the unique identifier of the roadway network as part of the device inventory information for each device.

3.3.5.1.1.2.2.5 Node Identifier – Device Inventory

The owner center shall provide the unique identifier of the node as assigned by the owner organization as part of the device inventory information for each device.

3.3.5.1.1.2.2.6 Node Name – Device Inventory

The owner center shall provide the node name as assigned by the owner organization as part of the device inventory information for each device.

3.3.5.1.1.2.2.7 Link Identifier – Device Inventory

The owner center shall provide the unique identifier of the link that the device is on as part of the device inventory information for each device.

3.3.5.1.1.2.2.8 Link Name – Device Inventory

The owner center shall provide the name of the link that the device is located on or is monitoring as part of the device inventory information for each device.

3.3.5.1.1.2.2.9 Link Direction – Device Inventory

The owner center shall provide the normal direction of travel on the link as part of the device inventory information for each device. Supported values shall include northbound, northeast bound, eastbound, southeast bound, southbound, southwest bound, westbound, northwest bound, not directional, positive direction, negative direction, both directions, and other.

3.3.5.1.1.2.2.10 Linear Reference – Device Inventory

The owner center shall provide the linear reference location information that the device is on as part of the device inventory information for each device.

3.3.5.1.1.2.2.11 Linear Reference Version

The owner center shall provide the linear reference version information for the linear reference that the device is on as part of the device inventory information for each device.

3.3.5.1.1.2.2.12 Route Designator – Device Inventory

The owner center shall provide the route designator information that the device is on as part of the device inventory information for each device.

3.3.5.1.1.2.2.13 Device Uniform Resource Locator (URL)

If a uniform resource locator (URL) is available for the device, the owner center shall provide the URL information as part of the device inventory information.

3.3.5.1.1.2.2.14 Device URL Reference Medium

The owner center shall provide the file type or medium that the URL reference points to as part of the URL reference information for each device.

3.3.5.1.1.2.2.15 Device Inventory Date and Time Change Information

The owner center shall provide the date and time, in UTC, of the last change to the device inventory as part of the device inventory information for each device.

3.3.5.1.1.3 Contents of Device Status Header

The requirements to exchange device status information between centers are as follows:

3.3.5.1.1.3.1 Required Device Status Header Content

The device status header sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Device type (detector, detector station, CCTV camera, dynamic message sign, environmental sensor station, gate, lane control signal, ramp meter, signal controller, signal section, or roadside unit);
- c. Unique identifier of each device; and
- d. Operational status of the device (on, off, out-of-service, unavailable, unknown, marginal, or failed).

3.3.5.1.1.3.2 Optional Device Status Header Content

The following are optional requirements that an owner center may include in the device status header sent to an external center.

3.3.5.1.1.3.2.1 Unique Identifier of the Controlling Center

The owner center shall provide the unique identifier of the center currently in control of that device as part of the device status information for each device.

3.3.5.1.1.3.2.2 Device Communications Status

The owner center shall provide the communications status of the device as part of the device status information for each device. Supported values shall include operational, offline, failed, and unknown.

3.3.5.1.1.3.2.3 Operator Identifier – Device Status

The requirements for the operator identifier which can be sent as part of device status information from an owner center to an external center are found in “3.3.1.8.3 **Operator Identifier – Responses..**”

3.3.5.1.1.3.2.4 Device Status Date and Time Change Information

The owner center shall provide the date and time of the last change, in UTC, to the device status as part of the device status information for each device.

3.3.5.1.1.4 Share Device Schedule Information

The requirements for sharing the schedule information for a device are as follows:

3.3.5.1.1.4.1 Required Device Schedule Information Content

The device schedule information that an owner center sends to an external center shall include:

- a. Owner organization identification (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of each device;
- c. Time base schedule number;
- d. Time base schedule month;
- e. Time base schedule day of week;
- f. Time base schedule date;
- g. Time base schedule day plan;
- h. Time base schedule day plan hour;
- i. Time base schedule day plan minute; and
- j. Date and time, in UTC, of the last change to the time base schedule.

3.3.5.1.2 Device Change Requests

The requirements to support requests from other authorized external centers to change parameters on owner center devices are as follows:

3.3.5.1.2.1 Contents of Device Change Request Header

The contents of device change requests an external center may send to an owner center follow:

3.3.5.1.2.1.1 Required Device Change Request Header Content

The device change request header sent to an owner center shall include:

- a. Authorization information (see 3.3.1.8.1 **Authorization Information – External Centers**);
- b. Requesting organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- c. Device type (CCTV camera, dynamic message sign, gate, lane control signal, ramp meter, signal controller, or signal section);
- d. Unique identifier of the device;
- e. Unique sequence number generated by the requesting center identifying the control request within the requesting center (this sequence number shall be returned to the requesting client in any response to the control request); and
- f. Request priority value (1 = Lowest Priority, 10 = Highest Priority, Default = 0 (not queued))

3.3.5.1.2.1.2 Optional Device Change Request Header Content

If the owner center supports it, the following are optional requirements that an external center may include in the device change request header sent to an owner center.

3.3.5.1.2.1.2.1 Operator Identifier – Device Change Request

The requirements for the operator identifier from an external center to an owner center as part of the device change request are found in Section “3.3.1.8.2 **Operator Identifier – Requests..**”

3.3.5.1.2.1.2.2 Event Identifier – Device Change

The external center shall provide the unique identifier of the event to be associated with the device change request.

3.3.5.1.2.1.2.3 Change Request Start Date and Time

The external center shall provide the date and time, in UTC, this request to control the device shall start as part of the device change request.

3.3.5.1.2.1.2.4 Change Request Expiration Date and Time

The external center shall provide the date and time, in UTC, this request to control the device shall expire as part of the device change request.

3.3.5.1.2.1.2.5 Change Request Date and Time Information

The external center shall provide the current date and time, in UTC, as part of the device change request.

3.3.5.1.2.2 Contents of Device Change Request Response

The following are requirements for the owner center response to a device change request from an external center:

3.3.5.1.2.2.1 Required Device Change Request Response Content

The device change request response sent from an owner center to an external center shall include:

- a. Owner organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- b. Device type (CCTV camera, dynamic message sign, gate, lane control signal, ramp meter, signal controller, signal section);
- c. Unique identifier of the device;
- d. Unique sequence number generated by the requesting center identifying the control request within the requesting center; and
- e. Status of the request (completed, received, rejected – insufficient privileges, rejected – device is locked, rejected – read-only parameter, rejected – bad value, rejected – other, cancelled, unknown).

3.3.5.1.2.2.2 Optional Device Change Request Response Content

The following are optional requirements that an owner center may include in the device change request response information sent to an external center.

3.3.5.1.2.2.2.1 Operator Identifier – Device Change Acknowledge

The requirements for the operator identifier when the operator acknowledges a device change request are found in “3.3.1.8.2 Operator Identifier – Requests..”

3.3.5.1.2.2.2.2 Operator Lock Identifier

The owner center shall provide the unique identifier of the owner operator who locked the device as part of the device change request response.

3.3.5.1.2.2.2.3 Operator Last Revised Date and Time – Device Change

The owner center shall provide the date and time, in UTC, the operator last revised the status as part of the device change request response.

3.3.5.1.2.3 Verify Device Change Request Status

The requirements to check the status of device change requests previously issued by an authorized external center are as follows:

3.3.5.1.2.3.1 Send Device Change Status Upon Request

An owner center shall respond to an authorized external center requesting the status of a previously issued device change request with a message containing the status of the device change request.

3.3.5.1.2.3.2 Required Device Change Status Request Content

The device change status request sent from an external center to an owner center shall include:

- a. Authorization information (See 3.3.1.8.1 **Authorization Information – External Centers**);
- b. Requesting organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- c. Device type (CCTV camera, dynamic message sign, gate, lane control signal, ramp meter, signal controller, or signal section);
- d. Unique identifier of the device; and
- e. Unique sequence number generated by the requesting center identifying the control request within the requesting center.

3.3.5.1.2.3.3 Contents of Device Change Status Response

The requirements for the contents of the device change status response sent from an owner center to an external center are found in “3.3.5.1.2.2 Contents of Device Change Request Response..”

3.3.5.1.2.4 Cancel External Change Requests for Devices

The requirements to cancel a device change request previously issued by an authorized external center follow.

3.3.5.1.2.4.1 Send Change Cancellation Response Upon Request

An owner center shall respond to an authorized external center requesting cancellation of a previously issued device change request with a message containing the status of the cancel device change request.

3.3.5.1.2.4.2 Contents of Device Change Cancellation Request

The requirements for a device change cancellation request that an external center may send to an owner center follow:

3.3.5.1.2.4.2.1 Required Device Change Cancellation Request Content

The device change cancellation request sent from an external center to an owner center shall include:

- a. Authorization information (see 3.3.1.8.1 **Authorization Information – External Centers**);
- b. Requesting organization information (see 3.3.2.5.1 and 3.3.2.5.2);
- c. Device type (CCTV camera, dynamic message sign, gate, lane control signal, ramp meter, signal controller, signal section);
- d. Unique identifier of the device; and
- e. Unique sequence number generated by the requesting center identifying the control request (to be canceled) within the requesting center.

3.3.5.1.2.4.2.2 Optional Device Change Cancellation Request Content

If the owner center supports it, the following are optional requirements that an external center may include in the cancel device change request sent to an owner center.

3.3.5.1.2.4.2.2.1 Operator Identifier – Cancel Device Control

The requirements for the operator identifier of the operator who is making the device change cancellation request are found in “3.3.1.8.2 **Operator Identifier – Requests**.”

3.3.5.1.2.4.3 Contents of Device Change Cancellation Response

The requirements for the contents of the cancel device control request response from an owner center to an external center are found in “3.3.5.1.2.2 Contents of Device Change Request Response.”

3.3.5.1.2.5 Device Priority Queue Header Information

For devices, an owner center may receive conflicting requests from different centers, including the owner center, for control of a specific field device. The owner center may maintain a priority queue where conflicting requests are received and then implemented as higher priority requests expire or are cancelled.

The requirements for sharing the contents of a device priority queue are as follows:

3.3.5.1.2.5.1 Contents of Device Priority Queue Request

The following are requirements for an external center’s request to an owner center to view the request queue.

3.3.5.1.2.5.1.1 Required Device Priority Queue Request Content

The device priority queue request sent from an external center to an owner center shall include:

- a. Device type (CCTV camera, dynamic message sign, gate, ramp meter, signal controller, or signal section) of each priority queue;
- b. Unique identifier of the requesting organization; and
- c. Unique identifier of each device.

3.3.5.1.2.5.1.2 Optional Device Priority Queue Request Content

The following are optional requirements that an external center may include in a request to an owner center to view the request queue for a device.

3.3.5.1.2.5.1.2.1 Authorization Information – Device Priority Queue Request

The requirements for the authorization information as part of the device priority queue request are found in “3.3.1.8.1 **Authorization Information – External Centers..**”

3.3.5.1.2.5.2 Contents of Device Priority Queue Response Header

The content for owner center response to a device priority queue request from an external center is as follows:

3.3.5.1.2.5.2.1 Required Device Priority Queue Response Header Content

The device priority queue header sent from an owner center to an external center shall include:

- a. Device type (CCTV camera, dynamic message sign, gate, ramp meter, signal controller, or signal section) of each priority queue;
- b. Unique identifier of each device;
- c. Current run-time priority of each device;
- d. Requesting organization information (see 3.3.2.5.1 and 3.3.2.5.2) for each control request in each device priority queue; and
- e. Request priority value (1 = Lowest Priority, 10 = Highest Priority, 0 = not queued)

3.3.5.1.2.5.2.2 Optional Device Priority Queue Response Header Content

The following are optional requirements that an owner center may include in the device priority queue header sent to an external center.

3.3.5.1.2.5.2.2.1 Operator Identifier – Device Queue Acknowledge

The requirements for the operator identifier who acknowledges device control requests in device each device priority queue as part of the device priority queue header are found in “3.3.1.8.3 **Operator Identifier – Responses..**”

3.3.5.1.2.5.2.2.2 Unique Sequence Number

The owner center shall provide the unique sequence number for each control request in each device priority queue as part of the device priority queue header.

3.3.5.1.2.5.2.2.3 Event Identifier – Device Queue

The owner center shall provide the unique identifier of the event associated with the message requested for each control request in each device priority queue as part of the device priority queue header.

3.3.5.1.2.5.2.2.4 Event Response Plan – Device Queue

The owner center shall provide the event response plan number associated with the message requested for each control request in each device priority queue as part of the device priority queue header.

3.3.5.1.2.5.2.2.5 Request Start Date and Time – Device Queue

The owner center shall provide the start date and time, in UTC, for each control request in each device priority queue as part of the device priority queue header.

3.3.5.1.2.5.2.2.6 Request Expiration Date and Time – Device Queue

The owner center shall provide the expiration date and time, in UTC, for each control request in each device priority queue as part of the device priority queue header.

3.3.5.1.3 External Device Control Command Requirements

3.3.5.1.3.1 Send Device Control Command Response Upon Receipt

An owner center shall respond to an authorized external center requesting to remotely command a device with a message indicating whether the command was implemented or not.

3.3.5.1.3.2 Contents of External Device Control Command

The content for external center command of devices operated by an owner center is as follows:

3.3.5.1.3.2.1 Required External Device Control Command Content

The remote device control command sent from an external center to an owner center shall include:

- a. Authorization information (see 3.3.1.8.1 “**Authorization Information – External Centers**”);
- b. Requesting organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- c. Device type (CCTV camera, dynamic message sign, gate, lane control signal, ramp meter, or signal controller);
- d. Unique identifier of the device; and
- e. Unique sequence number generated by the requesting center identifying the control request within the requesting center (this sequence number shall be returned to the requesting client in any response to the control request).

3.3.5.1.3.2.2 Optional External Device Control Command Content

The following are optional requirements that an external center may include in the remote device command sent to an owner center.

3.3.5.1.3.2.2.1 Operator Identifier – External Device Control Command

The requirements for the operator identifier from an external center to an owner center as part of the remote device command are found in Section 3.3.1.8.2 “**Operator Identifier – Requests.**”

3.3.5.1.3.3 Required External Device Control Command Response Content

The device control command response sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Device type (CCTV camera, dynamic message sign, gate, lane control signal, ramp meter, or signal controller);
- c. Unique identifier of the device;
- d. Unique sequence number generated by the requesting center identifying the control request within the requesting center; and
- e. Status of the command (completed, in progress, rejected – insufficient privileges, rejected – device is locked, rejected – read-only parameter, rejected – bad value, rejected – other, unknown).

3.3.5.2 Traffic Detectors

The traffic detector model used assumes that each traffic detector station may have multiple detectors or detector zones. Each detector or detector zone may be located on different links (roadway approaches) and/or each detector or detector zone may be located on different lanes. There are also instances where two detectors or detector zones are located on the same lane to form a speed trap. In these instances, the traffic detector model assumes that this speed trap is assigned its own detector identifier in addition to a detector identifier for each individual detector or detector zone.

However, it is also recognized that some implementations do not “poll” traffic detector stations for status information or data but “poll” each detector or detector zone directly. In these instances, each detector or detector zone has its own unique identifier and is polled directly.

The requirements to exchange traffic detector information and data between centers are as follows:

3.3.5.2.1 Share Detector Inventory Information

The requirements for sharing detector inventory information with other authorized centers are as follows:

3.3.5.2.1.1 Send Detector Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting detector inventory with a message containing the owner center's detector inventory information.

3.3.5.2.1.2 Publish Detector Inventory Information

An owner center shall publish a message containing its detector inventory information to all authorized subscribing external centers.

3.3.5.2.1.3 Subscribe to Detector Inventory Information

An external center shall send a subscription message to an owner center requesting its detector inventory information.

3.3.5.2.1.4 Required Detector Inventory Information Request Content

The detector inventory information request sent from an external center to an owner center shall include:

- a) Generic device information request (See 3.3.5.1.1.1), with the device type set to "detector" and device information type set to "device inventory.."
- b) For implementations where detector inventory information polling occurs at the detector station, the device identifier shall be the identifier of the detector station.

3.3.5.2.1.5 Contents of the Detector Inventory Information Response

The detector inventory information for an owner center to send to an external center is as follows:

3.3.5.2.1.5.1 Required Detector Inventory Response Content

The detector inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2), where the device is a detector or a detector zone, for each detector or detector zone (list); and
- b. Detector type (inductive loop, magnetic, magnetometers, pressure cells, microwave radar, ultrasonic, video image, laser, infrared, road tube, probe, unknown, or other) of each detector or detector zone. Probe detectors use Bluetooth devices, electronic toll tags, cellphones, and other devices to track a traveler through the traffic network.

3.3.5.2.1.5.2 Optional Detector Inventory Content

The following are optional requirements that an owner center may include in the detector inventory information sent to an external center.

3.3.5.2.1.5.2.1 Detector Station Inventory Information

For implementations where detector inventory information polling occurs at the detector station, the owner center shall send the generic device inventory header information (See section 3.3.5.1.1.2), where the device is a detector station as part of the detector inventory information.

3.3.5.2.1.5.2.2 Lane Number – Detector Inventory

The owner center shall provide a list of lane numbers that the detector is monitoring as part of the detector inventory information for each detector.

3.3.5.2.1.5.2.3 Speed Trap Flag

The owner center shall indicate if the detector is a speed trap as part of the detector inventory information for each detector.

3.3.5.2.1.5.2.4 Vehicle Bin 1

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 1 during the data collection period as part of the detector inventory information for each detector.

3.3.5.2.1.5.2.5 Vehicle Bin 2

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 2 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 2 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 1.

3.3.5.2.1.5.2.6 Vehicle Bin 3

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 3 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 3 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 2.

3.3.5.2.1.5.2.7 Vehicle Bin 4

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 4 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 4 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 3.

3.3.5.2.1.5.2.8 Vehicle Bin 5

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 5 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 5 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 4.

3.3.5.2.1.5.2.9 Vehicle Bin 6

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 6 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 6 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 5.

3.3.5.2.1.5.2.10 Vehicle Bin 7

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 7 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 7 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 6.

3.3.5.2.1.5.2.11 Vehicle Bin 8

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 8 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 8 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 7.

3.3.5.2.1.5.2.12 Vehicle Bin 9

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 9 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 9 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 8.

3.3.5.2.1.5.2.13 Vehicle Bin 10

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 10 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 10 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 9.

3.3.5.2.1.5.2.14 Vehicle Bin 11

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 11 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 11 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 10.

3.3.5.2.1.5.2.15 Vehicle Bin 12

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 12 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 12 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 11.

3.3.5.2.1.5.2.16 Vehicle Bin 13

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 13 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 13 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 12.

3.3.5.2.1.5.2.17 Vehicle Bin 14

The owner center shall provide the maximum vehicle length, in centimeters, for which vehicles will be classified as Bin 14 during the data collection period as part of the detector inventory information for each detector. Vehicles classified in Bin 14 have a vehicle length greater than or equal to the maximum vehicle length defined for Vehicle Bin 13.

Note: Vehicles with a vehicle length, in centimeters, greater than or equal to this maximum vehicle length will be classified as Bin 14.

3.3.5.2.2 Share Detector Status Information

The requirements for sharing detector status information with other authorized centers are as follows:

3.3.5.2.2.1 Send Detector Status Information Upon Request

An owner center shall respond to an authorized external center requesting detector status with a message containing the owner center's detector status information.

3.3.5.2.2.2 Publish Detector Status Information

An owner center shall publish a message containing its detector status information to all authorized subscribing external centers.

3.3.5.2.2.3 Subscribe to Detector Status Information

An external center shall send a subscription message to an owner center requesting its detector status information.

3.3.5.2.2.4 Required Detector Status Request Content

The detector status request sent from an external center to an owner center shall include:

Generic device information request (See 3.3.5.1.1.1), with the device type set to “detector” and device information type set to “device status..”

For implementations where detector inventory information polling occurs at the detector station, the device identifier shall be the identifier of the detector station.

3.3.5.2.2.5 Contents of the Detector Status Response

The detector status information for an owner center to send to an external center is as follows:

3.3.5.2.2.5.1 Required Detector Status Response Content

The ramp meter status information sent from an owner center to an external center shall include the generic device status header information (See 3.3.5.1.1.3) for each detector or detector zone (list).

3.3.5.2.2.5.2 Optional Detector Status Content

The following are optional requirements that an owner center may include in the detector status information sent to an external center.

3.3.5.2.2.5.2.1 Detector Station Status Information

For implementations where detector status information polling occurs at the detector station, the owner center shall send the generic device status header information (See 3.3.5.1.1.3), where the device is a detector station as part of the detector status information.

3.3.5.2.2.5.2.2 Lane Number – Detector Status

The owner center shall provide the lane number that each detector is monitoring as part of the detector status information for each detector.

3.3.5.2.2.5.2.3 Direction of Travel – Detector Status

The owner center shall provide the direction of travel on the link that the detector is monitoring as part of the detector status information for each detector. Supported values shall include northbound, northeast bound, eastbound, southeast bound, southbound, southwest bound, westbound, northwest bound, not directional, positive direction, negative direction, both directions and. any other.

3.3.5.2.3 Share Detector Data Information

The requirements for sharing detector data information with other authorized centers are as follows:

3.3.5.2.3.1 Send Detector Data Upon Request

An owner center shall respond to an authorized external center requesting detector data with a message containing the owner center’s detector data.

3.3.5.2.3.2 Publish Detector Data

An owner center shall publish a message containing its detector data to all authorized subscribing external centers.

3.3.5.2.3.3 Subscribe to Detector Data Information

An external center shall send a subscription message to an owner center requesting its detector data.

3.3.5.2.3.4 Contents of the Detector Data Request

The contents of a detector data request for an external center to send to an owner center are as follows:

3.3.5.2.3.4.1 Required Detector Data Request Content

The detector data request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to “detector” and device information type set to “device data..”

3.3.5.2.3.4.2 Optional Detector Data Request Content

If the owner center supports it, the following are optional requirements that an external center may include in the detector data request sent to an owner center.

3.3.5.2.3.4.2.1 Detector Station – Data Request

For implementations where detector data polling occurs at the detector station, the external center shall send the unique identifier of the detector station desired as part of the detector data request.

3.3.5.2.3.4.2.2 Data Type Request

The external center shall indicate the type of traffic data desired as part of the detector data request for each detector. Supported values shall include actual, reconstructed, historical, predicted, smoothed, averaged and estimated.

3.3.5.2.3.5 Contents of the Detector Data Response

The detector data information for an owner center to send to an external center is as follows:

3.3.5.2.3.5.1 Required Detector Data Response Content

The detector data information sent from an owner center to an external center shall include:

- a. Unique identifier of the owner organization;
- b. Identifier of each detector (list); and
- c. Timestamp of the detector data.

3.3.5.2.3.5.2 Optional Detector Data Response Content

The following are optional requirements that an owner center may include in the detector data information sent to external centers.

3.3.5.2.3.5.2.1 Detector Station – Detector Data

For implementations where detector data polling occurs at the detector station, the owner center shall send the unique identifier of the detector station as part of the detector data information for each detector.

3.3.5.2.3.5.2.2 Vehicle Count

The owner center shall provide the number of vehicles detected as part of the detector data information for each detector.

3.3.5.2.3.5.2.3 Average Vehicle Occupancy

The owner center shall provide the average vehicle occupancy, in percent, as part of the detector data information for each detector.

3.3.5.2.3.5.2.4 Data Collection Start

The owner center shall provide the start date and time, in UTC, of the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.5 Data Collection End

The owner center shall provide the end date and time, in UTC, of the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.6 Data Type

The owner center shall indicate the type of traffic data provided as part of the detector data information for each detector. Supported values shall include actual, reconstructed, historical, predicted, smoothed, averaged, and estimated.

3.3.5.2.3.5.2.7 Average Vehicle Speed

The owner center shall provide the average vehicle speed, in kilometers per hour, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.8 Average Vehicle Queue

The owner center shall provide the average number of vehicles in the queue during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.9 Vehicle Stops

The owner center shall provide the number of stopped vehicles measured during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.10 Vehicle Count – Bin 1

The owner center shall provide the number of vehicles detected and classified in Bin 1, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.11 Vehicle Count – Bin 2

The owner center shall provide the number of vehicles detected and classified in Bin 2, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.12 Vehicle Count – Bin 3

The owner center shall provide the number of vehicles detected and classified in Bin 3, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.13 Vehicle Count – Bin 4

The owner center shall provide the number of vehicles detected and classified in Bin 4, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.14 Vehicle Count – Bin 5

The owner center shall provide the number of vehicles detected and classified in Bin 5, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.15 Vehicle Count – Bin 6

The owner center shall provide the number of vehicles detected and classified in Bin 6, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.16 Vehicle Count – Bin 7

The owner center shall provide the number of vehicles detected and classified in Bin 7, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.17 Vehicle Count – Bin 8

The owner center shall provide the number of vehicles detected and classified in Bin 8, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.18 Vehicle Count – Bin 9

The owner center shall provide the number of vehicles detected and classified in Bin 9, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.19 Vehicle Count – Bin 10

The owner center shall provide the number of vehicles detected and classified in Bin 10, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.20 Vehicle Count – Bin 11

The owner center shall provide the number of vehicles detected and classified in Bin 11, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.21 Vehicle Count – Bin 12

The owner center shall provide the number of vehicles detected and classified in Bin 12, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.22 Vehicle Count – Bin 13

The owner center shall provide the number of vehicles detected and classified in Bin 13, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.23 Vehicle Count – Bin 14

The owner center shall provide the number of vehicles detected and classified in Bin 14, as determined by vehicle length, during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.24 Detector Status

The owner center shall provide the operational status of the detector as part of the detector data information for each detector. Supported values are on, off, out-of-service, unavailable, unknown, marginal, and failed.

3.3.5.2.3.5.2.25 Vehicle Class Count – Bin 1

The owner center shall provide the number of vehicles detected and classified as Class Group 1 (Motorcycles) by FHWA 13-category classification in Bin 1 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.26 Vehicle Class Count – Bin 2

The owner center shall provide the number of vehicles detected and classified as Class Group 2 (Passenger Cars) by FHWA 13-category classification in Bin 2 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.27 Vehicle Class Count – Bin 3

The owner center shall provide the number of vehicles detected and classified as Class Group 3 (Other two-axle four-tire single-unit vehicles) by FHWA 13-category classification in Bin 3 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.28 Vehicle Class Count – Bin 4

The owner center shall provide the number of vehicles detected and classified as Class Group 4 (Buses) by FHWA 13-category classification in Bin 4 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.29 Vehicle Class Count – Bin 5

The owner center shall provide the number of vehicles detected and classified as Class Group 5 (Two-axle, six-tire, single-unit trucks) by FHWA 13-category classification in Bin 5 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.30 Vehicle Class Count – Bin 6

The owner center shall provide the number of vehicles detected and classified as Class Group 6 (Three-axle, single-unit trucks) by FHWA 13-category classification in Bin 6 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.31 Vehicle Class Count – Bin 7

The owner center shall provide the number of vehicles detected and classified as Class Group 7 (Four or more axle, single-unit trucks) by FHWA 13-category classification in Bin 7 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.32 Vehicle Class Count – Bin 8

The owner center shall provide the number of vehicles detected and classified as Class Group 8 (Four or fewer axle, single-trailer trucks) by FHWA 13-category classification in Bin 8 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.33 Vehicle Class Count – Bin 9

The owner center shall provide the number of vehicles detected and classified as Class Group 9 (Five axle, single-trailer trucks) by FHWA 13-category classification in Bin 9 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.34 Vehicle Class Count – Bin 10

The owner center shall provide the number of vehicles detected and classified as Class Group 10 (Six or more axle, single-trailer trucks) by FHWA 13-category classification in Bin 10 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.35 Vehicle Class Count – Bin 11

The owner center shall provide the number of vehicles detected and classified as Class Group 11 (Five or fewer axle, multi-trailer trucks) by FHWA 13-category classification in Bin 11 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.36 Vehicle Class Count – Bin 12

The owner center shall provide the number of vehicles detected and classified as Class Group 12 (Six axle, multi-trailer trucks) by FHWA 13-category classification in Bin 12 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.37 Vehicle Class Count – Bin 13

The owner center shall provide the number of vehicles detected and classified as Class Group 13 (Seven or more axle, multi-trailer trucks) by FHWA 13-category classification in Bin 13 during the data collection period as part of the detector data information for each detector.

3.3.5.2.3.5.2.38 Vehicle Class Count – Bin 14

The owner center shall provide the number of vehicles detected and classified as Class Group 14 (Unclassified) by FHWA 13-category classification in Bin 14 during the data collection period as part of the detector data information for each detector.

3.3.5.2.4 Share Detector Maintenance History

The requirements for sharing detector maintenance history information with other authorized centers are as follows:

3.3.5.2.4.1 Send Detector Maintenance History Information Upon Request

An owner center shall respond to an authorized external center requesting detector maintenance history with a message containing the owner center's detector history information.

3.3.5.2.4.2 Contents of the Detector Maintenance History Request

The contents for a detector maintenance history request for an external center to send to an owner center are as follows:

3.3.5.2.4.2.1 Required Detector Maintenance History Request Content

The detector maintenance history request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to "detector" and device information type is set to "device maintenance history."

3.3.5.2.4.2.2 Optional Detector History Request Content

If the owner center supports it, the following are optional requirements that an external center may include in the detector maintenance history request sent to an owner center.

3.3.5.2.4.2.2.1 Detector Station – Detector History Request

The external center shall send the unique identifier of the detector station as part of the detector maintenance history request for the detector.

3.3.5.2.4.3 Contents of Detector Maintenance History Information

The detector maintenance history information for an owner center to send to an external center is as follows:

3.3.5.2.4.3.1 Required Detector Maintenance History Content

The detector maintenance history information sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2); and
- b. Identifier of each detector or detector zone (list).

3.3.5.2.4.3.2 Optional Detector Maintenance History Content

The following are optional requirements that an owner center may include in the detector maintenance history information sent to an external center.

3.3.5.2.4.3.2.1 Detector Station – Detector History

For implementations where detector information polling occurs at the detector station, the owner center shall send the unique identifier of the detector station as part of the detector maintenance history information for each detector.

3.3.5.2.4.3.2.2 Detector Type

The owner center shall provide the type of detector as part of the detector maintenance history information for each detector. Supported values are inductive loop, magnetic, magnetometers, pressure cells, microwave radar, ultrasonic, video image, laser, infrared, road tube, probe other, and unknown.

3.3.5.2.4.3.2.3 Installation Date and Time

The owner center shall provide the initial installation date and time, in UTC, of the detector as part of the detector maintenance history information for each detector.

3.3.5.2.4.3.2.4 Detector Calibration Date and Time

The owner center shall provide the date and time, in UTC, the detector was last calibrated as part of the detector maintenance history information for each detector.

3.3.5.2.4.3.2.5 Operational Date and Time

The owner center shall provide the last date and time, in UTC, the operational status of the detector changed from “on” to another operational status as part of the detector maintenance history information for each detector. Other operational status values are off, out of service, unavailable, unknown, marginal, and failed.

3.3.5.2.4.3.2.6 Non-Operational Date and Time

The owner center shall provide the last date and time, in UTC, the operational state of the detector changed from “not operational” to another operational state as part of the detector maintenance history information for each detector.

3.3.5.2.4.3.2.7 History Date and Time Change Information

The owner center shall provide the date and time, in UTC, of the last change to this detector history as part of the detector maintenance history information for each detector.

3.3.5.3 CCTVs

The requirements to exchange CCTV information and provide CCTV command/control capabilities between centers are as follows:

3.3.5.3.1 Share CCTV Inventory Information

The requirements for sharing CCTV inventory information with other authorized centers are as follows:

3.3.5.3.1.1 Send CCTV Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting CCTV inventory with a message containing the owner center’s CCTV inventory information.

3.3.5.3.1.2 Publish CCTV Inventory Information

An owner center shall publish a message containing its CCTV inventory information to all authorized subscribing external centers.

3.3.5.3.1.3 Subscribe to CCTV Inventory Information

An external center shall send a subscription message to an owner center requesting its CCTV inventory information.

3.3.5.3.1.4 Required CCTV Inventory Information Request Content

The CCTV inventory information request sent from an external center to an owner center shall include a generic device information request, with the device type set to “CCTV camera” and the device information type set to “device inventory.” (See 3.3.5.1.1.1)

3.3.5.3.1.5 Contents of the CCTV Inventory Information Response

The CCTV inventory information for an owner center to send to an external center is as follows:

3.3.5.3.1.5.1 Required CCTV Inventory Content

The CCTV inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2);
- b. Types of requests supported for each CCTV device (preset, jog positioning, direction, focus, manual iris, environmental (wipers) on/off, lock-for-the-camera, pan, tilt, zoom, and text overlay); and

- c. Types of images supported for each CCTV device as a list (JPEG, TIFF, MPEG, NTSC, PAL, SECAM, HDTV, ATSC, MJPEG, and Other).

Environmental requests supported are camera power, heater power, wiper, washer, and blower.

3.3.5.3.1.5.2 Optional CCTV Inventory Content

The following are optional requirements that an owner center may include in the CCTV inventory information sent to an external center.

3.3.5.3.1.5.2.1 Text Insertion – CCTV Inventory

The owner center shall provide the text inserted (titling text) on the camera images as part of the CCTV inventory information for each CCTV.

3.3.5.3.1.5.2.2 Camera Type

The owner center shall provide the type of CCTV camera as part of the CCTV inventory information for each CCTV. Supported values shall include black & white and color.

3.3.5.3.2 Share CCTV Status Information

The requirements for sharing CCTV status information with other authorized centers are as follows:

3.3.5.3.2.1 Send CCTV Status Information Upon Request

An owner center shall respond to an authorized external center requesting CCTV status with a message containing the owner center's CCTV status information.

3.3.5.3.2.2 Publish CCTV Status Information

An owner center shall publish a message containing its CCTV status information to all authorized subscribing external centers.

3.3.5.3.2.3 Subscribe to CCTV Status Information

An external center shall send a subscription message to an owner center requesting its CCTV status information.

3.3.5.3.2.4 Required CCTV Status Request Content

The CCTV status request sent from an external center to an owner center shall include a generic device information request, with the device type set to "CCTV camera" and the device information type set to "device status." (See 3.3.5.1.1.1)

3.3.5.3.2.5 Contents of the CCTV Status Response

The CCTV status information for an owner center to send to an external center is as follows:

3.3.5.3.2.5.1 Required CCTV Status Response Content

The CCTV status information sent from an owner center to an external center shall include the generic device status header information. (See 3.3.5.1.1.3)

3.3.5.3.2.5.2 Optional CCTV Status Response Content

The following are optional requirements that an owner center may include in the CCTV status information sent to an external center.

3.3.5.3.2.5.2.1 CCTV Error

The owner center shall indicate the type of error experienced by the CCTV as part of the CCTV status information for each CCTV. Supported values shall include communications error, power failure, device error, and controller error.

3.3.5.3.2.5.2.2 CCTV Format

The owner center shall provide the current format of the CCTV images as part of the CCTV status information for each CCTV. Supported values shall include JPEG, TIFF, MPEG, NTSC, PAL, SECAM, HDTV, ATSC, MJPEG, and other.

3.3.5.3.2.5.2.3 CCTV Preset Position

The owner center shall provide the value of the preset position, if that preset exists, as part of the CCTV status information for each CCTV.

3.3.5.3.2.5.2.4 CCTV Pan Position

The owner center shall provide the current pan position, in 1/100th degree units, of the CCTV device as part of the CCTV status information for each CCTV.

3.3.5.3.2.5.2.5 CCTV Tilt Position

The owner center shall provide the current tilt position, in 1/100th degree units, of the CCTV device as part of the CCTV status information for each CCTV.

3.3.5.3.2.5.2.6 CCTV Zoom Position

The owner center shall provide the current zoom position of the CCTV device as part of the CCTV status information for each CCTV.

3.3.5.3.2.5.2.7 CCTV Iris Position

The owner center shall provide the current iris position of the CCTV device as part of the CCTV status information for each CCTV.

3.3.5.3.2.5.2.8 CCTV Focus Position

The owner center shall provide the current focus position of the CCTV device as part of the CCTV status information for each CCTV.

3.3.5.3.2.5.2.9 Camera Environmental Features Status

The owner center shall provide the status (on, off, unknown) of the environmental features as part of the CCTV status information for each CCTV. Environmental features are camera power, heater power, wiper, washer, and blower.

3.3.5.3.3 External Change Requests for CCTV Devices

The requirements to support CCTV change requests from other authorized centers are as below. Only the following types of change requests to remote CCTV devices are supported by this standard: preset, jog positioning, direction, focus, iris, wiper on/off, lock-for-the-camera, pan, tilt, zoom, and text overlay.

3.3.5.3.3.1 Send CCTV Change Response Upon Request

An owner center shall respond to an authorized external center requesting a change to the CCTV device with a message containing the status of the request.

3.3.5.3.3.2 Required CCTV Change Request Content

The CCTV change request sent from an external center to an owner center shall include:

- a. Generic device change request header information (See 3.3.5.1.2.1) with the device type set to "CCTV camera";
- b. Type of request (preset, jog positioning, direction, focus, manual iris, environmental on/off, lock-for-the-camera, pan, tilt, zoom, or text overlay); and
- c. Requested value.

3.3.5.3.3.3 Required CCTV Change Request Response Content

The owner center response to a CCTV change request from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.3.4 Request CCTV Change Status

The requirements to check the status of CCTV change requests previously issued by an authorized external center are as follows.

3.3.5.3.4.1 Send CCTV Change Status Upon Request

An owner center shall respond to an authorized external center requesting the status of a previously issued CCTV change request as described in “3.3.5.1.2.3.1 Send Device Change Status Upon Request..”

3.3.5.3.4.2 Required CCTV Change Status Request Content

The CCTV change status request sent from an external center to an owner center shall include:

- a. Generic device change status request (See 3.3.5.1.2.3.2), with the device type set to “CCTV camera..”

3.3.5.3.4.3 Required CCTV Change Status Response Content

The owner center response to a CCTV change status request from an external center shall include:

- a. Generic device change response header information (See 3.3.5.1.2.2).

3.3.5.3.5 Cancel Change Requests for CCTV

The requirements to cancel a CCTV change request previously issued by an authorized external center are as follows.

3.3.5.3.5.1 Send CCTV Change Cancellation Response Upon Request

An owner center shall respond to authorized external center requesting cancellation of a previously issued CCTV change request as described in “3.3.5.1.2.4.1 Send Change Cancellation Response Upon Request..”

3.3.5.3.5.2 Required CCTV Change Cancellation Request Content

The CCTV change cancellation request sent from an external center to an owner center shall include:

- a. Generic cancel device change request (See 3.3.5.1.2.4.2), with the device type set to “CCTV camera..”

3.3.5.3.5.3 Required CCTV Change Cancellation Response Content

The owner center response to a CCTV change cancellation request sent from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.3.6 Share Image Links for CCTV

The requirements to share image links to an authorized external center are as follows.

3.3.5.3.6.1 Send Image Links for CCTV Upon Request

An owner center shall respond to an authorized external center’s request with a message containing the image links for the requested CCTV inventory.

3.3.5.3.6.2 Publish CCTV Link Information

An owner center shall publish a message containing its CCTV image link information to all authorized subscribing external centers.

3.3.5.3.6.3 Subscribe to CCTV Link Information

An external center shall send a subscription message to an owner center requesting its CCTV image link information.

3.3.5.3.6.4 Required CCTV Image Link Request Content

The image link for CCTV request sent from an external center to an owner center shall include:

- a. Generic device information request (See 3.3.5.1.1.1), with the device type set to “CCTV camera,” and the device information type set to “image link”:

- b. Identifier of the CCTV device: and
- c. The type of image requested (snapshot, suppressed stream, or unsuppressed stream).

3.3.5.3.6.5 Required CCTV Image Link Request Response Content

The CCTV inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2);
- b. The type of image provided (snapshot, suppressed stream, or unsuppressed stream); and
- c. A uniform resource locator (URL) to the image provided.

3.3.5.3.7 External Commands for CCTV Devices

The requirements for an external center to send commands to remotely control to a CCTV that is normally managed by an owner center are as follows. Only the following types of commands to remote CCTV devices are supported by this standard: preset, jog positioning, direction, focus, iris, wiper on/off, lock-for-the-camera, pan, tilt, zoom, and text overlay.

3.3.5.3.7.1 Send CCTV Control Command Status

An owner center shall respond to an authorized external center configuring a CCTV via a one-time control command with a message containing the status of the command.

3.3.5.3.7.2 Required CCTV Control Command Content

The CCTV control command sent from an external center to an owner center shall include:

- a. Generic device control command information (See 3.3.5.1.3.2) with the device type set to "CCTV camera";
- b. Type of command (preset, jog positioning, direction, focus, manual iris, environmental on/off, lock-for-the-camera, pan, tilt, zoom, or text overlay); and
- c. Control command value.

3.3.5.3.7.3 Required CCTV Control Command Response Content

The owner center response to a CCTV control command sent from an external center shall include generic device control command response information (See 3.3.5.1.3.3).

3.3.5.4 Dynamic Message Signs

The requirements to exchange DMS information and provide DMS command/control capabilities between centers are as follows:

3.3.5.4.1 Share DMS Inventory Information

The requirements for sharing DMS inventory information with other authorized centers are as follows:

3.3.5.4.1.1 Send DMS Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting DMS inventory with a message containing the owner center's DMS inventory information.

3.3.5.4.1.2 Publish DMS Inventory Information

An owner center shall publish a message containing its DMS inventory information to all authorized subscribing external centers.

3.3.5.4.1.3 Subscribe to DMS Inventory Information

An external center shall send a subscription message to an owner center requesting its DMS inventory information.

3.3.5.4.1.4 Required DMS Inventory Information Request Content

The DMS inventory information request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "dynamic message sign" and device information type set to "device inventory.."

3.3.5.4.1.5 Contents of the DMS Inventory Information Response

The DMS inventory information for an owner center to send to an external center is as follows:

3.3.5.4.1.5.1 Required DMS Inventory Content

The DMS inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2); and
- b. Sign type as defined in NTCIP 1203 (BOS, CMS, vmsChar, vmsLine, vmsFull, portable BOS, portable CMS, portable vmsChar, portable vmsLine, portable vmsFull, other, portable other) of each device.

3.3.5.4.1.5.2 Optional DMS Inventory Content

The following are optional requirements that an owner center may include in the DMS inventory information sent to an external center.

3.3.5.4.1.5.2.1 Sign Technology

The owner center shall provide the sign technology of the DMS as part of the DMS inventory information for each DMS. Supported values shall include LED, flip-disk, fiber optic, shuttered, bulb, drum, other and unknown.

3.3.5.4.1.5.2.2 Sign Pixel Height

The owner center shall provide the pixel height of the DMS face as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.3 Sign Pixel Width

The owner center shall provide the pixel width of the DMS face as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.4 Sign Height

The owner center shall provide the height of the DMS face, in millimeters, as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.5 Sign Width

The owner center shall provide the width of the DMS face, in millimeters, as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.6 Character Pixel Height

The owner center shall provide the character pixel height of the DMS as part of the DMS inventory information for each DMS. This is the pixel height of a single character. A value of 0 indicates a full matrix sign.

3.3.5.4.1.5.2.7 Character Pixel Width

The owner center shall provide the character pixel width of the DMS as part of the DMS inventory information for each DMS. This is the pixel width of a single character. A value of 0 indicates a line matrix or full matrix sign.

3.3.5.4.1.5.2.8 DMS Beacon Type

The owner center shall provide the beacon type as defined in NTCIP 1203 that the DMS supports as part of the DMS inventory information for each DMS. Supported values are none, one beacon, two beacon sync flash, two beacon opposed flash, four beacon sync flash, four beacon alternate row flash, four beacon alternate column flash, four beacon alternate diagonal flash, four beacon no sync, one beacon strobe, two beacon strobe, four beacon strobe, and other.

3.3.5.4.1.5.2.9 Vertical Border

The owner center shall provide the vertical border around the DMS face, in millimeters, as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.10 Horizontal Border

The owner center shall provide the horizontal border around the DMS face, in millimeters, as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.11 Sign Vertical Pixel Pitch

The owner center shall provide vertical distance between the center of one pixel to the center of the neighboring pixel in millimeters (pixel spacing) as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.12 Sign Horizontal Pixel Pitch

The owner center shall provide horizontal distance between the center of one pixel to the center of the neighboring pixel in millimeters (pixel spacing) as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.13 Maximum Number of Pages

The owner center shall provide the maximum number of pages that can be supported for a single message as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.14 Maximum Message Length

The owner center shall provide the maximum length that can be supported for a single message as part of the DMS inventory information for each DMS.

3.3.5.4.1.5.2.15 Color Scheme

The owner center shall provide the color scheme as defined in NTCIP 1203 that is supported by the DMS as part of the DMS inventory information for each DMS. Supported values shall include monochrome1bit, monochrome8bit, colorClassic, and color24bit.

3.3.5.4.1.5.2.16 MULTI Tags Supported

The owner center shall provide the MULTI tag information that the DMS supports as part of the DMS inventory information for each DMS.

3.3.5.4.2 Share DMS Status Information

The requirements for sharing DMS status information with other authorized centers are as follows:

3.3.5.4.2.1 Send DMS Status Information Upon Request

An owner center shall respond to an authorized external center requesting DMS status with a message containing the owner center's DMS status information.

3.3.5.4.2.2 Publish DMS Status Information

An owner center shall publish a message containing its DMS status information to all authorized subscribing external centers.

3.3.5.4.2.3 Subscribe to DMS Status Information

An external center shall send a subscription message to an owner center requesting its DMS status information.

3.3.5.4.2.4 Required DMS Status Request Content

The DMS status request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "dynamic message sign" and device information type set to "device status.."

3.3.5.4.2.5 Contents of the DMS Status Response

The DMS status information for an owner center to send to an external center is as follows:

3.3.5.4.2.5.1 Required DMS Status Response Content

The DMS status information sent from an owner center to an external center shall include:

- a. The generic device status header information (See 3.3.5.1.1.3); and

- b. Current message displayed on each DMS device.

3.3.5.4.2.5.2 Optional DMS Status Content

The following are optional requirements that an owner center may include in the DMS status information sent to an external center.

3.3.5.4.2.5.2.1 Current Message Number – DMS

The owner center shall provide the message number of the message currently displayed on the DMS device as part of the DMS status information for each DMS.

3.3.5.4.2.5.2.2 Time Remaining

The owner center shall provide the time remaining the current message shall be displayed, in minutes, as part of the DMS status information for each DMS.

3.3.5.4.2.5.2.3 Message Source

The owner center shall provide the message source as defined in NTCIP 1203 of the message currently displayed on the DMS device as part of the DMS status information for each DMS. Supported values are local, external, central, timebasedScheduler, powerRecovery, reset, commLoss, powerLoss, endDuration, and other.

3.3.5.4.2.5.2.4 Message Beacon

The owner center shall indicate if the beacon is enabled or disabled for the message currently displayed on the DMS device as part of the DMS status information for each DMS.

3.3.5.4.2.5.2.5 DMS On-Display Image

The owner center shall provide a uniform resource locator (URL) to an image containing a rendering of what is currently displayed on the DMS.

3.3.5.4.3 External Change Requests for DMS Devices

The requirements to support DMS change requests from other authorized centers are as follows. Only requests to display a specific message on a remote DMS device are supported.

3.3.5.4.3.1 Send DMS Change Response Upon Request

An owner center shall respond to an authorized external center requesting a message change on a DMS via a one-time change request with a message containing the status of the request.

3.3.5.4.3.2 Required DMS Change Request Content

The DMS change request sent from an external center to an owner center shall include:

- a. Generic device change request header information (See 3.3.5.1.2.1) with the device type set to “dynamic message sign”;
- b. Message command type (custom message, library message, or remove message); and
- c. Message requested in MULTI language; or
- d. Message number, the memory type (permanent, changeable, or volatile) and the CRC of the message being requested.

3.3.5.4.3.3 Required DMS Change Request Response Content

The owner center response to a DMS change request from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.4.4 Request DMS Change Status

The requirements to check the status of a DMS change request previously issued by an authorized external center are as follows.

3.3.5.4.4.1 Send DMS Change Status Upon Request

An owner center shall respond to an authorized external center requesting the status of a previously issued DMS change request as described in “3.3.5.1.2.3.1 Send Device Change Status Upon Request..”

3.3.5.4.4.2 Required DMS Change Status Request Content

The DMS change status request sent from an external center to an owner center shall include generic device change status request (See 3.3.5.1.2.3.2), with the device type set to “dynamic message sign..”

3.3.5.4.4.3 Required DMS Change Status Response Content

The owner center response to a DMS change status request from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.4.5 Cancel External Change Requests for DMS Devices

The requirements to cancel a DMS change request previously issued by an authorized external center are as follows.

3.3.5.4.5.1 Send Cancel DMS Change Response Upon Request

An owner center shall respond to authorized external center requesting cancellation of a previously issued DMS change request as described in “3.3.5.1.2.4.1 Send Change Cancellation Response Upon Request..”

3.3.5.4.5.2 Required DMS Change Cancellation Request Content

The DMS change cancellation request sent from an external center to an owner center shall includes a generic cancel device change request (See 3.3.5.1.2.4.2), with the device type set to “dynamic message sign.”

3.3.5.4.5.3 Required DMS Change Cancellation Request Response Content

The owner center response to a DMS change cancellation request sent from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.4.6 Share DMS Message Appearance

The requirements to share how a message would appear on a DMS with other authorized centers are as follows:

3.3.5.4.6.1 Send DMS Message Appearance Upon Request

An owner center shall respond to an authorized external center requesting how a message would appear on a DMS with messages containing the pertinent information required to reconstruct the message.

3.3.5.4.6.2 Required DMS Message Appearance Request Content

The DMS message appearance request sent from an external center to an owner center shall include:

- a. Generic device information request (See 3.3.5.1.1.1), with the device type set to “dynamic message sign”, device information type set to “message appearance,” and the device identifier for the DMS; and
- b. Message requested in MULTI language; **or**
- c. Message number, the memory type (permanent, changeable, volatile) and the CRC of the message being requested; **or**
- d. The current message flag.

3.3.5.4.6.3 Contents of the DMS Message Appearance Information

The DMS message appearance information for an owner center to send to an external center is as follows:

3.3.5.4.6.3.1 Required DMS Message Appearance Information

The DMS message appearance information sent from an owner center to an external center for a DMS shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of each DMS device; and
- c. Sign type of each DMS device.

3.3.5.4.6.3.2 Additional Required DMS Message Appearance Response Information for Matrix Signs

The DMS current message appearance response sent from an owner center to an external center for sign types vmsChar, vmsLine, vmsFull, portable vmsChar, portable vmsLine and portable vmsFull shall include:

- a. Sign height (in pixels);
- b. Sign width (in pixels);
- c. Sign height;
- d. Sign weight;
- e. Character pixel height;
- f. Character pixel width;
- g. Sign vertical border;
- h. Sign horizontal border;
- i. Sign vertical pixel pitch;
- j. Sign horizontal pixel pitch;
- k. Maximum number of pages;
- l. Maximum message length;
- m. Color scheme; and
- n. MULTI tags supported.

3.3.5.4.7 Share DMS Message Table

The requirements for sharing DMS message tables with other authorized centers are as follows:

3.3.5.4.7.1 Send DMS Message Table Upon Request

An owner center shall respond to an authorized external center requesting DMS message table information with a message containing the owner center's DMS message table information.

3.3.5.4.7.2 Publish DMS Message Table Information

An owner center shall publish a message containing its DMS message table information to all authorized subscribing external centers.

3.3.5.4.7.3 Subscribe to DMS Message Table Information

An external center shall send a subscription message to an owner center requesting its DMS message table information.

3.3.5.4.7.4 Contents of the DMS Message Table Inventory Request

The contents of a DMS Message Table Inventory request for an external center to send to an owner center are as follows:

3.3.5.4.7.4.1 Required DMS Message Table Inventory Request Content

The DMS message table inventory request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "dynamic message sign" and device information type set to "device plan.."

3.3.5.4.7.4.2 Optional DMS Message Table Inventory Request Content

If the owner center supports it, the following are optional requirements that an external center may include in the DMS message table inventory request sent to an owner center.

3.3.5.4.7.4.2.1 DMS Message Number Identifier

The external center shall provide the message number desired as part of the DMS message table inventory request for each DMS.

3.3.5.4.7.4.2.2 DMS Memory Type

The external center shall indicate from what memory type as defined in NTCIP 1203 is the message table desired from as part of the DMS message table inventory request for each DMS. Supported values are permanent, changeable, volatile, and currentBuffer.

3.3.5.4.7.5 Contents of the DMS Message Table Inventory Information

The DMS Message Table Inventory information for an owner center to send to an external center is as follows:

3.3.5.4.7.5.1 Required DMS Message Table Inventory Information Content

The DMS message table inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2);
- b. Message memory type;
- c. Message identifier (number) for each message;
- d. Message in MULTI language for each message;
- e. Message owner for each message;
- f. If the message beacon is enabled or disabled for this message;
- g. Message run-time priority for each message; and
- h. Message status as defined in NTCIP 1203 (notUsed, modifying, validating, valid, error, modifyReq, validateReq and notUsedReq) for each message.

3.3.5.4.7.5.2 Optional DMS Message Table Inventory Information Content

The following are optional requirements that an owner center may include in the DMS message table inventory information sent to an external center.

3.3.5.4.7.5.2.1 DMS Message Inventory Date and Time Change Information

The owner center shall provide the date and time, in UTC, of when the DMS message table was last changed as part of the DMS message table inventory information for each DMS.

3.3.5.4.7.5.2.2 DMS Message CRC

The external center shall provide the CRC-16 (polynomial defined in ISO/IEC 3309) value for the DMS message number and the memory type requested as part of the DMS message table inventory information for each DMS.

3.3.5.4.8 Share DMS Font Table

The requirements for sharing DMS font tables with other authorized centers are as follows:

3.3.5.4.8.1 Send DMS Font Table Upon Request

An owner center shall respond to an authorized external center requesting DMS font tables with a message containing the owner center's DMS font table information.

3.3.5.4.8.2 Contents of the DMS Font Table Request

The contents of a DMS Font Table request for an external center to send to an owner center are as follows:

3.3.5.4.8.2.1 Required DMS Font Table Request Content

The DMS font table request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "dynamic message sign" and device information type set to "device font table."

3.3.5.4.8.2.2 Optional DMS Font Table Request Content

If the owner center supports it, the following are optional requirements that an external center may include in the DMS font table request sent to an owner center.

3.3.5.4.8.2.2.1 DMS Font Identifier

The external center shall provide the font number desired as part of the DMS font table request for each DMS.

3.3.5.4.8.3 Contents of DMS Font Table Response

The DMS Font Table information for an owner center to send to an external center is as follows:

3.3.5.4.8.3.1 Required DMS Font Table Response Content

The DMS font table information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2);
- b. Font number for each font;
- c. Font number of the default font;
- d. Font height in pixels for each font;
- e. Font character spacing in pixels for each font;
- f. Font line spacing in pixels for each font;
- g. Font version ID for each font;
- h. Font state for each font;
- i. Character number for each character for each font;
- j. Character width in pixels for each character for each font; and
- k. Character bitmap for each character for each font.

3.3.5.4.8.3.2 Optional DMS Font Table Response Content

The following are optional requirements that an owner center may include in the DMS font table information sent to an external center.

3.3.5.4.8.3.2.1 Font Table Date and Time Change Information

The owner center shall provide the date and time, in UTC, of when the font table was last changed as part of the DMS font table information.

3.3.5.4.9 Share DMS Priority Queue Information

The requirements for sharing the contents of a DMS priority queue are as follows:

3.3.5.4.9.1 Send DMS Priority Queue Information Upon Request

An owner center shall respond to an authorized external center requesting the contents of its DMS priority queue with a message containing the contents of an owner center's DMS priority queue.

3.3.5.4.9.2 Required DMS Priority Queue Request Content

- a. Generic device queue request (See 3.3.5.1.2.5.1.1), with the device type set to "dynamic message sign".

3.3.5.4.9.3 Required DMS Priority Queue Request Response Content

The DMS priority queue response sent from an owner center to an external center shall include:

- a. Generic device priority queue response header information (See 3.3.5.1.2.5.2.1); and
- b. The message requested in MULTI language; or
- c. The number of the message being requested.

3.3.5.4.10 Share DMS Graphics Table

The requirements for sharing DMS graphic tables with other authorized centers are as follows:

3.3.5.4.10.1 Send DMS Graphic Table Upon Request

An owner center shall respond to an authorized external center requesting DMS graphic tables with a message containing the owner center's DMS graphic table information.

3.3.5.4.10.2 Required DMS Graphic Table Request Content

The DMS graphic table request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "dynamic message sign" and device information type set to "device graphic table."

3.3.5.4.10.3 Contents of DMS Graphic Table Response

The DMS Graphic Table information for an owner center to send to an external center is as follows.

3.3.5.4.10.3.1 Required DMS Graphic Table Response Content

The DMS graphic table information sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of each device;
- c. The number for each graphic;
- d. The name of each graphic;
- e. The height of each graphic in pixels;
- f. The width of each graphic in pixels;
- g. The type of each graphic;
- h. The ID for each graphic;
- i. The font line spacing in pixels for each font;
- j. If the graphic has a transparent color and what the color is; and
- k. The state of each graphic

3.3.5.4.10.3.2 Optional DMS Graphic Table Response Content

The following are optional requirements that an owner center may include in the DMS graphic table information sent to an external center.

3.3.5.4.10.3.2.1 Graphic Table Date and Time Change Information

The owner center shall provide the date and time, in UTC, of when the graphics table was last changed as part of the DMS graphic table information.

3.3.5.4.10.3.2.2 Graphic Table Bitmap

The owner center shall provide the bitmap for each graphic in the graphics table as part of the DMS graphic table information.

3.3.5.4.11 External Commands for DMS Devices

The requirements for an external center to send messages to control a DMS that is normally managed by an owner center are as follows.

3.3.5.4.11.1 Send DMS Control Command Status

An owner center shall respond to an authorized external center configuring a DMS via a one-time control command with a message containing the status of the command.

3.3.5.4.11.2 Contents of DMS Control Command

The content of the DMS command sent from an external center to an owner center is as follows:

3.3.5.4.11.2.1 Required DMS Control Command Content

The DMS command sent from an external center to an owner center shall include:

- a. Generic device control command header information (Section 3.3.5.1.3.2.1) with the device type set to "dynamic message sign";
- b. Message command type (custom message, library message, remove message); and
- c. Message requested in MULTI language; **or**

- d. Message number, the memory type (permanent, changeable, volatile) and the CRC of the message being requested.

3.3.5.4.11.2.2 Optional DMS Control Command Content

If the owner center supports it, the following are optional requirements that an external center may include in the DMS control command sent to an owner center.

3.3.5.4.11.2.2.1 Beacon Control

The external center shall indicate if the beacon is to be enabled or disabled as part of the DMS control command.

3.3.5.4.11.3 Required DMS Control Command Response

The owner center response to a DMS control command sent from an external center shall include a generic device control command response information (Section 3.3.5.1.3.3);

3.3.5.5 Environment Sensors

The environmental sensor station (ESS) model assumes that each environmental sensor station may have multiple environmental sensors. Each environmental sensor may collect different types of environmental or roadway data. Each environmental sensor may also be located on different links (roadways), on different lanes, bodies of water, or different elevations.

The requirements to exchange ESS information between centers are as follows:

3.3.5.5.1 Share ESS Inventory Information

The requirements for sharing ESS inventory information with other authorized centers are as follows:

3.3.5.5.1.1 Send ESS Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting ESS inventory with a message containing the owner center's ESS inventory information.

3.3.5.5.1.2 Publish ESS Inventory Information

An owner center shall publish a message containing its ESS inventory information to all authorized subscribing external centers.

3.3.5.5.1.3 Subscribe to ESS Inventory Information

An external center shall send a subscription message to an owner center requesting its ESS inventory information.

3.3.5.5.1.4 Required ESS Inventory Information Request Content

The ESS inventory information request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "environmental sensor station" and device information type set to "device inventory."

3.3.5.5.1.5 Contents of the ESS Inventory Information Response

The ESS inventory information for an owner center to send to an external center is as follows:

3.3.5.5.1.5.1 Required ESS Inventory Content

The ESS inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2), where the device is an environmental sensor station; and
- b. Generic device inventory header information (See 3.3.5.1.1.2), where the device is an environmental sensor, for each environmental sensor connected to this environmental sensor station (list).

3.3.5.5.1.5.2 Optional ESS Inventory Content

The following are optional requirements that an owner center may include in the ESS inventory information sent to an external center.

3.3.5.5.1.5.2.1 Lane Number – ESS

The owner center shall provide the lane number that the environmental sensor is located on as part of the ESS inventory information for each environmental sensor.

3.3.5.5.1.5.2.2 Device Elevation

The owner center shall provide the elevation that the environmental sensor is located at, in decimeters, as part of the ESS inventory information for each environmental sensor.

3.3.5.5.1.5.2.3 Device Height

The owner center shall provide the height of the environmental sensor from the base of the station, in decimeters, as part of the ESS inventory information for each environmental sensor.

3.3.5.5.1.5.2.4 Device Type

The owner center shall provide the type of environmental sensor as part of the ESS inventory information for each environmental sensor. Supported values are atmospheric, wind, temperature, precipitation, visibility, pavement, subsurface, other, and unknown.

3.3.5.5.1.5.2.5 Device Operation Type

The owner center shall provide the operation type of the environmental sensor station as part of the ESS inventory information for each environmental sensor station. Supported values are staffed, automatic, unknown, and other.

3.3.5.5.1.5.2.6 Device Mobility Type

The owner center shall provide the mobility type of the environmental sensor station as defined in NTCIP 1204 as part of the ESS inventory information for each environmental sensor station. Supported values are permanent, transportable, mobile and other.

3.3.5.5.2 Share ESS Status Information

The requirements for sharing ESS status information with other authorized centers are as follows:

3.3.5.5.2.1 Send ESS Status Information Upon Request

An owner center shall respond to an authorized external center requesting ESS status with a message containing the owner center's ESS status information.

3.3.5.5.2.2 Publish ESS Status Information

An owner center shall publish a message containing its ESS status information to all authorized subscribing external centers.

3.3.5.5.2.3 Subscribe to ESS Status Information

An external center shall send a subscription message to an owner center requesting its ESS status information.

3.3.5.5.2.4 Required ESS Status Request Content

The ESS status request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "environmental sensor status" and device information type set to "device status."

3.3.5.5.2.5 Required ESS Status Content

The ESS status information sent from an owner center to an external center shall include:

- a. Generic device status header information (See 3.3.5.1.1.3), where the device is an environmental sensor station; and

- b. Generic device status header information (See 3.3.5.1.1.3), where the device is an environmental sensor connected to the environmental sensor station.

3.3.5.5.3 Share ESS Observation Data

The requirements for sharing ESS observation data information with other authorized centers are as follows:

3.3.5.5.3.1 Send ESS Observation Data Upon Request

An owner center shall respond to an authorized external center requesting ESS observation data with a message containing the owner center's ESS observation data information.

3.3.5.5.3.2 Publish ESS Observation Data

An owner center shall publish a message containing its ESS observation data information to all authorized subscribing external centers.

3.3.5.5.3.3 Subscribe to ESS Observation Data

An external center shall send a subscription message to an owner center requesting its ESS observation data information.

3.3.5.5.3.4 Required ESS Observation Data Request Content

The ESS observation data request sent from an external center to an owner center shall include:

- a. Generic device information request (See 3.3.5.1.1.1), with the device type set to "environmental sensor station" and device information type set to "device data."

3.3.5.5.3.5 Required ESS Observation Data Information Content

The ESS observation data information sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the ESS station;
- c. Unique identifier of each ESS sensor;
- d. Timestamp of the ESS observation data; and
- e. The observation block data (weather, pavement, and subsurface).

3.3.5.5.4 Share ESS Metadata

The requirements for sharing ESS metadata information with other authorized centers are as follows:

3.3.5.5.4.1 Send ESS Metadata Information Upon Request

An owner center shall respond to an authorized external center requesting ESS metadata information with a message containing the owner center's ESS metadata information.

3.3.5.5.4.2 Required ESS Metadata Request Content

The ESS metadata request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "environmental sensor station" and device information type set to "device metadata."

3.3.5.5.4.3 Contents of the ESS Metadata Information

The content of the ESS metadata information sent from an external center to an owner center is as follows:

3.3.5.5.4.3.1 Required ESS Metadata Information Content

The ESS metadata information sent from an owner center to an external center shall include:

- a. Name of the file that contains the observations;
- b. Logical directory path to the observation file;
- c. Protocol used to retrieve observations;
- d. The network DNS name (including IP address form of the DNS) of the collector host server;
- e. The logical network address port on the collector host server;

- f. Observation collection frequency;
- g. Observation collection offset (the number of minutes after midnight UTC that the first collection occurs);
- h. The number of minutes offset from UTC for the agency's collector host server;
- i. Standard Time Zone where the agency's collector host is located; and
- j. An indication of whether Daylight Savings Time is observed on the server.

3.3.5.5.4.3.2 Optional ESS Metadata Information Content

The following are optional requirements that an owner center may include in the ESS observation metadata information sent to an external center.

3.3.5.5.4.3.2.1 Authorization

The requirements for the Authorization information as part of the ESS metadata information are found in "Section 3.3.1.8.1 Authorization Information – External Centers."

3.3.5.5.4.3.2.2 Collector Configuration Content

The requirements for an owner center to send collector configuration metadata information to an external center follow.

3.3.5.5.4.3.2.2.1 Required Collector Configuration Information

The collector configuration metadata information sent from an owner center to an external center shall include:

- a. Header index indicating the positional order of observation type in the collected observation file;
- b. Column label name for collected observation file;
- c. The type of collection units (e.g. Degrees Celsius) used by the collector; and
- d. The unit's multiplier or scale factor used to adjust the decimal position of the collected observations.

Multiple instances of collector configuration information may be sent as part of the ESS observation metadata information sent to an external center.

3.3.5.5.4.3.2.2.2 Observation Type

The owner center shall provide the observation type (e.g., wind speed) that is being collected as part of the collector configuration information.

3.3.5.5.4.3.2.2.3 Null Value

The owner center shall indicate the value used to indicate an error or missing value as part of the collector configuration information.

3.3.5.5.4.3.3 Owner Organization – ESS Metadata

The owner center shall provide the organization information (See 3.3.2) of the owner associated with that ESS metadata as part of the ESS metadata information.

3.3.5.5.4.3.4 Sensor Specific Information

If available, the following are requirements for sensor specific metadata information that an owner center may include in the ESS metadata information sent to an external center.

3.3.5.5.4.3.4.1 Required Sensor Specific Metadata Information

The owner center shall include the following sensor specific metadata information as part of the ESS metadata information sent to an EC:

- a. Unique identifier of the ESS station;
- b. Unique identifier of the ESS sensor;
- c. Distribution group for the sensor information;
- d. Type of observation collected by the sensor based on NTCIP 1204 types;

- e. Manufacturer of the sensor;
- f. Manufacturer's model number of the sensor; and
- g. Sensor index providing the order of like sensors.

3.3.5.5.4.3.4.2 Optional Sensor Specific Metadata Information Content

The following are optional requirements that an owner center may include in the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.1 Sensor Description

If the owner center supports it, the owner center shall provide a description of the sensor as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.2 Minimum Value of the Sensor Range

The owner center shall provide the minimum value of the sensor range if the value is different from the manufacturer's specifications as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.3 Maximum Value of the Sensor Range

The owner center shall provide the maximum value of the sensor range if the value is different from the manufacturer's specifications as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.4 Maximum Positive Rate of Change

If the owner center desires a custom value, the owner center shall provide the maximum positive rate of change during the time period defined by the rate interval as used by the step test as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.5 Maximum Negative Rate of Change

If the owner center desires a custom value, the owner center shall provide the maximum negative rate of change during the time period defined by the rate interval as used by the step test as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.6 Rate Interval

If the owner center desires a custom value, the owner center shall provide the rate interval (of time in seconds) over which maximum positive and negative rates apply in the step test as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.7 Persistence Interval

If the owner center desires a custom value, the owner center shall provide the amount of time, in seconds, that the observed values can remain constant (not change) as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.8 Persistence Threshold

If the owner center desires a custom value, the owner center shall provide the smallest amount of change that is allowed between observations as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.9 Like Instrument Threshold

If the owner center desires a custom value, the owner center shall provide the largest observed difference that is permitted among like instruments as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.10 Date of Calibration

If the owner center supports it, the owner center shall provide the last date the sensor was calibrated as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.11 Date of Last Maintenance

If the owner center supports it, the owner center shall provide the last date maintenance was performed on the sensor as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.12 Serial Number

If the owner center supports it, the owner center shall provide the manufacturer's serial number for the sensor as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.13 Sensor Resolution

If the owner center supports it, the owner center shall provide the smallest increment or measurement that can be obtained from the sensor as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.14 Sensor Accuracy

If the owner center supports it, the owner center shall provide the known potential variation of the observation (accuracy) for the sensor as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.15 Minimum Value Output

If the owner center supports it, the owner center shall provide the minimum value the sensor can output as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.16 Maximum Value Output

If the owner center supports it, the owner center shall provide the maximum value the sensor can output as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.17 Sensor to Station North South Offset

If the owner center supports it, the owner center shall provide the north/south distance, in meters, of the sensor from the station reference location as part of the sensor specific metadata information sent to an external center. North represents positive distance from the station and south represents negative distance from the station.

3.3.5.5.4.3.4.2.18 Sensor to Station East West Offset

If the owner center supports it, the owner center shall provide the east/west distance, in meters, of the sensor from the station reference location as part of the sensor specific metadata information sent to an external center. East represents positive distance from the station and west represents negative distance from the station.

3.3.5.5.4.3.4.2.19 Sensor to Station Elevation Offset

If the owner center supports it, the owner center shall provide the vertical distance, in meters, of the sensor from the station reference location as part of the sensor specific metadata information sent to an external center. A sensor above the station represents positive distance.

3.3.5.5.4.3.4.2.20 Sensor to Surface Offset

If the owner center supports it, the owner center shall provide the vertical distance, in meters, from the pavement surface as part of the sensor specific metadata information sent to an external center. A sensor above the surface represents positive distance.

3.3.5.5.4.3.4.2.21 Embedded Material Description

If the owner center supports it, the owner center shall provide a description of the material that the sensor is embedded as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.22 Output Average Interval

If the owner center supports it, the owner center shall provide the average interval, in milliseconds, that the sensor measures its observations as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.23 Output Internal Units

If the owner center supports it, the owner center shall provide the internal units of measurement reported to the data logger by the sensor as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.24 Initial Installation Date – ESS Sensor

If the owner center supports it, the owner center shall provide the date the sensor was initially installed as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.25 Begin Date/Time of Out of Service Period

If the owner center desires the sensor classified as out of service and a manual quality flag displayed, the owner center shall provide the date and time, in UTC, the sensor was taken out of service as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.26 End Date/Time of Out-of-Service Period

If the owner center desires the sensor declassified as out of service and the manual quality flag removed, the owner center shall provide the date and time, in UTC, the sensor was put back into service as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.4.2.27 Sampling Interval

If the owner center supports it, the owner center shall provide interval time, in seconds, between consecutive sensor readings, in seconds, as part of the sensor specific metadata information sent to an external center.

3.3.5.5.4.3.5 Site Specific Information

If available, the following are requirements for site specific metadata information that an owner center may include in the ESS metadata information sent to an external center.

3.3.5.5.4.3.5.1 Required Site-Specific Metadata Information

The owner center shall include a description of the site as defined by the owner organization as part of the ESS metadata information sent to an external center.

3.3.5.5.4.3.5.2 Roadway Name

If the owner center supports it, the owner center shall provide the name or number of the highway nearest the site as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.3 Linear Reference – ESS Metadata

If the owner center supports it, the owner center shall provide the linear reference location and version information as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.4 Linear Reference Units

If the owner center supports it, the owner center shall provide the units reported for the roadway marker as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.5 Distance to Roadway

If the owner center supports it, the owner center shall provide the distance, in meters, from the closest point on the center surface of the roadway to the site reference point as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.6 Elevation from Roadway

If the owner center supports it, the owner center shall provide the difference in elevation, in meters, between the center surface of the roadway to the site reference point as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.7 Jurisdiction

If the owner center supports it, the owner center shall provide the county or jurisdictional name of the site location as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.8 State

If the owner center supports it, the owner center shall provide the state (two-letter postal ID) the site is located in as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.9 Country

If the owner center supports it, the owner center shall provide the country the site is located in as part of the site-specific metadata information sent to an external center. Supported values shall include USA, CAN, and MEX.

3.3.5.5.4.3.5.10 Access Directions

If the owner center supports it, the owner center shall provide the directions to access the site from a major roadway as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.11 Site Representativeness

If the owner center supports it, the owner center shall provide the description of any unique meteorological or topographical feature(s) associated with the site as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.12 Site Obstructions

If the owner center supports it, the owner center shall provide the description of any physical properties that may affect the accuracy of the observations (e.g., trees, buildings) as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.13 Site Landscape

If the owner center supports it, the owner center shall provide the description of the landscape surrounding the site as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.14 Site Access Control

If the owner center supports it, the owner center shall indicate if access to the site is controlled as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.15 Site Slope

If the owner center supports it, the owner center shall provide the grade of the landscape surrounding the site, in whole degrees from horizontal, as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.16 Site Grade Direction

If the owner center supports it, the owner center shall provide the direction of the grade of the landscape surrounding the site, in degrees from North, as part of the site-specific metadata information sent to an external center. For example, slope down from west to east is noted as 270.

3.3.5.5.4.3.5.17 Site Wind Roughness

If the owner center supports it, the owner center shall provide the roughness of the wind in four directions, in whole percent, at the site as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.18 Site Soil Type

If the owner center supports it, the owner center shall provide the type of soil on which the site is located, as described by the USDA National Resource Conservation Service soil texture classification (e.g., sandy loam, silt) or by percent sand, silt and clay as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.5.19 Unique Site Identifier

If the owner center supports it, the owner center shall provide the unique identifier of the site as assigned by the owner organization as part of the site-specific metadata information sent to an external center.

3.3.5.5.4.3.6 Station Specific Information

If available, the following are requirements for station specific metadata information that an owner center may include in the ESS metadata information sent to an external center.

3.3.5.5.4.3.6.1 Required Station Specific Metadata Information

The owner center shall include the following station specific metadata information as part of the ESS metadata information sent to an EC:

- a. The category of the station as defined in NTCIP 1204 (permanent, transportable, mobile, other);
- b. Unique identifier of the station as assigned by the owner organization;
- c. Geographic location of the station (as a GeoJSON Point); and
- d. The elevation of the station base from mean sea level (meters).

3.3.5.5.4.3.6.2 Optional Station-Specific Metadata Information

The following are optional requirements that an owner center may include in the station-specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.1 Station Description

If the owner center supports it, the owner center shall provide a description of the station as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.2 Station Operation Type

If the owner center supports it, the owner center shall provide the operation type of the station as part of the station specific metadata information sent to an external center. Supported values are staffed, automatic and unknown.

3.3.5.5.4.3.6.2.3 Station Geo-coordinate Referencing Model

If the owner center supports it, the owner center shall provide the datum geocoordinate referencing model used to describe the station as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.4 Station Power Source

If the owner center supports it, the owner center shall indicate the power source for the station as part of the station specific metadata information sent to an external center. Supported values are battery andline.

3.3.5.5.4.3.6.2.5 Door Status

If the owner center supports it, the owner center shall indicate if any of the doors attached to the station are open as part of the station specific metadata information sent to an external center. Support values are closed, open.

3.3.5.5.4.3.6.2.6 Battery Status

If the owner center supports it, the owner center shall provide the percentage of full charge of the battery as part of the station specific metadata information sent to an external center. A value of 101 shall indicate error.

3.3.5.5.4.3.6.2.7 Line Volts

If the owner center supports it, the owner center shall provide the typical voltage for the power source as part of the station specific metadata information sent to an external center. Supported values range from 0 to 255.

3.3.5.5.4.3.6.2.8 Station Maintenance Group Name

If the owner center supports it, the owner center shall provide a description of the maintenance group for this station (for the site maintenance personnel) as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.9 Preventive Maintenance Interval

If the owner center supports it, the owner center shall provide a description of the preventive maintenance frequency, in days, for this station as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.10 Maintenance Calibration Interval

If the owner center supports it, the owner center shall provide a description of the calibration maintenance frequency (e.g. weeks, months) for this station as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.11 Maintenance Status

If the owner center supports it, the owner center shall indicate the maintenance status of the station as part of the station specific metadata information sent to an external center. Supported values are in service and out of service.

3.3.5.5.4.3.6.2.12 Initial Installation Date

If the owner center supports it, the owner center shall provide the date the station was initially installed as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.13 Number of Devices

If the owner center supports it, the owner center shall provide the number of sensor interface devices supported by the station as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.14 Communications Method

If the owner center supports it, the owner center shall provide the method of communications to the station as part of the station specific metadata information sent to an external center. Supported values are telephone number and IP address.

3.3.5.5.4.3.6.2.15 Station Phone Number

If the owner center supports it, the owner center shall provide the telephone number to contact the station as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.16 Station IP Address

If the owner center supports it, the owner center shall provide the IP address of the station as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.17 Station Manufacturer

If the owner center supports it, the owner center shall provide the manufacturer of the station as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.18 Observation Collection Interval

If the owner center supports it, the owner center shall provide the frequency between collection cycle, in minutes, between the station to the agency server as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.19 Observation Collection Offset

If the owner center supports it, the owner center shall provide the number of minutes after UTC (Coordinated Universal Time) midnight that the first collection occurs as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.20 Transmission Interval

If the owner center supports it, the owner center shall provide the frequency between transmission cycles, in minutes, as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.21 Transmission Offset

If the owner center supports it, the owner center shall provide the number of minutes after UTC midnight that the first transmission occurs as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.22 Transmission Format

If the owner center supports it, the owner center shall provide a description of the transmission format from the station to the network data logger as part of the station specific metadata information sent to an external center.

3.3.5.5.4.3.6.2.23 Station Maintenance Contact Information

If the owner center supports it, the owner center shall provide the unique identifier of the default contact group as assigned by the owner organization as part of the station specific metadata information sent to an external center (See 3.3.2).

3.3.5.5.4.3.7 Climate Record Information

If available, the following are requirements for climate record metadata information that an owner center shall include as part of the ESS metadata information sent to an external center:

- a. The minimum observed value of this observation type for this month;
- b. The maximum observed value of this observation type for this month; and
- c. The month to which the climate record applies (e.g., January, February, etc).

3.3.5.5.4.3.8 Data Collector Information

If available, the following are requirements for data collector metadata information that an owner center shall include as part of the ESS metadata information sent to an external center:

- a. Description of the data collector;
- b. Date of initial installation of the data collector;
- c. The name of the manufacturer;
- d. The name of the product; and
- e. The model number or software version of the collector.

3.3.5.5.4.3.9 Image Information

If available, the following are requirements for image information that an owner center shall include as part of the ESS metadata information sent to an external center:

- a. Description of the image provided; and
- b. Uniform resource locator (URL) for where any CCTV images associated with sensor can be found.

3.3.5.6 Lane Closure Gates

The requirements to exchange gate information and provide gate command/control capabilities between centers are as follows:

3.3.5.6.1 Share Gate Inventory Information

The requirements for sharing gate inventory information with other authorized centers are as follows:

3.3.5.6.1.1 Send Gate Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting gate inventory with a message containing the owner center's gate inventory information.

3.3.5.6.1.2 Publish Gate Inventory Information

An owner center shall publish a message containing its gate inventory information to all authorized, subscribing external centers.

3.3.5.6.1.3 Subscribe to Gate Inventory Information

An external center shall send a subscription message to an owner center requesting its gate inventory information.

3.3.5.6.1.4 Required Gate Inventory Information Request Content

The gate inventory information request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "gate" and device information type set to "device inventory."

3.3.5.6.1.5 Contents of the Gate Inventory Information Response

The gate inventory information for an owner center to send to an external center is as follows:

3.3.5.6.1.5.1 Required Gate Inventory Information Response Content

The gate inventory information sent from an owner center to an external center shall include a generic device inventory header information (See 3.3.5.1.1.2).

3.3.5.6.1.5.2 Optional Gate Inventory Content

The following are optional requirements that an owner center may include in the gate inventory information sent to an external center.

3.3.5.6.1.5.2.1 Number of Lanes – Gate Inventory

The owner center shall provide the number of lanes that the gate controls as part of the gate inventory information for each gate.

3.3.5.6.2 Share Gate Status Information

The requirements for sharing gate status information with other authorized centers are as follows:

3.3.5.6.2.1 Send Gate Status Information Upon Request

An owner center shall respond to an authorized external center requesting gate status with a message containing the owner center's gate status information.

3.3.5.6.2.2 Publish Gate Status Information

An owner center shall publish a message containing its gate status information to all authorized subscribing external centers.

3.3.5.6.2.3 Subscribe to Gate Status Information

An external center shall send a subscription message to an owner center requesting its gate status information.

3.3.5.6.2.4 Required Gate Status Request Content

The gate status request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "gate" and device information type set to "status."

3.3.5.6.2.5 Required Gate Status Response Content

The gate status information sent from an owner center to an external center shall include:

- a. The generic device status header information (See 3.3.5.1.1.3); and

- b. Gate status of each gate device (gate opened, gate closed, or gate partially open/closed).

3.3.5.6.3 External Control Requests for Gates

The requirements to support gate control requests from other authorized centers are as follows. Only control requests to open or close a remote gate device are supported.

3.3.5.6.3.1 Send Gate Control Response Upon Request

An owner center shall respond to an authorized external center requesting remote control of a gate via a one-time control request with a message containing the status of the request.

3.3.5.6.3.2 Required Gate Control Request Content

The gate control request sent from an external center to an owner center shall include:

- a. Generic device change request header information (See 3.3.5.1.2.1) with the device type set to “gate”; and
- b. Gate request command (gate open or gate closed).

3.3.5.6.3.3 Required Gate Control Response Content

The owner center response to a gate control request from an external center shall include a generic device change response header information (See 3.3.5.1.2.2).

3.3.5.6.4 Request Gate Control Status

The requirements to check the status of a gate control request previously issued by an authorized external center are as follows.

3.3.5.6.4.1 Send Gate Control Status Upon Request

An owner center shall respond to an authorized external center requesting the status of a previously issued gate control request as described in “3.3.5.1.2.3.1 Send Device Change Status Upon Request.”

3.3.5.6.4.2 Required Gate Control Status Request Content

The gate control status request sent from an external center to an owner center shall include a generic device change status request (See 3.3.5.1.2.3.2), with the device type set to “gate.”

3.3.5.6.4.3 Required Gate Control Status Response Content

The owner center response to a gate control status request from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.6.5 Cancel External Control Requests for Gates

The requirements to cancel a gate control request previously issued by an authorized external center are as follows.

3.3.5.6.5.1 Send Gate Control Cancellation Response Upon Request

The requirement for an owner center to respond to an authorized external center requesting cancellation of a previously issued gate control request is found in “3.3.5.1.2.4.1 Send Change Cancellation Response Upon Request.”

3.3.5.6.5.2 Required Gate Cancellation Request Content

The gate control cancellation request sent from an external center to an owner center shall include a generic cancel device change request (See 3.3.5.1.2.4.2), with the device type set to “gate.”

3.3.5.6.5.3 Required Gate Cancellation Response Content

The owner center response to a gate control cancellation request sent from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.6.6 Share Gate Schedule

The requirements to share the gate time base schedule with other authorized centers are as follows:

3.3.5.6.6.1 Send Gate Schedule Information Upon Request

An owner center shall respond to an authorized external center requesting gate schedules with a message containing the owner center's gate time base schedule information.

3.3.5.6.6.2 Publish Gate Schedule Information

An owner center shall publish a message containing its gate time base schedule information to all authorized subscribing external centers.

3.3.5.6.6.3 Subscribe to Gate Schedule Information

An external center shall send a subscription message to an owner center requesting its gate schedule information.

3.3.5.6.6.4 Required Gate Schedule Request Content

The gate time base schedule request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "gate" and device information type set to "device schedule."

3.3.5.6.6.5 Required Gate Schedule Information Content

The gate schedule information sent from an owner center to an external center shall include:

- a. Generic device schedule information (See 3.3.5.1.1.4.1); and
- b. Gate action (gate open or gate closed).

3.3.5.6.7 External Commands for Gates

The requirements to control gates from other authorized centers are as follows. Only control requests to open or close a remote gate device are supported.

3.3.5.6.7.1 Send Gate Control Command Status

An owner center shall respond to an authorized external center controlling a gate via a one-time control command with a message containing the status of the command.

3.3.5.6.7.2 Required Gate Control Command Content

The gate control request sent from an external center to an owner center shall include:

- a. Generic device control command header information (Section 3.3.5.1.3.2.1) with the device type set to "gate"; and
- b. Gate command (gate open or gate closed).

3.3.5.6.7.3 Required Gate Control Command Response Content

The owner center response to a gate control command sent from an external center shall include generic device control command response information (Section 3.3.5.1.3.3).

3.3.5.7 Lane Control Signals

The following are requirements to exchange LCS information and provide LCS command/control capabilities between centers.

3.3.5.7.1 Share LCS Inventory Information

The requirements for sharing LCS inventory information with other authorized centers are as follows:

3.3.5.7.1.1 Send LCS Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting LCS inventory with a message containing the owner center's LCS inventory information.

3.3.5.7.1.2 Publish LCS Inventory Information

An owner center shall publish a message containing its LCS inventory information to all authorized subscribing external centers.

3.3.5.7.1.3 Subscribe to LCS Inventory Information

An external center shall send a subscription message to an owner center requesting its LCS inventory information.

3.3.5.7.1.4 Required LCS Inventory Information Request Content

The LCS inventory information request sent from an external center to an owner center shall include a generic device information request (See 3.3.5.1.1.1), with the device type set to "lane control signal" and device information type set to "device inventory."

3.3.5.7.1.5 Contents of the LCS Inventory Information Response

The LCS inventory information for an owner center to send to an external center is as follows.

3.3.5.7.1.5.1 Required LCS Inventory Content

The LCS inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2);
- b. Unique identifier of the link that each device is controlling; and
- c. Lane number controlled by each device.

3.3.5.7.1.5.2 Optional LCS Inventory Content

The following are optional requirements that an owner center may include in the LCS inventory information sent to an external center.

3.3.5.7.1.5.2.1 Number of Lanes – LCS Inventory

The owner center shall provide the number of lanes on the link as part of the LCS inventory information for each LCS.

3.3.5.7.2 Share LCS Status Information

The requirements for sharing LCS status information with other authorized centers are as follows:

3.3.5.7.2.1 Send LCS Status Information Upon Request

An owner center shall respond to an authorized external center requesting LCS status with a message containing the owner center's LCS status information.

3.3.5.7.2.2 Publish LCS Status Information

An owner center shall publish a message containing its LCS status information to all authorized subscribing external centers.

3.3.5.7.2.3 Subscribe to LCS Status Information

An external center shall send a subscription message to an owner center requesting its LCS status information.

3.3.5.7.2.4 Required LCS Status Request Content

The LCS status request sent from an external center to an owner center shall include:

- a. Generic device information request (See 3.3.5.1.1.1), with the device type set to "lane control signal" and device information type set to "device status."

3.3.5.7.2.5 Required LCS Status Information Content

The LCS status information sent from an owner center to an external center shall include:

- a. The generic device status header information (See 3.3.5.1.1.3);
- b. Lane status (open, closed, opening, closing, unknown, turning lane); and
- c. Link direction (northbound, northeast bound, eastbound, southeast bound, southbound, southwest bound, westbound, northwest bound, not directional, positive direction, negative direction, both directions, or other) (See 3.3.5.1.1.2.2.9).

3.3.5.7.3 External Change Requests for Lane Control Devices

The requirements to support LCS change requests from other authorized centers are as follows. Only requests to open or close a lane on a remote LCS device are supported.

3.3.5.7.3.1 Send LCS Change Response Upon Request

An owner center shall respond to an authorized external center requesting a change to an LCS device via a one-time control request with a message containing the status of the request.

3.3.5.7.3.2 Required LCS Change Request Content

The LCS change request sent from an external center to an owner center shall include:

- a. Generic device change request header information (See 3.3.5.1.2.3.2) with the device type set to “lane control signal”; and
- b. Lane control signal indication requested (lane open, lane closed, or other).

3.3.5.7.3.3 Required LCS Change Request Response Content

The owner center response to an LCS change request from an external center shall include:

- a. Generic device change response header information (See 3.3.5.1.2.2).

3.3.5.7.4 Request LCS Change Status

The requirements to check the status of an LCS change request previously issued by an authorized external center are as follows.

3.3.5.7.4.1 Send LCS Change Status Upon Request

An owner center shall respond to an authorized external center requesting the status of a previously issued LCS change request as described “3.3.5.1.2.3.1 Send Device Change Status Upon Request.”

3.3.5.7.4.2 Required LCS Change Status Request Content

The LCS change status request sent from an external center to an owner center shall include a generic device change status request (See 3.3.5.1.2.3.2), with the device type set to “lane control signal.”

3.3.5.7.4.3 Required LCS Change Status Response Content

The owner center response to an LCS change status request from an external center shall include:

- Generic device change response header information (See 3.3.5.1.2.2).

3.3.5.7.5 Cancel External Requests for LCS

The requirements to cancel an LCS control request previously issued by an authorized external center are as follows.

3.3.5.7.5.1 Send LCS Change Cancellation Response Upon Request

An owner center shall respond to an authorized external center requesting cancellation of a previously issued LCS control request as described in “3.3.5.1.2.4.1 Send Change Cancellation Response Upon Request.”

3.3.5.7.5.2 Required LCS Change Cancellation Request Content

The cancel LCS change request sent from an external center to an owner center shall include generic cancel device change request content (see 3.3.5.1.2.4.2), with the device type set to “lane control signal.”

3.3.5.7.5.3 Required LCS Change Cancellation Request Response Content

The owner center response to an LCS change cancellation request sent from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.7.6 Share LCS Schedules

The requirements to share LCS time base schedule tables with other authorized centers are as follows:

3.3.5.7.6.1 Send LCS Schedule Information Upon Request

An owner center shall respond to an authorized external center requesting LCS schedules with a message containing the owner center's LCS time base schedule information.

3.3.5.7.6.2 Publish LCS Schedule Information

An owner center shall publish a message containing its LCS time base schedule information to all authorized subscribing external centers.

3.3.5.7.6.3 Subscribe to LCS Schedule Information

An external center shall send a subscription message to an owner center requesting its LCS time base schedule information.

3.3.5.7.6.4 Required LCS Schedule Request Content

The LCS timebase schedule request sent from an external center to an owner center shall include generic device schedule information (See 3.3.5.1.1.1) with the device type set to "lane control signal" and device information type set to "device schedule."

3.3.5.7.6.5 Required LCS Schedule Information Content

The LCS schedule information sent from an owner center to an external center shall include:

- a. Generic device schedule information (See 3.3.5.1.1.4.1); and
- b. Lane control signal indication (lane open, lane closed, other).

3.3.5.7.7 External Commands for Lane Control Devices

The requirements to support LCS control commands from other authorized centers are as follows. Only commands to open or close a lane on a remote LCS device are supported.

3.3.5.7.7.1 Send LCS Response Upon Command

An owner center shall respond to an authorized external center configuring a ramp meter via a one-time control command with a message containing the status of the command.

3.3.5.7.7.2 Required LCS Control Command Content

The LCS control command sent from an external center to an owner center shall include:

- a. Generic device control command header information (Section 3.3.5.1.3.2.1) with the device type set to "lane control signal"; and
- b. Lane control command (lane open, lane closed, or other).

3.3.5.7.7.3 Required LCS Control Command Response Content

The owner center response to an LCS control command sent from an external center shall include generic device control command response information (Section 3.3.5.1.3.3);

3.3.5.8 Ramp Meters

The ramp meter model used assumes that each ramp meter controller may control multiple ramp meter lanes, each with its own metering rate. Each metered lane may be located on different ramps, or each ramp meter lane may be located on the same ramp but different lanes (e.g., one ramp meter for a general-purpose lane and another ramp meter for an HOV lane).

The requirements to exchange ramp meter information between centers are as follows:

3.3.5.8.1 Share Ramp Meter Inventory Information

The requirements for sharing ramp meter inventory information with other authorized centers are as follows:

3.3.5.8.1.1 Send Ramp Meter Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting ramp meter inventory with a message containing the owner center's ramp meter inventory information.

3.3.5.8.1.2 Publish Ramp Meter Inventory Information

An owner center shall publish a message containing its ramp meter inventory information to all authorized subscribing external centers.

3.3.5.8.1.3 Subscribe to Ramp Meter Inventory Information

An external center shall send a subscription message to an owner center requesting its ramp meter inventory information.

3.3.5.8.1.4 Required Ramp Meter Inventory Request Content

The ramp meter inventory request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to “ramp meter” and device information type set to “device inventory.”

3.3.5.8.1.5 Contents of the Ramp Meter Inventory Information

The ramp meter inventory information for an owner center to send to an external center is as follows:

3.3.5.8.1.5.1 Required Ramp Meter Inventory Content

The ramp meter inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2);
- b. Generic device inventory header information (See 3.3.5.1.1.2) for each metered lane;
- c. Unique identifier of the node for each metered lane;
- d. Direction of travel on the link (northbound, northeast bound, eastbound, southeast bound, southbound, southwest bound, westbound, northwest bound, not directional, positive direction, negative direction, both directions, or other) for each metered lane (See 3.3.5.1.1.2.2.9); and
- e. Name of the roadway the entrance ramps intersects for each metered lane.

3.3.5.8.1.5.2 Optional Ramp Meter Inventory Content

The following are optional requirements that an owner center may include in the ramp meter inventory information sent to an external center.

3.3.5.8.1.5.2.1 Lane Number – Ramp Meters

The owner center shall provide the lane number of the lane controlled by the ramp meter as part of the ramp meter inventory information for each metered lane.

3.3.5.8.1.5.2.2 Lane Type – Ramp Meters

The owner center shall provide the lane type of each lane controlled by ramp meter as part of the ramp meter inventory information for each metered lane. Supported values are general traffic, HOV lane, bus lane, right turn bypass, and other.

3.3.5.8.1.5.2.3 Associated Detectors Identifiers

The owner center shall provide the identifiers of the detectors that are associated with this ramp meter as part of the ramp meter inventory information for each metered lane.

3.3.5.8.1.5.2.4 Absolute Minimum Metering Rate

The owner center shall indicate the absolute minimum metering rate in vehicles per hour as part of the ramp meter inventory information for each metered lane. Supported values shall include 0 and 120 to 1800, where a value of 0 indicates this parameter shall not be used.

3.3.5.8.1.5.2.5 Absolute Maximum Metering Rate

The owner center shall indicate the absolute maximum metering rate in vehicles per hour as part of the ramp meter inventory information for each metered lane. Supported values shall include 0 and 120 to 1800, where a value of 0 indicates this parameter shall not be used.

3.3.5.8.1.5.2.6 System Minimum Metering Rate

The owner center shall indicate the system metering rate in vehicles per hour as part of the ramp meter inventory information for each metered lane. Supported values shall include 0 and 120 to 1800, where a value of 0 indicates this parameter shall not be used.

3.3.5.8.1.5.2.7 System Maximum Metering Rate

The owner center shall indicate the system maximum metering rate in vehicles per hour as part of the ramp meter inventory information for each metered lane. Supported values shall include 0 and 120 to 1800, where a value of 0 indicates this parameter shall not be used.

3.3.5.8.2 Share Ramp Meter Status Information

The requirements for sharing ramp meter status information with other authorized centers are as follows:

3.3.5.8.2.1 Send Ramp Meter Status Information Upon Request

An owner center shall respond to an authorized external center requesting ramp meter status with a message containing the owner center's ramp meter status information.

3.3.5.8.2.2 Publish Ramp Meter Status Information

An owner center shall publish a message containing its ramp meter status information to all authorized subscribing external centers.

3.3.5.8.2.3 Subscribe to Ramp Meter Status Information

An external center shall send a subscription message to an owner center requesting its ramp meter status information.

3.3.5.8.2.4 Required Ramp Meter Status Request Content

The ramp meter status request sent from an external center to an owner center shall include generic device information request content (see 3.3.5.1.1.1), with the device type set to "ramp meter" and device information type set to "device status."

3.3.5.8.2.5 Contents of the Ramp Meter Status Information

The ramp meter status information for an owner center to send to an external center is as follows:

3.3.5.8.2.5.1 Required Ramp Meter Status Content

The ramp meter status information sent from an owner center to an external center shall include:

- a. The generic device status header information (See 3.3.5.1.1.3);
- b. The generic device status header information (See 3.3.5.1.1.3) for each metered lane; and
- c. The current operational mode of each ramp meter as defined in NTCIP 1207 (dark, restInGreen, fixedRate, trafficResponsive, emergencyGreen, or holdRestInGreen).

3.3.5.8.2.5.2 Optional Ramp Meter Status Content

The following are optional requirements that an owner center may include in the ramp meter status information sent to an external center.

3.3.5.8.2.5.2.1 Requested Metering Command Source

The owner center shall indicate the command source as defined in NTCIP 1207 that requested control of this metered lane as part of the ramp meter status information for each metered lane. Supported values are manual, communications, interconnect, timebaseControl, and default.

3.3.5.8.2.5.2.2 Implemented Metering Command Source

The owner center shall indicate the command source as defined in NTCIP 1207 that currently controls this metered lane as part of the ramp meter status information for each metered lane. Supported values are manual, communications, interconnect, timebaseControl, and default.

3.3.5.8.2.5.2.3 Implemented Plan

The owner center shall indicate the metering plan number that is currently implemented as part of the ramp meter status information for each metered lane. This requirement is mandatory if the operational mode is trafficResponsive.

3.3.5.8.2.5.2.4 Implemented Rate

The owner center shall indicate the current base metering rate, in vehicles per hour, as part of the ramp meter status information for each metered lane. This requirement is mandatory if the operational mode is fixedRate.

3.3.5.8.2.5.2.5 Implemented Vehicles Per Green

The owner center shall indicate the number of vehicles currently allowed to pass during the green and yellow intervals of one cycle, in vehicles per green, as part of the ramp meter status information for each metered lane.

3.3.5.8.2.5.2.6 Requested Action

The owner center shall indicate the action as defined in NTCIP 1207 that is requested for this metered lane as part of the ramp meter status information for each metered lane. Supported values shall include dark, restInGreen, fixedRate, trafficResponsive, and emergencyGreen.

3.3.5.8.2.5.2.7 Requested Plan – Ramp Meter Status

The owner center shall indicate the metering plan number that is requested as part of the ramp meter status information for each metered lane. This requirement is mandatory if the operational mode is trafficResponsive.

3.3.5.8.2.5.2.8 Requested Rate – Ramp Meter Status

The owner center shall indicate the requested metering rate, in vehicles per hour, as part of the ramp meter status information for each metered lane. This requirement is mandatory if the operational mode is fixedRate.

3.3.5.8.2.5.2.9 Requested Vehicles Per Green

The owner center shall indicate the number of vehicles allowed to pass during the green and yellow intervals of one cycle, in vehicles per green, as part of the ramp meter status information for each metered lane.

3.3.5.8.2.5.2.10 Operational Minimum Metering Rate

The owner center shall provide the operational minimum metering rate, in vehicles per hour, as part of the ramp meter status information for each metered lane.

3.3.5.8.2.5.2.11 Operational Maximum Metering Rate

The owner center shall provide the operational maximum metering rate, in vehicles per hour, as part of the ramp meter status information for each metered lane.

3.3.5.8.2.5.2.12 Demand Detector Status

The owner center shall indicate the status of the demand detector defined in NTCIP 1207 as part of the ramp meter status information for each metered lane. Supported values are recalled, working, otherError, erraticCount, maxPresence, noActivity, errorAtSensor, depNoActivity, and depMaxPresence.

3.3.5.8.2.5.2.13 Passage Detector Status

The owner center shall indicate the status of the passage detector defined in NTCIP 1207 as part of the ramp meter status information for each metered lane. Supported values are recalled, working, otherError, erraticCount, maxPresence, noActivity, errorAtSensor, and depNoActivity.

3.3.5.8.2.5.2.14 Queue Detector Status

The owner center shall indicate the status of the queue detector defined in NTCIP 1207 as part of the ramp meter status information for each metered lane. Supported values are recalled, working, otherError, erraticCount, maxPresence, noActivity, errorAtSensor, noDepActivity, and maxDepPresence.

3.3.5.8.2.5.2.15 Cycle Count

The owner center shall indicate the count the green intervals in the most recently completed calculation interval as part of the ramp meter status information for each metered lane.

3.3.5.8.2.5.2.16 Passenger Vehicle Count

The owner center shall indicate the number of actuations of the passage detector in the most recently completed calculation interval as part of the ramp meter status information for each metered lane.

3.3.5.8.2.5.2.17 Queue Detected Flag

The owner center shall indicate if a queue has been detected beyond the queue detector on the ramp as part of the ramp meter status information for each metered lane.

3.3.5.8.2.5.2.18 Violation Vehicle Count

The owner center shall indicate the number of vehicle violations of the passage detector in the most recently completed calculation interval as part of the ramp meter status information for each metered lane.

3.3.5.8.2.5.2.19 Mainline Flow Rate

The owner center shall provide the average mainline flow rate, in vehicles per hour, as part of the ramp meter status information.

3.3.5.8.2.5.2.20 Mainline Vehicle Occupancy

The owner center shall provide the average percent vehicle occupancy, in tenths of a percent, as part of the ramp meter status information.

3.3.5.8.2.5.2.21 Mainline Vehicle Speed

The owner center shall provide the average vehicle speed, in kilometers per hour, as part of the ramp meter status information.

3.3.5.8.3 External Change Requests for Ramp Meters

The requirements to support ramp meter change requests from other authorized centers are as follows. Only change requests to select an operational mode or metering plan on a remote ramp meter device is supported.

3.3.5.8.3.1 Send Ramp Meter Change Response Upon Request

An owner center shall respond to an authorized external center requesting a change to the ramp meter device via a one-time change request with a message containing the status of the request.

3.3.5.8.3.2 Contents of Ramp Meter Change Request

The contents for a ramp meter change request for an external center to send to an owner center are as follows:

3.3.5.8.3.2.1 Required Ramp Meter Change Request Content

The ramp meter control request sent from an external center to an owner center shall include:

- a. Generic device change request header information (See 3.3.5.1.2.1) with the device type set to "ramp meter";
- b. Metered lane identifier; and
- c. Operational mode requested as defined in NTCIP 1207 (dark, restInGreen, fixedRate, trafficResponsive, emergencyGreen, or holdRestInGreen).

3.3.5.8.3.2.2 Requested Plan – Ramp Meter Change

The external center shall provide the metering plan number requested as part of the ramp meter change request for each metered lane. This requirement is only mandatory if the operational mode is trafficResponsive.

3.3.5.8.3.2.3 Requested Rate – Ramp Meter Change

The external center shall indicate the requested metering rate, in vehicles per hour, as part of the ramp meter change request for each metered lane. This requirement is only mandatory if the operational mode is fixedRate.

3.3.5.8.3.3 Required Ramp Meter Change Request Content Response

The owner center response to a ramp meter change request from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.8.4 Request Ramp Meter Change Status

The requirements to check the status of a ramp meter change request previously issued by an authorized external center are as follows.

3.3.5.8.4.1 Send Ramp Meter Change Status Upon Request

An owner center shall respond to an authorized external center requesting the status of a previously issued ramp meter change request as described found in “3.3.5.1.2.3.1 Send Device Change Status Upon Request.”

3.3.5.8.4.2 Required Ramp Meter Change Status Request Content

The ramp meter change status request sent from an external center to an owner center shall include generic device change status request (See 3.3.5.1.2.3.2), with the device type set to “ramp meter.”

3.3.5.8.4.3 Required Ramp Meter Change Status Response Content

The owner center response to a ramp meter change status request from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.8.5 Cancel External Change Requests for Ramp Meter

The requirements to cancel a ramp meter change request previously issued by an authorized external center are as follows.

3.3.5.8.5.1 Send Cancel Ramp Meter Change Response Upon Request

An owner center shall respond to an authorized external center requesting cancellation of a previously issued ramp meter change request as described in “3.3.5.1.2.4.1 Send Change Cancellation Response Upon Request.”

3.3.5.8.5.2 Required Ramp Meter Change Cancellation Request Content

The ramp meter change cancellation request sent from an external center to an owner center shall include generic cancel device change request (See 3.3.5.1.2.4.2), with the device type set to “ramp meter.”

3.3.5.8.5.3 Required Ramp Meter Change Cancellation Response Content

The owner center response to a ramp meter change cancellation request sent from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.8.6 Share Ramp Meter Schedule

The requirements to share ramp meter time base schedule tables with other authorized centers are as follows:

3.3.5.8.6.1 Send Ramp Meter Schedule Information Upon Request

An owner center shall respond to an authorized external center requesting ramp meter schedules with a message containing the owner center's ramp meter timebase schedule information.

3.3.5.8.6.2 Publish Ramp Meter Schedule Information

An owner center shall publish a message containing its ramp meter timebase schedule information to all authorized subscribing external centers.

3.3.5.8.6.3 Subscribe to Ramp Meter Schedule Information

An external center shall send a subscription message to an owner center requesting its ramp meter schedule information.

3.3.5.8.6.4 Required Ramp Meter Schedule Request Content

The ramp meter timebase schedule request sent from an external center to an owner center shall include generic device schedule information (See 3.3.5.1.1.1) with the device type set to "ramp meter" and device information type set to "device schedule."

3.3.5.8.6.5 Contents of the Ramp Meter Schedule Information

The ramp meter timebase schedule information sent from an owner center to an external center is as follows:

3.3.5.8.6.5.1 Required Ramp Meter Schedule Content

The ramp meter schedule information sent from an owner center to an external center shall include:

- a. Generic device schedule information (See 3.3.5.1.1.4.1);
- b. Metered lane identifier; and
- c. Ramp meter TBC action entry to be executed.

3.3.5.8.6.5.2 Optional Ramp Meter Schedule Content

The following are optional requirements that an owner center may include in the ramp meter schedule information sent to an external center.

3.3.5.8.6.5.2.1 Metered Lane Action Control

The owner center shall indicate the action as defined in NTCIP 1207 that may be active for a metered lane as part of the ramp meter schedule information. Supported values are dark, restInGreen, fixedRate, trafficResponsive, emergencyGreen, and skip.

3.3.5.8.6.5.2.2 Time base Plan Control

The owner center shall provide the metering plan number to be used for each metered lane action number. This requirement is mandatory if the time base action control is "trafficResponsive" as part of the ramp meter schedule information (See 3.3.5.8.6.5.2.1).

3.3.5.8.6.5.2.3 Time base Rate Control

The owner center shall provide the metering rate to be used, in vehicles per hour. This requirement is mandatory if the time base action control is "fixedRate" as part of the ramp meter schedule information (See 3.3.5.8.6.5.2.1).

3.3.5.8.6.5.2.4 Time base Vehicles Per Green Control

The owner center shall provide the number of vehicles that are allowed to pass during the green and yellow intervals of one cycle for each metered lane action number as part of the ramp meter schedule information.

3.3.5.8.6.5.2.5 Time base Control Minimum Metering Rate

The owner center shall provide the operational minimum metering rate, in vehicles per hour, for each metered lane action number as part of the ramp meter schedule information. Supported values shall include 0 and 120 to 1800, where a value of 0 indicates this parameter shall not be used.

3.3.5.8.6.5.2.6 Time base Control Maximum Metering Rate

The owner center shall provide the operational maximum metering rate, in vehicles per hour, for each metered lane action number as part of the ramp meter schedule information. Supported values shall include 0 and 120 to 1800, where a value of 0 indicates this parameter shall not be used.

3.3.5.8.6.5.2.7 Time base Control Lane Usage Mode

The owner center shall provide the mainline station traffic parameters as defined in NTCIP 1207 that are used on this lane for each mainline lane action number as part of the ramp meter schedule information. Supported values are notUsed, schemeF (mainline flow rate), schemeO (mainline occupancy), schemeFO (mainline flow rate and occupancy), schemeS (mainline speed), schemeFS (mainline flow rate and speed), schemeOS (mainline occupancy and speed), and schemeFOS (mainline flow rate, occupancy and speed).

3.3.5.8.7 Share Ramp Metering Plan Information

The requirements for sharing ramp metering plan information with other authorized centers are as follows:

3.3.5.8.7.1 Send Metering Plan Upon Request

An owner center shall respond to an authorized external center requesting metering plan information with a message containing the owner center's metering plan information.

3.3.5.8.7.2 Publish Metering Plan Information

An owner center shall publish a message containing its metering plan information to all authorized subscribing external centers.

3.3.5.8.7.3 Subscribe to Metering Plan Information

An external center shall send a subscription message to an owner center requesting its metering plan information.

3.3.5.8.7.4 Required Metering Plan Request Content

The metering plan inventory request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to "ramp meter" and device information type set to "device plan."

3.3.5.8.7.5 Contents of the Metering Plan Response

The metering plan inventory information for an owner center to send to an external center is as follows:

3.3.5.8.7.5.1 Required Metering Plan Response Content

The metering plan inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2);
- b. Metering plan number;
- c. Metering level;
- d. Metering rate (vehicles per hour);
- e. Flow rate threshold (vehicles per hour);
- f. Occupancy threshold (tenths of percent); and
- g. Speed threshold (kilometers per hour).

3.3.5.8.7.5.2 Optional Metering Plan Response Content

The following are optional requirements that an owner center may include in the metering plan inventory information sent to an external center.

3.3.5.8.7.5.2.1 Metering Plan Date and Time Change Information

The owner center shall provide the date and time, in UTC, of when the metering plan was last changed as part of the metering plan information.

3.3.5.8.8 Share Ramp Meter Priority Queue Information

The requirements for sharing the contents of a ramp meter priority queue are as follows:

3.3.5.8.8.1 Send Ramp Meter Priority Queue Information Upon Request

An owner center shall respond to an authorized external center requesting the contents of its ramp meter priority queue with a message containing the contents of an owner center's ramp meter priority queue.

3.3.5.8.8.2 Required Ramp Meter Priority Queue Request Content

The ramp request sent from an external center to an owner center shall include generic device queue request (See 3.3.5.1.2.5.1.1), with the device type set to "ramp meter."

3.3.5.8.8.3 Contents of the Ramp Meter Priority Queue Response

The ramp meter priority queue for an owner center to send to an external center is as follows:

3.3.5.8.8.3.1 Required Ramp Meter Priority Queue Response Content

The ramp meter priority queue response sent from an owner center to an external center shall include:

- a. Generic device priority queue header information (See 3.3.5.1.2.5.2); and
- b. Operational mode requested as defined in NTCIP 1207 (dark, restInGreen, fixedRate, trafficResponsive, emergencyGreen, or holdRestInGreen).

3.3.5.8.8.3.2 Optional Ramp Meter Priority Queue Response Content

The following are optional requirements that an owner center may include in the ramp meter priority queue response sent to an external center.

3.3.5.8.8.3.2.1 Metered Lane Identifier

The owner center shall provide the identifier of the metered lane for each change request in the device priority queue as part of the ramp meter priority queue response.

3.3.5.8.8.3.2.2 Requested Plan – Ramp Meter Queue

The owner center shall provide the number of the metering plan requested for each change request in the ramp meter priority queue as part of the ramp meter priority queue response.

3.3.5.8.8.3.2.3 Requested Rate – Ramp Meter Queue

The owner center shall provide the requested metering rate, in vehicles per hour, for each change request in the ramp meter priority queue as part of the ramp meter priority queue response.

3.3.5.8.9 External Commands for Ramp Metering Devices

The requirements for an external center to send control commands to remotely control a Ramp Metering Device that is normally managed by an owner center are as follows.

3.3.5.8.9.1 Send Ramp Meter Control Command Status

An owner center shall respond to an authorized external center configuring a ramp meter via a one-time control command with a message containing the status of the command.

3.3.5.8.9.2 Contents of Ramp Meter Control Command

The content of the ramp meter control command is as follows:

3.3.5.8.9.2.1 Required Ramp Meter Control Command Content

The ramp meter command sent from an external center to an owner center shall include:

- a. Generic device control command header information (Section 3.3.5.1.3.2.1) with the device type set to "ramp meter";
- b. Metered lane identifier; and
- c. Operational mode requested as defined in NTCIP 1207 (dark, restInGreen, fixedRate, trafficResponsive, emergencyGreen, or holdRestInGreen).

3.3.5.8.9.2.2 Command Ramp Meter Control Plan

The external center shall provide the metering plan number requested as part of the ramp meter control command for each metered lane. This requirement is only mandatory if the operational mode is trafficResponsive.

3.3.5.8.9.2.3 Command Ramp Meter Control Rate

The external center shall indicate the requested metering rate, in vehicles per hour, as part of the ramp meter control request for each metered lane. This requirement is only mandatory if the operational mode is fixedRate.

3.3.5.8.9.3 Required Ramp Meter Control Command Response Content

The owner center response to a ramp meter control command sent from an external center shall include: Generic device control command response information (Section 3.3.5.1.3.3);

3.3.5.9 Traffic Signal Controllers

3.3.5.9.1 Share Signal Inventory Information

The requirements for sharing signal inventory information with other authorized centers are as follows:

3.3.5.9.1.1 Send Signal Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting signal inventory with a message containing the owner center's signal inventory information.

3.3.5.9.1.2 Publish Signal Inventory Information

An owner center shall publish a message containing its signal inventory information to all authorized subscribing external centers.

3.3.5.9.1.3 Subscribe to Signal Inventory Information

An external center shall send a subscription message to an owner center requesting signal inventory information.

3.3.5.9.1.4 Required Signal Inventory Request Content

The signal controller inventory information request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1.), with the device type set to "signal controller" and device information type set to "device inventory."

3.3.5.9.1.5 Contents of the Signal Inventory Information

The signal inventory information for an owner center to send to an external center is as follows:

3.3.5.9.1.5.1 Required Signal Inventory Content

The signal inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2); and
- b. Intersection name.

3.3.5.9.1.5.2 Optional Signal Inventory Content

The following are optional requirements that an owner center may include in the signal inventory information sent to an external center.

3.3.5.9.1.5.2.1 Field Management Station

If supported, the owner center shall provide the unique identifier of the field management station as part of the signal inventory information for each signal controller. The field management station may facilitate local signal controller operations such as time sync or coordination. This was formerly referred to as the master controller.

3.3.5.9.1.5.2.2 Link Identifiers

The owner center shall provide the unique identifier of each link at the intersection as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.3 Direction of Traffic

The owner center shall provide the direction of traffic referenced for each link at the intersection as part of the signal inventory information for each signal controller. Supported values are northbound, northeast bound, eastbound, southeast bound, southbound, southwest bound, westbound, northwest bound, not directional, positive direction, negative direction, both directions, and other (See 3.3.5.1.1.2.2.9).

3.3.5.9.1.5.2.4 Movement Identifier

The owner center shall provide an identifier for each vehicle or pedestrian movement at the intersection as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.5 Vehicle Movement Approach Link

For each vehicle movement, the owner center shall provide the unique identifier of the approach link into the intersection as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.6 Pedestrian Movement Approach Link

For each pedestrian movement, the owner center shall provide the unique identifier of the approach link that the pedestrian movement is crossing as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.7 Departing Link

For each vehicle movement, the owner center shall provide the unique identifier of the link the vehicles are “driving” into as part of the signal inventory information for each signal.

3.3.5.9.1.5.2.8 Crossing Point

For each movement, the owner center shall indicate which crossing point does the turning movement occur at as part of the signal inventory information for each signal controller. The crossing point defines the location of the geometric center (as a GeoJSON Point) where one or more approaches of an intersection intersect. Most intersections have only one crossing point, but there exist signal controllers that control more than one intersection (e.g., Texas Diamond Interchange).

3.3.5.9.1.5.2.9 Turning Movement Approach Vector

For each movement, the owner center shall provide the angle of the link into the intersection, measured in hundredths of a degree in a clockwise direction as part of the signal inventory information for each signal controller. An approach of zero degrees into the intersection shall be true north; that is, traffic shall be approaching into the intersection from true north.

3.3.5.9.1.5.2.10 Turning Movement Type

For each movement, the owner center shall indicate the type of turning movement as part of the signal inventory information for each signal controller. Supported values shall include maneuver straight allowed, maneuver left allowed, maneuver right allowed, and maneuver u turn allowed.

3.3.5.9.1.5.2.11 Turning Movement Lanes

For each vehicle movement, the owner center shall indicate the lane number(s) involved with the type of turning movement as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.12 Turning Movement Description

For each movement, the owner center shall provide a textual description of the movement as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.13 Enabled Phases

The owner center shall provide an identifier for each phase enabled at the intersection as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.14 Concurrent Phases

For each enabled phase, the owner center shall provide the phase identifier of those phases that may run concurrently with that phase as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.15 Active Movements

The owner center shall provide the movement identifiers of those vehicle or pedestrian movements that are active for each phase and overlap as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.16 Overlap-Phase Assignment

The owner center shall provide an identifier for each overlap in use at the intersection and what phases are included in each overlap as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.17 Ring-Phase Assignment

The owner center shall provide an identifier for each ring in use at the intersection and a list of phases assigned to that ring as part of the signal inventory information for each signal controller.

3.3.5.9.1.5.2.18 Special Function Information

For each special function, the owner center shall provide an identifier and a textual description for that special function output as part of the signal inventory information for each signal.

3.3.5.9.1.5.2.19 Time Reference

The owner center shall provide the time reference used as part of the signal inventory information for each signal controller. Supported values are WWV, GPS, Power Linesync, NTP Server, other, and unknown.

3.3.5.9.1.5.2.20 Sync Reference Time

The owner center shall provide the time reference, in minutes past midnight, the traffic signal controller shall use as the controller sync reference time as part of the signal inventory information for each signal.

3.3.5.9.1.5.2.21 Supported Timing Modes

The owner center shall provide the different timing modes that the intersection is currently capable of operating in as part of the signal inventory information for each signal. Supported values are fixed-time, actuated, critical intersection control, traffic responsive, and adaptive.

Note: Critical intersection control is also referred to as dynamic split allocation. Traffic responsive is also referred to as dynamic pattern selection.

3.3.5.9.2 Share Signal Section Inventory Information

The requirements for sharing signal section inventory information with other authorized centers are as follows:

3.3.5.9.2.1 Send Signal Section Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting signal section inventory with a message containing the owner center's signal section inventory information.

3.3.5.9.2.2 Publish Signal Section Inventory Information

An owner center shall publish a message containing its signal inventory information to all authorized subscribing external centers.

3.3.5.9.2.3 Subscribe to Signal Section Inventory Information

An external center shall send a subscription message to an owner center requesting signal inventory information.

3.3.5.9.2.4 Required Signal Section Inventory Request Content

The signal section inventory information request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1, with the device type set to “signal section” and device information type set to “device inventory”).

3.3.5.9.2.5 Required Signal Section Inventory Content

The signal section inventory information sent from an owner center to an external center shall include:

- a. Unique identifier for the section;
- b. Generic device inventory header information (See 3.3.5.1.1.2) for each signal controller in the section; and
- c. The intersection name for each signal controller in the intersection.

3.3.5.9.3 Share Intersection Status Information

The requirements for sharing intersection status information with other authorized centers are as follows:

3.3.5.9.3.1 Send Intersection Status Information Upon Request

An owner center shall respond to an authorized external center requesting intersection status with a message containing the owner center’s intersection status information.

3.3.5.9.3.2 Publish Intersection Status Information

An owner center shall publish a message containing its intersection status information to all authorized subscribing external centers.

3.3.5.9.3.3 Subscribe to Intersection Status Information

An external center shall send a subscription message to an owner center requesting signal status information.

3.3.5.9.3.4 Required Intersection Status Request Content

The intersection status request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to “signal controller” and device information type set to “device status.”

3.3.5.9.3.5 Contents of the Intersection Status Information

The intersection status information for an owner center to send to an external center is as follows:

3.3.5.9.3.5.1 Required Intersection Status Content

The intersection status information sent from an owner center to an external center shall include:

- a. The generic device status header information (See 3.3.5.1.1.3);
- b. Signal control source for the signal controller (Unknown, other, central-time-of-day (intersection), central-operator-commanded (intersection), central-time-of-day (section), central-operator-commanded (section), local, local-time-of-day, local-manual, local-backup-loss-of-central, and central-adaptive);
- c. Planned signal timing mode of the signal controller (unknown, other, local, local-manual, local-time-of-day, local-traffic-responsive, central-time-of-day, central-traffic-responsive, central-hold-force-omit, central-holiday-schedule, central-standby, coordinated-critical-intersection-control, coordinated-adaptive, coordinated-transit-priority, flash-programmed); and
- d. Current signal timing mode of the signal controller (unknown, other, free, fixed-time, actuated, semi-actuated, critical intersection control, traffic responsive, adaptive, flash-programmed, conflict-flash, free due to fault, flash-automatic, flash-preempt, flash-local-manual, flash-fault,

flash-mmu/cmu, flash-reasons-unknown, flash-startup, special function, coordinated alarm, transition, preempt, signal-priority, and standby).

3.3.5.9.3.5.2 Optional Intersection Status Content

The following are optional requirements that an owner center may include in the intersection status information sent to an external center.

3.3.5.9.3.5.2.1 Section Identifier – Intersection Status

The owner center shall provide the unique identifier of the section the intersection is currently assigned to as part of the intersection status information. If the intersection is not currently assigned to a section, this value shall be NULL.

3.3.5.9.3.5.2.2 Planned Signal Timing Mode Description

The owner center shall provide a textual description of the planned signal timing mode selected as part of the intersection status information. For example, the text may include a description of the adaptive mode selected.

3.3.5.9.3.5.2.3 Timing Pattern Identifier – Current

The owner center shall provide the signal timing pattern number of the current signal timing pattern as part of the intersection status information. Supported values range from 1 to 255. A value of 254 shall indicate the controller is in Free. A value of 255 shall indicate the controller is in Flash.

3.3.5.9.3.5.2.4 Timing Pattern Description

The owner center shall provide the description of the current signal timing pattern as assigned by the owner organization as part of the intersection status information.

3.3.5.9.3.5.2.5 Actuation Mode

The owner center shall indicate the current actuation mode of the planned signal timing mode as part of the intersection status information. Supported values are fixed-time, semi-actuated, fully-actuated, unknown, and other.

3.3.5.9.3.5.2.6 Phase Recalls

For each phase in use, the owner center shall indicate the operational characteristics of the phase as part of the intersection status information. Supported values are minimumVehicleRecall, maximumVehicleRecall, pedestrianRecall, minimumVehicleAndPedestrianRecall, maximumVehicleAndPedestrianRecall, softRecall, softAndPedestrianRecall, phaseOmitted, other, and none.

3.3.5.9.3.5.2.7 Cycle Length – Planned

The owner center shall provide the planned cycle length of the current signal timing pattern, in seconds, as part of the intersection status information.

3.3.5.9.3.5.2.8 Cycle Length – Current

The owner center shall provide the actual cycle length, in seconds, for the current cycle of the traffic signal controller in seconds as part of the intersection status information.

3.3.5.9.3.5.2.9 Cycle Length – Previous

The owner center shall provide the actual cycle length, in seconds, for the previous cycle of the traffic signal controller in seconds as part of the intersection status information.

3.3.5.9.3.5.2.10 Field Management Station Cycle Length – Actual

The owner center shall provide the actual cycle length, in seconds, for the current cycle of the field management station as part of the intersection status information.

3.3.5.9.3.5.2.11 Local Controller Cycle Counter

The owner center shall provide the local cycle timer information for the current cycle of the traffic signal controller in seconds as part of the intersection status information.

3.3.5.9.3.5.2.12 Field Management Station Cycle Counter

The owner center shall provide the field management station cycle timer information for the current cycle of the local controller in seconds as part of the intersection status information.

3.3.5.9.3.5.2.13 Offset Reference

The owner center shall indicate the reference point of the coordinated phase of the current signal timing pattern for which the offset is determined by as part of the intersection status information. The offset reference would be the point in the phase at which the local cycle counter is zero. Supported values are start of green, end of green, end of yellow, and start of pedestrian clearance.

3.3.5.9.3.5.2.14 Offset – Planned

The owner center shall provide the planned offset of the current signal timing pattern, in seconds, as part of the intersection status information.

3.3.5.9.3.5.2.15 Offset – Actual

The owner center shall provide the actual offset for the current cycle, in seconds, as part of the intersection status information.

3.3.5.9.3.5.2.16 Offset – Previous

The owner center shall provide the actual offset for the previous cycle, in seconds, as part of the intersection status information.

3.3.5.9.3.5.2.17 Controller Timestamp

The owner center shall provide current date and time, in UTC, on the traffic signal controller as part of the intersection status information.

3.3.5.9.3.5.2.18 Coordinated Phases

The owner center shall provide identifiers for the current coordinated phases as part of the intersection status information. If no phases are currently coordinated, this value shall be NULL.

3.3.5.9.3.5.2.19 Phase Splits

For each phase in the current pattern, the owner center shall indicate the current phase split time, in tenths of a second, for that phase as part of the intersection status information.

3.3.5.9.3.5.2.20 Ring Status

The owner center shall indicate the current status of each ring as part of the intersection status information. Status values are minimum green, extension, maximum green, green rest, yellow change, red clearance, red rest, undefined, gap out, max out, or force off.

3.3.5.9.3.5.2.21 Active Phase Sequence

For each ring in the currently active sequence, the owner center shall provide the phase identifiers of the phases currently active in sequential order as part of the intersection status information.

3.3.5.9.3.5.2.22 Phase Status Greens

The owner center shall indicate which phases are currently green as part of the intersection status information.

3.3.5.9.3.5.2.23 Phase Status Yellows

The owner center shall indicate which phases are currently yellow as part of the intersection status information.

3.3.5.9.3.5.2.24 Phase Status Reds

The owner center shall indicate which phases are currently red as part of the intersection status information.

3.3.5.9.3.5.2.25 Phase Status Walks

The owner center shall indicate which phases are currently walk as part of the intersection status information.

3.3.5.9.3.5.2.26 Phase Status Pedestrian Clearance

The owner center shall indicate which phases are currently flashing-don't-walk as part of the intersection status information.

3.3.5.9.3.5.2.27 Phase Status Don't Walks

The owner center shall indicate which phases are currently steady-don't-walk as part of the intersection status information.

3.3.5.9.3.5.2.28 Overlap Status Greens

The owner center shall indicate which overlaps are currently green as part of the intersection status information.

3.3.5.9.3.5.2.29 Overlap Status Yellows

The owner center shall indicate which overlaps are currently yellow as part of the intersection status information.

3.3.5.9.3.5.2.30 Overlap Status Reds

The owner center shall indicate which overlaps are currently red as part of the intersection status information for each signal.

3.3.5.9.3.5.2.31 Special Functions

The owner center shall indicate which special function numbers are currently active as part of the intersection status information for each signal.

3.3.5.9.3.5.2.32 Preemption / Priority Description

The owner center shall provide a text description of the type of preemption or signal priority at the intersection as part of the intersection status information for each signal.

3.3.5.9.4 External Change Requests for Traffic Signals

The requirements to support signal control requests from other authorized centers are as follows. Only control requests to change the traffic signal timing mode, select a signal timing pattern, or make an offset adjustment on a remote traffic signal controller device are supported.

3.3.5.9.4.1 Send Signal Change Response Upon Request

An owner center shall send a one-time response message identifying the status of a requested traffic signal control change to the authorized external center that requested the change.

3.3.5.9.4.2 Required Signal Change Request Content

The signal change request sent from an external center to an owner center shall include:

- a. Generic device change request header information (See 3.3.5.1.2.1) with the device type set to "signal controller";
- b. The type of change request for each signal device (change signal timing mode, change signal timing pattern, or make offset adjustment);
- c. The requested change in the signal timing mode (free, fixed-time, actuated, semi-actuated, critical intersection control, traffic responsive, adaptive, or flash-programmed) **IF** the requested change type is "change signal timing mode"; **OR**

- d. The requested section signal timing pattern **IF** the requested change type is “change signal timing pattern”; **OR**
- e. The requested offset in seconds **IF** the requested change type is “make offset adjustment.”

3.3.5.9.4.3 Contents of Signal Change Request Response

The contents owner center response to a signal controller change request from an authorized external center are as follows:

3.3.5.9.4.3.1 Required Signal Change Response Content

The owner center response to a signal controller change request from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.9.4.3.2 Optional Signal Change Response Content

The following are optional requirements that an owner center may include in the signal control response sent to an external center.

3.3.5.9.4.3.2.1 Section Identifier – Signal Change

The owner center shall provide the unique identifier of the section the traffic signal controller is currently assigned to as part of the signal change response. The owner center may change the section assignment of a signal controller as a result of a signal change response.

3.3.5.9.4.3.2.2 Signal Timing Mode – Current

The owner center shall provide the signal timing mode currently in effect as part of the signal control response. Supported values are unknown, other, local, local-manual, local-time-of-day, local-traffic-responsive, central-time-of-day, central-traffic-responsive, central-hold-force-omit, central-holiday-schedule, central-standby, coordinated-coordinated-intersection-control, coordinated-adaptive, coordinated-transit-priority, and flash-programmed.

3.3.5.9.4.3.2.3 Signal Timing Pattern Identifier – Current

The owner center shall provide the signal timing pattern currently in effect as part of the signal control response.

3.3.5.9.4.3.2.4 Signal Offset – Current

The owner center shall indicate the offset, in seconds, currently in effect as part of the signal control response.

3.3.5.9.5 Request Signal Change Status

The requirements to check the status of a signal control request previously issued by an authorized external center are as follows.

3.3.5.9.5.1 Send Signal Controller Change Status Upon Request

An owner center shall respond to an authorized external center requesting the status of a previously issued signal controller change request as described “3.3.5.1.2.3.1 Send Device Change Status Upon Request.”

3.3.5.9.5.2 Required Signal Controller Change Status Request Content

The signal controller change status request sent from an external center to an owner center shall include generic change device status request (See 3.3.5.1.2.3.2), with the device type set to “signal controller.”

3.3.5.9.5.3 Required Signal Controller Change Status Response Content

The owner center response to a DMS change status request from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.9.6 Cancel External Change Requests for Traffic Signals

The requirements to cancel a signal control request previously issued by an authorized external center are as follows.

3.3.5.9.6.1 Send Cancel Signal Controller Change Response Upon Request

An owner center shall respond to an authorized external center requesting cancellation of a previously issued signal controller change request as described “3.3.5.1.2.4.1 Send Change Cancellation Response Upon Request.”

3.3.5.9.6.2 Required Signal Controller Cancellation Request Content

The signal controller change cancellation request sent from an external center to an owner center shall include generic cancel device change request (See3.3.5.1.2.4.2), with the device type set to “signal controller.”

3.3.5.9.6.3 Required Signal Controller Cancellation Response Content

The owner center response to a signal controller change cancellation request sent from an external center shall include generic device change response header information (See3.3.5.1.2.2).

3.3.5.9.7 Share Traffic Signal Timing Pattern Schedule

The requirements to share traffic signal timing pattern time base schedule tables for individual signal controllers with other authorized centers are as follows:

3.3.5.9.7.1 Send Signal Timing Pattern Schedule Information Upon Request

An owner center shall respond to an authorized external center requesting signal timing pattern schedules with a message containing the owner center’s signal timing pattern time base schedule information.

3.3.5.9.7.2 Publish Signal Timing Pattern Schedule Information

An owner center shall publish a message containing its signal timing pattern time base schedule information to all authorized subscribing external centers.

3.3.5.9.7.3 Subscribe to Signal Timing Pattern Schedule Information

An external center shall send a subscription message to an owner center requesting signal timing pattern schedule information.

3.3.5.9.7.4 Required Signal Timing Pattern Schedule Request Content

The signal timing pattern time base schedule request sent from an external center to an owner center shall include generic device schedule information (See 3.3.5.1.1.1) with the device type set to “signal controller” and device information type set to “device schedule.”

3.3.5.9.7.5 Required Signal Timing Pattern Schedule Content

The signal timing pattern schedule information sent from an owner center to an external center shall include:

- a. Generic device schedule information (See 3.3.5.1.1.4.1);
- b. The time base schedule day pattern timing mode (unknown, other, free, fixed-time, actuated, semi-actuated, critical intersection control, traffic responsive, adaptive, or flash-programmed); and
- c. The time base schedule day pattern signal timing pattern identifier.

3.3.5.9.8 Share Signal Timing Pattern Information

The requirements for sharing signal timing pattern information with other authorized centers are as follows:

3.3.5.9.8.1 Send Signal Timing Pattern Upon Request

An owner center shall respond to an authorized external center requesting signal timing pattern information with a message containing the owner center's signal timing pattern information.

3.3.5.9.8.2 Publish Signal Timing Pattern Information

An owner center shall publish a message containing its signal timing pattern information to all authorized subscribing external centers.

3.3.5.9.8.3 Subscribe to Signal Timing Pattern Information

An external center shall send a subscription message to an owner center requesting signal timing pattern information.

3.3.5.9.8.4 Contents of the Signal Timing Pattern Request

The content for a signal timing pattern request for an external center to send to an owner center is as follows:

3.3.5.9.8.4.1 Required Signal Timing Pattern Information Request Content

The signal timing plan inventory request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to "signal controller" and device information type set to "device plan."

3.3.5.9.8.4.2 Optional Signal Timing Pattern Information Request Content

If the owner center supports it, the following are optional requirements that an external center may include in the signal timing pattern inventory request sent to an owner center.

3.3.5.9.8.4.2.1 Signal Timing Pattern Identifier

The external center shall provide each signal timing pattern number desired as part of the signal timing pattern inventory request for the signal controller.

3.3.5.9.8.5 Contents of the Signal Timing Pattern Request Response

The signal timing pattern plan inventory information for an owner center to send to an external center is as follows:

3.3.5.9.8.5.1 Required Signal Timing Pattern Information Response Content

The signal timing pattern inventory information sent from an owner center to an external center shall include:

- a. Generic device inventory header information (See 3.3.5.1.1.2);
- b. Signal timing pattern identifier for the signal timing pattern;
- c. Cycle length (seconds) for the signal timing pattern;
- d. Offset time (seconds) for the signal timing pattern;
- e. An identifier for each phase for the signal timing pattern;
- f. An indication on which phase(s) are coordinated in the signal timing pattern;
- g. Split-mode as defined in NTCIP 1202 (other, none, minimum vehicle recall, maximum vehicle recall, pedestrian recall, maximum vehicle and pedestrian recall, phase omitted) for each phase in the signal timing pattern; and
- h. Phase-split, in tenths of a second, for each phase for each signal timing pattern.

3.3.5.9.8.5.2 Optional Signal Timing Pattern Information Response Content

The following are optional requirements that an owner center may include in the signal timing pattern information sent to an external center.

3.3.5.9.8.5.2.1 Description of Signal Timing Pattern

The owner center shall provide the description of the signal timing pattern for each signal timing pattern as part of the timing pattern information.

3.3.5.9.8.5.2.2 Maximum Green Duration

For each phase in the pattern, the owner center shall indicate the maximum duration of green time, in tenths of a second, that a vehicle movement is permitted for each signal timing pattern as part of the signal timing pattern.

3.3.5.9.8.5.2.3 Minimum Green Duration

For each phase, the owner center shall indicate the minimum duration of green time, in tenths of a second, that must be provided for a vehicle movement for each signal timing pattern as part of the signal timing pattern.

Vehicle Yellow Duration For each phase, the owner center shall indicate the vehicle clearance duration, in tenths of a second, that must be provided for a vehicle movement for each signal timing pattern as part of the signal timing pattern for each signal.

Typically, the signal will be yellow during this period.

Vehicle Red Clearance Duration For each phase, the owner center shall indicate the secondary vehicle clearance duration, in tenths of a second, that must be provided for a vehicle movement for each signal timing pattern as part of the signal timing pattern for each signal.

Typically, the signal will be red during this period.

3.3.5.9.8.5.2.6 Minimum Walk Duration

For each phase, the owner center shall indicate the minimum duration of walk time, in tenths of a second, that must be provided for a pedestrian movement for each signal timing pattern as part of the signal timing pattern for each signal.

3.3.5.9.8.5.2.7 Pedestrian Clearance Duration

For each phase, the owner center shall indicate the pedestrian clearance duration, in tenths of a second, that must be provided for a pedestrian movement for each signal timing pattern as part of the signal timing pattern for each signal.

3.3.5.9.8.5.2.8 Steady-Dont-Walk Duration

For each phase, the owner center shall indicate the secondary pedestrian clearance duration, in tenths of a second, that must be provided for a pedestrian movement for each signal timing pattern as part of the signal timing pattern for each signal. Typically, the pedestrian signal will be steady-don't-walk during this period.

3.3.5.9.8.5.2.9 Phase Sequence Information

For each ring, the owner center shall indicate the phase sequence for each signal timing pattern as part of the signal timing pattern for each signal.

3.3.5.9.8.5.2.10 Signal Timing Pattern Date and Time Change Information

The owner center shall provide the date and time, in UTC, of when the signal timing pattern was last changed as part of the signal timing pattern information for each signal.

3.3.5.9.9 Share Section Status Information

The requirements for sharing section status information with other authorized centers are as follows:

3.3.5.9.9.1 Send Section Status Information Upon Request

An owner center shall respond to an authorized external center requesting section status with a message containing the owner center's section status information.

3.3.5.9.9.2 Publish Section Status Information

An owner center shall publish a message containing its section status information to all authorized subscribing external centers.

3.3.5.9.9.3 Subscribe to Section Status Information

An external center shall send a subscription message to an owner center requesting section status information.

3.3.5.9.9.4 Required Section Status Request Content

The section status request sent from an external center to an owner center shall include:

- a. Generic device information request (See 3.3.5.1.1.1), with the device type set to “signal section” and device information type set to “device status.”

3.3.5.9.9.5 Contents of the Section Status Information

The section status information for an owner center to send to an external center is as follows:

3.3.5.9.9.5.1 Required Section Status Content

The section status information sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the section;
- c. Unique identifiers of each signal controller assigned to the section;
- d. Section timing mode of the section, typically the same for each signal controller assigned to the section (unknown, free, fixed-time, time base coordination, actuated, semi-actuated, critical intersection control, traffic responsive, adaptive, flash-programmed); and
- e. Unique identifier of the section timing pattern. A section timing pattern is a list of individual signal timing patterns for each signal controller assigned to the section.

3.3.5.9.9.5.2 Optional Section Status Content

The following are optional requirements that an owner center may include in the section status information sent to an external center.

3.3.5.9.9.5.2.1 Section Name

The owner center shall provide the section name as assigned by the owner organization as part of the section status information.

3.3.5.9.9.5.2.2 Description of Section Timing Pattern – Section Status

The owner center shall provide the description of the current signal timing pattern as assigned by the owner organization as part of the section status information.

3.3.5.9.9.5.2.3 Section Cycle Length – Section Status

The owner center shall provide the cycle length of the current section timing pattern as part of the section status information. Typically, each signal controller in the section will have the same cycle length.

3.3.5.9.9.5.2.4 Operator Identifier – Section Status

The requirements for the operator identifier of the operator currently controlling or who last controlled the section as part of the section status information are found in “3.3.1.8.3 **Operator Identifier – Responses.**”

3.3.5.9.9.5.2.5 Event Identifier – Section Status

The owner center shall provide the unique identifier of the event associated with the current position or operating mode of the section as part of the section status information.

3.3.5.9.9.5.2.6 Event Response Plan – Section Status

The owner center shall provide the event response plan number associated with the current position or operating mode of the section as part of the section status information.

3.3.5.9.9.5.2.7 Section Status Date and Time Change Information

The owner center shall provide the date and time, in UTC, of the last change to the section status as part of the section status information.

3.3.5.9.10 External Change Requests for Signal Sections

The requirements to support signal section control requests from other authorized centers are as follows. Only control requests to change the traffic signal timing mode or current signal timing pattern of a remote signal section is supported.

3.3.5.9.10.1 Send Signal Section Change Response Upon Request

An owner center shall send to an authorized external center requesting a change to a traffic signal section via a one-time change request with a message containing the status of the request.

3.3.5.9.10.1.1 Required Signal Section Change Request Content

The signal section change request sent from an external center to an owner center shall include:

- a. Generic device control request header information (See 3.3.5.1.2.1) with the device type set to “signal section”;
- b. The type of change request for the section (change section timing mode, change section timing pattern);
- c. The requested change in to the signal timing mode (free, fixed-time, actuated, semi-actuated, critical intersection control, traffic responsive, adaptive, flash-programmed) **IF** the requested change type is “change signal timing mode”; **OR**
- d. The requested section signal timing pattern **IF** the requested change type is “change signal timing pattern.”

3.3.5.9.10.2 Contents of Signal Section Change Response

The contents owner center response to a signal controller change request from an authorized external center are as follows:

3.3.5.9.10.2.1 Required Signal Section Change Response Content

The owner center response to a signal section controller change request from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.9.10.2.2 Optional Signal Section Change Response Content

The following are optional requirements that an owner center may include in the signal section control response sent to an external center.

3.3.5.9.10.2.2.1 Section Timing Mode – Current

The owner center shall provide the section timing mode currently in effect as part of the signal section change response. Supported values shall include local, local-manual, local-time-of-day, local-traffic-responsive, central-time-of-day, central-traffic-responsive, central-hold-force-omit, central-holiday-schedule, central-standby, coordinated-coordinated-intersection-control, coordinated-adaptive, coordinated-transit-priority, flash-programmed, other, and unknown.

3.3.5.9.10.2.2.2 Section Timing Pattern Identifier – Current

The owner center shall provide the signal timing pattern currently in effect as part of the signal section control response.

3.3.5.9.11 Request Section Change Status

The requirements to check the status of a section control request previously issued by an authorized external center are as follows:

3.3.5.9.11.1 Send Section Change Status Upon Request

An owner center shall respond to an authorized external center requesting the status of a previously issued section change request with a message containing the status of the section control request.

3.3.5.9.11.2 Required Section Change Status Request Content

The signal section change status request sent from an external center to an owner center shall include generic change device status request (See 3.3.5.1.2.3.2), with the device type set to “signal section.”

3.3.5.9.11.3 Required Section Change Status Response Content

The owner center response to a signal section change status request from an external center shall include:

- a. Generic device change response header information (See 3.3.5.1.2.2).

3.3.5.9.12 Cancel Control Requests for Remote Signal Sections

The requirements to cancel a section change request previously issued by an authorized external center are as follows.

3.3.5.9.12.1 Send Cancel Signal Section Change Response Upon Request

An owner center shall respond to an authorized external center requesting cancellation of a previously issued signal section change request as described in “3.3.5.1.2.4.1 Send Change Cancellation Response Upon Request.”

3.3.5.9.12.2 Required Signal Controller Cancellation Request Content

The signal section change cancellation request sent from an external center to an owner center shall include generic cancel device change request (See 3.3.5.1.2.4.2), with the device type set to “signal section.”

3.3.5.9.12.3 Required Signal Section Cancellation Request Response Content

The owner center response to a signal section change cancellation request sent from an external center shall include generic device change response header information (See 3.3.5.1.2.2).

3.3.5.9.13 Share Section Timing Pattern Schedule

The requirements to share section timing pattern time base schedule tables with other authorized centers are as follows:

3.3.5.9.13.1 Send Section Timing Pattern Schedule Information Upon Request

An owner center shall respond to an authorized external center requesting section signal timing pattern schedules with a message containing the owner center’s section timing pattern time base schedule information.

3.3.5.9.13.2 Publish Section Timing Pattern Schedule Information

An owner center shall publish a message containing its section timing pattern time base schedule information to all authorized subscribing external centers.

3.3.5.9.13.3 Subscribe to Section Timing Pattern Schedule Information

An external center shall send a subscription message to an owner center requesting section timing pattern schedule information.

3.3.5.9.13.4 Required Section Timing Pattern Schedule Request Content

The signal section plan inventory request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to “section status” and device information type set to “device plan.”

3.3.5.9.13.5 Required Section Timing Pattern Schedule Content

The section timing pattern schedule information sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of each section;
- c. The time base schedule number;
- d. The time base schedule month;
- e. The time base schedule day of week;
- f. The time base schedule date;
- g. The time base schedule day pattern;

- h. The time base schedule day pattern hour;
- i. The time base schedule day pattern minute;
- j. Date and time, in UTC, of the last change to the time base schedule;
- k. Unique identifiers of each signal controller assigned to the section (list);
- l. The time base schedule day pattern timing mode (unknown, other, free, fixed-time, actuated, semi-actuated, critical intersection control, traffic responsive, adaptive, or flash-programmed); and
- m. The time base schedule day pattern section timing pattern identifier. A section timing pattern is a list of individual signal timing patterns for each signal controller assigned to the section.

3.3.5.9.14 Share Signal Change Priority Queue Information

The requirements for sharing the contents of a traffic signal control priority queue are as follows:

3.3.5.9.14.1 Send Signal Priority Queue Information Upon Request

An owner center shall respond to an authorized external center requesting the contents of its traffic signal control priority queue with a message containing the contents of an owner center's traffic signal control priority queue.

3.3.5.9.14.2 Required Signal Change Priority Queue Request Content

The signal controller priority queue request sent from an external center to an owner center shall include generic device queue request (See 3.3.5.1.2.5.1.1), with the device type set to "signal controller."

3.3.5.9.14.3 Required Signal Change Priority Queue Content

The traffic signal priority queue response sent from an owner center to an external center shall include:

- a. Generic device priority queue response header information (See 3.3.5.1.2.5.2.1); and
- b. The type of change request for each signal device (change signal timing mode, change signal timing pattern, or make offset adjustment).
- c. The requested change in the signal timing mode (free, fixed-time, actuated, semi-actuated, critical intersection control, traffic responsive, adaptive, or flash-programmed) **IF** the requested change type is "change signal timing mode"; **OR**
- d. The requested section signal timing pattern **IF** the requested change type is "change signal timing pattern"; **OR**
- e. The requested offset in seconds **IF** the requested change type is "make offset adjustment."

3.3.5.9.15 Share Section Change Priority Queue Information

The requirements for sharing the contents of a traffic signal section change priority queue are as follows:

3.3.5.9.15.1 Send Section Change Priority Queue Information Upon Request

An owner center shall respond to an authorized external center requesting the contents of its section change priority queue with a message containing the contents of an owner center's section change priority queue.

3.3.5.9.15.2 Required Section Change Priority Queue Request Content

The signal section priority queue request sent from an external center to an owner center shall include:

- a. Generic device queue request (See 3.3.5.1.2.5.1.1), with the device type set to "signal section."

3.3.5.9.15.3 Required Section Change Priority Queue Content

The section change priority queue response sent from an owner center to an external center shall include:

- a. Generic device priority queue response header information (See 3.3.5.1.2.5.2.1); and
- b. The type of change requested for each section (change signal timing mode or change signal timing pattern).
- c. The requested change in the section timing mode, typically the same for each signal controller assigned to the section (free, fixed-time, actuated, semi-actuated, critical

- intersection control, traffic responsive, adaptive, or flash-programmed) **IF** the requested change type is “change signal timing mode”; **OR**
- d. The requested section signal timing pattern **IF** the requested change type is “change section timing pattern.”

3.3.5.9.16 Share Section Timing Pattern Information

The requirements for sharing section timing pattern information with other authorized centers are as follows:

3.3.5.9.16.1 Send Section Timing Pattern Upon Request

An owner center shall respond to an authorized external center requesting signal section timing pattern information with a message containing the owner center’s signal section timing pattern information.

3.3.5.9.16.2 Publish Section Timing Pattern Information

An owner center shall publish a message containing its signal section timing pattern information to all authorized subscribing external centers.

3.3.5.9.16.3 Subscribe to Section Timing Pattern Information

An external center shall send a subscription message to an owner center requesting signal section timing pattern information.

3.3.5.9.16.4 Required Section Timing Pattern Information Request Content

The signal section timing plan inventory request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to “signal section” and device information type set to “device plan.”

3.3.5.9.16.5 Contents of the Section Timing Pattern Information Response

The signal section timing pattern plan inventory information for an owner center to send to an external center is as follows:

3.3.5.9.16.5.1 Required Section Timing Pattern Information Response Content

The signal section timing pattern inventory information sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Unique identifier of the section;
- c. The section timing pattern identifier. A section timing pattern is a list of individual signal timing patterns for each signal controller assigned to the section;
- d. The section cycle length (seconds), typically the same for each signal controller assigned to the section;
- e. Unique identifiers of each signal controller assigned to the section;
- f. The cycle length (seconds) for each signal controller assigned to the section;
- g. The offset time (seconds) for each signal controller assigned to the section;
- h. The unique identifier of the signal timing pattern for each signal controller assigned to the section.;
- i. An identifier for each phase in use for each signal controller.
- j. A list of the coordinates phases for each signal controller assigned to the section;
- k. Split-mode as defined in NTCIP 1202 (other, none, minimum vehicle recall, maximum vehicle recall, pedestrian recall, maximum vehicle and pedestrian recall, or phase omitted) for each phase in use for each signal controller assigned to the section; and
- l. The split time, in tenths-of-a-second, for each phase in use for each signal controller assigned to the section.

3.3.5.9.16.5.2 Optional Section Timing Pattern Information Response Content

The following are optional requirements that an owner center may include in the signal section timing pattern information sent to an external center.

3.3.5.9.16.5.2.1 Description of the Section Timing Pattern

The owner center shall provide the description of the section timing pattern for each signal timing pattern as part of the signal section timing pattern information for the section.

3.3.5.9.16.5.2.2 Section Timing Pattern Inventory Date and Time Change Information

The owner center shall provide the date and time, in UTC, of when the section timing pattern inventory was last changed as part of the signal section timing pattern information for the section.

3.3.5.9.17 External Commands for Traffic Signal Controllers

The requirements to for an external center to send commands to remotely control a Traffic Signal Controller that is normally managed by an owner center are as follows.

3.3.5.9.17.1 Send Signal Control Response Upon Command

An owner center shall respond to an authorized external center configuring a signal controller via a one-time control command with a message containing the status of the command.

3.3.5.9.17.2 Required Traffic Signal Controller Command Content

The signal control command sent from an external center to an owner center shall include:

- a. Generic device control command header information (See 3.3.5.1.3.2.1) with the device type set to "signal controller";
- b. The type of control command (change signal timing mode, change signal timing pattern);
- c. The change in the signal timing mode (free, fixed-time, actuated, semi-actuated, critical intersection control, traffic responsive, adaptive, or flash-programmed) **IF** the change type is "change signal timing mode"; **OR**
- d. The change to the signal timing pattern **IF** the requested change type is "change signal timing pattern."

3.3.5.9.17.3 Required Traffic Signal Controller Command Response Content

The owner center response to a signal controller control command sent from an external center shall include generic device control command response information (See 3.3.5.1.3.3);

3.3.5.10 Roadside Units

The requirements to exchange RSU information between centers are as follows:

3.3.5.10.1 Share RSU Inventory Information

The requirements for sharing RSU inventory information with other authorized centers are as follows:

3.3.5.10.1.1 Send RSU Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting RSU inventory with a message containing the owner center's RSU inventory information.

3.3.5.10.1.2 Publish RSU Inventory Information

An owner center shall publish a message containing its RSU inventory information to all authorized subscribing external centers.

3.3.5.10.1.3 Subscribe to RSU Inventory Information

An external center shall send a subscription message to an owner center requesting its RSU inventory information.

3.3.5.10.1.4 Required RSU Inventory Information Request Content

The RSU inventory information request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to "roadside unit" and device information type set to "device inventory."

3.3.5.10.1.5 Contents of the RSU Inventory Information Response

The RSU inventory information for an owner center to send to an external center is as follows:

3.3.5.10.1.5.1 Required RSU Inventory Response Content

The RSU inventory information sent from an owner center to an external center shall include generic device inventory header information (See 3.3.5.1.1.2);

3.3.5.10.2 Share RSU Status Information

The requirements for sharing RSU status information with other authorized centers are as follows:

3.3.5.10.2.1 Send RSU Status Information Upon Request

An owner center shall respond to an authorized external center requesting RSU status with a message containing the owner center's RSU status information.

3.3.5.10.2.2 Publish RSU Status Information

An owner center shall publish a message containing its RSU status information to all authorized subscribing external centers.

3.3.5.10.2.3 Subscribe to RSU Status Information

An external center shall send a subscription message to an owner center requesting its RSU status information.

3.3.5.10.2.4 Required RSU Status Request Content

The RSU status request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to "roadside unit" and device information type set to "device status."

3.3.5.10.2.5 Contents of the RSU Status Response

The RSU status information for an owner center to send to an external center is as follows:

3.3.5.10.2.5.1 Required RSU Status Response Content

The RSU status information sent from an owner center to an external center shall include:

- a. The generic device status header information (See 3.3.5.1.1.3);
- b. The RSU health status as defined in NTCIP 1218 (okay, warning, critical, unknown, or other); and
- c. The RSU mode of operations as defined in NTCIP 1218 (standby, operate, fault, or other).

3.3.5.10.3 Share RSU Data Information

The requirements for sharing RSU data information with other authorized centers are as follows:

3.3.5.10.3.1 Send RSU Data Upon Request

An owner center shall respond to an authorized external center requesting RSU data with a message containing the owner center's RSU data.

3.3.5.10.3.2 Publish RSU Data

An owner center shall publish a message containing its RSU data to all authorized subscribing external centers.

3.3.5.10.3.3 Subscribe to RSU Data

An external center shall send a subscription message to an owner center requesting its RSU data.

3.3.5.10.3.4 Contents of the RSU Data Request

The contents of an RSU data request for an external center to send to an owner center are as follows:

3.3.5.10.3.4.1 Required RSU Data Request Content

The RSU data request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to “roadside unit” and device information type set to “device data.”

3.3.5.10.3.5 Contents of the RSU Data Response

The RSU data information for an owner center to send to an external center is as follows:

3.3.5.10.3.5.1 Required RSU Data Response Content

The RSU data information sent from an owner center to an external center shall include:

- a. Unique identifier of the owner organization;
- b. The message payload of all messages received or broadcasted by the RSU (list);
- c. The message number of each message received or broadcasted by the RSU;
- d. The V2X message type of each message received or broadcasted by the RSU. Supported values are TIM, RSM, SPaT, MAP, SRM, SSM, SSM, RTCM, other;
- e. The message source of each message received or broadcasted by the RSU. Supported values are v2sConnected, stored message, management station, gnss, ca, or other; and
- f. The active message type of each message received or broadcasted by the RSU. Supported values are store and repeat message, immediate forward message, received messages from V2X, transmitted messages over V2X interface, and wave service advertisement.

3.3.5.10.4 Share RSU Security Content

The requirements for sharing RSU security content with other authorized centers are as follows:

3.3.5.10.4.1 Send RSU Security Content Upon Request

An owner center shall respond to an authorized external center requesting RSU security content with a message containing the owner center’s RSU security content.

3.3.5.10.4.2 Publish RSU Security Content

An owner center shall publish a message containing its RSU security content to all authorized subscribing external centers.

3.3.5.10.4.3 Subscribe to RSU Security Content

An external center shall send a subscription message to an owner center requesting its RSU security content.

3.3.5.10.4.4 Contents of the RSU Security Content Request

The contents of a RSU security content request for an external center to send to an owner center are as follows:

3.3.5.10.4.4.1 Required RSU Security Content Request

The RSU security content request sent from an external center to an owner center shall include generic device information request (See 3.3.5.1.1.1), with the device type set to “roadside unit” and device information type set to “device enrollment certificates.”

3.3.5.10.4.5 Contents of the RSU Security Content Response Content

The RSU security content information for an owner center to send to an external center is as follows:

3.3.5.10.4.5.1 Required RSU Data Security Content Response Content

The RSU security content information sent from an owner center to an external center shall include the status of the enrollment certificates for an RSU. Valid values are (unknown, not enrolled, enrolled, other)

3.3.6 Share Archive Data

Archiving data is generally applied to the areas of traffic monitoring, roadway characteristics and event data. The archiving of data is also concerned with how that data is collected. The archived data, once collected, can also be exchanged between centers. These centers may be data archives or operational centers.

The requirements to share archived data and metadata between centers are as follows:

3.3.6.1 Share Traffic Monitoring Data for Data Archiving

The requirements to exchange traffic monitoring data with other authorized centers are as follows:

3.3.6.1.1 Share Traffic Monitoring Data Inventory Information

The requirements to support the sharing of traffic monitoring data inventory information with other authorized centers are as follows. This inventory information defines what traffic monitoring data is available to other centers for the purpose of data archiving.

3.3.6.1.1.1 Send Traffic Monitoring Data Inventory Information Upon Request

An owner center shall respond to an authorized external center requesting traffic monitoring data with a message containing the owner center's traffic monitoring data inventory information.

3.3.6.1.1.2 Contents of the Traffic Monitoring Data Inventory Request

An external center shall send a traffic monitoring data inventory request to an owner center.

3.3.6.1.1.2.1 Required Traffic Monitoring Data Inventory Request Content

The traffic monitoring data inventory request sent from an external center to an owner center shall include:

- a. Requesting organization information (See 3.3.2.5.1 and 3.3.2.5.2); and
- b. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2).

3.3.6.1.1.2.2 Optional Traffic Monitoring Data Inventory Request Content

If the owner center supports it, the following are optional requirements that an external center may include in the traffic monitoring data inventory request sent to an owner center.

3.3.6.1.1.2.2.1 Authorization – Traffic Monitoring Data

The requirements for the authorization information as part of the traffic monitoring data inventory request are found in "Section 3.3.1.8.1 Authorization Information – External Centers."

3.3.6.1.1.2.2.2 Operator Identifier – Traffic Monitoring Data

The requirements for the operator identifier from an external center to an owner center as part of the traffic monitoring data inventory request, are found in "Section 3.3.1.8.2 Operator Identifier – Requests"

3.3.6.1.1.2.2.3 Data Set Type

The external center shall send the type of data set of interest as part of the traffic monitoring data inventory request. Supported values are traffic-monitoring-data.

3.3.6.1.1.2.2.4 Data Collection Period

The external center shall send the data collection period of interest as part of the traffic monitoring data inventory request.

3.3.6.1.1.2.2.5 Geographic Location – Traffic Monitoring Data

The external center shall send the geographic location of interest as part of the traffic monitoring data inventory request. The geographic location is determined by the county and state.

3.3.6.1.1.3 Contents of the Traffic Monitoring Data Inventory Information

An owner center shall send traffic monitoring data inventory to external centers.

3.3.6.1.1.3.1 Required Traffic Monitoring Data Inventory Content

The traffic monitoring data inventory information sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Data set type;
- c. Description of the data set;
- d. Data collection time period; and
- e. Publication date and time in UTC.

3.3.6.1.1.3.2 Optional Traffic Monitoring Data Inventory Content

The following are optional requirements that an owner center may include in the traffic monitoring data inventory sent to an external center.

3.3.6.1.1.3.2.1 Information Access Restrictions – Traffic Monitoring Data

The requirements for the owner center to place restrictions on the dissemination of the information that is part of the traffic monitoring data inventory are found in “Section 3.3.1.9.1 Information Access Restrictions – Response Message Content.”

3.3.6.1.1.3.2.2 Purpose of the Data Set

The owner center shall provide a description of the purpose of the data set as assigned by the owner center as part of the traffic monitoring data inventory.

3.3.6.1.1.3.2.3 Title of the Data Set

The owner center shall provide the title of the data set as assigned by the owner center as part of the traffic monitoring data inventory.

3.3.6.1.1.3.2.4 Version of the Data Set

The owner center shall provide the version of the data set as assigned by the owner center as part of the traffic monitoring data inventory.

3.3.6.1.1.3.2.5 Publication Information of the Data Set

The owner center shall provide the publication information of the data set as assigned by the owner center as part of the traffic monitoring data inventory.

3.3.6.1.1.3.2.6 Progress of the Data Set

The owner center shall indicate the progress of the data set as assigned by the owner center as part of the traffic monitoring data inventory. Supported values are complete, work in progress, and planned.

3.3.6.1.1.3.2.7 Maintenance of the Data Set

The owner center shall indicate the maintenance and update frequency of the data set as assigned by the owner center as part of the traffic monitoring data inventory. Supported values are continually, daily, weekly, monthly, annually, unknown, as needed, irregular, none planned, and free text.

3.3.6.1.1.3.2.8 Data Set Uniform Resource Locator (URL)

The owner center shall provide the URL information for where the data set, or information about how to access the data set, can be found as part of the traffic monitoring data inventory.

3.3.6.1.1.3.2.9 Data Set URL Reference Medium

The owner center shall provide the file type or medium that the URL reference points to as part of the URL reference information.

3.3.6.1.1.3.2.10 Roadway Network Identifier – Traffic Monitoring Data

The owner center shall provide the roadway network identifier information for where the data in the data set can be found as part of the traffic monitoring data inventory.

3.3.6.1.1.3.2.11 Link Identifier – Traffic Monitoring Data

The owner center shall provide the link identifier information for where the data in the data set can be found as part of the traffic monitoring data inventory.

3.3.6.1.1.3.2.12 Route Designator – Traffic Monitoring Data

The owner center shall provide the route designator information for where the data in the data set as part of the traffic monitoring data inventory.

3.3.6.1.1.3.2.13 Linear Reference – Traffic Monitoring Data

The owner center shall provide the linear reference location and version information for where the data in the data set can be found as part of the traffic monitoring data inventory.

3.3.6.2 Share Processing Documentation Metadata

The requirements to support the sharing of processing documentation metadata information with other authorized centers are as follows. The processing documentation metadata contains information on the processes used to collect and process field data.

3.3.6.2.1 Send Processing Documentation Metadata Information Upon Request

An owner center shall respond to an authorized external center requesting processing documentation metadata with a message containing the owner center's processing documentation metadata information.

3.3.6.2.2 Contents of the Processing Documentation Metadata Information Request

An external center shall send a processing documentation metadata information request to an owner center.

3.3.6.2.2.1 Required Processing Documentation Metadata Information Request Content

The processing documentation metadata information request sent from an external center to an owner center shall include:

- a. User name of the requesting operator;
- b. Password of the requesting operator; and
- c. Requesting organization information (See 3.3.2.5.1 and 3.3.2.5.2).

3.3.6.2.3 Contents of the Processing Documentation Metadata Information

An owner center shall send processing documentation metadata information to external centers.

3.3.6.2.3.1 Required Processing Documentation Metadata Information Content

The processing documentation metadata information sent from an owner center to an external center shall include:

- a. Owner organization information (See 3.3.2.5.1 and 3.3.2.5.2);
- b. Date the metadata was created or last updated;
- c. Name assigned to the metadata standard by the owner organization; and
- d. Metadata version number.

3.3.6.2.3.2 Optional Processing Documentation Metadata Information Content

The following are optional requirements that an owner center may include in the processing documentation metadata information sent to an external center.

3.3.6.2.3.2.1 Information Access Restrictions – Archive Metadata

The requirements for the owner center to place restrictions on the dissemination of the information that is part of the processing documentation metadata information are found in "Section 3.3.1.9.1 Information Access Restrictions – Response Message Content."

3.3.6.2.3.2.2 Publication Date and Time

The owner center shall provide the publication date and time, in UTC, of the processing documentation metadata information as part of the processing documentation metadata information.

3.3.6.2.3.2.3 Processing Method

The owner center shall provide the name of the processing method used as part of the processing documentation metadata information.

3.3.6.2.3.2.4 Processing Method Description

The owner center shall provide a description of the processing method used as part of the processing documentation metadata information.

3.3.6.2.3.2.5 Application Rules

The owner center shall provide the rules for the application of the method to the original source data as part of the processing documentation metadata information.

3.3.6.2.3.2.6 Enumeration

The owner center shall provide an enumeration of the processing method results as part of the processing documentation metadata information.

3.4 Performance Requirements

The purpose of the performance requirements is to specify the communications performance requirements for the information exchanges between two centers. This section defines the range of allowable time intervals between when an event takes place at an owner center (e.g., an action, a change in status, or a change in the data) to when it transmits the updated information to an external center, and the allowable time intervals between when a receiving center first receives a request to when it must begin transmitting a response.

The time intervals for each implementation will vary based on the message, the importance and size of the message, and environmental conditions, such as the communications network used and congestion on the network.

For example, an external center monitoring another agency's traffic signal controller may be interested in receiving second-by-second information from the owner center, but may receive the owner center's traffic signal inventory only when the inventory changes. Also, the response time to a request for an owner center's complete traffic signal inventory will be different than the response time to a request for event data of a single event.

3.4.1 Message Transmission Time – Publication Updates

Table 2, Needs to Requirements Traceability Matrix, specifies the allowable amount of time between when information is updated in the owner center and when the owner center shall begin sending the information update message to an authorized external center. This requirement is for owner centers that transmit updates to subscribing external centers and assumes that the owner center has approved an external center's subscription for information updates on an event-driven basis (See 3.3.1.3.2). The maximum time within which an owner center shall begin sending information update messages after the information is updated shall range from 100 milliseconds to 24 hours.

3.4.2 Response Time

Unless otherwise specified in Table 2, Needs to Requirements Traceability Matrix, the owner center shall process a request from an external center within one minute of receiving the request. The response time is measured in milliseconds from the time a receiving center receives the last byte of a request message from another center to the transmission of the first byte of the response. During the response time, the receiving center shall process the request in accordance with all of the rules of the relevant standards, including updating any values in its database and initiating the transmission of the appropriate response. The maximum response time for an owner center to process a request shall range from 100 milliseconds to 1 hour.

Section 4

Needs to Requirements Matrix [Normative]

The Needs to Requirements Traceability Matrix (NRTM), presented below, maps the user needs defined in Section 2 to the requirements defined in Section 3. The table lists each user need supported by the ngTMDD, followed immediately by the requirements that support (and traces to) that user need. The matrix table can be used by:

- A user or specification writer to indicate which requirements are to be implemented in a project-specific implementation;
- The protocol implementer, as a checklist to reduce the risk of failure to conform to the standard through oversight;
- The supplier and user, as a detailed indication of the capabilities of the implementation; and
- The user, as a basis for initially checking the potential interoperability with another implementation.

The NRTM can be used to indicate which items are mandatory or optional for a specific project. Procurement personnel can use the NRTM to specify the desired features of an ngTMDD implementation, and the systems integrator or programmer can use it to document the features.

ngTMDD Volume II defines the System Design Details for the features identified in in the NRTM.

4.1 User Need ID and User Needs Columns

The user needs are defined within Section 2 and the NRTM is based upon the user need sections within that section. The section number and user need name are indicated within these columns.

4.2 Requirements ID and Requirements Columns

The requirements are defined within Section 3 and the NRTM references the traces from user needs to these requirements. The section number and requirements name are indicated within these columns.

4.3 Conformance Column

This column is used to indicate which of the user needs are required to be in conformance with the ngTMDD standard, and to indicate what requirements are to be fulfilled in support of those user needs selected for an implementation.

User needs that are required for being in conformance with the ngTMDD standard are marked “Mandatory”; all other user needs are marked “Optional.” For user needs that are required for the implementation, the details on how a systems integrator will satisfy the user need is missing. This column indicates at a greater level of detail what requirements are satisfied in support of the user need.

The following notations and symbols are used to indicate status in the NRTM.

4.3.1 Status Symbols

The following symbols are used to indicate status:

Symbol	Value
M	Mandatory – This requirement(s) is required to support the specified user need.
O	Optional – This requirement may be included in support of the specified user need.
O.# (range)	Part of an option group. Support of the number of items indicated by the ‘(range)’ is required from all options labeled with the same numeral #.

The O.# (range) notation is used to show a set of selectable options (e.g., O.2 (1..*)) would indicate that one or more of the option group 2 options must be implemented.

4.3.2 Conditional Status Notation

The following predicate notation is used:

<predicate>:	This notation introduces a single item that is conditional on the <predicate>.
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The <predicate>: notation means that the status following it applies only when the NRTM states that the feature or features identified by the predicate within the same user need are supported. In the simplest case, <predicate> is the identifying tag of a single NRTM item. When the group predicate is true then the associated section shall be completed. The symbol <predicate> also may be a Boolean expression composed of several indices. "AND", "OR", and "NOT" shall be used to indicate the Boolean logical operations.

4.3.3 Needs to Requirements Traceability Matrix

Table 2: Needs to Requirements Traceability Matrix

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
2.4.1.3	Architecture Need – Connection Management						
2.4.1.3.1	Need to Identify Type of Connection				Mandatory	Yes	
		Dialogs					
			3.3.1.1.1	Send Center Connection Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		3.3.1.1.2	3.3.1.1.2	Publish Center Connection Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 100 ms) after the information is updated in the owner center. See 3.4.1.
			3.3.1.1.3	Subscribe to Center Connection Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.1.4	Contents of the Center Connection Information Request	M	Yes	
			3.3.1.1.4.1	Required Center Connection Information Request Content	M	Yes	
		Response Message					
			3.3.1.1.5	Contents of Center Connection Information	M	Yes	
			3.3.1.1.5.1	Required Center Connection Information	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.1.1.5.2.2	Version Identifier	O	Yes / No	
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.1.3.2	Need to Identify Time Domains Supported				Mandatory	Yes	
		Dialogs					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.1.1	Send Center Connection Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.1.1.2	Publish Center Connection Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 100 ms) after the information is updated in the owner center. See 3.4.1.
			3.3.1.1.3	Subscribe to Center Connection Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.1.4	Contents of the Center Connection Information Request	M	Yes	
			3.3.1.1.4.1	Required Center Connection Information Request Content	M	Yes	
		Response Message					
			3.3.1.1.5	Contents of Center Connection Information	M	Yes	
			3.3.1.1.5.1	Required Center Connection Information	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.1.1.5.2.2	Version Identifier	O	Yes / No	
			3.3.1.1.5.2.3	Time Domains Supported	O	Yes / No	
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.1.3.3	Need to Verify Active Connection				Mandatory	Yes	
		Dialogs					
			3.3.1.1.1	Send Center Connection Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.1.2	Publish Center Connection Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 100 ms) after the information is updated in the owner center. See 3.4.1.
			3.3.1.1.3	Subscribe to Center Connection Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.1.4	Contents of the Center Connection Information Request	M	Yes	
			3.3.1.1.4.1	Required Center Connection Information Request Content	M	Yes	
		Response Message					
			3.3.1.1.5	Contents of Center Connection Information	M	Yes	
			3.3.1.1.5.1	Required Center Connection Information	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.1.1.5.2.2	Version Identifier	M	Yes	
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.1.3.4	Need to Support Requests				Mandatory	Yes	
			3.3.1.2	Support Request-Response	M	Yes	
			3.4.2	Response Time	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
2.4.1.3.5	Need to Support Subscriptions				Optional	Yes / No	
			3.3.1.3.1	Support Periodic Updates (Subscription)	O.1(1..*)	Yes / No	The owner center shall support periodic updates from once per ____ (default = 300 seconds) to once per ____ (default = 31,536,000 seconds).
			3.3.1.3.2	Support Event-Driven Updates (Subscription)	O.1(1..*)	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.4.1	Message Transmission Time – Publication Updates	Subscription:M	Yes / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
2.4.1.3.6	Need to Identify Active Subscriptions				Subscription:O	Yes / NA	
		Dialogs					
			3.3.1.5.1	Send List of Currently Active Subscriptions Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.1.5.2	Publish List of Currently Active Subscriptions	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 100 ms) after the information is updated in the owner center. See 3.4.1.
			3.3.1.5.3	Subscribe to List of Currently Active Subscriptions	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.5.4	Contents of the List of Currently Active Subscriptions Request	M	Yes	
			3.3.1.5.4.1	Required List of Currently Active Subscriptions Request Content	M	Yes	
		Response Message					
			3.3.1.5.5	Contents of the List of Currently Active and Failed Subscriptions	M	Yes	
			3.3.1.5.5.1	Required List of Currently Active Subscriptions Content	M	Yes	
			3.3.1.5.5.2.1	Subscription update source endpoint	O	Yes / No	
			3.3.1.5.5.2.2	Owner center subscription request endpoint	O	Yes / No	
			3.3.1.5.5.2.3	Subscription update target endpoint	O	Yes / No	
			3.3.1.5.5.2.4	Subscription Name	O	Yes / No	
			3.3.1.5.5.2.5	Subscription request received date and time	O	Yes / No	
			3.3.1.5.5.2.6	Subscription first message sent date and time	O	Yes / No	
			3.3.1.5.5.2.7	Most recent update message send date and time	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.5.5.2.8	Most recent update message size	O	Yes / No	
			3.3.1.5.5.2.9	Total number of messages sent	O	Yes / No	
			3.3.1.5.5.2.10	Time interval for the total number of messages sent	O	Yes / No	
			3.3.1.5.5.2.11	List of errors encountered	O	Yes / No	
			3.3.1.5.5.2.12	Time interval for the list of errors	O	Yes / No	
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.1.3.7	Need to Identify Failed Subscriptions				Subscription:O	Yes / NA	
		Dialogs					
			3.3.1.5.1	Send List of Currently Active Subscriptions Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.1.5.2	Publish List of Currently Active Subscriptions	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 100 ms) after the information is updated in the owner center. See 3.4.1.
			3.3.1.5.3	Subscribe to List of Currently Active Subscriptions	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.5.4	Contents of the List of Currently Active Subscriptions Request	M	Yes	
			3.3.1.5.4.1	Required List of Currently Active Subscriptions Request Content	M	Yes	
		Response Message					
			3.3.1.5.5	Contents of the List of Currently Active and Failed Subscriptions	M	Yes	
			3.3.1.5.5.3	Required List of Currently Failed Subscriptions Content	M	Yes	
			3.3.1.5.5.2.1	Subscription update source endpoint	O	Yes / No	
			3.3.1.5.5.4.2	Owner center subscription request endpoint	O	Yes / No	
			3.3.1.5.5.4.3	Subscription update target endpoint	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	a	
2.4.1.3.8	Need to Describe Active Subscription Status				Subscription:O	Yes / No / NA	
		Dialogs					
			3.3.1.5.1	Send List of Currently Active Subscriptions Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.1.5.2	Publish List of Currently Active Subscriptions	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 100 ms) after the information is updated in the owner center. See 3.4.1.
			3.3.1.5.3	Subscribe to List of Currently Active Subscriptions	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.5.4	Contents of the List of Currently Active Subscriptions Request	M	Yes	
			3.3.1.5.4.1	Required List of Currently Active Subscriptions Request Content	M	Yes	
		Response Message					
			3.3.1.5.5	Contents of the List of Currently Active and Failed Subscriptions	M	Yes	
			3.3.1.5.5.1	Required List of Currently Active Subscriptions Content	M	Yes	
			3.3.1.5.5.2.1	Subscription update source endpoint	O	Yes / No	
			3.3.1.5.5.2.2	Owner center subscription request endpoint	O	Yes / No	
			3.3.1.5.5.2.3	Subscription update target endpoint	O	Yes / No	
			3.3.1.5.5.2.4	Subscription Name	O	Yes / No	
			3.3.1.5.5.2.5	Subscription request received date and time	O	Yes / No	
			3.3.1.5.5.2.6	Subscription first message sent date and time	O	Yes / No	
			3.3.1.5.5.2.7	Most recent update message send date and time	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.5.5.2.8	Most recent update message size	O	Yes / No	
			3.3.1.5.5.2.9	Total number of messages sent	O	Yes / No	
			3.3.1.5.5.2.10	Time interval for the total number of messages sent	O	Yes / No	
			3.3.1.5.5.2.11	List of errors encountered	O	Yes / No	
			3.3.1.5.5.2.12	Time interval for the list of errors	O	Yes / No	
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.1.3.9	Support Confirmation Receipts				Subscription:O	Yes / No / NA	
		Response Message					
			3.3.1.6.1	Contents of Confirmation Receipt	M	Yes	
			3.3.1.6.1.1	Required Confirmation Receipt Content	M	Yes	
2.4.1.3.10	Support Change-Driven Updates				Optional	Yes / No	
			3.3.1.2	Support Event-Driven Updates (Subscription)	O.1(1..*)	Yes / No	
2.4.1.4.1	Need to Provide Secure Communications				M	Yes	
			3.3.1.10.1	Connection Security	M	Yes	
			3.3.1.10.2	Encryption	M	Yes	
2.4.1.4.2	Need to Verify Authentication for Access				M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.1.1	Valid certificates	O	Yes / No	
2.4.1.4.3	Need to Verify Trusted Source of Information				M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.1.1	Valid certificates	O	Yes / No	
2.4.2.1.1	Need to Provide Information Relating to Organization and Centers				Optional	Yes / No	
		Dialogs					
			3.3.2.1	Send Organization Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.2.2	Publish Organization Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.2.3	Subscribe to Organization Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.2.4	Contents of the Organization Information Request	M	Yes	
			3.3.2.4.1	Required Organization Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.1.1	Valid certificates			
			3.3.1.8.2	Operator Identifier – Requests	AuthOrg:O	Yes / No / NA	
			3.3.2.4.2.2	Owner Organization Identifier	O	Yes / No	
			3.3.2.4.2.3	Owner Center Identifier	O	Yes / No	
		Response Message					
			3.3.2.5	Contents of the Organization and Centers Information	M	Yes	
			3.3.2.5.1	Required Organization Information Content	M	Yes	
			3.3.2.5.2.1	Organization Name	O	Yes / No	
			3.3.2.5.2.2	Organization Location	O	Yes / No	
			3.3.2.5.2.3	Organization Contact Information (ContactInformation)	O	Yes / No	
			3.3.2.5.2.3.1	Required Organization Contact Information	ContactInformation:M	Yes / NA	
			3.3.2.5.2.3.2.1	Contact Group Name	ContactInformation:O	Yes / No / NA	
			3.3.2.5.2.3.2.2	Contact Group Role	ContactInformation:O	Yes / No / NA	
			3.3.2.5.2.3.2.3	Work Phone Number	ContactInformation:O	Yes / No / NA	
			3.3.2.5.2.3.2.4	Alternate Phone Number	ContactInformation:O	Yes / No / NA	
			3.3.2.5.2.4	Organization Center Information (CenterInformation)	O	Yes / No	
			3.3.2.5.2.4.1	Required Organization Center Information	CenterInformation:M	Yes / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.2.5.2.4.2.1	Organization Center Name	CenterInformation:O	Yes / No / NA	
			3.3.2.5.2.4.2.2	Organization Center Location	CenterInformation:O	Yes / No / NA	
			3.3.2.5.2.4.2.3	Organization Center Description	CenterInformation:O	Yes / No / NA	
			3.3.2.5.2.4.2.4	Organization Center Type	CenterInformation:O	Yes / No / NA	
			3.3.2.5.2.4.2.5	Organization Center Contact Information	CenterInformation:O	Yes / No / NA	
			3.3.2.5.2.5	Date and Time Change Information - -Organization Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.1.2	Need to Identify Organization that Originates Information						
			3.3.3.5.1.3.2.1	Information Source Organization	EventSource:O.6 (1..*)	Yes / No / NA	
2.4.2.1.3	Need to Identify Level of Confidentiality of Information						
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
2.4.2.2	Data Needs to Share Event Information						
2.4.2.2.1	Need for an Index of Events				Optional	Yes / No	
		Dialogs					
			3.3.3.7.1	Send Event Index Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.3.7.2	Publish Event Index Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 100 ms) after the information is updated in the owner center. See 3.4.1.
			3.3.3.7.3	Subscribe to Event Index Information	Subscription:O	Yes / No / NA	
		Request Message					
			Error! Reference source not found.	Error! Reference source not found.	M	Yes	
			3.3.3.7.4	Contents of Event Index Request	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.7.4.1	Required Event Index Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	AuthEventIndex:O	Yes / No / NA	
			3.3.3.7.4.2.3	Requesting Organization – Event Index	O	Yes / No	
		Response Message					
			Error! Reference source not found.	Error! Reference source not found.	M	Yes	
			3.3.3.7.5.1	Required Event Index Information Content	M	Yes	
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.2.2	Need for Current Event Information				Optional	Yes / No	
		Dialogs					
			3.3.3.1	Send Event Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.3.2	Publish Event Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 100 ms) after the information is updated in the owner center. See 3.4.1.
			3.3.3.3	Subscribe to Event Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.4	Contents of Event Information Request	M	Yes	
			3.3.3.4.1	Required Event Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	AuthEvents:O	Yes / No / NA	
			3.3.3.7.4.2.3	Requesting Organization – Event Index	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Response Message					
			3.3.3.5	Contents of the Event Information	M	Yes	
			3.3.3.5.1	Required Event Information Content	M	Yes	
			3.3.3.5.1.1.1	Required Event Message Header Information	M	Yes	
			3.3.3.5.1.1.2.1	External Center Organization – Events	O	Yes / No	
			3.3.3.5.1.1.2.2	Message Expiry Time	O	Yes / No	
			3.3.3.5.1.2.1	Required Event Reference Information	M	Yes	
			3.3.3.5.1.3.1	Event Time (EventTime)	M	Yes	Optional if the message is to close an event.
			3.3.3.5.1.3.1.1	Required Event Time Information	M	Yes	
			3.3.3.5.1.3.1.2.13.3.3.5.1.3.1.2.1	Event Valid Period (EventValidPeriod)	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.2	Effective Period Qualifier	EventValidPeriod:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.3	Days Event Not In Effect	EventValidPeriod:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.5	Sequence Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.6	Event Start Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.11	Roadway Clearance Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.2	Event Source (EventSource)	O	Yes / No	
			3.3.3.5.1.3.2.1	Information Source Organization	EventSource:M	Yes	
			3.3.3.5.1.3.2.2	Event Detection Method	EventSource:O	Yes / No	
			3.3.3.5.1.3.3	Event Description (EventDescription)	O	Yes / No	
			3.3.3.5.1.3.3.1	Event Quantity	EventDescription:O	Yes / No / NA	
			3.3.3.5.1.3.3.2	Detour Information	EventDescription:O	Yes / No / NA	
			3.3.3.5.1.3.4	Event Location (EventLocation)	O	Yes / No	
			3.3.3.5.1.3.4.1	Area Identifier (AreaLocation)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.1.2	Name of Area	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.1.3	Area Location Rank	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.1.4	Secondary Area Location Reference	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.2	Required Link Location Information (LinkLocation)	EventLocation:O.2 (1..*)	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.3.4.3.1	Link Ownership	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.2	Route Designator	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.3	Second Route Designator	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.4	Link Identifier	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.5	Link Name – Events	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.7	Secondary Point	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.8	Link Direction	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.9	Link Alignment	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.10	Linear Reference Version – Events	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.11	Alternate Link Location	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.4	Required Point on a Link Location Information (PointOnALink)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.5.1	Linear Reference Location	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.2	Link Name – Event Point	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.3	Point Name	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.4	Cross Street Identifier	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.5	Cross Street Name	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.6	Signed Destination	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.7	Point Location Rank	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.8	Landmark Type	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.9	Secondary Link Location	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.6	Required Landmark Location Information (Landmark)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.7.1	Landmark Point Name	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.2	Landmark Location Rank	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.3	Landmark Location	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.4	Secondary Landmark Location	Landmark:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.3.4.8	Event Geographic Location	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.5	Event Name	O	Yes / No	
			3.3.3.5.1.3.6	Event Lane (EventLane)	O	Yes / No	
			3.3.3.5.1.3.6.1.1	Lane Type	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.2	Direction of Travel	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.3	Total Number of Lanes	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.4	Number of Lanes Affected	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.5	Lane Number Affected	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.6	Lane Status	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.7	Event Description Confidence Level	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.3.6.2	Event Indicator (EventIndicator)	O	Yes / No	
			3.3.3.6.2.1	Event Status	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.2	Event Duration Exceeded Flag	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.3	Event Impact Level	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.4	Event Active Flag	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.5	Event Class	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.3	Other References(EventReferences)	O	Yes / No	
			3.3.3.6.3.1	Trip Reference	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.2	Responsible Reference	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.3	Related Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.4	Previous Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.5	Split Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.6	Merged Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.7	Sibling Event	EventReferences:O.5 (1..*)	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.6.3.8	Associated Device	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.9	Associated URL	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.4	Event Comments (EventComments)	O	Yes / No	
			3.3.3.6.4.1	Required Event Comments	EventComments:M	Yes / NA	
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.2.3	Need for Planned Event Information				Optional	Yes / No	
		Dialogs					
			3.3.3.1	Send Event Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.3.2	Publish Event Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.3.3	Subscribe to Event Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.4	Contents of Event Information Request	M	Yes	
			3.3.3.4.1	Required Event Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	AuthEvents:O	Yes / No / NA	
			3.3.3.4.2.3	Requesting Organization – — Events	O	Yes / No	
		Response Message					
			3.3.3.5	Contents of the Event Information	M	Yes	
			3.3.3.5.1	Required Event Information Content	M	Yes	
			3.3.3.5.1.1.1	Required Event Message Header Information	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.1.2.1	External Center Organization – Events	O	Yes / No	
			3.3.3.5.1.1.2.2	Message Expiry Time	O	Yes / No	
			3.3.3.5.1.2.1	Required Event Reference Information	O	Yes / No	
			3.3.3.5.1.3.1	Event Time (EventTime)	M	Yes	
			3.3.3.5.1.3.1.1	Required Event Time Information	M	Yes	
			3.3.3.5.1.3.1.2.13.3.3.5.1.3.1.2.1	Event Valid Period (EventValidPeriod)	M	Yes	
			3.3.3.5.1.3.1.2.2	Effective Period Qualifier	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.3	Days Event Not In Effect	EventValidPeriod:O	Yes / No / NA	
			3.3.3.5.1.1.2.2	Message Expiry Time	EventValidPeriod:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.4	Planned Event Schedule Element Identifier	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.5	Sequence Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.7	Expected Start Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.8	Expected End Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.9	Recurrent Times Event in Effect	EffectivePeriod:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.10	Planned Event Continuous Flag	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.2	Event Source (EventSource)	O	Yes / No	
			3.3.3.5.1.3.2.1	Information Source Organization	EventSource:O.6 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.3	Event Description (EventDescription)	O	Yes / No	
			3.3.3.5.1.3.4	Event Location (EventLocation)	O	Yes / No	
			3.3.3.5.1.3.4.1	Area Identifier (AreaLocation)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.1.2	Name of Area	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.1.3	Area Location Rank	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.1.4	Secondary Area Location Reference	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.2	Required Link Location Information (LinkLocation)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.3.1	Link Ownership	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.2	Route Designator	LinkLocation:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.3.4.3.3	Second Route Designator	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.4	Link Identifier	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.5	Link Name – Events	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.7	Secondary Point	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.8	Link Direction	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.9	Link Alignment	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.10	Linear Reference Version – Events	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.11	Alternate Link Location	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.4	Required Point on a Link Location Information (PointOnALink)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.5.1	Linear Reference Location	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.2	Link Name – Event Point	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.3	Point Name	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.4	Cross Street Identifier	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.5	Cross Street Name	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.6	Signed Destination	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.7	Point Location Rank	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.8	Landmark Type	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.9	Secondary Link Location	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.6	Required Landmark Location Information (Landmark)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.7.1	Landmark Point Name	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.2	Landmark Location Rank	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.3	Landmark Location	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.4	Secondary Landmark Location	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.8	Event Geographic Location	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.5	Event Name	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.3.6	Event Lane (EventLane)	O	Yes / No	
			3.3.3.5.1.3.6.1.1	Lane Type	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.2	Direction of Travel	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.3	Total Number of Lanes	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.4	Number of Lanes Affected	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.5	Lane Number Affected	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.6	Lane Status	EventLane:O	Yes / No / NA	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.3.6.2	Event Indicator (EventIndicator)	O	Yes / No	
			3.3.3.6.2.1	Event Status	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.2	Event Duration Exceeded Flag	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.3	Event Impact Level	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.5	Event Class	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.3	Other References(EventReferences)	O	Yes / No	
			3.3.3.6.3.1	Trip Reference	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.2	Responsible Reference	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.3	Related Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.4	Previous Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.5	Split Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.6	Merged Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.7	Sibling Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.9	Associated URL	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.4	Event Comments (EventComments)	O	Yes / No	
			3.3.3.6.4.1	Required Event Comments	EventComments:M	Yes / NA	
		Error Report Message					
			3.3.1.7.1	Contents of the Error Report	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.2.4	Need for Forecasted Event Information				Optional	Yes / No	
		Dialogs					
			3.3.3.1	Send Event Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.3.2	Publish Event Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.3.3	Subscribe to Event Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.4	Contents of Event Information Request	M	Yes	
			3.3.3.4.1	Required Event Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	AuthEvents:O	Yes / No / NA	
			3.3.3.4.2.3	Requesting Organization – — Events	O	Yes / No	
		Response Message					
			3.3.3.5	Contents of the Event Information	M	Yes	
			3.3.3.5.1	Required Event Information Content	M	Yes	
			3.3.3.5.1.1.1	Required Event Message Header Information	M	Yes	
			3.3.3.5.1.1.2.1	External Center Organization – Events	O	Yes / No	
			3.3.3.5.1.1.2.2	Message Expiry Time	O	Yes / No	
			3.3.3.5.1.2.1	Required Event Reference Information	M	Yes	
			3.3.3.5.1.3.1	Event Time (EventTime)	M	Yes	
			3.3.3.5.1.3.1.1	Required Event Time Information	M	Yes	
			3.3.3.5.1.3.1.2.13.3.3.5.1.3.1.2.1	Event Valid Period (EventValidPeriod)	EventTime:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.3.1.2.2	Effective Period Qualifier	EventValidPeriod:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.3	Days Event Not In Effect	EventValidPeriod:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.5	Sequence Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.6	Event Start Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.7	Expected Start Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.8	Expected End Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.9	Recurrent Times Event in Effect	EffectivePeriod:O	Yes / No / NA	
			3.3.3.5.1.3.2	Event Source (EventSource)	O	Yes / No	
			3.3.3.5.1.3.2.1	Information Source Organization	EventSource:O.6 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.3	Event Description (EventDescription)	O	Yes / No	
			3.3.3.5.1.3.3.1	Event Quantity	EventDescription:O	Yes / No / NA	
			3.3.3.5.1.3.4	Event Location (EventLocation)	O	Yes / No	
			3.3.3.5.1.3.4.1	Area Identifier (AreaLocation)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.1.2	Name of Area	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.1.3	Area Location Rank	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.1.4	Secondary Area Location Reference	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.2	Required Link Location Information (LinkLocation)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.3.1	Link Ownership	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.2	Route Designator	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.3	Second Route Designator	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.4	Link Identifier	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.5	Link Name – Events	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.7	Secondary Point	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.8	Link Direction	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.9	Link Alignment	LinkLocation:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.3.4.3.10	Linear Reference Version – Events	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.11	Alternate Link Location	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.4	Required Point on a Link Location Information (PointOnALink)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.5.1	Linear Reference Location	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.2	Link Name – Event Point	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.3	Point Name	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.4	Cross Street Identifier	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.5	Cross Street Name	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.6	Signed Destination	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.7	Point Location Rank	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.8	Landmark Type	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.9	Secondary Link Location	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.6	Required Landmark Location Information (Landmark)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.7.1	Landmark Point Name	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.2	Landmark Location Rank	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.3	Landmark Location	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.4	Secondary Landmark Location	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.8	Event Geographic Location	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.5	Event Name	O	Yes / No	
			3.3.3.5.1.3.6	Event Lane (EventLane)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.6.1.1	Lane Type	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.2	Direction of Travel	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.2	Landmark Location Rank	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.3	Total Number of Lanes	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.4	Number of Lanes Affected	EventLane:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.3.6.1.5	Lane Number Affected	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.6	Lane Status	EventLane:O	Yes / No / NA	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.3.6.2	Event Indicator (EventIndicator)	O	Yes / No	
			3.3.3.6.2.1	Event Status	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.2	Event Duration Exceeded Flag	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.3	Other References(EventReferences)	O	Yes / No	
			3.3.3.6.3.1	Trip Reference	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.2	Responsible Reference	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.3	Related Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.4	Previous Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.5	Split Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.6	Merged Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.7	Sibling Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.8	Associated Device	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.9	Associated URL	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.4	Event Comments(EventComments)	O	Yes / No	
			3.3.3.6.4.1	Required Event Comments	EventComments:M	Yes / NA	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.2.5	Need to Share the List of Events				Optional	Yes / No	
		Dialogs					
			3.3.3.9.1	Send Activity Logs Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.9.2	Publish Activity Log Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 100 ms) after the information is updated in the owner center. See 3.4.1.
			3.3.3.9.3	Subscribe to Activity Log Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.9.4	Contents of the Activity Log Request	M	Yes	
			3.3.3.9.4.1	Required Activity Log Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.3.9.4.2.2	Request Time	O	Yes / No	
		Response Message					
			3.3.3.7.5.1	Required Event Index Information Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3	Data Needs for Event Response Plans					Yes / No	
2.4.2.3.1	Need to Distribute a Set of Proposed Response Plans to an Event				Optional		
		Dialogs					
			3.3.3.8.1	Send Response Plan Information Upon Request	M	Yes	
			3.3.3.8.2	Publish Response Plan Information	Subscription:O	Yes / No / NA	
			3.3.3.8.3	Subscribe to Response Plan Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.8.4	Content of Response Plan Information Request	M	Yes	
			3.3.3.8.4.1	Required Response Plan Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.3.9.4.2.2	Request Time	O	Yes / No	
			3.3.3.8.4.2.3	Corridor Identifier	O	Yes / No	
			3.3.3.8.4.2.4	Response Plan Request Filter	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Response Message					
			3.3.3.8.5.1	Response Plan Information Content	M	Yes	
			3.3.3.8.5.2.1	Required Response Plan Header Content	M	Yes	
			3.3.3.8.5.2.2.1	Response Plan Ranking	O	Yes	
			3.3.3.8.5.2.2.2	Submission Time	O	Yes / No	
			3.3.3.8.5.3.1	Required Evaluation Cycle Content	M	Yes	
			3.3.3.8.5.3.2.1	Link State	O	Yes / No	
			3.3.3.8.5.3.2.2	Response Plan List	O	Yes / No	
			3.3.3.8.5.4.1	Required Response Plan Details	M	Yes	
			3.3.3.8.5.4.2.1	Detour List	O	Yes / No	
			3.3.3.8.5.4.2.2	Ramp Meter Actions	O	Yes / No	
			3.3.3.8.5.4.2.3	Intersection Signal Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.4	DMS Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.5	HAR Message Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.6	Other Messaging	O	Yes / No	
			3.3.3.8.5.4.2.7	LCS Schedule Changes	O	Yes / No	
			3.3.3.8.5.4.2.8	Speed Restrictions	O	Yes / No	
			3.3.3.8.5.4.2.9	Road Closure Actions	O	Yes / No	
			3.3.3.8.5.4.2.10	Personnel Deployment Actions	O	Yes / No	
			3.3.3.8.5.4.2.11	Device Control Cancellations	O	Yes / No	
			3.3.3.8.5.4.2.12	Aggregate Approval Decisions	O	Yes / No	
			3.3.3.8.5.4.2.13	Individual Approval Decisions	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.2	Need to Correlate Response Plan with an Event				Optional		
		Dialogs					
			3.3.3.8.1	Send Response Plan Information Upon Request	M	Yes	
			3.3.3.8.2	Publish Response Plan Information	Subscription:O	Yes / No / NA	
			3.3.3.8.3	Subscribe to Response Plan Information	Subscription:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Request Message					
			3.3.3.8.4	Content of Response Plan Information Request	M	Yes	
			3.3.3.8.4.1	Required Response Plan Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.3.9.4.2.2	Request Time	O	Yes / No	
			3.3.3.8.4.2.3	Corridor Identifier	O	Yes / No	
			3.3.3.8.4.2.4	Response Plan Request Filter	O	Yes / No	
		Response Message					
			3.3.3.8.5.1	Response Plan Information Content	M	Yes	
			3.3.3.8.5.2.1	Required Response Plan Header Content	M	Yes	
			3.3.3.8.5.2.2.1	Response Plan Ranking	O	Yes / No	
			3.3.3.8.5.2.2.2	Submission Time	O	Yes / No	
			3.3.3.8.5.3.1	Required Evaluation Cycle Content	M	Yes	
			3.3.3.8.5.3.2.1	Link State	O	Yes / No	
			3.3.3.8.5.3.2.2	Response Plan List	O	Yes / No	
			3.3.3.8.5.4.1	Required Response Plan Details	M	Yes	
			3.3.3.8.5.4.2.1	Detour List	O	Yes / No	
			3.3.3.8.5.4.2.2	Ramp Meter Actions	O	Yes / No	
			3.3.3.8.5.4.2.3	Intersection Signal Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.4	DMS Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.5	HAR Message Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.6	Other Messaging	O	Yes / No	
			3.3.3.8.5.4.2.7	LCS Schedule Changes	O	Yes / No	
			3.3.3.8.5.4.2.8	Speed Restrictions	O	Yes / No	
			3.3.3.8.5.4.2.9	Road Closure Actions	O	Yes / No	
			3.3.3.8.5.4.2.10	Personnel Deployment Actions	O	Yes / No	
			3.3.3.8.5.4.2.11	Device Control Cancellations	O	Yes / No	
			3.3.3.8.5.4.2.12	Aggregate Approval Decisions	O	Yes / No	
			3.3.3.8.5.4.2.13	Individual Approval Decisions	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.3	Need to Share Response Plan List of Organizations				Optional		
		Dialogs					
			3.3.3.8.1	Send Response Plan Information Upon Request	M	Yes	
			3.3.3.8.2	Publish Response Plan Information	Subscription:O	Yes / No / NA	
			3.3.3.8.3	Subscribe to Response Plan Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.8.4	Content of Response Plan Information Request	M	Yes	
			3.3.3.8.4.1	Required Response Plan Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.3.9.4.2.2	Request Time	O	Yes / No	
			3.3.3.8.4.2.3	Corridor Identifier	O	Yes / No	
			3.3.3.8.4.2.4	Response Plan Request Filter	O	Yes / No	
		Response Message					
			3.3.3.8.5.1	Response Plan Information Content	M	Yes	
			3.3.3.8.5.2.1	Required Response Plan Header Content	M	Yes	
			3.3.3.8.5.2.2.1	Response Plan Ranking	O	Yes / No	
			3.3.3.8.5.2.2.2	Submission Time	O	Yes / No	
			3.3.3.8.5.3.1	Required Evaluation Cycle Content	O	Yes / No	
			3.3.3.8.5.3.2.1	Link State	M	Yes	
			3.3.3.8.5.3.2.2	Response Plan List	O	Yes	
			3.3.3.8.5.4.1	Required Response Plan Details	M	Yes / No	
			3.3.3.8.5.4.2.1	Detour List	O	Yes / No	
			3.3.3.8.5.4.2.2	Ramp Meter Actions	O	Yes / No	
			3.3.3.8.5.4.2.3	Intersection Signal Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.4	DMS Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.5	HAR Message Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.6	Other Messaging	O	Yes / No	
			3.3.3.8.5.4.2.7	LCS Schedule Changes	O	Yes / No	
			3.3.3.8.5.4.2.8	Speed Restrictions	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.8.5.4.2.9	Road Closure Actions	O	Yes / No	
			3.3.3.8.5.4.2.10	Personnel Deployment Actions	O	Yes / No	
			3.3.3.8.5.4.2.11	Device Control Cancellations	O	Yes / No	
			3.3.3.8.5.4.2.12	Aggregate Approval Decisions	O	Yes / No	
			3.3.3.8.5.4.2.13	Individual Approval Decisions	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.4	Need to Share Response Plan Assets and Activities				Optional		
		Dialogs					
			3.3.3.8.1	Send Response Plan Information Upon Request	M	Yes	
			3.3.3.8.2	Publish Response Plan Information	Subscription:O	Yes / No / NA	
			3.3.3.8.3	Subscribe to Response Plan Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.8.4	Content of Response Plan Information Request	M	Yes	
			3.3.3.8.4.1	Required Response Plan Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.3.9.4.2.2	Request Time	O	Yes / No	
			3.3.3.8.4.2.3	Corridor Identifier	O	Yes / No	
			3.3.3.8.4.2.4	Response Plan Request Filter	O	Yes / No	
		Response Message					
			3.3.3.8.5.1	Response Plan Information Content	M	Yes	
			3.3.3.8.5.2.1	Required Response Plan Header Content	M	Yes	
			3.3.3.8.5.2.2.1	Response Plan Ranking	O	Yes	
			3.3.3.8.5.2.2.2	Submission Time	O	Yes / No	
			3.3.3.8.5.3.1	Required Evaluation Cycle Content	M	Yes	
			3.3.3.8.5.3.2.1	Link State	O	Yes / No	
			3.3.3.8.5.3.2.2	Response Plan List	O	Yes / No	
			3.3.3.8.5.4.1	Required Response Plan Details	M	Yes	
			3.3.3.8.5.4.2.1	Detour List	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.8.5.4.2.2	Ramp Meter Actions	O	Yes / No	
			3.3.3.8.5.4.2.3	Intersection Signal Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.4	DMS Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.5	HAR Message Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.6	Other Messaging	O	Yes / No	
			3.3.3.8.5.4.2.7	LCS Schedule Changes	O	Yes / No	
			3.3.3.8.5.4.2.8	Speed Restrictions	O	Yes / No	
			3.3.3.8.5.4.2.9	Road Closure Actions	O	Yes / No	
			3.3.3.8.5.4.2.10	Personnel Deployment Actions	O	Yes / No	
			3.3.3.8.5.4.2.11	Device Control Cancellations	O	Yes / No	
			3.3.3.8.5.4.2.12	Aggregate Approval Decisions	O	Yes / No	
			3.3.3.8.5.4.2.13	Individual Approval Decisions	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.5	Need to Share Status of Response Plans				Optional		
		Dialogs					
			3.3.3.8.6.1	Send Response Plan Status Upon Request	M	Yes	
			3.3.3.8.6.2	Publish Response Plan Status	Subscription:O	Yes / No / NA	
			3.3.3.8.6.3	Subscribe to Response Plan Status	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.8.6.4	Contents of the Response Plan Status Information Request	M	Yes	
			3.3.3.8.6.4.1	Required Response Plan Status Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.3.9.4.2.2	Request Time	O	Yes / No	
		Response Message					
			3.3.3.8.6.5	Contents of the Response Plan Status Response	M	Yes	
			3.3.3.8.6.5.1	Required Response Plan Status Content	M	Yes	
		Error Report Message					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.6	Need to Share a Log of Response Plan Activities				Optional		
		Dialogs					
			3.3.3.9.1	Send Activity Logs Upon Request	M	Yes	
			3.3.3.9.2	Publish Activity Log Information	Subscription:O	Yes / No / NA	
			3.3.3.9.3	Subscribe to Activity Log Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.9.4	Contents of the Activity Log Request	M	Yes	
			3.3.3.9.4.1	Required Activity Log Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.3.9.4.2.2	Request Time	O	Yes / No	
		Response Message					
			3.3.3.9.5.1	Required Event Activity Log Information Content	M	Yes	
			3.3.3.9.5.4.1	Required Response Plan Activity Log Details Content	M	Yes	
			3.3.3.9.5.4.2.1	Command Send Time	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.7	Need to Request Approval of a Response Plan				Optional		
		Dialogs					
			3.3.3.8.7.1	Send Response Plan Approval Upon Request	M	Yes	
			3.3.3.8.7.2	Publish Response Approval	Subscription:O	Yes / No / NA	
			3.3.3.8.7.3	Subscribe to Response Plan Approval	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.8.7.4	Contents of the Response Plan Approval Request	M	Yes	
		Response Message					
			3.3.3.8.7.5	Contents of the Response Plan Approval Response	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.8.7.5.1	Required Response Plan Approval Response Content	M	Yes	
			3.3.3.8.7.5.2	Contents of the Response Approval Decision	M	Yes	
			3.3.3.8.7.5.2.1	Required Response Approval Decision Content	M	Yes	
			3.3.3.8.7.5.2.2.1	Decision Time	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.8	Need to Provide Approval of a Response Plan				Optional		
		Dialogs					
			3.3.3.8.7.1	Send Response Plan Approval Upon Request	M	Yes	
			3.3.3.8.7.2	Publish Response Approval	Subscription:O	Yes / No / NA	
			3.3.3.8.7.3	Subscribe to Response Plan Approval	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.8.7.4	Contents of the Response Plan Approval Request	M	Yes	
		Response Message					
			3.3.3.8.7.5	Contents of the Response Plan Approval Response	M	Yes	
			3.3.3.8.7.5.1	Required Response Plan Approval Response Content	M	Yes	
			3.3.3.8.7.5.2	Contents of the Response Approval Decision	M	Yes	
			3.3.3.8.7.5.2.2.1	Decision Time	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.9	Need to Update a Response Plan				Optional		
		Dialogs					
			3.3.3.8.1	Send Response Plan Information Upon Request	M	Yes	
			3.3.3.8.2	Publish Response Plan Information	Subscription:O	Yes / No / NA	
			3.3.3.8.3	Subscribe to Response Plan Information	Subscription:O	Yes / No / NA	
		Request Message					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.8.4	Content of Response Plan Information Request	M	Yes	
			3.3.3.8.4.1	Required Response Plan Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.3.9.4.2.2	Request Time	O	Yes / No	
			3.3.3.8.4.2.3	Corridor Identifier	O	Yes / No	
			3.3.3.8.4.2.4	Response Plan Request Filter	O	Yes / No	
		Response Message					
			3.3.3.8.5.1	Response Plan Information Content	M	Yes	
			3.3.3.8.5.2.1	Required Response Plan Header Content	M	Yes	
			3.3.3.8.5.2.2.1	Response Plan Ranking	O	Yes / No	
			3.3.3.8.5.2.2.2	Submission Time	O	Yes / No	
			3.3.3.8.5.3.1	Required Evaluation Cycle Content	M	Yes	
			3.3.3.8.5.3.2.1	Link State	O	Yes / No	
			3.3.3.8.5.3.2.2	Response Plan List	O	Yes / No	
			3.3.3.8.5.4.1	Required Response Plan Details	M	Yes / No	
			3.3.3.8.5.4.2.1	Detour List	O	Yes / No	
			3.3.3.8.5.4.2.2	Ramp Meter Actions	O	Yes / No	
			3.3.3.8.5.4.2.3	Intersection Signal Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.4	DMS Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.5	HAR Message Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.6	Other Messaging	O	Yes / No	
			3.3.3.8.5.4.2.7	LCS Schedule Changes	O	Yes / No	
			3.3.3.8.5.4.2.8	Speed Restrictions	O	Yes / No	
			3.3.3.8.5.4.2.9	Road Closure Actions	O	Yes / No	
			3.3.3.8.5.4.2.10	Personnel Deployment Actions	O	Yes / No	
			3.3.3.8.5.4.2.11	Device Control Cancellations	O	Yes / No	
			3.3.3.8.5.4.2.12	Aggregate Approval Decisions	O	Yes / No	
			3.3.3.8.5.4.2.13	Individual Approval Decisions	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
2.4.2.3.10	Need to Cancel a Response Plan				Optional		
		Dialogs					
			3.3.3.8.8.1	Send Response Plan Cancellation Acknowledgement Upon Request	M	Yes	
		Request Message					
			3.3.3.8.8.2	Contents of the Response Plan Cancellation Request	M	Yes	
			3.3.3.8.8.2.1	Required Response Plan Cancellation Request Requirements	M	Yes	
			3.3.3.8.8.2.2.1	List of Response Plans to be Cancelled	O	Yes / No	
		Response Message					
			3.3.3.8.8.3	List of Response Plans to be Cancelled	M	Yes	
			3.3.3.8.8.3.1	Required Response Plan Cancellation Response Content	M	Yes	
			3.3.3.8.8.3.2.1	Time of Status Update	O	Yes / No	
			3.3.3.8.8.3.2.2	Cancellation Plan Details	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.11	Need to Request Cancellation of Event Response Plan Activities				Optional		
		Dialogs					
			3.3.3.8.8.1	Send Response Plan Cancellation Acknowledgement Upon Request	M	Yes	
		Request Message					
			3.3.3.8.8.2	Contents of the Response Plan Cancellation Request	M	Yes	
			3.3.3.8.8.2.1	Required Response Plan Cancellation Request Requirements	M	Yes	
			3.3.3.8.8.2.2.1	List of Response Plans to be Cancelled	O	Yes / No	
		Response Message					
			3.3.3.8.8.3	List of Response Plans to be Cancelled	M	Yes	
			3.3.3.8.8.3.1	Required Response Plan Cancellation Response Content	M	Yes	
			3.3.3.8.8.3.2.1	Time of Status Update	O	Yes	
			3.3.3.8.8.3.2.2	Cancellation Plan Details	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.3.12	Need to Indicate Cancellation of Event Response Plan Activities				Optional	Yes / No	
		Response Message					
			3.3.3.8.8.3.1	Required Response Plan Cancellation Response Content	M	Yes	
			3.3.3.8.8.3.2.1	Time of Status Update	O	Yes / No	
			3.3.3.8.8.3.2.2	Cancellation Plan Details	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.4	Data Needs Relating to Roadway Network Data						
2.4.2.4.1	Need for Roadway Network Inventory						
2.4.2.4.1.1	Need for Node Inventory				Mandatory	Yes	
		Dialogs					
			3.3.4.2.1.2	Publish Node Inventory Information	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.2.1.3	Subscribe to Node Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.4.2.1.3	Subscribe to Node Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.1.1.2.2	Roadway Network Identifier	AuthNetwork:O	Yes / No / NA	
			3.3.4.1.1.2.3	Traffic Network Identifier	O	Yes / No	
			3.3.4.2.1.4	Contents of the Node Inventory Request	M	Yes	
		Response Message					
			3.3.4.2.1.5	Contents of the Node Inventory Information	M	Yes	
			3.3.4.2.1.5.1	Required Node Inventory Information Content	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.4.2.1.5.2.2	Roadway Network Name – Node Inventory	O	Yes / No	
			3.3.4.2.1.5.2.3	Node Name – Node Inventory	O	Yes / No	
			3.3.4.2.1.5.2.4	Node Description	O	Yes / No	
			3.3.4.2.1.5.2.5	Route Designator – Node Inventory	O	Yes / No	
			3.3.4.2.1.5.2.6	Node Direction	O	Yes / No	
			3.3.4.2.1.5.2.7	Linear Reference – Node Inventory	O	Yes / No	
			3.3.4.2.1.5.2.8	Node Type	O	Yes / No	
			3.3.4.2.1.5.2.9	Number of Links	O	Yes / No	
			3.3.4.2.1.5.2.10	Node Inventory Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.4.1.2	Need for Link Inventory				Mandatory		
		Dialogs					
			3.3.4.3.1.1	Send Link Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.3.1.2	Publish Link Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.4.1.3	Subscribe to Link Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.4.1.1.2.2	Roadway Network Identifier	AuthNetwork:O	Yes / No / NA	
			3.3.4.1.1.2.3	Traffic Network Identifier	O	Yes / No	
			3.3.4.3.1.4	Contents of the Link Inventory Request	M	Yes	
		Response Message					
			3.3.4.3.1.5	Contents of the Link Inventory Information	M	Yes	
			3.3.4.3.1.5.1	Required Link Inventory Information Content	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.4.3.1.5.2.2	Roadway Network Name – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.3	Link Name – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.4	Alternate Names – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.5	Route Designator – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.6	Secondary Route Designators	O	Yes / No	
			3.3.4.3.1.5.2.7	Linear Reference – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.8	Link Length	O	Yes / No	
			3.3.4.3.1.5.2.9	Link Capacity	O	Yes / No	
			3.3.4.3.1.5.2.10	Link Lane Information	O	Yes / No	
			3.3.4.3.1.5.2.11	Link Speed Limit – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.12	Link Truck Speed Limit – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.13	Speed Limit Units – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.14	Link Law Enforcement Jurisdiction	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.3.1.5.2.15	Designated Owner	O	Yes / No	
			3.3.4.3.1.5.2.16	Left Shoulder Width	O	Yes / No	
			3.3.4.3.1.5.2.17	Right Shoulder Width	O	Yes / No	
			3.3.4.3.1.5.2.18	Median Type	O	Yes / No	
			3.3.4.3.1.5.2.19	Link Inventory Date and Time Change Information	O	Yes / No	
			3.3.4.3.1.5.2.20	Next Link	O	Yes / No	
			3.3.4.3.1.5.2.21	Previous Link	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.4.1.3	Need for Route Inventory				Optional	Yes / No	
		Dialogs					
			3.3.4.3.1.1	Send Link Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.4.1.2	Publish Route Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.4.4.1.3	Subscribe to Route Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.4.1.1.2.2	Roadway Network Identifier	AuthNetwork:O	Yes / No / NA	
			3.3.4.1.1.2.3	Traffic Network Identifier	O	Yes / No	
			3.3.4.4.1.4	Contents of the Route Inventory Request	M	Yes	
		Response Message					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.4.1.5	Contents of the Route Inventory Information	M	Yes	
			3.3.4.4.1.5.1	Required Route Inventory Information Content	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.4.4.1.5.2	Roadway Network Name – Route Inventory	O	Yes / No	
			3.3.4.4.1.5.2.3	Route Name – Route Inventory	O	Yes / No	
			3.3.4.4.1.5.2.4	Alternate Route Names – Route Inventory	O	Yes / No	
			3.3.4.4.1.5.2.5	Route Length	O	Yes / No	
			3.3.4.4.1.5.2.6	Node List	O	Yes / No	
			3.3.4.4.1.5.2.7	Route Image URL(RouteURL)	O	Yes / No	
			3.3.4.4.1.5.2.8	Route Image URL Reference Medium	RouteURL:O	Yes / No / NA	
			3.3.4.4.1.5.2.9	Route Inventory Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.4.1.4	Need to Share Vehicle Inventory						
		Dialogs					
			3.3.4.5.1.1	Send Fleet Vehicle Inventory Information Upon Request	M	Yes	
			3.3.4.5.1.2	Publish Fleet Vehicle Inventory Information	Subscription:O	Yes / No / NA	
			3.3.4.5.1.3	Subscribe to Fleet Vehicle Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
		Response Message					
			3.3.4.5.1.5.1	Required Fleet Vehicle Inventory Information Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.4.2	Need to Share Node, Link and Route Status					Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
2.4.2.4.2.1	Need to Share Node State				Optional	Yes / No	
		Dialogs					
			3.3.4.2.2.1	Send Node Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.2.2.2	Publish Node Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.4.2.2.3	Subscribe to Node Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	AuthNetwork:O	Yes / No / NA	
			3.3.4.1.1.2.2	Roadway Network Identifier	O	Yes / No	
			3.3.4.1.1.2.3	Traffic Network Identifier	O	Yes / No	
			3.3.4.2.2.4	Contents of the Node Status Request	M	Yes	
		Response Message					
			3.3.4.2.2.5	Contents of the Node Status Information	M	Yes	
			3.3.4.2.2.5.1	Required Node Status Information Content	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.4.2.2.5.2.2	Roadway Network Name – Node Status	O	Yes / No	
			3.3.4.2.2.5.2.3	Node Name – Node Status	O	Yes / No	
			3.3.4.2.2.5.2.4	Node Status Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
2.4.2.4.2.2	Need to Share Link State				Optional	Yes / No	
		Dialogs					
			3.3.4.3.2.1	Send Link Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.3.2.2	Publish Link Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.4.3.2.3	Subscribe to Link Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	M	Yes	
			3.3.1.8.2	Operator Identifier – Requests	AuthNetwork:O	Yes / No / NA	
			3.3.4.1.1.2.2	Roadway Network Identifier	O	Yes / No	
			3.3.4.1.1.2.3	Traffic Network Identifier	O	Yes / No	
			3.3.4.3.2.4	Contents of the Link Status Request	M	Yes	
		Response Message					
			3.3.4.3.2.5	Contents of the Link Status Information	M	Yes	
			3.3.4.3.2.5.1	Required Link Status Information Content	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.4.3.2.5.2.2	Link Name – – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.3	Link Direction – – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.4	Lanes Open	O	Yes / No	
			3.3.4.3.2.5.2.19	Roadway Event Source	O	Yes / No	
			3.3.4.3.2.5.2.37	Event Description Time – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.38	Link Lane Status	O	Yes / No	
			3.3.4.3.2.5.2.39	Link Lane Direction Status	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.3.2.5.2.40	Link Status Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.4.2.3	Need to Share Route State				Optional	Yes / No	
		Dialogs					
			3.3.4.4.2.1	Send Route Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.4.2.2	Publish Route Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.4.4.2.3	Subscribe to Route Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	AuthNetwork:O	Yes / No / NA	
			3.3.4.1.1.2.2	Roadway Network Identifier	O	Yes / No	
			3.3.4.1.1.2.3	Traffic Network Identifier	O	Yes / No	
			3.3.4.4.2.4	Contents of the Route Status Request	M	Yes	
		Response Message					
			3.3.4.4.2.5	Contents of the Route Status Information	M	Yes	
			3.3.4.4.2.5.1	Required Route Status Information Content	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.4.2.5.2.2	Route Name – Route Status	O	Yes / No	
			3.3.4.4.2.5.2.3	Route Detour Status Flag	O	Yes / No	
			3.3.4.4.2.5.2.21	Event Description Time – Route Status	O	Yes / No	
			3.3.4.4.2.5.2.22	Route Status Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.4.3	Need to Share Link Data				Optional	Yes / No	
		Dialogs					
			3.3.4.3.2.1	Send Link Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.3.2.2	Publish Link Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.4.3.2.3	Subscribe to Link Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	M	Yes	
			3.3.1.8.2	Operator Identifier – Requests	AuthNetwork:O	Yes / No / NA	
			3.3.4.1.1.2.2	Roadway Network Identifier	O	Yes / No	
			3.3.4.1.1.2.3	Traffic Network Identifier	O	Yes / No	
			3.3.4.3.2.4	Contents of the Link Status Request	M	Yes	
		Response Message					
			3.3.4.3.2.5	Contents of the Link Status Information	M	Yes	
			3.3.4.3.2.5.1	Required Link Status Information Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.4.3.2.5.2.2	Link Name – – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.3	Link Direction – – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.4	Lanes Open	O	Yes / No	
			3.3.4.3.2.5.2.5	Link Priority	O	Yes / No	
			3.3.4.3.2.5.2.6	Link Restrictions – – Axles	O	Yes / No	
			3.3.4.3.2.5.2.7	Link Restrictions – – Height	O	Yes / No	
			3.3.4.3.2.5.2.8	Link Restrictions – – Length	O	Yes / No	
			3.3.4.3.2.5.2.9	Link Restrictions – Weight	O	Yes / No	
			3.3.4.3.2.5.2.10	Link Restrictions – Width	O	Yes / No	
			3.3.4.3.2.5.2.11	Link Restrictions –Axle Weight	O	Yes / No	
			3.3.4.3.2.5.2.12	Link Restrictions Units	O	Yes / No	
			3.3.4.3.2.5.2.13	Link Surface Conditions	O	Yes / No	
			3.3.4.3.2.5.2.14	Link Saturation	O	Yes / No	
			3.3.4.3.2.5.2.15	Link Saturation Threshold	O	Yes / No	
			3.3.4.3.2.5.2.16	Link Level of Service	O	Yes / No	
			3.3.4.3.2.5.2.17	Lane Numbers	O	Yes / No	
			3.3.4.3.2.5.2.18	Link Data Stored Type	O	Yes / No	
			3.3.4.3.2.5.2.19	Roadway Event Source	O	Yes / No	
			3.3.4.3.2.5.2.20	Traffic Data Type	O	Yes / No	
			3.3.4.3.2.5.2.21	Link Stops	O	Yes / No	
			3.3.4.3.2.5.2.22	Link Delay Time	O	Yes / No	
			3.3.4.3.2.5.2.23	Link Delay Time – Alternate Route	O	Yes / No	
			3.3.4.3.2.5.2.24	Link Headway	O	Yes / No	
			3.3.4.3.2.5.2.25	Link Travel Time	O	Yes / No	
			3.3.4.3.2.5.2.26	Link Existing Capacity	O	Yes / No	
			3.3.4.3.2.5.2.27	Link Travel Time Increase	O	Yes / No	
			3.3.4.3.2.5.2.28	Link Average Speed	O	Yes / No	
			3.3.4.3.2.5.2.29	Link Estimated Speed	O	Yes / No	
			3.3.4.3.2.5.2.30	Link Speed Limit – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.31	Link Current Advisory Speed	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.3.2.5.2.32	Link Truck Speed Limit – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.33	Speed Limit Units – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.34	Link Density	O	Yes / No	
			3.3.4.3.2.5.2.35	Link Occupancy	O	Yes / No	
			3.3.4.3.2.5.2.36	Link Volume	O	Yes / No	
			3.3.4.3.2.5.2.37	Event Description Time – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.38	Link Lane Status	O	Yes / No	
			3.3.4.3.2.5.2.39	Link Lane Direction Status	O	Yes / No	
			3.3.4.3.2.5.2.40	Link Status Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.4.4	Need to Share Route Data				Optional	Yes / No	
		Dialogs					
			3.3.4.4.2.1	Send Route Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.4.2.2	Publish Route Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.4.4.2.3	Subscribe to Route Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	AuthNetwork:O	Yes / No / NA	
			3.3.4.1.1.2.2	Roadway Network Identifier	O	Yes / No	
			3.3.4.1.1.2.3	Traffic Network Identifier	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.4.2.4	Contents of the Route Status Request	M	Yes	
		Response Message					
			3.3.4.4.2.5.1	Required Route Status Information Content	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.4.4.2.5.2.2	Route Name – Route Status	O	Yes / No	
			3.3.4.4.2.5.2.3	Route Detour Status Flag	O	Yes / No	
			3.3.4.4.2.5.2.4	Route Surface Conditions	O	Yes / No	
			3.3.4.4.2.5.2.5	Route Existing Capacity	O	Yes / No	
			3.3.4.4.2.5.2.6	Route Level of Service	O	Yes / No	
			3.3.4.4.2.5.2.7	Route Saturation	O	Yes / No	
			3.3.4.4.2.5.2.8	Route Data Stored Type	O	Yes / No	
			3.3.4.4.2.5.2.9	Route Traffic Algorithm Data Type	O	Yes / No	
			3.3.4.4.2.5.2.10	Route Delay Time	O	Yes / No	
			3.3.4.4.2.5.2.11	Route Delay Time – Alternate Route	O	Yes / No	
			3.3.4.4.2.5.2.12	Route Headway	O	Yes / No	
			3.3.4.4.2.5.2.13	Route Travel Time	O	Yes / No	
			3.3.4.4.2.5.2.14	Route Travel Time Increase	O	Yes / No	
			3.3.4.4.2.5.2.15	Route Volume	O	Yes / No	
			3.3.4.4.2.5.2.16	Route Average Speed	O	Yes / No	
			3.3.4.4.2.5.2.17	Route Density	O	Yes / No	
			3.3.4.4.2.5.2.18	Route Occupancy	O	Yes / No	
			3.3.4.4.2.5.2.19	Route Current Advisory Speed	O	Yes / No	
			3.3.4.4.2.5.2.20	Speed Limit Units – Route Status	O	Yes / No	
			3.3.4.4.2.5.2.21	Event Description Time – Route Status	O	Yes / No	
			3.3.4.4.2.5.2.22	Route Status Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.4.5	Need for Fleet Vehicle Information				Optional	Yes / No	
	Dialogs						

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.5.2.1	Send Fleet Vehicle Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.5.2.2	Publish Fleet Vehicle Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.4.5.2.3	Subscribe to Fleet Vehicle Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
		Response Message					
			3.3.4.5.2.5	Contents of the Fleet Vehicle Information	M	Yes	
			3.3.4.5.2.5.1	Required Fleet Vehicle Information Content	M	Yes	
			3.3.4.5.2.5.2.1	Fleet Vehicle Driver	M	Yes	
			3.3.4.5.2.5.2.2	Fleet Vehicle Occupancy	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5	Data Needs Relating to Device Data and Device Control						
2.4.2.5.1	Need to Share Traffic Detector Data						
2.4.2.5.1.1	Need to Share Detector Inventory				Optional	Yes / No	
			3.3.5.2.1.1	Send Detector Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.2.1.2	Publish Detector Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.2.1.3	Subscribe to Detector Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.2.1.4	Required Detector Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.2.1.5.1	Required Detector Inventory Response Content	M	Yes	
			3.3.5.2.1.5.2.1	Detector Station Inventory Information	O	Yes / No	
			3.3.5.2.1.5.2.2	Lane Number – Detector Inventory	O	Yes / No	
			3.3.5.2.1.5.2.3	Speed Trap Flag	O	Yes / No	
			3.3.5.2.1.5.2.4	Vehicle Bin 1	O	Yes / No	
			3.3.5.2.1.5.2.5	Vehicle Bin 2	O	Yes / No	
			3.3.5.2.1.5.2.6	Vehicle Bin 3	O	Yes / No	
			3.3.5.2.1.5.2.7	Vehicle Bin 4	O	Yes / No	
			3.3.5.2.1.5.2.8	Vehicle Bin 5	O	Yes / No	
			3.3.5.2.1.5.2.9	Vehicle Bin 6	O	Yes / No	
			3.3.5.2.1.5.2.10	Vehicle Bin 7	O	Yes / No	
			3.3.5.2.1.5.2.11	Vehicle Bin 8	O	Yes / No	
			3.3.5.2.1.5.2.12	Vehicle Bin 9	O	Yes / No	
			3.3.5.2.1.5.2.13	Vehicle Bin 10	O	Yes / No	
			3.3.5.2.1.5.2.14	Vehicle Bin 11	O	Yes / No	
			3.3.5.2.1.5.2.15	Vehicle Bin 12	O	Yes / No	
			3.3.5.2.1.5.2.16	Vehicle Bin 13	O	Yes / No	
			3.3.5.2.1.5.2.17	Vehicle Bin 14	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.1.2	Need to Share Updated Detector Inventory				Optional	Yes / No	
		Dialogs					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.2.1.2	Publish Detector Inventory Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.2.1.3	Subscribe to Detector Inventory Information	M	Yes	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	M	Yes	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.2.1.4	Required Detector Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL)(DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.2.1.5.1	Required Detector Inventory Response Content	M	Yes	
			3.3.5.2.1.5.2.1	Detector Station Inventory Information	O	Yes / No	
			3.3.5.2.1.5.2.2	Lane Number – Detector Inventory	O	Yes / No	
			3.3.5.2.1.5.2.3	Speed Trap Flag	O	Yes / No	
			3.3.5.2.1.5.2.4	Vehicle Bin 1	O	Yes / No	
			3.3.5.2.1.5.2.5	Vehicle Bin 2	O	Yes / No	
			3.3.5.2.1.5.2.6	Vehicle Bin 3	O	Yes / No	
			3.3.5.2.1.5.2.7	Vehicle Bin 4	O	Yes / No	
			3.3.5.2.1.5.2.8	Vehicle Bin 5	O	Yes / No	
			3.3.5.2.1.5.2.9	Vehicle Bin 6	O	Yes / No	
			3.3.5.2.1.5.2.10	Vehicle Bin 7	O	Yes / No	
			3.3.5.2.1.5.2.11	Vehicle Bin 8	O	Yes / No	
			3.3.5.2.1.5.2.12	Vehicle Bin 9	O	Yes / No	
			3.3.5.2.1.5.2.13	Vehicle Bin 10	O	Yes / No	
			3.3.5.2.1.5.2.14	Vehicle Bin 11	O	Yes / No	
			3.3.5.2.1.5.2.15	Vehicle Bin 12	O	Yes / No	
			3.3.5.2.1.5.2.16	Vehicle Bin 13	O	Yes / No	
			3.3.5.2.1.5.2.17	Vehicle Bin 14	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.1.3	Need to Share Detector Status				Optional	Yes / No	
		Dialogs					
			3.3.5.2.2.1	Send Detector Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.2.2.2	Publish Detector Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.2.2.3	Subscribe to Detector Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.2.2.4	Required Detector Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.3.1	Required Device Status Header Content	M	Yes	
			3.3.5.1.1.3.2.1	Unique Identifier of the Controlling Center	O	Yes / No	
			3.3.5.1.1.3.2.2	Device Communications Status	O	Yes / No	
			3.3.5.1.1.3.2.4	Device Status Date and Time Change Information	O	Yes / No	
			3.3.5.2.2.5.1	Required Detector Status Response Content	M	Yes	
			3.3.5.2.2.5.2.1	Detector Station Status Information	O	Yes / No	
			3.3.5.2.2.5.2.2	Lane Number – Detector Status	O	Yes / No	
			3.3.5.2.2.5.2.3	Direction of Travel – Detector Status	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.1.4	Need for Detector Metadata				Optional	Yes / No	
		Dialogs					
			3.3.6.2.1	Send Processing Documentation Metadata Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.6.2.2.1	Required Processing Documentation Metadata Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.6.2.3	Contents of the Processing Documentation Metadata Information	M	Yes	
			3.3.6.2.3.1	Required Processing Documentation Metadata Information Content	M	Yes	
			3.3.6.2.3.2.2	Publication Date and Time	O	Yes / No	
			3.3.6.2.3.2.3	Processing Method	O	Yes / No	
			3.3.6.2.3.2.4	Processing Method Description	O	Yes / No	
			3.3.6.2.3.2.5	Application Rules	O	Yes / No	
			3.3.6.2.3.2.6	Enumeration	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.1.5	Need for Detector Data Correlation				Optional	Yes / No	
		Dialogs					
			3.3.5.2.1.1	Send Detector Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications	
			3.3.5.2.1.2	Publish Detector Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.	
			3.3.5.2.1.3	Subscribe to Detector Inventory Information	Subscription:O	Yes / No / NA		
		Request Message						
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No		
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No		
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes		
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No		
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No		
			3.3.5.2.1.4	Required Detector Inventory Information Request Content	M	Yes		
		Response Message						
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No		
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes		
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No		
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No		
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No		
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No		
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL)(DeviceURL)	O	Yes / No		
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA		
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No		
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No		
			3.3.5.1.1.2.2.3	System Description	O	Yes / No		
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No		

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.2.1.5.1	Required Detector Inventory Response Content	M	Yes	
			3.3.5.2.1.5.2.1	Detector Station Inventory Information	O	Yes / No	
			3.3.5.2.1.5.2.2	Lane Number – Detector Inventory	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.1.6	Need for Detector Data Sharing				Optional	Yes / No	
		Dialogs					
			3.3.5.2.3.1	Send Detector Data Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.2.3.2	Publish Detector Data	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.2.3.3	Subscribe to Detector Data Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.2.3.4.1	Required Detector Data Request Content	M	Yes	
			3.3.5.2.3.4.2.1	Detector Station – Data Request	O	Yes / No	
			3.3.5.2.3.4.2.2	Data Type Request	O	Yes / No	
		Response Message					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.2.3.5.1	Required Detector Data Response Content	M	Yes	
			3.3.5.2.3.5.2.1	Detector Station – Detector Data	O	Yes / No	
			3.3.5.2.3.5.2.2	Vehicle Count	O	Yes / No	
			3.3.5.2.3.5.2.3	Average Vehicle Occupancy	O	Yes / No	
			3.3.5.2.3.5.2.4	Data Collection Start	O	Yes / No	
			3.3.5.2.3.5.2.5	Data Collection End	O	Yes / No	
			3.3.5.2.3.5.2.6	Data Type	O	Yes / No	
			3.3.5.2.3.5.2.7	Average Vehicle Speed	O	Yes / No	
			3.3.5.2.3.5.2.8	Average Vehicle Queue	O	Yes / No	
			3.3.5.2.3.5.2.9	Vehicle Stops	O	Yes / No	
			3.3.5.2.3.5.2.10	Vehicle Count – Bin 1	O	Yes / No	
			3.3.5.2.3.5.2.11	Vehicle Count – Bin 2	O	Yes / No	
			3.3.5.2.3.5.2.12	Vehicle Count – Bin 3	O	Yes / No	
			3.3.5.2.3.5.2.13	Vehicle Count – Bin 4	O	Yes / No	
			3.3.5.2.3.5.2.14	Vehicle Count – Bin 5	O	Yes / No	
			3.3.5.2.3.5.2.15	Vehicle Count – Bin 6	O	Yes / No	
			3.3.5.2.3.5.2.16	Vehicle Count – Bin 7	O	Yes / No	
			3.3.5.2.3.5.2.17	Vehicle Count – Bin 8	O	Yes / No	
			3.3.5.2.3.5.2.18	Vehicle Count – Bin 9	O	Yes / No	
			3.3.5.2.3.5.2.19	Vehicle Count – Bin 10	O	Yes / No	
			3.3.5.2.3.5.2.20	Vehicle Count – Bin 11	O	Yes / No	
			3.3.5.2.3.5.2.21	Vehicle Count – Bin 12	O	Yes / No	
			3.3.5.2.3.5.2.22	Vehicle Count – Bin 13	O	Yes / No	
			3.3.5.2.3.5.2.23	Vehicle Count – Bin 14	O	Yes / No	
			3.3.5.2.3.5.2.24	Detector Status	O	Yes / No	
			3.3.5.2.3.5.2.25	Vehicle Class Count – Bin 1	O	Yes / No	
			3.3.5.2.3.5.2.26	Vehicle Class Count – Bin 2	O	Yes / No	
			3.3.5.2.3.5.2.27	Vehicle Class Count – Bin 3	O	Yes / No	
			3.3.5.2.3.5.2.28	Vehicle Class Count – Bin 4	O	Yes / No	
			3.3.5.2.3.5.2.29	Vehicle Class Count – Bin 5	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.2.3.5.2.30	Vehicle Class Count – Bin 6	O	Yes / No	
			3.3.5.2.3.5.2.31	Vehicle Class Count – Bin 7	O	Yes / No	
			3.3.5.2.3.5.2.32	Vehicle Class Count – Bin 8	O	Yes / No	
			3.3.5.2.3.5.2.33	Vehicle Class Count – Bin 9	O	Yes / No	
			3.3.5.2.3.5.2.34	Vehicle Class Count – Bin 10	O	Yes / No	
			3.3.5.2.3.5.2.35	Vehicle Class Count – Bin 11	O	Yes / No	
			3.3.5.2.3.5.2.36	Vehicle Class Count – Bin 12	O	Yes / No	
			3.3.5.2.3.5.2.37	Vehicle Class Count – Bin 13	O	Yes / No	
			3.3.5.2.3.5.2.38	Vehicle Class Count – Bin 14	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.1.7	Need for Detector History				Optional	Yes / No	
		Dialogs					
			3.3.5.2.4.1	Send Detector Maintenance History Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	M	Yes	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.2.4.2.1	Required Detector Maintenance History Request Content	M	Yes	
			3.3.5.2.4.2.2.1	Detector Station – Detector History Request	O	Yes / No	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.2.4.3.1	Required Detector Maintenance History Content	M	Yes	
			3.3.5.2.4.3.2.1	Detector Station – Detector History	O	Yes / No	
			3.3.5.2.4.3.2.2	Detector Type	O	Yes / No	
			3.3.5.2.4.3.2.3	Installation Date and Time	O	Yes / No	
			3.3.5.2.4.3.2.4	Detector Calibration Date and Time	O	Yes / No	
			3.3.5.2.4.3.2.5	Operational Date and Time	O	Yes / No	
			3.3.5.2.4.3.2.6	Non-Operational Date and Time	O	Yes / No	
			3.3.5.2.4.3.2.7	History Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.2	Need to Share CCTV Camera Status and Control						
2.4.2.5.2.1	Need to Share CCTV Device Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.3.1.1	Send CCTV Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.3.1.2	Publish CCTV Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.3.1.3	Subscribe to CCTV Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.3.1.4	Required CCTV Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL)(URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.3.1.5.1	Required CCTV Inventory Content	M	Yes	
			3.3.5.3.1.5.2.1	Text Insertion – CCTV Inventory	O	Yes / No	
			3.3.5.3.1.5.2.2	Camera Type	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.2.2	Need to Share Updated CCTV Device Inventory				Optional	Yes / No	
		Dialogs					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.3.1.2	Publish CCTV Inventory Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.3.1.3	Subscribe to CCTV Inventory Information	M	Yes	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.3.1.4	Required CCTV Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL)(DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.3.1.5.1	Required CCTV Inventory Content	M	Yes	
			3.3.5.3.1.5.2.1	Text Insertion – CCTV Inventory	O	Yes / No	
			3.3.5.3.1.5.2.2	Camera Type	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.2.3	Need to Share CCTV Device Status				Optional	Yes / No	
		Dialogs					
			3.3.5.3.2.1	Send CCTV Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.3.2.2	Publish CCTV Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.3.2.3	Subscribe to CCTV Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.3.2.4	Required CCTV Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.3.1	Required Device Status Header Content	M	Yes	
			3.3.5.1.1.3.2.1	Unique Identifier of the Controlling Center	O	Yes / No	
			3.3.5.1.1.3.2.2	Device Communications Status	O	Yes / No	
			3.3.5.1.1.3.2.4	Device Status Date and Time Change Information	O	Yes / No	
			3.3.5.2.2.5.1	Required Detector Status Response Content	M	Yes	
			3.3.5.2.2.5.2.1	Detector Station Status Information	O	Yes / No	
			3.3.5.2.2.5.2.2	Lane Number – Detector Status	O	Yes / No	
			3.3.5.2.2.5.2.3	Direction of Travel – Detector Status	O	Yes / No	
			3.3.5.3.2.5.2.4	CCTV Pan Position	O	Yes / No	
			3.3.5.3.2.5.2.5	CCTV Tilt Position	O	Yes / No	
			3.3.5.3.2.5.2.6	CCTV Zoom Position	O	Yes / No	
			3.3.5.3.2.5.2.7	CCTV Iris Position	O	Yes / No	
			3.3.5.3.2.5.2.8	CCTV Focus Position	O	Yes / No	
			3.3.5.3.2.5.2.9	Camera Environmental Features Status	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.2.4	Need to Request Control of a Remote CCTV Device				Optional	Yes / No	
		Dialogs					
			3.3.5.3.3.1	Send CCTV Change Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.1.1	Required Device Change Request Header Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.2.1.2.2	Event Identifier – Device Change	O	Yes / No	
			3.3.5.1.2.1.2.3	Change Request Start Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.4	Change Request Expiration Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.5	Change Request Date and Time Information	O	Yes / No	
			3.3.5.3.3.2	Required CCTV Change Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.3.3.3	Required CCTV Change Request Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.2.5	Need to Verify CCTV Control Status				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.2.4 is selected
		Dialogs					
			3.3.5.1.2.3.1	Send Device Change Status Upon Request	M	Yes	
			3.3.5.3.4.1	Send CCTV Change Status Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.3.2	Required Device Change Status Request Content	M	Yes	
			3.3.5.3.4.2	Required CCTV Change Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.3.4.3	Required CCTV Change Status Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.2.6	Need to Cancel CCTV Control Requests				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.2.4 is selected
		Dialogs					
			3.3.5.1.2.4.1	Send Change Cancellation Response Upon Request	M	Yes	
			3.3.5.3.5.1	Send CCTV Change Cancellation Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.3.5.2	Required CCTV Change Cancellation Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	M	Yes	
			3.3.5.3.5.3	Required CCTV Change Cancellation Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.2.7	Need to Share CCTV Image Links				Optional	Yes / No	
		Dialogs					
			3.3.5.3.6.1	Send Image Links for CCTV Upon Request	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.3.6.2	Publish CCTV Link Information	Subscription:O	Yes / No / NA	
			3.3.5.3.6.3	Subscribe to CCTV Link Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.3.6.4	Required CCTV Image Link Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.3.6.5	Required CCTV Image Link Request Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.2.8	Need to Control a Remote CCTV Device				Optional	Yes / No	
		Dialogs					
			3.3.5.1.3.1	Send Device Control Command Response Upon Receipt	M	Yes	
			3.3.5.3.7.1	Send CCTV Control Command Status	M	Yes	
		Control Command Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.3.2.1	Required External Device Control Command Content	M	Yes	
			3.3.5.3.7.2	Required CCTV Control Command Content	M	Yes	
		Response Message					
			3.3.5.1.3.3	Required External Device Control Command Response Content	M	Yes	
			3.3.5.3.7.3	Required CCTV Control Command Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3	Need to Share DMS Status and Control					Yes / No	
2.4.2.5.3.1	Need to Share DMS Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.4.1.1	Send DMS Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.4.1.2	Publish DMS Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.4.1.3	Subscribe to DMS Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.4.1.4	Required DMS Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	O	Yes / No	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.4.1.5.1	Required DMS Inventory Content	M	Yes	
			3.3.5.4.1.5.2.1	Sign Technology	O	Yes / No	
			3.3.5.4.1.5.2.2	Sign Pixel Height	O	Yes / No	
			3.3.5.4.1.5.2.3	Sign Pixel Width	O	Yes / No	
			3.3.5.4.1.5.2.4	Sign Height	O	Yes / No	
			3.3.5.4.1.5.2.5	Sign Width	O	Yes / No	
			3.3.5.4.1.5.2.6	Character Pixel Height	O	Yes / No	
			3.3.5.4.1.5.2.7	Character Pixel Width	O	Yes / No	
			3.3.5.4.1.5.2.8	DMS Beacon Type	O	Yes / No	
			3.3.5.4.1.5.2.9	Vertical Border	O	Yes / No	
			3.3.5.4.1.5.2.10	Horizontal Border	O	Yes / No	
			3.3.5.4.1.5.2.11	Sign Vertical Pixel Pitch	O	Yes / No	
			3.3.5.4.1.5.2.12	Sign Horizontal Pixel Pitch	O	Yes / No	
			3.3.5.4.1.5.2.13	Maximum Number of Pages	O	Yes / No	
			3.3.5.4.1.5.2.14	Maximum Message Length	O	Yes / No	
			3.3.5.4.1.5.2.15	Color Scheme	O	Yes / No	
			3.3.5.4.1.5.2.16	MULTI Tags Supported	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.2	Need to Share Updated DMS Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.4.1.2	Publish DMS Inventory Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.4.1.3	Subscribe to DMS Inventory Information	M	Yes	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.4.1.4	Required DMS Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.4.1.5.1	Required DMS Inventory Content	M	Yes	
			3.3.5.4.1.5.2.1	Sign Technology	O	Yes / No	
			3.3.5.4.1.5.2.2	Sign Pixel Height	O	Yes / No	
			3.3.5.4.1.5.2.3	Sign Pixel Width	O	Yes / No	
			3.3.5.4.1.5.2.4	Sign Height	O	Yes / No	
			3.3.5.4.1.5.2.5	Sign Width	O	Yes / No	
			3.3.5.4.1.5.2.6	Character Pixel Height	O	Yes / No	
			3.3.5.4.1.5.2.7	Character Pixel Width	O	Yes / No	
			3.3.5.4.1.5.2.8	DMS Beacon Type	O	Yes / No	
			3.3.5.4.1.5.2.9	Vertical Border	O	Yes / No	
			3.3.5.4.1.5.2.10	Horizontal Border	O	Yes / No	
			3.3.5.4.1.5.2.11	Sign Vertical Pixel Pitch	O	Yes / No	
			3.3.5.4.1.5.2.12	Sign Horizontal Pixel Pitch	O	Yes / No	
			3.3.5.4.1.5.2.13	Maximum Number of Pages	O	Yes / No	
			3.3.5.4.1.5.2.14	Maximum Message Length	O	Yes / No	
			3.3.5.4.1.5.2.15	Color Scheme	O	Yes / No	
			3.3.5.4.1.5.2.16	MULTI Tags Supported	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.3	Need to Share DMS Status				Optional	Yes / No	
		Dialogs					
			3.3.5.4.2.1	Send DMS Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.4.2.2	Publish DMS Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.4.2.3	Subscribe to DMS Status Information	Subscription:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.4.2.4	Required DMS Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.3.1	Required Device Status Header Content	M	Yes	
			3.3.5.1.1.3.2.1	Unique Identifier of the Controlling Center	O	Yes / No	
			3.3.5.1.1.3.2.2	Device Communications Status	O	Yes / No	
			3.3.5.1.1.3.2.4	Device Status Date and Time Change Information	O	Yes / No	
			3.3.5.4.2.5.1	Required DMS Status Response Content	M	Yes	
			3.3.5.4.2.5.2.1	Current Message Number – DMS	O	Yes / No	
			3.3.5.4.2.5.2.2	Time Remaining	O	Yes / No	
			3.3.5.4.2.5.2.3	Message Source	O	Yes / No	
			3.3.5.4.2.5.2.4	Message Beacon	O	Yes / No	
			3.3.5.4.2.5.2.5	DMS On-Display Image	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.4	Need to Request to Display a Message on a Remote DMS				Optional	Yes / No	
		Dialogs					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.4.3.1	Send DMS Change Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.1.1	Required Device Change Request Header Content	M	Yes	
			3.3.5.1.2.1.2.2	Event Identifier – Device Change	O	Yes / No	
			3.3.5.1.2.1.2.3	Change Request Start Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.4	Change Request Expiration Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.5	Change Request Date and Time Information	O	Yes / No	
			3.3.5.4.3.2	Required DMS Change Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.4.3.3	Required DMS Change Request Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.5	Need to Verify DMS Message Request Status				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.3.4 is selected
		Dialogs					
			3.3.5.1.2.3.1	Send Device Change Status Upon Request	M	Yes	
			3.3.5.4.4.1	Send DMS Change Status Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.2.3.2	Required Device Change Status Request Content	M	Yes	
			3.3.5.4.4.2	Required DMS Change Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.4.4.3	Required DMS Change Status Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.6	Need to View DMS Message Queue				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.3.4 is selected
		Dialogs					
			3.3.5.4.9.1	Send DMS Priority Queue Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.5.1.1	Required Device Priority Queue Request Content	M	Yes	
			3.3.5.4.9.3	Required DMS Priority Queue Request Response Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.2.5.2.1	Required Device Priority Queue Response Header Content	M	Yes	
			3.3.5.1.2.5.2.2.2	Unique Sequence Number	O	Yes / No	
			3.3.5.1.2.5.2.2.3	Event Identifier – Device Queue	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.2.5.2.2.4	Event Response Plan – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.5	Request Start Date and Time – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.6	Request Expiration Date and Time – Device Queue	O	Yes / No	
			3.3.5.4.9.3	Required DMS Priority Queue Request Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.7	Need to Cancel DMS Message Requests				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.3.4 is selected
		Dialogs					
			3.3.5.1.2.4.1	Send Change Cancellation Response Upon Request	M	Yes	
			3.3.5.4.5.1	Send Cancel DMS Change Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.4.2.1	Required Device Change Cancellation Request Content	M	Yes	
			3.3.5.4.5.2	Required DMS Change Cancellation Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.4.5.3	Required DMS Change Cancellation Request Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.8	Need to Share DMS Message Appearance				Optional	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Dialogs					
			3.3.5.4.6.1	Send DMS Message Appearance Upon Request	M		The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.4.8.1	Send DMS Font Table Upon Request	VMS:M	Yes / NA	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.4.10.1	Send DMS Graphic Table Upon Request	VMS:M	Yes / NA	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.1.1.1.2.7	Center Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.8	Time Range Filter	O	Yes / No	
			3.3.5.4.6.2	Required DMS Message Appearance Request Content	M	Yes	
			3.3.5.4.8.2.1	Required DMS Font Table Request Content	VMS:M	Yes / NA	
			3.3.5.4.8.2.2.1	DMS Font Identifier	VMS:O	Yes / No / NA	
			3.3.5.4.10.2	Required DMS Graphic Table Request Content	VMS:M	Yes / NA	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.4.6.3.1	Required DMS Message Appearance Information	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.4.6.3.2	Additional Required DMS Message Appearance Response Information for Matrix Signs	O	Yes / No	
			3.3.5.4.8.3.1	Required DMS Font Table Response Content	VMS:M	Yes / NA	
			3.3.5.4.8.3.2.1	Font Table Date and Time Change Information	VMS:O	Yes / No / NA	
			3.3.5.4.10.3.1	Required DMS Graphic Table Response Content	VMS:M	Yes / NA	
			3.3.5.4.10.3.2.1	Graphic Table Date and Time Change Information	VMS:O	Yes / No / NA	
			3.3.5.4.10.3.2.2	Graphic Table Bitmap	VMS:O	Yes / No / NA	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.9	Need to Share DMS Message Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.4.7.1	Send DMS Message Table Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.4.7.2	Publish DMS Message Table Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.4.7.3	Subscribe to DMS Message Table Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.1.1.1.2.7	Center Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.8	Time Range Filter	O	Yes / No	
			3.3.5.4.7.4.1	Required DMS Message Table Inventory Request Content	M	Yes	
			3.3.5.4.7.4.2.1	DMS Message Number Identifier	O	Yes / No	
			3.3.5.4.7.4.2.2	DMS Memory Type	O	Yes / No	
		Response Message					
			3.3.1.9.1	Restrictions – Response Message Content	O	Yes / No	
			3.3.5.4.7.5.1	Required DMS Message Table Inventory Information Content	O	Yes / No	
			3.3.5.4.7.5.2.1	DMS Message Inventory Date and Time Change Information	M	Yes	
			3.3.5.4.7.5.2.2	DMS Message CRC	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.10	Need to Share DMS Font Table				Optional	Yes / No	
		Dialogs					
			3.3.5.4.8.1	Send DMS Font Table Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.4.8.2.1	Required DMS Font Table Request Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.4.8.2.2.1	DMS Font Identifier	O	Yes / No	
		Response Message					
			3.3.1.9.1	Restrictions – Response Message Content	O	Yes / No	
			3.3.5.4.8.3.1	Required DMS Font Table Response Content	M	Yes	
			3.3.5.4.8.3.2.1	Font Table Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.11	Need to Share DMS Graphics Table						
		Dialogs					
			3.3.5.4.10.1	Send DMS Graphic Table Upon Request	M	Yes	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.4.10.2	Required DMS Graphic Table Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Restrictions – Response Message Content	O	Yes / No	
			3.3.5.4.10.3.1	Required DMS Graphic Table Response Content	M	Yes	
			3.3.5.4.10.3.2.1	Graphic Table Date and Time Change Information	O	Yes / No	
			3.3.5.4.10.3.2.2	Graphic Table Bitmap	O	Yes / No	
		Error Report Message					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.3.12	Need to Control a DMS				Optional	Yes / No	
		Dialogs					
			3.3.5.4.11.1	Send DMS Control Command Status	M	Yes	
		Control Command Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.3.2.1	Required External Device Control Command Content	M	Yes	
			3.3.5.4.11.2.1	Required DMS Control Command Content	M	Yes	
			3.3.5.4.11.2.2.1	Beacon Control	O	Yes / No	
		Response Message					
			3.3.5.1.3.3	Required External Device Control Command Response Content	M	Yes	
			3.3.5.4.11.3	Required DMS Control Command Response	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.4	Need to Share Environment Sensor Data						
2.4.2.5.4.1	Need to Share ESS Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.5.1.1	Send ESS Inventory Information Upon Request Publish ESS Inventory Information	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.5.1.2	Publish ESS Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.5.1.3	Subscribe to ESS Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.5.1.4	Required ESS Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.2.5.2.1	Required Device Priority Queue Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.5.1.5.1	Required ESS Inventory Content	M	Yes	
			3.3.5.5.1.5.2.1	Lane Number – ESS	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.1.5.2.2	Device Elevation	O	Yes / No	
			3.3.5.5.1.5.2.3	Device Height	O	Yes / No	
			3.3.5.5.1.5.2.4	Device Type	O	Yes / No	
			3.3.5.5.1.5.2.5	Device Operation Type	O	Yes / No	
			3.3.5.5.1.5.2.6	Device Mobility Type	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.4.2	Need to Share Updated ESS Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.5.1.2	Publish ESS Inventory Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.5.1.3	Subscribe to ESS Inventory Information	M	Yes	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.5.1.4	Required ESS Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.2.5.2.1	Required Device Priority Queue Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.5.1.5.1	Required ESS Inventory Content	M	Yes	
			3.3.5.5.1.5.2.1	Lane Number – ESS	O	Yes / No	
			3.3.5.5.1.5.2.2	Device Elevation	O	Yes / No	
			3.3.5.5.1.5.2.3	Device Height	O	Yes / No	
			3.3.5.5.1.5.2.4	Device Type	O	Yes / No	
			3.3.5.5.1.5.2.5	Device Operation Type	O	Yes / No	
			3.3.5.5.1.5.2.6	Device Mobility Type	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.4.3	Need to Share ESS Device Status				Optional	Yes / No	
		Dialogs					
			3.3.5.5.2.1	Send ESS Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.2.2	Publish ESS Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.5.2.3	Subscribe to ESS Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.5.2.4	Required ESS Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.3.1	Required Device Status Header Content	M	Yes	
			3.3.5.1.1.3.2.1	Unique Identifier of the Controlling Center	M	Yes	
			3.3.5.1.1.3.2.2	Device Communications Status	O	Yes / No	
			3.3.5.1.1.3.2.4	Device Status Date and Time Change Information	O	Yes / No	
			3.3.5.5.2.5	Required ESS Status Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.4.4	Need to Share ESS Environmental Observations				Optional	Yes / No	
		Dialogs					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.3.1	Send ESS Observation Data Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.5.3.2	Publish ESS Observation Data	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.5.3.3	Subscribe to ESS Observation Data	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.5.3.4	Required ESS Observation Data Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.5.3.5	Required ESS Observation Data Information Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.4.5	Need to Share ESS Environmental Observation Metadata				Optional	Yes / No	
		Dialogs					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.4.1	Send ESS Metadata Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.5.4.2	Required ESS Metadata Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.5.4.3.1	Required ESS Metadata Information Content	M	Yes	
			3.3.5.5.4.3.2.2.1	Required Collector Configuration Information(CollectorConfig)	O	Yes / No	
			3.3.5.5.4.3.2.2.2	Observation Type	CollectorConfig:O	Yes / No / NA	
			3.3.5.5.4.3.2.2.3	Null Value	CollectorConfig:O	Yes / No / NA	
			3.3.5.5.4.3.3	Owner Organization – ESS Metadata	O	Yes / No	
			3.3.5.5.4.3.4.1	Required Sensor Specific Metadata Information(SensorMetadata)	O	Yes / No	
			3.3.5.5.4.3.4.2.1	Sensor Description	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.2	Minimum Value of the Sensor Range	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.3	Maximum Value of the Sensor Range	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.4	Maximum Positive Rate of Change	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.5	Maximum Negative Rate of Change	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.6	Rate Interval	SensorMetadata:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.4.3.4.2.7	Persistence Interval	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.8	Persistence Threshold	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.9	Like Instrument Threshold	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.10	Date of Calibration	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.11	Date of Last Maintenance	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.12	Serial Number	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.13	Sensor Resolution	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.14	Sensor Accuracy	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.15	Minimum Value Output	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.16	Maximum Value Output	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.17	Sensor to Station North South Offset	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.18	Sensor to Station East West Offset	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.19	Sensor to Station Elevation Offset	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.20	Sensor to Surface Offset	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.21	Embedded Material Description	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.22	Output Average Interval	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.23	Output Internal Units	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.24	Initial Installation Date – ESS Sensor	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.25	Begin Date/Time of Out of Service Period	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.26	End Date/Time of Out-of-Service Period	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.27	Sampling Interval	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.1	Required Site-Specific Metadata Information(SiteMetadata)	O	Yes / NA	
			3.3.5.5.4.3.5.2	Roadway Name	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.3	Linear Reference – ESS Metadata	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.4	Linear Reference Units	SiteMetadata:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.4.3.5.5	Distance to Roadway	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.6	Elevation from Roadway	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.7	Jurisdiction	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.8	State	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.9	Country	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.10	Access Directions	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.11	Site Representativeness	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.12	Site Obstructions	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.13	Site Landscape	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.14	Site Access Control	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.15	Site Slope	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.16	Site Grade Direction	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.17	Site Wind Roughness	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.18	Site Soil Type	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.19	Unique Site Identifier	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.1	Required Station Specific Metadata Information(StationMetadata)	O	Yes / NA	
			3.3.5.5.4.3.6.2.1	Station Description	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.2	Station Operation Type	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.3	Station Geo-coordinate Referencing Model	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.4	Station Power Source	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.5	Door Status	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.6	Battery Status	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.7	Line Volts	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.8	Station Maintenance Group Name	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.9	Preventive Maintenance Interval	StationMetadata:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.4.3.6.2.10	Maintenance Calibration Interval	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.11	Maintenance Status	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.12	Initial Installation Date	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.13	Number of Devices	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.14	Communications Method	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.15	Station Phone Number	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.16	Station IP Address	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.17	Station Manufacturer	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.18	Observation Collection Interval	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.19	Observation Collection Offset	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.20	Transmission Interval	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.21	Transmission Offset	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.22	Transmission Format	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.23	Station Maintenance Contact Information	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.7	Climate Record Information	O	Yes / No	
			3.3.5.5.4.3.8	Data Collector Information	O	Yes / No	
			3.3.5.5.4.3.9	Image Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.4.6	Need to Receive a Qualified ESS Report				Optional	Yes / No	
		Dialogs					
			3.3.5.5.3.1	Send ESS Observation Data Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.4.1	Send ESS Metadata Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.5.3.4	Required ESS Observation Data Request Content	M	Yes	
			3.3.5.5.4.2	Required ESS Metadata Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.5.3.5	Required ESS Observation Data Information Content	M	Yes	
			3.3.5.5.4.3.1	Required ESS Metadata Information Content	M	Yes	
			3.3.5.5.4.3.2.2.1	Required Collector Configuration Information(CollectorConfig)	O	Yes / No	
			3.3.5.5.4.3.2.2.2	Observation Type	CollectorConfig:O	Yes / No / NA	
			3.3.5.5.4.3.2.2.3	Null Value	CollectorConfig:O	Yes / No / NA	
			3.3.5.5.4.3.3	Owner Organization – ESS Metadata	O	Yes / No	
			3.3.5.5.4.3.4.1	Required Sensor Specific Metadata Information(SensorMetadata)	O	Yes / No	
			3.3.5.5.4.3.4.2.1	Sensor Description	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.2	Minimum Value of the Sensor Range	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.3	Maximum Value of the Sensor Range	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.4	Maximum Positive Rate of Change	SensorMetadata:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.4.3.4.2.5	Maximum Negative Rate of Change	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.6	Rate Interval	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.7	Persistence Interval	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.8	Persistence Threshold	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.9	Like Instrument Threshold	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.10	Date of Calibration	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.11	Date of Last Maintenance	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.12	Serial Number	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.13	Sensor Resolution	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.14	Sensor Accuracy	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.15	Minimum Value Output	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.16	Maximum Value Output	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.17	Sensor to Station North South Offset	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.18	Sensor to Station East West Offset	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.19	Sensor to Station Elevation Offset	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.20	Sensor to Surface Offset	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.21	Embedded Material Description	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.22	Output Average Interval	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.23	Output Internal Units	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.24	Initial Installation Date – ESS Sensor	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.25	Begin Date/Time of Out of Service Period	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.26	End Date/Time of Out-of-Service Period	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.4.2.27	Sampling Interval	SensorMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.1	Required Site-Specific Metadata Information(SiteMetadata)	O	Yes / NA	
			3.3.5.5.4.3.5.2	Roadway Name	SiteMetadata:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.4.3.5.3	Linear Reference – ESS Metadata	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.4	Linear Reference Units	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.5	Distance to Roadway	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.6	Elevation from Roadway	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.7	Jurisdiction	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.8	State	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.9	Country	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.10	Access Directions	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.11	Site Representativeness	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.12	Site Obstructions	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.13	Site Landscape	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.14	Site Access Control	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.15	Site Slope	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.16	Site Grade Direction	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.17	Site Wind Roughness	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.18	Site Soil Type	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.5.19	Unique Site Identifier	SiteMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.1	Required Station Specific Metadata Information(StationMetadata)	O	Yes / NA	
			3.3.5.5.4.3.6.2.1	Station Description	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.2	Station Operation Type	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.3	Station Geo-coordinate Referencing Model	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.4	Station Power Source	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.5	Door Status	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.6	Battery Status	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.7	Line Volts	StationMetadata:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.5.4.3.6.2.8	Station Maintenance Group Name	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.9	Preventive Maintenance Interval	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.10	Maintenance Calibration Interval	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.11	Maintenance Status	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.12	Initial Installation Date	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.13	Number of Devices	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.14	Communications Method	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.15	Station Phone Number	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.16	Station IP Address	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.17	Station Manufacturer	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.18	Observation Collection Interval	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.19	Observation Collection Offset	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.20	Transmission Interval	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.21	Transmission Offset	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.22	Transmission Format	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.6.2.23	Station Maintenance Contact Information	StationMetadata:O	Yes / No / NA	
			3.3.5.5.4.3.7	Climate Record Information	O	Yes / No	
			3.3.5.5.4.3.8	Data Collector Information	O	Yes / No	
			3.3.5.5.4.3.9	Image Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.4.7	Need to Share ESS Organizational Metadata				Optional	Yes / No	
		Dialogs					
			3.3.5.5.4.1	Send ESS Metadata Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.5.4.2	Required ESS Metadata Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.5.4.3.1	Required ESS Metadata Information Content	M	Yes	
			3.3.5.5.4.3.2.2.1	Required Collector Configuration Information	M	Yes	
			3.3.5.5.4.3.3	Owner Organization – ESS Metadata	O	Yes / No	
			3.3.5.5.4.3.8	Data Collector Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.5	Need to Share Lane Closure Gate Control						
2.4.2.5.5.1	Need to Share Gate Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.6.1.1	Send Gate Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.6.1.2	Publish Gate Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.6.1.3	Subscribe to Gate Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.6.1.4	Required Gate Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.6.1.5.1	Required Gate Inventory Information Response Content	M	Yes	
			3.3.5.6.1.5.2.1	Number of Lanes – Gate Inventory	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.5.2	Need to Share Updated Gate Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.6.1.2	Publish Gate Inventory Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.6.1.3	Subscribe to Gate Inventory Information	M	Yes	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.6.1.4	Required Gate Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.6.1.5.1	Required Gate Inventory Information Response Content	M	Yes	
			3.3.5.6.1.5.2.1	Number of Lanes – Gate Inventory	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.5.3	Need to Share Gate Status				Optional	Yes / No	
		Dialogs					
			3.3.5.6.2.1	Send Gate Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.6.2.2	Publish Gate Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.6.2.3	Subscribe to Gate Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	M	Yes	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.6.2.4	Required Gate Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.3.1	Required Device Status Header Content	M	Yes	
			3.3.5.1.1.3.2.1	Unique Identifier of the Controlling Center	O	Yes / No	
			3.3.5.1.1.3.2.2	Device Communications Status	O	Yes / No	
			3.3.5.1.1.3.2.4	Device Status Date and Time Change Information	O	Yes / No	
			3.3.5.5.2.5	Required ESS Status Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.5.4	Need to Request a Change for a Remote Gate Control Device				Optional	Yes / No	
		Dialogs					
			3.3.5.6.3.1	Send Gate Control Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.1.1	Required Device Change Request Header Content	M	Yes	
			3.3.5.1.2.1.2.2	Event Identifier – Device Change	O	Yes	
			3.3.5.1.2.1.2.3	Change Request Start Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.4	Change Request Expiration Date and Time	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.2.1.2.5	Change Request Date and Time Information	O	Yes / No	
			3.3.5.6.3.2	Required Gate Control Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.6.3.3	Required Gate Control Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.5.5	Need to Verify Gate Control Request Status				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.5.4 is selected
		Dialogs					
			3.3.5.1.2.3.1	Send Device Change Status Upon Request	M	Yes	
			3.3.5.6.4.1	Send Gate Control Status Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.3.2	Required Device Change Status Request Content	M	Yes	
			3.3.5.6.4.2	Required Gate Control Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.6.4.3	Required Gate Control Status Response Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.5.6	Need to Cancel Gate Control Device Requests				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.5.4 is selected
		Dialogs					
			3.3.5.1.2.4.1	Send Change Cancellation Response Upon Request	M	Yes	
			3.3.5.6.5.1	Send Gate Control Cancellation Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.4.2.1	Required Device Change Cancellation Request Content	M	Yes	
			3.3.5.6.5.2	Required Gate Cancellation Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.6.5.3	Required Gate Cancellation Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.5.7	Need to Share Gate Control Schedule				Optional	Yes / No	
		Dialogs					
			3.3.5.6.6.1	Send Gate Schedule Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications	
			3.3.5.6.6.2	Publish Gate Schedule Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.	
			3.3.5.6.6.3	Subscribe to Gate Schedule Information	Subscription:O	Yes / No / NA		
		Request Message						
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No		
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No		
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes		
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No		
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No		
			3.3.5.6.6.4	Required Gate Schedule Request Content	M	Yes		
		Response Message						
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No		
			3.3.5.1.1.4.1	Required Device Schedule Information Content	M	Yes		
			3.3.5.6.6.5	Required Gate Schedule Information Content	M	Yes		
		Error Report Message						
			3.3.1.7.1.1	Required Error Report Contents	M	Yes		
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No		
		2.4.2.5.5.8	Need to Control Remote Gate Control Devices				Optional	Yes / No
		Dialogs						
			3.3.5.6.7.1	Send Gate Control Command Status	M	Yes		
		Control Command Message						
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No		
			3.3.5.1.3.2.1	Required External Device Control Command Content	M	Yes		

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.6.7.2	Required Gate Control Command Content	M	Yes	
		Response Message					
			3.3.5.1.3.3	Required External Device Control Command Response Content	M	Yes	
			3.3.5.6.7.3	Required Gate Control Command Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.6	Need to Share Lane Control Signal Status and Control						
2.4.2.5.6.1	Need to Share Lane Control Signal Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.7.1.1	Send LCS Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.7.1.2	Publish LCS Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.7.1.3	Subscribe to LCS Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.7.1.4	Required LCS Inventory Information Request Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.7.1.5.1	Required LCS Inventory Content	M	Yes	
			3.3.5.7.1.5.2.1	Number of Lanes – LCS Inventory	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.6.2	Need to Share Updated Lane Control Signal Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.7.1.2	Publish LCS Inventory Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.7.1.3	Subscribe to LCS Inventory Information	M	Yes	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.7.1.4	Required LCS Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.7.1.5.1	Required LCS Inventory Content	M	Yes	
			3.3.5.7.1.5.2.1	Number of Lanes – LCS Inventory	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.6.3	Need to Share Lane Control Signal Status				Optional	Yes / No	
		Dialogs					
			3.3.5.7.2.1	Send LCS Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.7.2.2	Publish LCS Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.7.2.3	Subscribe to LCS Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.7.2.4	Required LCS Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.3.1	Required Device Status Header Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.3.2.1	Unique Identifier of the Controlling Center	O	Yes / No	
			3.3.5.1.1.3.2.2	Device Communications Status	O	Yes / No	
			3.3.5.1.1.3.2.4	Device Status Date and Time Change Information	O	Yes / No	
			3.3.5.7.2.5	Required LCS Status Information Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.6.4	Need to Request a Change for a Remote Lane Control Signal Device				Optional	Yes / No	
		Dialogs					
			3.3.5.7.3.1	Send LCS Change Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.1.1	Required Device Change Request Header Content	M	Yes	
			3.3.5.1.2.1.2.2	Event Identifier – Device Change	O	Yes	
			3.3.5.1.2.1.2.3	Change Request Start Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.4	Change Request Expiration Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.5	Change Request Date and Time Information	O	Yes / No	
			3.3.5.7.3.2	Required LCS Change Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.7.3.3	Required LCS Change Request Response Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.6.5	Need to Verify Lane Control Signal Device Control Status				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.6.4 is selected
		Dialogs					
			3.3.5.1.2.3.1	Send Device Change Status Upon Request	M	Yes	
			3.3.5.7.4.1	Send LCS Change Status Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.3.2	Required Device Change Status Request Content	M	Yes	
			3.3.5.7.4.2	Required LCS Change Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.7.4.3	Required LCS Change Status Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.6.6	Need to Cancel Lane Control Signal Device Control Requests				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.6.4 is selected
		Dialogs					
			3.3.5.1.2.4.1	Send Change Cancellation Response Upon Request	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.7.5.1	Send LCS Change Cancellation Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.4.2.1	Required Device Change Cancellation Request Content	M	Yes	
			3.3.5.7.5.2	Required LCS Change Cancellation Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.7.5.3	Required LCS Change Cancellation Request Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.6.7	Need to Share Lane Control Signal Schedule				Optional	Yes / No	
		Dialogs					
			3.3.5.7.6.1	Send LCS Schedule Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.7.6.2	Publish LCS Schedule Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.7.6.3	Subscribe to LCS Schedule Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.7.6.4	Required LCS Schedule Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.4.1	Required Device Schedule Information Content	M	Yes	
			3.3.5.7.2.5	Required LCS Status Information Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.6.8	Need to Control Lane Control Signal Devices				Optional	Yes / No	
		Dialogs					
			3.3.5.7.7.1	Send LCS Response Upon Command	M	Yes	
		Control Command Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.3.2.1	Required External Device Control Command Content	M	Yes	
			3.3.5.7.7.2	Required LCS Control Command Content	M	Yes	
		Response Message					
			3.3.5.1.3.3	Required External Device Control Command Response Content	M	Yes	
			3.3.5.7.7.3	Required LCS Control Command Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7	Need to Share Ramp Meter Status and Control						
2.4.2.5.7.1	Need to Share Ramp Meter Inventory				Optional	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Dialogs					
			3.3.5.8.1.1	Send Ramp Meter Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.8.1.2	Publish Ramp Meter Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.8.1.3	Subscribe to Ramp Meter Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.8.1.4	Required Ramp Meter Inventory Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL)(DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.8.1.5.1	Required Ramp Meter Inventory Content	M	Yes	
			3.3.5.8.1.5.2.2	Lane Type – Ramp Meters	O	Yes / No	
			3.3.5.8.1.5.2.3	Associated Detectors Identifiers	O	Yes / No	
			3.3.5.8.1.5.2.4	Absolute Minimum Metering Rate	O	Yes / No	
			3.3.5.8.1.5.2.5	Absolute Maximum Metering Rate	O	Yes / No	
			3.3.5.8.1.5.2.6	System Minimum Metering Rate	O	Yes / No	
			3.3.5.8.1.5.2.7	System Maximum Metering Rate	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7.2	Need to Share Updated Ramp Meter Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.8.1.2	Publish Ramp Meter Inventory Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.8.1.3	Subscribe to Ramp Meter Inventory Information	M	Yes	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.8.1.4	Required Ramp Meter Inventory Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL)(DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.8.1.5.1	Required Ramp Meter Inventory Content	M	Yes	
			3.3.5.8.1.5.2.2	Lane Type – Ramp Meters	O	Yes / No	
			3.3.5.8.1.5.2.3	Associated Detectors Identifiers	O	Yes / No	
			3.3.5.8.1.5.2.4	Absolute Minimum Metering Rate	O	Yes / No	
			3.3.5.8.1.5.2.5	Absolute Maximum Metering Rate	O	Yes / No	
			3.3.5.8.1.5.2.6	System Minimum Metering Rate	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.8.1.5.2.7	System Maximum Metering Rate	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7.3	Need to Share Ramp Meter Status				Optional	Yes / No	
			3.3.5.8.2.1	Send Ramp Meter Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.8.2.2	Publish Ramp Meter Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.8.2.3	Subscribe to Ramp Meter Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.8.2.4	Required Ramp Meter Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.3.1	Required Device Status Header Content	M	Yes	
			3.3.5.1.1.3.2.1	Unique Identifier of the Controlling Center	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.3.2.2	Device Communications Status	O	Yes / No	
			3.3.5.1.1.3.2.4	Device Status Date and Time Change Information	O	Yes / No	
			3.3.5.8.2.5.2.1	Requested Metering Command Source	O	Yes / No	
			3.3.5.8.2.5.2.2	Implemented Metering Command Source	O	Yes / No	
			3.3.5.8.2.5.2.3	Implemented Plan	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.2.5.1 is "trafficResponsive"
			3.3.5.8.2.5.2.4	Implemented Rate	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.2.5.1 is "fixedRate"
			3.3.5.8.2.5.2.5	Implemented Vehicles Per Green	O	Yes / No	
			3.3.5.8.2.5.2.6	Requested Action	O	Yes / No	
			3.3.5.8.2.5.2.7	Requested Plan – Ramp Meter Status	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.2.5.1 is "trafficResponsive"
			3.3.5.8.2.5.2.8	Requested Rate – Ramp Meter Status	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.2.5.1 is "fixedRate"
			3.3.5.8.2.5.2.9	Requested Vehicles Per Green	O	Yes / No	
			3.3.5.8.2.5.2.10	Operational Minimum Metering Rate	O	Yes / No	
			3.3.5.8.2.5.2.11	Operational Maximum Metering Rate	O	Yes / No	
			3.3.5.8.2.5.2.12	Demand Detector Status	O	Yes / No	
			3.3.5.8.2.5.2.13	Passage Detector Status	O	Yes / No	
			3.3.5.8.2.5.2.14	Queue Detector Status	O	Yes / No	
			3.3.5.8.2.5.2.15	Cycle Count	O	Yes / No	
			3.3.5.8.2.5.2.16	Passenger Vehicle Count	O	Yes / No	
			3.3.5.8.2.5.2.17	Queue Detected Flag	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.8.2.5.2.18	Violation Vehicle Count	O	Yes / No	
			3.3.5.8.2.5.2.19	Mainline Flow Rate	O	Yes / No	
			3.3.5.8.2.5.2.20	Mainline Vehicle Occupancy	O	Yes / No	
			3.3.5.8.2.5.2.21	Mainline Vehicle Speed	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7.4	Need to Request a Metering Plan for a Remote Ramp Meter Device				Optional	Yes / No	
		Dialogs					
			3.3.5.8.3.1	Send Ramp Meter Change Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.1.1	Required Device Change Request Header Content	M	Yes	
			3.3.5.1.2.1.2.2	Event Identifier – Device Change	O	Yes / No	
			3.3.5.1.2.1.2.3	Change Request Start Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.4	Change Request Expiration Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.5	Change Request Date and Time Information	O	Yes / No	
			3.3.5.8.3.2.1	Required Ramp Meter Change Request Content	M	Yes	
			3.3.5.8.3.2.2	Requested Plan – Ramp Meter Change	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.3.2.2 is "trafficResponsive"
			3.3.5.8.3.2.3	Requested Rate – Ramp Meter Change	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.3.2.2 is "fixedRate"
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			Error! Reference source not found.	Error! Reference source not found.	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.8.3.3	Required Ramp Meter Change Request Content Response	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7.5	Need to Verify Ramp Meter Control Request Status				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.7.4 is selected
		Dialogs					
			3.3.5.1.2.3.1	Send Device Change Status Upon Request	M	Yes	
			3.3.5.8.4.1	Send Ramp Meter Change Status Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.3.2	Required Device Change Status Request Content	M	Yes	
			3.3.5.8.4.2	Required Ramp Meter Change Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.8.4.3	Required Ramp Meter Change Status Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7.6	Need to Cancel Ramp Meter Control Requests				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.7.4 is selected
		Dialogs					
			3.3.5.1.2.4.1	Send Change Cancellation Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.8.5.1	Send Cancel Ramp Meter Change Response Upon Request	M	Yes	
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.4.2.1	Required Device Change Cancellation Request Content	M	Yes	
			3.3.5.8.5.2	Required Ramp Meter Change Cancellation Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.8.5.3	Required Ramp Meter Change Cancellation Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7.7	Need to View Ramp Metering Plan Queue				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.7.4 is selected
		Dialogs					
			3.3.5.8.8.1	Send Ramp Meter Priority Queue Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.5.1.1	Required Device Priority Queue Request Content	M	Yes	
			3.3.5.8.8.2	Required Ramp Meter Priority Queue Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.2.5.2.1	Required Device Priority Queue Response Header Content	M	Yes	
			3.3.5.1.2.5.2.2.2	Unique Sequence Number	O	Yes / No	
			3.3.5.1.2.5.2.2.3	Event Identifier – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.4	Event Response Plan – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.5	Request Start Date and Time – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.6	Request Expiration Date and Time – Device Queue	O	Yes / No	
			3.3.5.8.8.3.1	Required Ramp Meter Priority Queue Request Content	M	Yes	
			3.3.5.8.8.3.2.1	Metered Lane Identifier	O	Yes / No	
			3.3.5.8.8.3.2.2	Requested Plan – Ramp Meter Queue	O	Yes / No	
			3.3.5.8.8.3.2.3	Requested Rate – Ramp Meter Queue	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7.8	Need to Share Ramp Metering Schedule				Optional	Yes / No	
		Dialogs					
			3.3.5.8.6.13.3.5.8.6.2	Send Ramp Meter Schedule Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.8.6.2	Publish Ramp Meter Schedule Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.8.6.3	Subscribe to Ramp Meter Schedule Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.8.6.4	Required Ramp Meter Schedule Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.4.1	Required Device Schedule Information Content	M	Yes	
			3.3.5.8.6.5.1	Required Ramp Meter Schedule Content	M	Yes	
			3.3.5.8.6.5.2.1	Metered Lane Action Control	M	Yes	
			3.3.5.8.6.5.2.2	Time base Plan Control	O	Yes / No	
			3.3.5.8.6.5.2.3	Time base Rate Control	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.6.5.1 is "trafficResponsive"
			3.3.5.8.6.5.2.4	Time base Vehicles Per Green Control	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.6.5.1 is "fixedRate"
			3.3.5.8.6.5.2.5	Time base Control Minimum Metering Rate	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.8.6.5.2.6	Time base Control Maximum Metering Rate	O	Yes / No	
			3.3.5.8.6.5.2.7	Time base Control Lane Usage Mode	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7.9	Need to Share Ramp Metering Plans				Optional	Yes / No	
		Dialogs					
			3.3.5.8.7.1	Send Metering Plan Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.8.7.2	Publish Metering Plan Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.8.7.3	Subscribe to Metering Plan Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	M	Yes	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.1.1.1.2.7	Center Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.8	Time Range Filter	O	Yes / No	
			3.3.5.8.7.4	Required Metering Plan Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.8.7.5.1	Required Metering Plan Response Content	M	Yes	
			3.3.5.8.7.5.2.1	Metering Plan Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.7.10	Need to Control Ramp Metering Devices				Optional	Yes / No	
		Dialogs					
			3.3.5.8.9.1	Send Ramp Meter Control Command Status	M	Yes	
		Control Command Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.3.2.1	Required External Device Control Command Content	M	Yes	
			3.3.5.8.9.2.1	Required Ramp Meter Control Command Content	M	Yes	
			3.3.5.8.9.2.2	Command Ramp Meter Control Plan	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.9.2.1 is "trafficResponsive"
			3.3.5.8.9.2.3	Command Ramp Meter Control Rate	C	Yes / No	This requirement is mandatory if the operational mode in requirement 3.3.5.8.9.2.1 is "fixedRate"
		Response Message					
			3.3.5.1.3.3	Required External Device Control Command Response Content	M	Yes	
			3.3.5.8.9.3	Required Ramp Meter Control Command Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8	Need to Share Traffic Signal Control and Status						
2.4.2.5.8.1	Need to Share Signal System Inventory				Optional	Yes / No	
		Dialogs					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.1.1	Send Signal Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.9.1.2	Publish Signal Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.1.3	Subscribe to Signal Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.9.1.4	Required Signal Inventory Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL)(DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.9.1.5.1	Required Signal Inventory Content	M	Yes	
			3.3.5.9.1.5.2.1	Field Management Station	O	Yes / No	
			3.3.5.9.1.5.2.2	Link Identifiers	O	Yes / No	
			3.3.5.9.1.5.2.3	Direction of Traffic	O	Yes / No	
			3.3.5.9.1.5.2.4	Movement Identifier (MovementIdentifier)	O	Yes / No	
			3.3.5.9.1.5.2.5	Vehicle Movement Approach Link	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.6	Pedestrian Movement Approach Link	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.7	Departing Link	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.8	Crossing Point	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.9	Turning Movement Approach Vector	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.10	Turning Movement Type	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.11	Turning Movement Lanes	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.12	Turning Movement Description	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.13	Enabled Phases	O	Yes / No	
			3.3.5.9.1.5.2.14	Concurrent Phases	O	Yes / No	
			3.3.5.9.1.5.2.15	Active Movements	O	Yes / No	
			3.3.5.9.1.5.2.16	Overlap-Phase Assignment	O	Yes / No	
			3.3.5.9.1.5.2.17	Ring-Phase Assignment	O	Yes / No	
			3.3.5.9.1.5.2.18	Special Function Information	O	Yes / No	
			3.3.5.9.1.5.2.19	Time Reference	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.1.5.2.20	Sync Reference Time	O	Yes / No	
			3.3.5.9.1.5.2.21	Supported Timing Modes	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.2	Need to Share Signal Section Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.9.2.1	Send Signal Section Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.9.2.2	Publish Signal Section Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.2.3	Subscribe to Signal Section Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			Error! Reference source not found.	Error! Reference source not found.	M	Yes	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.6	Section Identifier Filter	O	Yes / No	
			3.3.5.9.2.4	Required Signal Section Inventory Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.2.5	Required Signal Section Inventory Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.3	Need to Share Updated Signal System Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.9.1.2	Publish Signal Inventory Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.1.3	Subscribe to Signal Inventory Information	M	Yes	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.9.1.4	Required Signal Inventory Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL)(DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.9.1.5.1	Required Signal Inventory Content	M	Yes	
			3.3.5.9.1.5.2.1	Field Management Station	O	Yes / No	
			3.3.5.9.1.5.2.2	Link Identifiers	O	Yes / No	
			3.3.5.9.1.5.2.3	Direction of Traffic	O	Yes / No	
			3.3.5.9.1.5.2.4	Movement Identifier (MovementIdentifier)	O	Yes / No	
			3.3.5.9.1.5.2.5	Vehicle Movement Approach Link	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.6	Pedestrian Movement Approach Link	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.7	Departing Link	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.8	Crossing Point	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.9	Turning Movement Approach Vector	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.10	Turning Movement Type	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.11	Turning Movement Lanes	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.12	Turning Movement Description	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.13	Enabled Phases	O	Yes / No	
			3.3.5.9.1.5.2.14	Concurrent Phases	O	Yes / No	
			3.3.5.9.1.5.2.15	Active Movements	O	Yes / No	
			3.3.5.9.1.5.2.16	Overlap-Phase Assignment	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.1.5.2.17	Ring-Phase Assignment	O	Yes / No	
			3.3.5.9.1.5.2.18	Special Function Information	O	Yes / No	
			3.3.5.9.1.5.2.19	Time Reference	O	Yes / No	
			3.3.5.9.1.5.2.20	Sync Reference Time	O	Yes / No	
			3.3.5.9.1.5.2.21	Supported Timing Modes	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.4	Need to Share Intersection Status				Optional	Yes / No	
		Dialogs					
			3.3.5.9.3.1	Send Intersection Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.9.3.2	Publish Intersection Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.3.3	Subscribe to Intersection Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	M	Yes	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.1.1.1.2.6	Section Identifier Filter	O	Yes / No	
			3.3.5.9.3.4	Required Intersection Status Request Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.3.1	Required Device Status Header Content	M	Yes	
			3.3.5.1.1.3.2.1	Unique Identifier of the Controlling Center	O	Yes / No	
			3.3.5.1.1.3.2.2	Device Communications Status	O	Yes / No	
			3.3.5.1.1.3.2.4	Device Status Date and Time Change Information	O	Yes / No	
			3.3.5.9.3.5.1	Required Intersection Status Content	M	Yes	
			3.3.5.9.3.5.2.1	Section Identifier – Intersection Status	O	Yes / No	
			3.3.5.9.3.5.2.2	Planned Signal Timing Mode Description	O	Yes / No	
			3.3.5.9.3.5.2.3	Timing Pattern Identifier – Current	O	Yes / No	
			3.3.5.9.3.5.2.4	Timing Pattern Description	O	Yes / No	
			3.3.5.9.3.5.2.5	Actuation Mode	O	Yes / No	
			3.3.5.9.3.5.2.6	Phase Recalls	O	Yes / No	
			3.3.5.9.3.5.2.7	Cycle Length – Planned	O	Yes / No	
			3.3.5.9.3.5.2.8	Cycle Length – Current	O	Yes / No	
			3.3.5.9.3.5.2.9	Cycle Length – Previous	O	Yes / No	
			3.3.5.9.3.5.2.10	Field Management Station Cycle Length – Actual	O	Yes / No	
			3.3.5.9.3.5.2.11	Local Controller Cycle Counter	O	Yes / No	
			3.3.5.9.3.5.2.12	Field Management Station Cycle Counter	O	Yes / No	
			3.3.5.9.3.5.2.13	Offset Reference	O	Yes / No	
			3.3.5.9.3.5.2.14	Offset – Planned	O	Yes / No	
			3.3.5.9.3.5.2.15	Offset – Actual	O	Yes / No	
			3.3.5.9.3.5.2.16	Offset – Previous	O	Yes / No	
			3.3.5.9.3.5.2.17	Controller Timestamp	O	Yes / No	
			3.3.5.9.3.5.2.18	Coordinated Phases	O	Yes / No	
			3.3.5.9.3.5.2.19	Phase Splits	O	Yes / No	
			3.3.5.9.3.5.2.20	Ring Status	O	Yes / No	
			3.3.5.9.3.5.2.21	Active Phase Sequence	O	Yes / No	
			3.3.5.9.3.5.2.22	Phase Status Greens	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.3.5.2.23	Phase Status Yellows	O	Yes / No	
			3.3.5.9.3.5.2.24	Phase Status Reds	O	Yes / No	
			3.3.5.9.3.5.2.25	Phase Status Walks	O	Yes / No	
			3.3.5.9.3.5.2.26	Phase Status Pedestrian Clearance	O	Yes / No	
			3.3.5.9.3.5.2.27	Phase Status Don't Walks	O	Yes / No	
			3.3.5.9.3.5.2.28	Overlap Status Greens	O	Yes / No	
			3.3.5.9.3.5.2.29	Overlap Status Yellows	O	Yes / No	
			3.3.5.9.3.5.2.30	Overlap Status Reds	O	Yes / No	
			3.3.5.9.3.5.2.31	Special Functions	O	Yes / No	
			3.3.5.9.3.5.2.32	Preemption / Priority Description	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.5	Need to Request a Change to Control of a Remote Traffic Signal Controller Plan or Mode				Optional	Yes / No	
		Dialogs					
			3.3.5.9.4.1	Send Signal Change Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.1.1	Required Device Change Request Header Content	M	Yes	
			3.3.5.1.2.1.2.2	Event Identifier – Device Change	O	Yes / No	
			3.3.5.1.2.1.2.3	Change Request Start Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.4	Change Request Expiration Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.5	Change Request Date and Time Information	O	Yes / No	
			3.3.5.9.4.2	Required Signal Change Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.9.4.3.1	Required Signal Change Response Content	M	Yes	
			3.3.5.9.4.3.2.1	Section Identifier – Signal Change	O	Yes / No	
			3.3.5.9.4.3.2.2	Signal Timing Mode – Current	O	Yes / No	
			3.3.5.9.4.3.2.3	Signal Timing Pattern Identifier – Current	O	Yes / No	
			3.3.5.9.4.3.2.4	Signal Offset – Current	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.6	Need to Verify Traffic Signal Controller Control Request Status				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.8.5 is selected
		Dialogs					
			3.3.5.1.2.3.1	Send Device Change Status Upon Request	M	Yes	
			3.3.5.9.5.1	Send Signal Controller Change Status Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.3.2	Required Device Change Status Request Content	M	Yes	
			3.3.5.9.5.2	Required Signal Controller Change Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.2	Operator Lock Identifier	O	Yes / No	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.9.4.3.1	Required Signal Change Response Content	M	Yes	
			3.3.5.9.4.3.2.1	Section Identifier – Signal Change	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.4.3.2.2	Signal Timing Mode – Current	O	Yes / No	
			3.3.5.9.4.3.2.3	Signal Timing Pattern Identifier – Current	O	Yes / No	
			3.3.5.9.4.3.2.4	Signal Offset – Current	O	Yes / No	
			Error! Reference source not found.	Required Signal Controller Change Status Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.7	Need to View Traffic Signal Controller Plan Queue				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.8.5 is selected
		Dialogs					
			3.3.5.9.14.1	Send Signal Priority Queue Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.5.1.1	Required Device Priority Queue Request Content	M	Yes	
			3.3.5.9.14.2	Required Signal Change Priority Queue Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.2.5.2.1	Required Device Priority Queue Response Header Content	M	Yes	
			3.3.5.1.2.5.2.2.2	Unique Sequence Number	O	Yes / No	
			3.3.5.1.2.5.2.2.3	Event Identifier – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.4	Event Response Plan – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.5	Request Start Date and Time – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.6	Request Expiration Date and Time – Device Queue	O	Yes / No	
			3.3.5.9.14.3	Required Signal Change Priority Queue Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.8	Need to Cancel Traffic Signal Controller Control Requests				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.8.5 is selected
		Dialogs					
			3.3.5.1.2.4.1	Send Change Cancellation Response Upon Request	M	Yes	
			3.3.5.9.6.1	Send Cancel Signal Controller Change Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.4.2.1	Required Device Change Cancellation Request Content	M	Yes	
			3.3.5.9.6.2	Required Signal Controller Cancellation Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.9.6.3	Required Signal Controller Cancellation Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.9	Need to Share Controller Timing Patterns				Optional	Yes / No	
		Dialogs					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.8.1	Send Signal Timing Pattern Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.9.8.2	Publish Signal Timing Pattern Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.8.3	Subscribe to Signal Timing Pattern Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.1.1.1.2.7	Center Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.8	Time Range Filter	O	Yes / No	
			3.3.5.9.8.4.1	Required Signal Timing Pattern Information Request Content	M	Yes	
			3.3.5.9.8.4.2.1	Signal Timing Pattern Identifier	O	Yes / No	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.9.8.5.1	Required Signal Timing Pattern Information Response Content	M	Yes	
			3.3.5.9.8.5.2.1	Description of Signal Timing Pattern	O	Yes / No	
			3.3.5.9.8.5.2.2	Maximum Green Duration	O	Yes / No	
			3.3.5.9.8.5.2.3	Minimum Green Duration	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications	
			3.3.5.9.8.5.2.4	Vehicle Yellow Duration	O	Yes / No		
			3.3.5.9.8.5.2.5	Vehicle Red Clearance Duration	O	Yes / No		
			3.3.5.9.8.5.2.6	Minimum Walk Duration	O	Yes / No		
			3.3.5.9.8.5.2.7	Pedestrian Clearance Duration	O	Yes / No		
			3.3.5.9.8.5.2.8	Steady-Dont-Walk Duration	O	Yes / No		
			3.3.5.9.8.5.2.9	Phase Sequence Information	O	Yes / No		
			3.3.5.9.8.5.2.10	Signal Timing Pattern Date and Time Change Information	O	Yes / No		
		Error Report Message						
			3.3.1.7.1.1	Required Error Report Contents	M	Yes		
	3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No				
2.4.2.5.8.10	Need to Share Controller Schedule				Optional	Yes / No		
		Dialogs						
			3.3.5.9.7.1	Send Signal Timing Pattern Schedule Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.	
			3.3.5.9.7.2	Publish Signal Timing Pattern Schedule Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.	
			3.3.5.9.7.3	Subscribe to Signal Timing Pattern Schedule Information	Subscription:O	Yes / No / NA		
		Request Message						
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No		
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No		
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes		
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No		
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No		

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.7.4	Required Signal Timing Pattern Schedule Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.4.1	Required Device Schedule Information Content	M	Yes	
			3.3.5.9.7.5	Required Signal Timing Pattern Schedule Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
2.4.2.5.8.11	Need to Share Turning Movement and Intersection Data		3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
		Dialogs					
			3.3.5.9.1.1	Send Signal Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.9.1.2	Publish Signal Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.1.3	Subscribe to Signal Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.9.1.4	Required Signal Inventory Request Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.9.1.5.1	Required Signal Inventory Content	M	Yes	
			3.3.5.9.1.5.2.2	Link Identifiers	O	Yes / No	
			3.3.5.9.1.5.2.3	Direction of Traffic	O	Yes / No	
			3.3.5.9.1.5.2.4	Movement Identifier (MovementIdentifier)	O	Yes / No	
			3.3.5.9.1.5.2.5	Vehicle Movement Approach Link	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.6	Pedestrian Movement Approach Link	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.7	Departing Link	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.8	Crossing Point	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.9	Turning Movement Approach Vector	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.10	Turning Movement Type	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.11	Turning Movement Lanes	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.12	Turning Movement Description	MovementIdentifier:O	Yes / No / NA	
			3.3.5.9.1.5.2.13	Enabled Phases	O	Yes / No	
			3.3.5.9.1.5.2.14	Concurrent Phases	O	Yes / No	
			3.3.5.9.1.5.2.15	Active Movements	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.1.5.2.16	Overlap-Phase Assignment	O	Yes / No	
			3.3.5.9.1.5.2.17	Ring-Phase Assignment	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.12	Need to Share Time Synchronization Information				Optional	Yes / No	
		Dialogs					
			3.3.5.9.1.1	Send Signal Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.9.1.2	Publish Signal Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.1.3	Subscribe to Signal Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.9.1.4	Required Signal Inventory Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.9.1.5.1	Required Signal Inventory Content	M	Yes	
			3.3.5.9.1.5.2.20	Sync Reference Time	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.13	Need to Share Section Status				Optional	Yes / No	
		Dialogs					
			3.3.5.9.9.1	Send Section Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.9.9.2	Publish Section Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.9.3	Subscribe to Section Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.1.1.1.2.6	Section Identifier Filter	O	Yes / No	
			3.3.5.9.9.4	Required Section Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.9.9.5.1	Required Section Status Content	M	Yes	
			3.3.5.9.9.5.2.1	Section Name	O	Yes / No	
			3.3.5.9.9.5.2.2	Description of Section Timing Pattern – Section Status	O	Yes / No	
			3.3.5.9.9.5.2.3	Section Cycle Length – Section Status	O	Yes / No	
			3.3.5.9.9.5.2.5	Event Identifier – Section Status	O	Yes / No	
			3.3.5.9.9.5.2.6	Event Response Plan – Section Status	O	Yes / No	
			3.3.5.9.9.5.2.7	Section Status Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.14	Need to Control a Section				Optional	Yes / No	
		Dialogs					
			3.3.5.9.10.1	Send Signal Section Change Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.1.1	Required Device Change Request Header Content	M	Yes	
			3.3.5.1.2.1.2.2	Event Identifier – Device Change	O	Yes / No	
			3.3.5.1.2.1.2.3	Change Request Start Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.4	Change Request Expiration Date and Time	O	Yes / No	
			3.3.5.1.2.1.2.5	Change Request Date and Time Information	O	Yes / No	
			3.3.5.9.10.1.1	Required Signal Section Change Request Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.9.10.2.1	Required Signal Section Change Response Content	M	Yes	
			3.3.5.9.10.2.2.1	Section Timing Mode – Current	O	Yes / No	
			3.3.5.9.10.2.2.2	Section Timing Pattern Identifier – Current	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.15	Need to Verify Section Plan Status				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.8.14 is selected
		Dialogs					
			3.3.5.9.11.1	Send Section Change Status Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes	
			3.3.5.1.2.3.2	Required Device Change Status Request Content	M	Yes	
			3.3.5.9.11.2	Required Section Change Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.9.10.2.1	Required Signal Section Change Response Content	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.10.2.2.1	Section Timing Mode – Current	O	Yes / No	
			3.3.5.9.10.2.2.2	Section Timing Pattern Identifier – Current	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.16	Need to View Section Plan Queue				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.8.14 is selected
		Dialogs					
			3.3.5.9.15.1	Send Section Change Priority Queue Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.5.1.1	Required Device Priority Queue Request Content	M	Yes	
			3.3.5.9.15.2	Required Section Change Priority Queue Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.2.5.2.1	Required Device Priority Queue Response Header Content	M	Yes	
			3.3.5.1.2.5.2.2.2	Unique Sequence Number	O	Yes / No	
			3.3.5.1.2.5.2.2.3	Event Identifier – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.4	Event Response Plan – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.5	Request Start Date and Time – Device Queue	O	Yes / No	
			3.3.5.1.2.5.2.2.6	Request Expiration Date and Time – Device Queue	O	Yes / No	
			3.3.5.9.15.3	Required Section Change Priority Queue Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.17	Need to Cancel Traffic Signal Section Control Requests				Conditional	Yes / No	This user need is Mandatory if UN 2.4.2.5.8.14 is selected
		Dialogs					
			3.3.5.1.2.4.1	Send Change Cancellation Response Upon Request	M	Yes	
			3.3.5.9.12.1	Send Cancel Signal Section Change Response Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.9.12.2	Required Signal Controller Cancellation Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	
			3.3.5.1.2.2.1	Required Device Change Request Response Content	M	Yes	
			3.3.5.1.2.2.2.3	Operator Last Revised Date and Time – Device Change	O	Yes / No	
			3.3.5.9.12.3	Required Signal Section Cancellation Request Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.18	Need to Share Section Timing Pattern Schedule				Optional	Yes / No	
		Dialogs					
			3.3.5.9.13.1	Send Section Timing Pattern Schedule Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.13.2	Publish Section Timing Pattern Schedule Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.13.3	Subscribe to Section Timing Pattern Schedule Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.1.1.1.2.6	Section Identifier Filter	O	Yes / No	
			3.3.5.9.13.4	Required Section Timing Pattern Schedule Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.4.1	Required Device Schedule Information Content	M	Yes	
			3.3.5.9.13.5	Required Section Timing Pattern Schedule Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.19	Need to Share Section Timing Patterns				Optional	Yes / No	
		Dialogs					
			3.3.5.9.16.2	Publish Section Timing Pattern Information	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.16.3	Subscribe to Section Timing Pattern Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.9.16.3	Subscribe to Section Timing Pattern Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.1.1.1.2.6	Section Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.7	Center Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.8	Time Range Filter	O	Yes / No	
			3.3.5.9.16.4	Required Section Timing Pattern Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.9.16.5.1	Required Section Timing Pattern Information Response Content	M	Yes	
			3.3.5.9.16.5.2.1	Description of the Section Timing Pattern	O	Yes / No	
			3.3.5.9.16.5.2.2	Section Timing Pattern Inventory Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.8.20	Need to Control a Remote Traffic Signal Controller				Optional	Yes / No	
		Dialogs					

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.9.17.1	Send Signal Control Response Upon Command	M	Yes	
		Control Command Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.3.2.1	Required External Device Control Command Content	M	Yes	
			3.3.5.9.17.2	Required Traffic Signal Controller Command Content	M	Yes	
		Response Message					
			3.3.5.1.3.3	Required External Device Control Command Response Content	M	Yes	
			3.3.5.9.17.3	Required Traffic Signal Controller Command Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.9	Need to Share Roadside Unit Status						
2.4.2.5.9.1	Need to Share RSU Device Inventory				Optional	Yes / No	
		Dialogs					
			3.3.5.10.1.1	Send RSU Inventory Information Upon Request	M	Yes	owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.10.1.2	Publish RSU Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.10.1.3	Subscribe to RSU Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
2.4.2.5.9.2			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.10.1.4	Required RSU Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	M	Yes	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.10.1.5.1	Required RSU Inventory Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
		Need to Share Updated RSU Device Inventory				Optional	Yes / No
		Dialogs					
			3.3.5.10.1.2	Publish RSU Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
							(100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.5.10.1.3	Subscribe to RSU Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.10.1.4	Required RSU Inventory Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.2.1	Required Device Inventory Response Header Content	M	Yes	
			3.3.5.1.1.2.2.1	User Device Description	M	Yes	
			3.3.5.1.1.2.2.2	Device Control Type	O	Yes / No	
			3.3.5.1.1.2.2.3	System Description	O	Yes / No	
			3.3.5.1.1.2.2.4	Roadway Network Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.5	Node Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.6	Node Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.7	Link Identifier – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.8	Link Name – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.9	Link Direction – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.10	Linear Reference – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.11	Linear Reference Version	O	Yes / No	
			3.3.5.1.1.2.2.12	Route Designator – Device Inventory	O	Yes / No	
			3.3.5.1.1.2.2.13	Device Uniform Resource Locator (URL) (DeviceURL)	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.2.2.14	Device URL Reference Medium	DeviceURL:O	Yes / No / NA	
			3.3.5.1.1.2.2.15	Device Inventory Date and Time Change Information	O	Yes / No	
			3.3.5.10.1.5.1	Required RSU Inventory Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.9.3	Need to Share RSU Device Status				Optional	Yes / No	
		Dialogs					
			3.3.5.10.2.1	Send RSU Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.10.2.2	Publish RSU Status Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.10.2.3	Subscribe to RSU Status Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.10.2.4	Required RSU Status Request Content	M	Yes	
		Response Message					
			3.3.1.8.3	Operator Identifier – Responses	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.1.1.3.1	Required Device Status Header Content	M	Yes	
			3.3.5.1.1.3.2.1	Unique Identifier of the Controlling Center	O	Yes / No	
			3.3.5.1.1.3.2.2	Device Communications Status	O	Yes / No	
			3.3.5.1.1.3.2.4	Device Status Date and Time Change Information	O	Yes / No	
			3.3.5.10.2.5.1	Required RSU Status Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.5.9.4	Need for RSU Data Sharing				Optional	Yes / No	
		Dialogs					
			3.3.5.10.3.1	Send RSU Data Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.10.3.2	Publish RSU Data	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.10.3.3	Subscribe to RSU Data	Subscription:O	Yes / No / NA	
			3.3.5.10.4.1	Send RSU Security Content Upon Request	M	Yes	
			3.3.5.10.4.2	Publish RSU Security Content	Subscription:O	Yes / No / NA	
			3.3.5.10.4.3	Subscribe to RSU Security Content	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	M	Yes	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.10.3.4.1	Required RSU Data Request Content	M	Yes	
			3.3.5.10.4.4.1	Required RSU Security Content Request	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.10.3.5.1	Required RSU Data Response Content	M	Yes	
			3.3.5.10.4.5.1	Required RSU Data Security Content Response Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.6	Data Needs Relating to Shared Data for Archiving						
2.4.2.6.1	Need for Traffic Monitoring Data					Yes / No	
2.4.2.6.1.1	Need for Direct Measurements of Traffic Flow and Conditions				Optional	Yes / No	
		Dialogs					
			3.3.5.2.3.1	Send Detector Data Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.5.2.3.2	Publish Detector Data	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.5.2.3.3	Subscribe to Detector Data Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes	
			3.3.5.1.1.1.2.1	Device Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No	
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No	
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No	
			3.3.5.2.3.4.1	Required Detector Data Request Content	M	Yes	
			3.3.5.2.3.4.2.1	Detector Station – Data Request	O	Yes / No	
			3.3.5.2.3.4.2.2	Data Type Request	O	Yes / No	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.5.2.3.5.1	Required Detector Data Response Content	M	Yes	
			3.3.5.2.3.5.2.1	Detector Station – Detector Data	O	Yes / No	
			3.3.5.2.3.5.2.2	Vehicle Count	O	Yes / No	
			3.3.5.2.3.5.2.3	Average Vehicle Occupancy	O	Yes / No	
			3.3.5.2.3.5.2.4	Data Collection Start	O	Yes / No	
			3.3.5.2.3.5.2.5	Data Collection End	O	Yes / No	
			3.3.5.2.3.5.2.6	Data Type	O	Yes / No	
			3.3.5.2.3.5.2.7	Average Vehicle Speed	O	Yes / No	
			3.3.5.2.3.5.2.8	Average Vehicle Queue	O	Yes / No	
			3.3.5.2.3.5.2.9	Vehicle Stops	O	Yes / No	
			3.3.5.2.3.5.2.10	Vehicle Count – Bin 1	O	Yes / No	
			3.3.5.2.3.5.2.11	Vehicle Count – Bin 2	O	Yes / No	
			3.3.5.2.3.5.2.12	Vehicle Count – Bin 3	O	Yes / No	
			3.3.5.2.3.5.2.13	Vehicle Count – Bin 4	O	Yes / No	
			3.3.5.2.3.5.2.14	Vehicle Count – Bin 5	O	Yes / No	
			3.3.5.2.3.5.2.15	Vehicle Count – Bin 6	O	Yes / No	
			3.3.5.2.3.5.2.16	Vehicle Count – Bin 7	O	Yes / No	
			3.3.5.2.3.5.2.17	Vehicle Count – Bin 8	O	Yes / No	
			3.3.5.2.3.5.2.18	Vehicle Count – Bin 9	O	Yes / No	
			3.3.5.2.3.5.2.19	Vehicle Count – Bin 10	O	Yes / No	
			3.3.5.2.3.5.2.20	Vehicle Count – Bin 11	O	Yes / No	
			3.3.5.2.3.5.2.21	Vehicle Count – Bin 12	O	Yes / No	
			3.3.5.2.3.5.2.22	Vehicle Count – Bin 13	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.2.3.5.2.23	Vehicle Count – Bin 14	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.6.1.2	Need for Original Source Data for Traffic Monitoring Measurements				Optional	Yes / No	
		Dialogs					
			3.3.6.1.1.1	Send Traffic Monitoring Data Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.6.1.1.2	Contents of the Traffic Monitoring Data Inventory Request	M	Yes	
			3.3.6.1.1.2.1	Required Traffic Monitoring Data Inventory Request Content	M	Yes	
			3.3.6.1.1.2.2.3	Data Set Type	O	Yes / No	
			3.3.6.1.1.2.2.4	Data Collection Period	O	Yes / No	
			3.3.6.1.1.2.2.5	Geographic Location – Traffic Monitoring Data	O	Yes / No	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.6.1.1.3	Contents of the Traffic Monitoring Data Inventory Information	M	Yes	
			3.3.6.1.1.3.1	Required Traffic Monitoring Data Inventory Content	M	Yes	
			3.3.6.1.1.3.2.2	Purpose of the Data Set			
			3.3.6.1.1.3.2.3	Title of the Data Set	O	Yes / No	
			3.3.6.1.1.3.2.4	Version of the Data Set	O	Yes / No	
			3.3.6.1.1.3.2.5	Publication Information of the Data Set	O	Yes / No	
			3.3.6.1.1.3.2.6	Progress of the Data Set	O	Yes / No	
			3.3.6.1.1.3.2.7	Maintenance of the Data Set	O	Yes / No	
			3.3.6.1.1.3.2.8	Data Set Uniform Resource Locator (URL)(DataURL)	O	Yes / No	
			3.3.6.1.1.3.2.9	Data Set URL Reference Medium	DataURL:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.6.1.1.3.2.10	Roadway Network Identifier – Traffic Monitoring Data	O	Yes / No	
			3.3.6.1.1.3.2.11	Link Identifier – Traffic Monitoring Data	O	Yes / No	
			3.3.6.1.1.3.2.12	Route Designator – Traffic Monitoring Data	O	Yes / No	
			3.3.6.1.1.3.2.13	Linear Reference – Traffic Monitoring Data	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.6.1.3	Need for Processed Traffic Monitoring Data				Optional	Yes / No	
		Dialogs					
			3.3.6.1.1.1	Send Traffic Monitoring Data Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.6.1.1.2	Contents of the Traffic Monitoring Data Inventory Request	M	Yes	
			3.3.6.1.1.2.1	Required Traffic Monitoring Data Inventory Request Content	M	Yes	
			3.3.6.1.1.2.2.3	Data Set Type	O	Yes / No	
			3.3.6.1.1.2.2.4	Data Collection Period	O	Yes / No	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.6.1.1.3	Contents of the Traffic Monitoring Data Inventory Information	M	Yes	
			3.3.6.1.1.3.1	Required Traffic Monitoring Data Inventory Content	M	Yes	
			3.3.6.1.1.3.2.2	Purpose of the Data Set			
			3.3.6.1.1.3.2.3	Title of the Data Set	O	Yes / No	
			3.3.6.1.1.3.2.4	Version of the Data Set	O	Yes / No	
			3.3.6.1.1.3.2.5	Publication Information of the Data Set	O	Yes / No	
			3.3.6.1.1.3.2.6	Progress of the Data Set	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications	
			3.3.6.1.1.3.2.7	Maintenance of the Data Set	O	Yes / No		
			3.3.6.1.1.3.2.8	Data Set Uniform Resource Locator (URL)(DataURL)	O	Yes / No		
			3.3.6.1.1.3.2.9	Data Set URL Reference Medium	DataURL:O	Yes / No / NA		
			3.3.6.1.1.3.2.10	Roadway Network Identifier – Traffic Monitoring Data	O	Yes / No		
			3.3.6.1.1.3.2.11	Link Identifier – Traffic Monitoring Data	O	Yes / No		
			3.3.6.1.1.3.2.12	Route Designator – Traffic Monitoring Data	O	Yes / No		
			3.3.6.1.1.3.2.13	Linear Reference – Traffic Monitoring Data	O	Yes / No		
		Error Report Message						
			3.3.1.7.1.1	Required Error Report Contents	M	Yes		
	3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No				
2.4.2.6.1.4	Need for Data Collection System Metadata				Optional	Yes / No		
		Dialogs						
			3.3.5.2.4.1	Send Detector Maintenance History Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.	
		Request Message						
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No		
			3.3.5.1.1.1.1	Required Device Information Request Content	M	Yes		
			3.3.5.1.1.1.2.1	Device Identifier Filter	M	Yes		
			3.3.5.1.1.1.2.2	Roadway Network Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.3	Link Identifier Filter	O	Yes / No		
			3.3.5.1.1.1.2.4	Route Designator Filter	O	Yes / No		
			3.3.5.1.1.1.2.5	Linear Reference Filter	O	Yes / No		
			3.3.5.2.4.2.1	Required Detector Maintenance History Request Content	M	Yes		
			3.3.5.2.4.2.2.1	Detector Station – Detector History Request	O	Yes / No		
		Response Message						
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No		
			3.3.5.2.4.3.1	Required Detector Maintenance History Content	M	Yes		

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.5.2.4.3.2.1	Detector Station – Detector History	O	Yes / No	
			3.3.5.2.4.3.2.2	Detector Type	O	Yes / No	
			3.3.5.2.4.3.2.3	Installation Date and Time	O	Yes / No	
			3.3.5.2.4.3.2.4	Detector Calibration Date and Time	O	Yes / No	
			3.3.5.2.4.3.2.5	Operational Date and Time	O	Yes / No	
			3.3.5.2.4.3.2.6	Non-Operational Date and Time	O	Yes / No	
			3.3.5.2.4.3.2.7	History Date and Time Change Information	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
2.4.2.6.1.5	Need for Processing Documentation Metadata		3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
						Optional	Yes / No
		Dialogs					
			3.3.6.2.1	Send Processing Documentation Metadata Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
		Request Message					
			3.3.6.2.2.1	Required Processing Documentation Metadata Information Request Content	M	Yes	
		Response Message					
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.6.2.3.1	Required Processing Documentation Metadata Information Content	M	Yes	
			3.3.6.2.3.2.2	Publication Date and Time	O	Yes / No	
			3.3.6.2.3.2.3	Processing Method	O	Yes / No	
			3.3.6.2.3.2.4	Processing Method Description	O	Yes / No	
			3.3.6.2.3.2.5	Application Rules	O	Yes / No	
			3.3.6.2.3.2.6	Enumeration	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.6.1.6	Need for Roadway Characteristics Data					Optional	Yes / No

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
		Dialogs					
			3.3.4.3.2.1	Send Link Status Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.3.2.2	Publish Link Status Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.4.3.2.3	Subscribe to Link Status Information	Subscription:O	Yes / No / NA	
			3.3.4.2.1.1	Send Node Inventory Information Upon Request	Subscription:O	Yes / No / NA	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.2.1.2	Publish Node Inventory Information	M	Yes	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.4.2.1.3	Subscribe to Node Inventory Information	Subscription:O	Yes / No / NA	
			3.3.4.3.1.1	Send Link Inventory Information Upon Request	Subscription:O	Yes / No / NA	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.3.1.2	Publish Link Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 15 minutes) after the information is updated in the owner center. See 3.4.1.
			3.3.4.3.1.3	Subscribe to Route Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
			3.3.4.2.1.4	Contents of the Node Inventory Request	M	Yes	
			3.3.4.3.1.4	Contents of the Link Inventory Request	M	Yes	
			3.3.4.3.2.4	Contents of the Link Status Request	M	Yes	
			3.3.1.8.2	Operator Identifier – Requests	O	Yes / No	
			3.3.4.1.1.2.2	Roadway Network Identifier	O	Yes / No	
			3.3.4.1.1.2.3	Traffic Network Identifier	O	Yes / No	
		Response Message					
			3.3.4.2.1.5	Contents of the Node Inventory Information	M	Yes	
			3.3.4.2.1.5.1	Required Node Inventory Information Content	M	Yes	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.4.2.1.5.2.2	Roadway Network Name – Node Inventory	O	Yes / No	
			3.3.4.2.1.5.2.3	Node Name – Node Inventory	O	Yes / No	
			3.3.4.2.1.5.2.4	Node Description	O	Yes / No	
			3.3.4.2.1.5.2.5	Route Designator – Node Inventory	O	Yes / No	
			3.3.4.2.1.5.2.6	Node Direction	O	Yes / No	
			3.3.4.2.1.5.2.7	Linear Reference – Node Inventory	O	Yes / No	
			3.3.4.2.1.5.2.8	Node Type	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.2.1.5.2.9	Number of Links	O	Yes / No	
			3.3.4.2.1.5.2.10	Node Inventory Date and Time Change Information	O	Yes / No	
			3.3.4.3.1.5	Contents of the Link Inventory Information	M	Yes	
			3.3.4.3.1.5.1	Required Link Inventory Information Content	M	Yes	
			3.3.4.3.1.5.2.2	Roadway Network Name – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.3	Link Name – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.4	Alternate Names – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.5	Route Designator – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.6	Secondary Route Designators	O	Yes / No	
			3.3.4.3.1.5.2.7	Linear Reference – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.8	Link Length	O	Yes / No	
			3.3.4.3.1.5.2.9	Link Capacity	O	Yes / No	
			3.3.4.3.1.5.2.10	Link Lane Information	O	Yes / No	
			3.3.4.3.1.5.2.11	Link Speed Limit – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.12	Link Truck Speed Limit – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.13	Speed Limit Units – Link Inventory	O	Yes / No	
			3.3.4.3.1.5.2.14	Link Law Enforcement Jurisdiction	O	Yes / No	
			3.3.4.3.1.5.2.15	Designated Owner	O	Yes / No	
			3.3.4.3.1.5.2.16	Left Shoulder Width	O	Yes / No	
			3.3.4.3.1.5.2.17	Right Shoulder Width	O	Yes / No	
			3.3.4.3.1.5.2.18	Median Type	O	Yes / No	
			3.3.4.3.2.5	Contents of the Link Status Information	M	Yes	
			3.3.4.3.2.5.1	Required Link Status Information Content	M	Yes	
			3.3.4.3.2.5.2.2	Link Name – – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.3	Link Direction – – Link Status	O	Yes / No	
			3.3.4.3.2.5.2.5	Link Priority	O	Yes / No	
			3.3.4.3.2.5.2.6	Link Restrictions – – Axles	O	Yes / No	
			3.3.4.3.2.5.2.7	Link Restrictions – – Height	O	Yes / No	
			3.3.4.3.2.5.2.8	Link Restrictions – – Length	O	Yes / No	
			3.3.4.3.2.5.2.9	Link Restrictions – Weight	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.4.3.2.5.2.10	Link Restrictions – Width	O	Yes / No	
			3.3.4.3.2.5.2.11	Link Restrictions –Axle Weight	O	Yes / No	
			3.3.4.3.2.5.2.13	Link Surface Conditions	O	Yes / No	
			3.3.4.3.2.5.2.14	Link Saturation	O	Yes / No	
			3.3.4.3.2.5.2.15	Link Saturation Threshold	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.6.1.7	Need for Event Data				Optional	Yes / No	
		Dialogs					
			3.3.3.1	Send Event Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.3.2	Publish Event Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.3.3	Subscribe to Event Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.4	Contents of Event Information Request	M	Yes	
			3.3.3.4.1	Required Event Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.1.8.2	Operator Identifier – Requests	AuthEvents:O	Yes / No / NA	
			3.3.3.7.4.2.3	Requesting Organization – Event Index	O	Yes / No	
		Response Message					
			3.3.3.5	Contents of the Event Information	M	Yes	
			3.3.3.5.1	Required Event Information Content	M	Yes	
			3.3.3.5.1.1.2.1	External Center Organization – Events	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.1.2.2	Message Expiry Time	O	Yes / No	
			3.3.3.5.1.2.1	Required Event Reference Information	M	Yes	
			3.3.3.5.1.3.1	Event Time(EventTime)	M	Yes	
			3.3.3.5.1.3.1.1	Required Event Time Information	M	Yes	Optional if the message is to close an event.
			3.3.3.5.1.3.1.2.1	Event Valid Period(EventValidPeriod)	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.2	Effective Period Qualifier	EventValidPeriod:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.3	Days Event Not In Effect	EventValidPeriod:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.5	Sequence Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.6	Event Start Date/Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.1.2.11	Roadway Clearance Time	EventTime:O	Yes / No / NA	
			3.3.3.5.1.3.2	Event Source(EventSource)	O	Yes / No	
			3.3.3.5.1.3.2.1	Information Source Organization	EventSource:M	Yes	
			3.3.3.5.1.3.2.2	Event Detection Method	EventSource:O	Yes / No	
			3.3.3.5.1.3.3	Event Description(EventDescription)	O	Yes / No	
			3.3.3.5.1.3.3.1	Event Quantity	EventDescription:O	Yes / No / NA	
			3.3.3.5.1.3.3.2	Detour Information	EventDescription:O	Yes / No / NA	
			3.3.3.5.1.3.4	Event Location(EventLocation)	O	Yes / No	
			3.3.3.5.1.3.4.1.1	Area Identifier(AreaLocation)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.1.2	Name of Area	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.1.3	Area Location Rank	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.1.4	Secondary Area Location Reference	AreaLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.2	Required Link Location Information(LinkLocation)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.3.1	Link Ownership	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.2	Route Designator	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.3	Second Route Designator	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.4	Link Identifier	LinkLocation:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.3.4.3.5	Link Name – Events	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.7	Secondary Point	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.8	Link Direction	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.9	Link Alignment	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.10	Linear Reference Version – Events	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.3.11	Alternate Link Location	LinkLocation:O	Yes / No / NA	
			3.3.3.5.1.3.4.4	Required Point on a Link Location Information (PointOnALink)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.5.1	Linear Reference Location	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.2	Link Name – Event Point	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.3	Point Name	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.4	Cross Street Identifier	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.5	Cross Street Name	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.6	Signed Destination	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.7	Point Location Rank	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.8	Landmark Type	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.5.9	Secondary Link Location	PointOnALink:O	Yes / No / NA	
			3.3.3.5.1.3.4.6	Required Landmark Location Information(Landmark)	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.4.7.1	Landmark Point Name	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.2	Landmark Location Rank	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.3	Landmark Location	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.7.4	Secondary Landmark Location	Landmark:O	Yes / No / NA	
			3.3.3.5.1.3.4.8	Event Geographic Location	EventLocation:O.2 (1..*)	Yes / No / NA	
			3.3.3.5.1.3.5	Event Name	O	Yes / No	
			3.3.3.5.1.3.6	Event Lane(EventLane)	O	Yes / No	
			3.3.3.5.1.3.6.1.1	Lane Type	EventLane:O	Yes / No / NA	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.5.1.3.6.1.2	Direction of Travel	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.3	Total Number of Lanes	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.4	Number of Lanes Affected	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.5	Lane Number Affected	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.6.1.6	Lane Status	EventLane:O	Yes / No / NA	
			3.3.3.5.1.3.7	Event Description Confidence Level	O	Yes / No	
			3.3.1.9.1	Information Access Restrictions – Response Message Content	O	Yes / No	
			3.3.3.6.2	Event Indicator(EventIndicator)	O	Yes / No	
			3.3.3.6.2.1	Event Status	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.2	Event Duration Exceeded Flag	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.3	Event Impact Level	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.4	Event Active Flag	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.2.5	Event Class	EventIndicator:O.4 (1..*)	Yes / No / NA	
			3.3.3.6.3	Other References(EventReferences)	O	Yes / No	
			3.3.3.6.3.1	Trip Reference	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.2	Responsible Reference	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.3	Related Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.4	Previous Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.5	Split Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.6	Merged Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.7	Sibling Event	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.8	Associated Device	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.3.9	Associated URL	EventReferences:O.5 (1..*)	Yes / No / NA	
			3.3.3.6.4	Event Comments(EventComments)	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.6.4.1	Required Event Comments	EventComments:M	Yes / NA	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.6.1.8	Need for Event Response Plan Data				Optional	Yes / No	
		Dialogs					
			3.3.3.8.1	Send Response Plan Information Upon Request	M	Yes	
			3.3.3.8.2	Publish Response Plan Information	Subscription:O	Yes / No / NA	
			3.3.3.8.3	Subscribe to Response Plan Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.3.8.4	Content of Response Plan Information Request	M	Yes	
			3.3.3.8.4.1	Required Response Plan Information Request Content	M	Yes	
			3.3.1.8.1	Authorization Information – External Centers	O	Yes / No	
			3.3.3.9.4.2.2	Request Time	O	Yes / No	
			3.3.3.8.4.2.3	Corridor Identifier	O	Yes / No	
			3.3.3.8.4.2.4	Response Plan Request Filter	O	Yes / No	
		Response Message					
			3.3.3.8.5.1	Response Plan Information Content	M	Yes	
			3.3.3.8.5.2.1	Required Response Plan Header Content	M	Yes	
			3.3.3.8.5.2.2.1	Response Plan Ranking	O	Yes	
			3.3.3.8.5.2.2.2	Submission Time	O	Yes / No	
			3.3.3.8.5.3.1	Required Evaluation Cycle Content	M	Yes	
			3.3.3.8.5.3.2.1	Link State	O	Yes / No	
			3.3.3.8.5.3.2.2	Response Plan List	O	Yes / No	
			3.3.3.8.5.4.1	Required Response Plan Details	M	Yes	
			3.3.3.8.5.4.2.1	Detour List	O	Yes / No	
			3.3.3.8.5.4.2.2	Ramp Meter Actions	O	Yes / No	
			3.3.3.8.5.4.2.3	Intersection Signal Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.4	DMS Control Actions	O	Yes / No	
			3.3.3.8.5.4.2.5	HAR Message Control Actions	O	Yes / No	

UN ID	User Need	Message	Requirement ID	Requirement	Conformance	Support	Additional Specifications
			3.3.3.8.5.4.2.6	Other Messaging	O	Yes / No	
			3.3.3.8.5.4.2.7	LCS Schedule Changes	O	Yes / No	
			3.3.3.8.5.4.2.8	Speed Restrictions	O	Yes / No	
			3.3.3.8.5.4.2.9	Road Closure Actions	O	Yes / No	
			3.3.3.8.5.4.2.10	Personnel Deployment Actions	O	Yes / No	
			3.3.3.8.5.4.2.11	Device Control Cancellations	O	Yes / No	
			3.3.3.8.5.4.2.12	Aggregate Approval Decisions	O	Yes / No	
			3.3.3.8.5.4.2.13	Individual Approval Decisions	O	Yes / No	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	
2.4.2.6.1.9	Need for Direct Measurements of Fleet Vehicle Data				Optional	Yes / No	
		Dialogs					
			3.3.4.5.1.1	Send Fleet Vehicle Inventory Information Upon Request	M	Yes	The owner center shall respond within ____ (100 ms – 1 hour; Default = 1 minute) after receiving the request. See 3.4.2.
			3.3.4.5.1.2	Publish Fleet Vehicle Inventory Information	Subscription:O	Yes / No / NA	The owner center shall begin sending the updated response message within ____ (100 ms – 24 hours; Default = 1 minute) after the information is updated in the owner center. See 3.4.1.
			3.3.4.5.1.3	Subscribe to Fleet Vehicle Inventory Information	Subscription:O	Yes / No / NA	
		Request Message					
			3.3.4.1.1	Contents of the Traffic Network Information Request	M	Yes	
			3.3.4.1.1.1	Required Traffic Network Information Request Content	M	Yes	
		Response Message					
			3.3.4.5.1.5.1	Required Fleet Vehicle Inventory Information Content	M	Yes	
		Error Report Message					
			3.3.1.7.1.1	Required Error Report Contents	M	Yes	
			3.3.1.7.1.2.1	Information Access Restrictions – Error Report	O	Yes / No	

Annex A: Future User Needs [Informative]

The following user needs have been identified as candidates for inclusion into ngTMDD, but have not been included in the current version.

A.1 Event Data Needs

A.1.1 Need for Event Timeline Information

External centers need to obtain event timeline data such as incident verified time, response dispatched time, response arrival at incident time, time that all lanes are open after incident, and time that the last responder has left the scene.

Organizations monitor the incident timeline in order to develop performance measures for Traffic Incident Management, which requires calculation of NOCOE Traffic Incident Management timeline parameters such as Roadway Clearance Time (RCT) and Incident Clearance Time (ICT).

A.2 Roadway Data Needs

A.2.1 Need to Share Lane Level Link Data

Centers need to share link data by lane.

The level of granularity in data collected now allows the information to be collected at the lane level and applications now make use of the more detailed information.

A.2.2 Need for Vehicle Data

Centers need to share general vehicle data, including location and speed.

Centers have many ways to collect data on individual vehicles that can be used to provide insight into the operation of the road network. They might collect the data directly, or have it provided by third party providers. This information could be Basic Safety Message (BSM) data defined in SAE 2735. BSM data includes information about individual vehicle size, speed, position, and heading (direction).

A.3 Data Needs Relating to Device Data and Device Control

A.3.1 Need to Control Traffic Detector

A.3.1.1 Need to Control Remote Traffic Detectors

Centers need to be able to control a remote traffic detector that is normally managed by an external center.

In the case that one center must take over operation of a remote center, then that center must be able to directly control and configure traffic detectors controlled by the remote center.

A.3.2 Need to Share Video Switch Status and Control

Note- when considered for future versions, this will be revised to focus on video distribution control.,

Video switches are used to route the video from a source device to an end device. Video switch devices can be used by centers to:

- Display the output of a video device on an output device (local monitor, video wall, etc.);
- Provide visual images to other centers;
- Provide visual images to the public as to the state of the roadway;

- Receive visual images from external centers that may be closed;
- Record the video onto a storage device; and
- Alter the attributes of a video stream in order to effectively utilize available communications bandwidth.

A.3.2.1 Need to Share Video Switch Inventory

Centers need to exchange inventory information so that video switches operated by a center can become known to other centers. Centers need to exchange video switch device attributes so that the capabilities of the video switch operated by the owner center can become known to external centers. Inventory information includes static video switch device attributes such as:

- Number of video inputs and outputs supported;
- The video source assigned to each video input; and
- The end device assigned to each video output.

A.3.2.2 Need to Share Updated Video Switch Inventory

Centers need to exchange updated inventory information as video switch devices are added, removed, or changed. As centers add, remove, change, or reassign end devices from their systems, the updated inventory should be provided to other centers, without requiring operator intervention.

A.3.2.3 Need to Share Video Switch Status

Centers need to exchange status information for any connections (a mapping between an input and an output) that are currently implemented by the video switch. Status information includes:

- Communications status (connected, disconnected, failed);
- Operational status (available, not-available); and
- Current operational state information (what inputs are currently assigned to what outputs).

A.3.2.4 Need to Request Control a Remote Video Switch

Centers need to be able to request changes to the inputs and outputs of a video switch operated by another center.

When a control request is received, the center that controls the video switch needs to make a determination if the control request will be implemented, queued, or rejected. Then, the center that controls the video switch needs to send a response to the center that originated the request describing the status (action taken) on the control request.

A.3.2.5 Need to Verify Video Switch Control Status

The center that sends a request to control a video switch operated by another center needs to verify the status of such a control request. The status may be that the control was implemented, was queued, or was rejected.

A.3.2.6 Need to Cancel Video Switch Control Requests

Centers need to be able to “cancel” a video switch control request so the owner center knows that the control request is no longer required.

A.3.2.7 Need to Control a Remote Video Switch

Centers need to be able to send control commands to a video switch that is normally managed by an external center.

In the case that one center must take over operation of a remote center, then that center must be able to directly control a video switch device controlled by the remote (owner) center.

A.3.3 Highway Advisory Radio (HAR)

A.3.3.1 Need to Share Highway Advisory Radio (HAR) Status and Control

Highway Advisory Radios (HAR) are used by centers as an information dissemination device to help manage the surface transportation system. Their use is often coupled with the use of messages on dynamic message signs to provide a consistent message to travelers.

HARs may be used by centers to:

- Reach travelers at the major decision points in their trips before they add to the backup; and
- Give notice of future construction and upcoming special events.

A.3.3.2 Need to Share HAR Inventory

Centers need to exchange inventory information so that HARs operated by a center can become known to other centers. Centers need to exchange HAR device attributes so that the capabilities of the HAR devices operated by the owner center can become known to external centers. Inventory information includes static HAR device attributes such as:

- Location; and
- Capabilities (recording times).

A.3.3.3 Need to Share Updated HAR Inventory

Centers need to exchange updated inventory information as HAR devices are added, removed, or changed. As centers add, remove, or change HAR devices, the updated inventory should be provided to other centers, without requiring operator intervention. Changes may include the HAR device location or technology.

A.3.3.4 Need to Share HAR Device Status

Centers need to exchange status information for each HAR device. Status information includes:

- Communications status (connected, disconnected, failed);
- Operational status (available, not-available); and
- Current operational state information (current message, etc.).

A.3.3.5 Need to Control a Remote HAR Device

Centers need to be able to request to play a message on a HAR device operated by another center.

When a control request is received, the center that controls the HAR needs to make a determination if the request will be implemented, queued, or rejected. Then, the center that controls the HAR device needs to send a response to the center that originated the request describing the status (action taken) on the control request. Message playback requests can be either freeform voice or text messages, or messages from a library associated with the HAR.

A.3.3.6 Need to Verify HAR Control Request Status

The center that sends a request to control a HAR device operated by another center needs to verify the status of the request. The status may be that the control request was implemented, queued, or rejected.

A.3.3.7 Need to View HAR Message Queue

The center that originates a request to control a HAR device operated by another center needs to view the control queue for that HAR device if the control request has been queued.

This control model assumes that there may be competing priorities for the use of a HAR device and that a center may implement a queue or priority list of the control requests received, whether from the owner

center itself or external centers, and their priority. External centers thus need to be able to read this queue for multiple devices to determine where their specific control request currently “sits.”

A.3.3.8 Need to Cancel HAR Control Requests

Centers need to be able to “cancel” a HAR control request so the owner center knows that the control request is no longer required.

A.3.3.9 Need to Share HAR Schedule

Centers need to exchange HAR schedule information. This allows centers to exchange time-of-day schedules of messages for the HAR device.

A.3.3.10 Need to Share HAR Messages

Centers need to be able to share the messages that are broadcast on the HARs that they control.

A.3.4 Need to Share Traffic Signal Control and Status

A.3.4.1 Need to Monitor Signal Operations

Centers need to monitor signal operations at a traffic signal. Monitoring includes tracking current phasing, current turning movements, current pedestrian movements and other current signal pattern parameters, such as actual offsets, cycle lengths and splits. This is a differentiation from what currently exists at a traffic signal (actual) versus the signal timing parameters of a scheduled or ordered signal timing pattern (planned).

This real-time information may be used by centers to verify current traffic signal coordination within a region (between TMC boundaries) and diagnostic information for maintenance purposes.

A.3.5 Roadside Units (RSUs)

A.3.5.1 Need to Request to Broadcast a Message on a Remote RSU

Centers need to request that a specific connected vehicle message be broadcast by an RSU controlled by another center.

When a control request is received the center that controls the RSU needs to make a determination if the message will be implemented, queued, or rejected. Then, the center that controls the RSU needs to send a response to the center that originated the request describing the status (action taken) on the control request.

A.3.5.2 Need to Control an RSU

Centers need to be able to send control commands to an RSU that is normally managed by an external center.

Control commands may include setting the RSU to broadcast connected vehicle messages for traveler information.

A.3.6 Need to Verify Trusted Source of Information using External System

Centers exchanging data need to verify whether a data provider is a trustworthy source using security certificates and signing of data.

This may allow operational organization identifiers provided by security certificates to be used to identify if external centers are allowed to exchange data.

A.3.7 Need to Identify Connection Behaviors

External centers need to identify the behaviors supported by the dialogs and the fields

supported. Some connections support updates based on changes. Some connections provide complete snapshots of the data at fixed intervals. For those that define updates based on changes- what information changes will generate an update? Also, for this type of update connection, how is startup handled- with an initial full set of data followed by updates as data changes? These are all examples of connection behaviors that should be defined.

A.3.8 Device Security Content Needs

External centers need to view the security content of the devices supported. This version only supports monitoring the status of security certificate for RSUs. Possible future security content includes IEEE security certificate content as defined in NTCIP 1218 for RSUs. Security content should be expanded to other devices as well. This version is written for security content for other devices to be added in the future.