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### Publication Date

2023-01-21

PARTNERS FOR ADVANCED TRANSPORTATION TECHNOLOGY  
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# Modernization of Center-to-Center Data Communication Standards

Task 3713 (65A0761)

## TMDD Standards Update Recommendations – Data Structures

Version 1.1  
January 21, 2021



Partners for Advanced Transportation Technology works with researchers, practitioners, and industry to implement transportation research and innovation, including products and services that improve the efficiency, safety, and security of the transportation system.

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# TMDD Standards Update Recommendations – Data Structures

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## TABLE OF CONTENTS

<b>Table of Contents .....</b>	<b>v</b>
<b>1. Introduction.....</b>	<b>1</b>
1.1. Purpose of Document .....	1
1.2. Intended Audience.....	1
1.3. Document Organization .....	2
<b>2. High-Level Recommendations.....</b>	<b>3</b>
2.1. Objectives.....	3
2.2. Data Structure Related Recommendations.....	3
<b>3. Recommendations for current TMDD v3.1 volume 1:.....</b>	<b>7</b>
3.1. TMDD Volume 1 Scope .....	7
3.2. Recommendations for Project Extensions .....	7
3.3. Recommendations for Backward Compatibility.....	7
3.4. Recommendations for Implementation Guidance.....	7
3.4.1. Limit the Number of Enumerations for a Field .....	8
3.4.2. Recommendations for Multi-Jurisdiction, Multi-Organization, Multi-Center Implementations .....	10
3.5. Recommendations for the Concept of Operations .....	11
3.5.1. Recommendations for Section 2.1 Scope .....	11
3.5.2. Recommendations for Section 2.3 User Needs .....	14
3.5.3. Recommendations for Section 3.....	18
3.6. Updates to Volume 1, Table 4.....	36
<b>4. Recommendations for Current TMDD v3.1 Volume 2:.....</b>	<b>37</b>
4.1. Data Structure High Level Recommendations .....	37
4.1.1. Additional Data Formats and Transmission Protocols.....	37
4.1.2. Compartmentalization of Dialogs and Messages.....	37
4.2. Suggested Modifications to Section 2.....	38
4.2.1. TMDD Communication Methods .....	38
4.2.2. XML-based Specification Separation .....	38
4.2.3. JSON-based Specification Addition .....	39
4.3. Data definitions – Modifications to Section 3 .....	39
4.3.1. Section 3 Introduction Modifications .....	40

## TMDD Standards Update Recommendations – Data Structures

4.3.2.	Inventory Action and Update Method.....	41
4.3.3.	Multipart Organization Information .....	49
4.3.4.	Additional Connection Management.....	51
4.4.	Enumerations .....	83
4.4.1.	Event-effective-period-qualifier .....	83
4.4.2.	Event-Incident-Status .....	84
4.4.3.	Organization-Information-Forwarding-Restrictions: .....	85
4.4.4.	Enumerations Recommendations .....	86
4.5.	Implementation Guidance .....	86
4.5.1.	Semantics.....	89
4.5.2.	Temporal Standards.....	99
4.6.	WS-I Compatibility Recommendations For SOAP-Based Messaging.....	100
4.6.1.	Multipart Message Requirement Alternative .....	101
4.6.2.	Unique Body Parts Requirement Alternative.....	103
<b>5.</b>	<b>References.....</b>	<b>107</b>
	<b>Appendix A – Example TMDD JSON Schema .....</b>	<b>109</b>

## 1. INTRODUCTION

This document provides a set of recommendations for modernization of the Traffic Management Data Dictionary (TMDD) (1), currently at version 3.1. These recommendations are based upon the following:

- Connected Corridors project experience
- Three previous technical memorandums provided under this project discussing the current and future state of transportation, the state of the supporting technology for information exchange, and a review of the TMDD standard
- A gap analysis based on the three technical memorandums delivered as part of this project.

The intention of this document is to inform the Institute of Transportation Engineers (ITE) committee responsible for TMDD, the California Department of Transportation (Caltrans), and users of the standard of potential improvements in the standard that should improve its ability to serve current and future transportation and traffic management needs.

### 1.1. PURPOSE OF DOCUMENT

This document provides recommendations for modifications to the current TMDD standard. Its goal is to provide a foundation for modernizing the standard. This document specifically provides recommendations for implementing this project's gap analysis recommendations related to data structures and implementation guidance related to such structures. Included in this document are recommendations related to the existing volumes 1 and 2 of the TMDD specification dealing with TMDD's defined user needs, requirements, and the concept of operations.

The recommendations contained in this report should be used in conjunction with those contained within the other related reports dealing with data communication protocols and security for data exchange. The recommendations should be considered for implementation in California transportation projects with center-to-center (C2C) communications implementations and for adoption by the ITE committee responsible for the TMDD standard.

### 1.2. INTENDED AUDIENCE

The primary audience for this document includes:

- The Caltrans Division of Research, Innovation, and System Information.
- TMDD Steering Committee
- Caltrans Operations personnel involved in specifying, procuring, and implementation of systems requiring C2C communications
- Transportation systems vendor community



### 1.3. DOCUMENT ORGANIZATION

The remainder of this document is organized as follows:

- **Section 2** presents the recommendations resulting from the gap analysis relevant to data structures for implementation within TMDD
- **Section 3** provides the specifics for implementation of Section 2's recommendations within Volume 1 of the current TMDD Standard related to TMDD's data structures
- **Section 4** provides the specifics for implementation of Section 2's recommendations within Volume 2 of the current TMDD Standard related to TMDD's data structures

## 2. HIGH-LEVEL RECOMMENDATIONS

### 2.1. OBJECTIVES

The objective of these recommendations can be simply stated as follows:

Improve the Traffic Management Data Dictionary to achieve:

- a. Reduced future traffic and transportation management system deployments and integration costs
- b. Support high availability, high volume, real-time communications required for support of future transportation advances
- c. Achieve off-the-shelf system integration across jurisdictions and between multiple vendor systems with minimal implementation effort
- d. Allow the standard to be flexible enough to adapt to future technology advances and remain relevant in an environment dominated by advances in transportation technology

### 2.2. DATA STRUCTURE RELATED RECOMMENDATIONS

Within the gap analysis high-level recommendations were developed within the three areas detailed in the previous technical memorandums, including:

- Technology
- Transportation
- TMDD specification and its implementation

These priorities assume a strategy of first separating the standard into additional volumes as suggested throughout this project to include:

Volume 1 – Concept of Operations and Requirements

Volume 2 – Data Structures and Semantics

Volume 3 – Communication Protocols

Volume 4 – Security Requirements and Recommendations

Guide to the Traffic Management Data Dictionary

Some of these recommendations were related to the user needs and concept of operations as well as the data structures defined within the TMDD specification. In addition, recommendations regarding the need to provide guidance for their implementation in center-to-center

## TMDD Standards Update Recommendations – Data Structures

communications were included. These recommendations and the priority assigned for implementation within the standard include:

**Table 2-1 Recommendations**

	Recommendation	Priority
1	Change the TMDD standard to allow additional data transmission formats beyond XML. Create a list of recommended data formats and implementation guidance for each format.	High
2	Change the TMDD standard to allow for additional data transmission methods beyond SOAP (2). Create a list of recommended data transmission methods and implementation guidance for each.	High
3	Select appropriate technologies that will allow for scalable real-time, high volume communications for use with the standard.	High
4	Allow for the data transmission technology to be selected appropriate for each individual data exchange. Separate the technology selections available from the data structure standards to allow choice and flexibility within the standard.	High
5	For the data exchange technology requirements or recommendations within the standard, provide recommendations or minimum requirements for security implementation, along with references to external security standards appropriate for implementation.	High
6	<p>Increase the release cycle of the TMDD standard, incorporating experience of implementations that require new information sources and more advanced devices. Provide a more active method of review and incorporation of implementation specific extensions within the standard with the goal of adding them to the standard.</p> <p>Actively review the current standard requirements and advances in transportation technology, with the specific purpose of identifying and incorporating new user needs and requirements to prepare the standard for the future.</p>	Medium
7	Add dialogs, messages, dataframes, and data elements for exchange of public messaging activities.	Medium
8	Add the dialogs and associated data structures developed by the I-210 Connected Corridors implementation for use in coordination of response plan and response plan approval activities. Review TMDD for additional needs related to other coordinating activities. Review TMDD for applicability within a multi-jurisdictional, multi-party environment.	High
9	Provide new methods of data exchange capable of scaling to real-time date exchange across large geographic areas and a large number of devices.	High

TMDD Standards Update Recommendations – Data Structures

	Recommendation	Priority
<b>10</b>	Select multi-point broadcast communication technologies, along with updates to the data structure to support multi-party communications. Alternatively, hub/spoke system architectures should be recommended within the standard.	Medium
<b>11</b>	Develop a central registry of authorized and standardized TMCs and other party systems that communicate at a State level within the state transportation community. Provide standardized, unique identifiers for each participant, along with other requirements for participation.	Medium
<b>12</b>	<p>Add additional connection management dialogs to the standard such as:</p> <ol style="list-style-type: none"> <li>1. Current subscription list query</li> <li>2. Subscription status</li> <li>3. Message status and count information</li> <li>4. System subscription limitations</li> <li>5. Data content available within a subscription</li> <li>6. Subscription discovery</li> </ol> <p>Add guidance regarding how systems manage subscriptions for both senders and receivers.</p>	High
<b>13</b>	Provide additional implementation guidance for extensions, along with an improved process for migrating extensions into the base standard. Provide a repository for shared extensions, if not at the national level, at minimum state level to minimize engineering and implementation costs of new installations.	High
<b>14</b>	Add guidance and requirements for each dialog for dialog behavior. This should take into account the temporal behavior of the dialog as well as ensuring compatibility with the type of data being transmitted and its temporal characteristics.	High
<b>15</b>	Add guidance for the selection of dialogs and methods to limit dialog behavior to match time-domain behavior of field equipment.	High
<b>16</b>	Provide dialog start-up behavior requirements within the standard.	High
<b>17</b>	Add to the TMDD standard, data trigger standards for each on-change dialog.	Medium
<b>18</b>	Provide additional guidance in how messages, dataframes, and data elements are populated. Provide guidance on enumerations usage.	High
<b>19</b>	Update TMDD to provide guidance in resolving temporal dissonance issues to ensure a common implementation standard.	Medium
<b>20</b>	Standardize the usage of command messages.	High
<b>21</b>	Add clear time field definitions and examples to the standard.	High
<b>22</b>	Provide technology options for implementation of the standard.	High

TMDD Standards Update Recommendations – Data Structures

	Recommendation	Priority
<b>23</b>	<p>Add action elements to inventory messages to provide CRUD operations – Create, read, update, delete</p> <p>Allow additional formats and serializations, including JSON, binary, or others for data messages</p>	High
<b>24</b>	<p>While maintaining SOAP as a protocol, add additional data communication protocols/technologies as options in TMDD implementations. Review, update, and add, as necessary, additional dialogs, messages, dataframes and data elements to the standard. While maintaining the current methods within the standard, with some improvements, add parallel methods of information exchange suited for larger, real-time implementations of the standard. Implementation guidance for minimum system performance should be provided.</p>	High
<b>25</b>	<p>Update the standard to comply with the latest SOAP standard and WS-I. Ensure that future technology updates are implemented in future standard updates.</p>	Medium

In the following sections we will provide specific recommendations for adoption within the standard’s two volumes. Note that we are recommending that Volume 2 be updated to remove its dependence on SOAP as a communication protocol, and the addition of a volume 3 (Communication Protocols) and volume 4 (Security Requirements and Recommendations).

### 3. RECOMMENDATIONS FOR CURRENT TMDD V3.1 VOLUME 1:

#### 3.1. TMDD VOLUME 1 SCOPE

TMDD volume 1, titled “Concept of Operations and Requirements”, is developed to “identify and operationally describe the ways in which the system will be used.” It defines the scope of the standard, the operations supported, information for system procurements, and a designer perspective of the standard. It identifies and describes “the needs and requirements for a traffic management center (TMC) to provide services to external centers (EC) via a communications interface.”

#### 3.2. RECOMMENDATIONS FOR PROJECT EXTENSIONS

The following recommendation is suggested for updates to TMDD v3.1, Volume 1, Section 1.8.1.

- Add item 13 to the list of rules for extensions, requesting but not requiring, that projects that add extensions, submit those extensions to the committee for potential inclusion in updates to the standard. Include within the recommendation that the committee maintain a library of those extensions, and request that implementing agencies require projects to check this extension library prior to developing their own extensions.

#### 3.3. RECOMMENDATIONS FOR BACKWARD COMPATIBILITY

TMDD works to maintain backwards compatibility with previous versions of the standard and maintains compliance with NTCIP 2304 or NTCIP 2306 with specific implementation references to NTCIP 2306. This report’s recommendations require that backwards compatibility is not maintained and that limited NTCIP compliance would be maintained within a SOAP-based implementation, but additional guidance would be required by NTCIP or within the TMDD standard itself for other communication protocols to maintain technology relevance of the standard.

It is recommended that backward compatibility not be maintained between a standard based on these recommendations and previous versions of TMDD. Depending upon the specific implementation of these recommendations, maintaining backward compatibility of a SOAP-based exchange may be possible but also excessively limiting.

#### 3.4. RECOMMENDATIONS FOR IMPLEMENTATION GUIDANCE

It is recommended that additional implementation guidance be provided as part of the standard. This includes general implementation likely best suited for Volume 1 and more specific

implementation guidance suggested for Volume 2. For those elements suggested for incorporation into Volume 1, it is recommended a new section be added. In addition, a review of the existing requirements in Volume 1 is recommended to alter requirements to fit these recommendations as needed. An example of such a review would be to review the options available for a specific field that result in the allowable enumerated values to limit the number of repetitive or overlapping enumerations – such as the supported values in section 3.3.3.6.3.1 Required Event Headline Information. This report does not address all of these recommendations specifically. Such an effort would require significant input from users and future users of the standard. However, general suggestions and examples are provided.

### 3.4.1. LIMIT THE NUMBER OF ENUMERATIONS FOR A FIELD

Often a large number of enumerations are provided for a field element within the standard. Large numbers of enumerated values complicate integration efforts between systems and create custom implementations, increasing cost and limiting off-the-shelf system deployments. An example of this is the enumerations for lanes-status. These enumerations include:

- closed-to-traffic
- closed
- closed-ahead
- closed-intermittently
- closed-for-repairs
- closed-for-the-season
- blocked
- blocked-ahead
- reduced-to-one-lane
- reduced-to-two-lanes
- reduced-to-three-lanes
- collapse
- out
- open-to-traffic
- open
- reopened-to-traffic
- clearing
- cleared-from-road

This example, however, is for an ITIS schema element contained within ITIS-Adopted-03-00-02.xsd, not TMDD itself. Unfortunately, the result is the same with regards to the limitations to usability of the standard and effect on system integrations. In this case there is no guidance within the standard on under what circumstances each individual enumeration is applicable. The result of this is that two systems attempting to communicate may use different enumeration elements or may assign different semantics to each enumeration. An additional issue might occur based on the context of where the field is used. For lanes-status within TMDD, another related

element is available for describing the actual lanes affected – event-lanes-affected. This may be used to indicate the lanes closed or blocked for the event or incident, indicated by their lane number. For large urban locations where the number of lanes exceed four lanes, given that the lanes-status enumerations cannot express “reduced-to-four-lanes” or higher, this may be the only way to indicate how many lanes remain open, and is under any circumstance the only way to indicate exactly which lanes are blocked. For advanced decision support systems, the specific lane blocked may be critical for its operation.

Consider a sending system (owner center) may use all of the allowed enumerations with meaningful distinction between elements such as closed-to-traffic and closed. Consider also that the receiving system (external center) only handles the following enumerations - closed, blocked, open, and clearing. The receiving system must then be modified to handle the additional enumerations in order to exchange information with the sending system, either to ignore the other possible values or translate them into one of the enumerations it allows. Imagine the effort required to do this for every field within the specification. This is the disadvantage of a specification that provides so much flexibility. The ability to integrate systems is actually disadvantaged by the flexibility, resulting in a lack of ability to integrate and additional cost to integrate. As the number of systems to integrate within any project implementing TMDD increases, the complexity of such an integration increases as well.

To improve the standard, both a limit to the allowable enumerations as well as guidance, even when referencing external standards and schemas, is highly recommended. In the example, providing guidance that limits use to a smaller set of well-defined enumerations would be recommended.

For a new General Implementation Guidance and Recommendations section in Volume 1, verbiage similar to the following would help to address this issue and improve the ability to create “off-the-shelf” or lower cost integrations between systems implementing the standard:

Within a new section “General Implementation Guidance and Recommendations”:

“Guidance in Enumerations Usage

Enumerations listed within this standard attempt to provide sufficient choices to effectively describe all possible alternatives for a specific field, while also ensuring consistent application of those enumerations across different implementations of the standard within systems using the standard. As a result, the choices are reduced to a set of distinct enumerations, and definitions provided for each enumeration that ensure a common understanding and usage across implementations.

When the enumerations are insufficient for the project’s requirements, or more detailed information is required within a selected enumeration, it is recommended that users of the standard use the standards enumeration choices and follow the extension guidelines contained within this standard, creating an additional field to contain the added detail.



When the standard references separate external standards for its data type definitions, it may also require or recommend limiting the enumerations used to a smaller set than that provided within the external standard. This is done to improve the compatibility and, as a result, reduce the effort and associated cost of system integration between systems using this standard.

Systems that implement this standard should support the entire set of enumerations contained within this standard when implementing a specific data element using enumerations.”

Within volume 2, specific guidance for each enumeration should be provided similar to the following:

“For the itis element lanes-status within the path – EventDetails.full-event-update.event-element-details.event-element-detail.event-lanes.event-lane.lanes-status should limit the allowed enumerations to the following:

- closed
- blocked
- collapse
- open
- clearing

Closed indicates the lane is closed for an extended period of time. Blocked indicates that some temporary obstruction such as a traffic incident or debris currently blocks the lane. Collapse indicates a structural failure of the roadway. Open indicates that the lane is open for use. Clearing indicates that a previously reported blockage or closure is expected to be updated to open in the near future. If additional information is to be exchanged related to lanes-status enumerations, it is recommended that an extension be utilized to provide such information.”

### 3.4.2. RECOMMENDATIONS FOR MULTI-JURISDICTION, MULTI-ORGANIZATION, MULTI-CENTER IMPLEMENTATIONS

The following should be added within the General Implementation Guidance and Recommendations”:

“Guidance in Multi-Organization, Multi-Center Data Exchange Implementations

Implementations with multiple organizations and multiple centers can add significant complexity. This complexity may involve:

- The need to understand by all connected entities which parties are involved in specific actions, such as event responses

- The need to uniquely identify each organization, each center, and each asset owned by each center
- The need to ensure all parties are updated in the same manner (dialog behavior is consistent with all parties)
- The need to ensure all parties share an agreed upon data set, that the data set is updated and consistent across all parties
- Inconsistencies in the capabilities of different organizations’ and centers’ devices and systems
- Temporal inconsistencies in data between different parties (such as data refresh frequencies)
- Level of detail available for specific data sets across different parties. For example, one organization may be capable of refreshing intersection signal status with detailed real-time ring status, while another may be capable of updating only basic availability status on a less frequent basis.

As a result, the following guidance is provided when implementations involve more than two centers in the exchange of information:

1. Organizations should ensure uniqueness in the identifiers for the organizations and for their devices across all exchanging organizations. All exchanging organizations should define and agree upon a common standard for assigning identifiers.
2. Organizations should agree upon a common standard for a minimum data set for all information exchanged. Exceptions to the standard for any organization should be well documented and justified.
3. Organizations should agree upon minimum refresh rates and performance measures for all communications.
4. Dialog behaviors should be standardized across organizations and centers. Update triggers for on-change subscription updates and other behaviors should be common across all organizations and centers.
5. Organizations should agree on the data ownership and its impacts on sharing information.
6. Organizations should agree on the specific two-party communication channels to be created and the specifics of publish-subscribe channels created as a result of any data exchange implementation.”

### 3.5. RECOMMENDATIONS FOR THE CONCEPT OF OPERATIONS

The following recommendations are suggested for updates to TMDD v3.1, Volume 1.

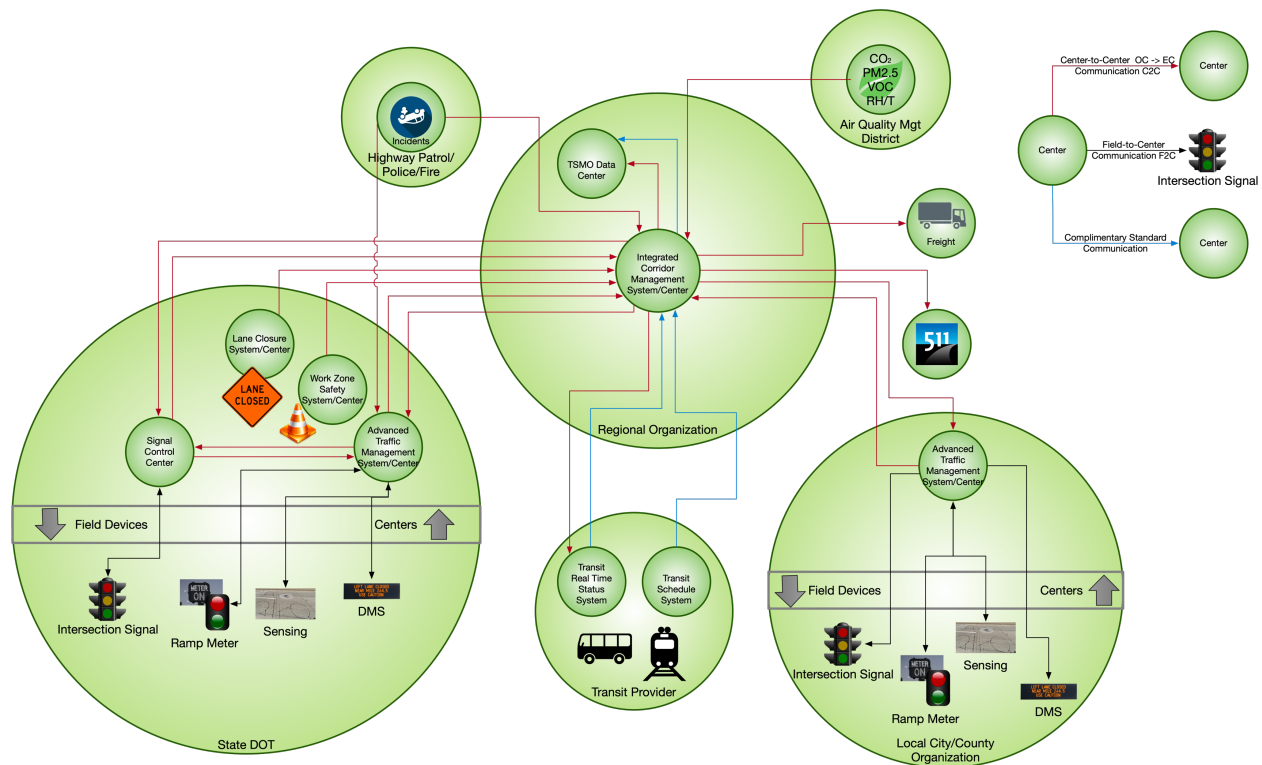
#### 3.5.1. RECOMMENDATIONS FOR SECTION 2.1 SCOPE

Section 2.1 currently provides a generic two-party communication exchange, with an owner center and external center. It is recommended that section 2.1 be expanded, with examples of how such designations operate in more complex situations. For example, consider a regional implementation with multiple organizations or agencies, each with multiple systems or centers,

## TMDD Standards Update Recommendations – Data Structures

sharing information with a common regional system (along with its owning organization and center(s)). This is a typical exchange for Integrated Corridor Management (ICM) and [Transportation Systems Management and Operations](#) (TSMO) operational scenarios. In this scenario, some systems may act as both owner center and external center, depending upon the information being exchanged. This is an important scenario, as this adds additional complexities to the implementation of the standard, even with simple concepts such as ensuring organization and center identifiers that are unique across the region.

An additional figure that illustrates potential usage scenarios along with accompanying text should be added as follows:



**Figure 1 TMDD Usage Scenarios**

“The TMDD standard can support many different types of communication and is part of a transportation data communication infrastructure. Figure 1 provides an illustration of several different usage scenarios. Within the figure there are several organizations: a state DOT, regional organization, a local city or county jurisdiction, freight providers, 511 provider, regional air quality district, and highway patrol or first responder. Within those organizations are one or more centers, the systems that manage their jurisdictional responsibilities. For example, the state DOT has an intersection signal control center, lane closure system center, work zone safety system center, and an Advanced Traffic Management System (ATMS) center. The lines between them represent different types of communication, including TMDD C2C (red), field-to-center (F2C), and complimentary transportation standards such as the General Transit Feed Specification for transit data exchange (blue). Some example usage scenarios include:

Center-to-Center Within the Same Organization – In Figure 1 this scenario is illustrated within the state DOT organization. Large TMCs such as a state DOT TMC have many different systems to manage a vast transportation management infrastructure. In the example in Figure 1, the state DOT has four systems (centers), that manage Intersection signal control, lane closures, work zone safety, and an ATMS that controls ramps, sensors, and signs. The red lines between the signal system and ATMS provide for two-way communication between the centers, providing a way for the ATMS to become single point of control for the primary control assets within the ATMS zone of control. In this communication path, the intersection signal control system could use several TMDD dialogs to communicate intersection signal plans, schedules, inventories, status and other signal related information to the ATMS and the ATMS could request specific changes to change the current plan in place at an intersection or update schedules and plans as required.

Center-to-Center Between Two Organizations Centers – In Figure 1 nearly all of the connections described in red are C2C exchanges between two organizations. One specific example is the connection between the highway patrol/police/fire organization and the ATMS within the state DOT. A familiar usage scenario for this connection would be the sending of incidents to the ATMS for potential action by traffic and incident management personnel within the TMC. This example is a simple point-to-point transaction with the owner center being the highway patrol and the external center the state DOT. If that incident is forwarded from the state DOT ATMS to another entity, such as the Regional Organization Integrated Corridor Management System, the owner center role would belong to the state DOT and the external center within the Regional ICM system. Owner center and external center are roles in the specific communication being established and can change depending upon the specific sender and receiver. If the state DOT and highway patrol established communication for incident response plans being generated and sent from the ATMS to the highway patrol, the roles of owner center and external center between the two would be the reverse of the incident communication, with the ATMS being the owner center and the highway patrol being the external center.

Center-to-Center Web Communication Between Multiple Organization Centers – In Figure 1 the Regional Organization Integrated Corridor Management System has established TMDD connections with all of the organizations within the illustration, providing a way to coordinate regional transportation management activities, perhaps for events and incidents, or perhaps for normal recurring conditions. It also provides the opportunity for a hub and spoke architecture or other architectures to exchange information between organizations. By doing this it can also provide the opportunity to integrate non-TMDD related information with TMDD information across organizations. Such an architecture does not preclude individual two-party information exchanges, but creates additional complexity in communication, as all parties need a mechanism to identify when more than two parties' information is contained within the message being exchanged. A simple owner center – external center description may be insufficient to identify multi-party information exchanges.”

### 3.5.2. RECOMMENDATIONS FOR SECTION 2.3 USER NEEDS

#### 3.5.2.1. Recommendations for Section 2.3.1

Section 2.3.1 Need for Connection Management should be updated to include additional connection management user needs. These include:

*“Need to identify capabilities of owner centers – External centers need to identify the dialogs and their type (request/response, subscription, and type of subscription) supported by an owner center. External centers need to identify the behaviors supported by the dialogs and the fields supported. External centers need to identify the time domains supported for each dialog.*

*Need to identify active subscriptions – Centers need to verify the identity and operating parameters of subscriptions. Owner and external 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.).*

*Need to identify failed subscriptions – Centers need to identify subscriptions that have been interrupted due to system or other error or issue.*

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

#### 3.5.2.2. Recommendations for Section 2.3.2

Section 2.3. Information on Organizations, Centers, and Contacts should be updated to include additional organization user needs. These include:

*“Centers need to be able to exchange information about other organizations that may own or share information being exchanged via any individual two-party communication exchange. 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.*

*Centers need to implement and share across organizations and centers, within multi-jurisdictional and multi-center information exchanges, unique identifiers for organizations and centers that are identified within the information exchanged via TMDD.*

*Centers need the ability to provide information obtained from other centers an identifier indicating a level of confidentiality required for the information being shared. 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.”*

### 3.5.2.3. Recommendation for a New Section Following Section 2.3.3 for Event Response Management (Response Plans)

Event or incident responses do not have a structure and are not described within the current TMDD specification. A key traffic management goal within many TSMO or ICM implementations is to develop and implement coordinated responses to different types of events or incidents. As automated implementation of these responses becomes the norm and advanced decision support systems and other tools become more widespread, a mechanism to respond to events within TMDD becomes a critical missing element. The following user needs are recommended additions to the TMDD specification (labeled 2.3.3A for convenience):

#### “2.3.3A Need to Provide, Distribute, Approve, Execute, and Terminate Coordinated Response Plans to Events

Organizations have a need to share and coordinate responses to events. These responses, or response plans, are a way to minimize traffic impacts and improve safety when events occur, whether planned or unplanned. 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.

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.

#### 2.3.3A.1 Need to Distribute a Set of Proposed Responses to an Event

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. Centers need a way to exchange a set of possible response plans to an event, including information such as:

#### 2.3.3A.1.2 Need to Share Potential Response Plans for an 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.*

#### 2.3.3A.1.3 Need to Share Originating Event Information for a Response Plan

*Centers need to share the identity of the event as well as event information for which a response plan or plans has been generated.*

2.3.3A.1.4 Need to Share a List of Organizations Involved within the Response

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

2.3.3A.1.5 Need to Share Response Plan Assets and Activities

*Centers need to share the assets and activities involved within the response plan, such as intersection signals and timing changes, traffic rerouting, dynamic message signs and messages, information distribution, ramp meters and metering changes, and other actions required for implementation of a response plan.*

2.3.3A.1.6 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.*

2.3.3A.1.7 Need to Share a Log of Response Plan Activities

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

2.3.3A.1.8 Need to Request Approval of a Response Plan

*Centers need to request approval to implement a response plan.*

2.3.3A.1.9 Need to Provide Approval of a Response Plan

*Centers need to provide approval to implement a response plan or reject a response plan.*

2.3.3A.1.10 Need to update a Response Plan

Response plans need to be updated, especially for long-lived events, due to changing conditions, updates to the event itself, or as a result of interaction with secondary or additional events.

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

2.3.3A.1.11 Need to Terminate a Response Plan

Organizations will need the ability to end 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.

2.3.3A.1.11.1 Need to Request Termination of Event Response Activities

*Centers need to be able to request termination of a response plan.*

2.3.3A.1.11.1 Need to Distribute Termination Plans for Approval of Actively Involved Organizations

*Centers need to be able to distribute termination plans to obtain approval for execution of the termination plan.*

2.3.3A.1.11.2 Need to Request Approval to Terminate Response Activities

*Centers need to be able to approve the termination of a response plan.”*

3.5.2.4. Recommendations for Section 2.3.5 Regarding Control of Devices

Section 2.3.5 provides for the user need to allow control of devices by an external center. It is recommended to add the following at the end of Section 2.3.5 and before section 2.3.5.1:

“In addition to allowing an external center control of an owner centers devices, a mechanism to return control of those devices to normal operation with control released back to the owner center is needed. An example of this is an intersection signal control request from an external center to an owner center to implement a specific timing plan for coordinated event response between jurisdictions. At some future time, the event will end, and the coordinated response completed as well. At this point, the external center will need to indicate to the owner center that the owner center may return the intersection signal back to its normal operation such as a time-of-day based plan.”

3.5.2.5. Recommendations for a New Section for Public Messaging Activities

When TMDD was developed, messaging to public entities was limited, mostly using changeable message signs and highway advisory radio. Third party providers generally available to the public were limited to radio traffic reports on commercial radio and television stations. Google Maps and Waze were yet to be invented. 511 traveler information services were still experimental. Connected communication systems for vehicle-transportation infrastructure communication today is still in its experimental and prototype stages.

However, as information technology, vehicle technology, and transportation infrastructure technology advance and connected vehicles become the norm, the opportunity for centers to communicate with drivers and vehicles is likely to increase. This will open the door to improvements in event response capabilities, for example, the ability to inform drivers and vehicles directly instead of using signs, radio communications, and third-party information providers such as Waze. The ability to balance rerouting traffic in emergencies or in response to events to manage demand and capacity will become available.

TMDD’s limitations with regards to information distribution require updating in order to address its shortfalls in this area. As a result, the following user needs are suggested for TMDD volume 1, labeled as section 2.3.5A below:

“2.3.5A Need to Disseminate Public Messages and Messaging Activities



Organizations have a need to exchange real-time public targeted messaging and messaging activities. This includes messages targeted to public audiences as well as informing other organizations of public messaging activities. This may include messages sent to vehicles, personal devices (via SMS text messaging, email, or other platforms), sent to third-party providers as a distribution channel, to 511 information services, or other methods. Messages may inform travelers of alternative transportation route recommendations, alternative or recommended modes of transportation, event advisories, alerts, or other types of messages.

#### 2.3.5A.1 Need to Send Messages to the Public

*Centers need to send messages to the public, via SMS, email, third-party platforms, 511, or other platforms.*

#### 2.3.5A.2 Need to Inform Other Agencies of Public Messaging Activities

*Centers need to inform other organizations and centers of public messaging activities.”*

### 3.5.3. RECOMMENDATIONS FOR SECTION 3

#### 3.5.3.1. Recommendations for Section 3.3.1 – Additional Connection Management Recommendations

Section 3.3.1 contains requirements for Connection Management. As described in 3.5.2.1, additional connection management needs were captured. These additional requirements are recommended for incorporation into the standard in accordance with those additional connection management needs.

**“3.3.1.5 Send List of Available Dialogs and Subscription Types and Their Behaviors Upon Request**  
An owner center shall respond to an authorized external center requesting a list of available dialogs, their subscription types available (if any), and specific behaviors upon request.

##### 3.3.1.5.1 Contents of the Available Dialogs and Subscription Types/Behaviors

An owner center shall send the dialogs supported by the owner center along with the available subscription types (if any) and dialog specific behaviors to external centers.

##### 3.3.1.5.1.1 Required Available Dialog Information

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

- 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
- e. Supported data types if subscription is a generic subscription with multiple data type support

- f. Dialog behaviors for each dialog including:
  - 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
  - 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.

3.3.1.6 Exchange List of Currently Active Subscriptions and Operating Parameters Upon Request  
Each center that is part of a C2C network shall support the exchange of currently active subscriptions with the following requirements.

3.3.1.6.1 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.

3.3.1.6.2 Publish List of Currently Active Subscriptions

Centers shall publish a message containing a list of currently active subscriptions and operating parameters. External centers shall publish subscriptions currently receiving data or believed to be receiving data from the owner center. Owner centers shall publish subscriptions currently providing data to the external center.

3.3.1.6.3 Subscribe to List of Currently Active Subscriptions

Centers shall send a subscription message requesting a list of currently active subscriptions and operating parameters.

3.3.1.6.4 Contents of the List of Currently Active Subscriptions Request

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

3.3.1.6.4.1 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
- c. Start date and time for reporting of failed subscriptions

3.3.1.6.4.2 Optional List of Currently Active Subscriptions Request Content

The center list of currently active subscriptions may include:

## TMDD Standards Update Recommendations – Data Structures

- a. List of desired dialogs and, if applicable, data types to filter the return message
- b. Sending or receiving flag to indicate filter on subscriptions being sent or received by the receiving organization

### 3.3.1.6.5 Contents of the List of Currently Active Subscriptions

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

#### 3.3.1.6.5.1 Required List of Currently Active Subscriptions Content

The currently active subscriptions list content shall include:

- a. Center organization information
- b. Center name as assigned by the owner organization
- c. Unique identifier of the center as assigned by the owner organization or by regional agreement
- d. List of active subscriptions currently sending data to the requesting center (filtered as required by any optional filter received within the request), 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
  - 7) Subscription update source endpoint
  - 8) Owner center subscription request endpoint
  - 9) Subscription update target endpoint
- e. List of active subscriptions currently receiving data from the requesting center (filtered as required by any optional filter received within the request), 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
  - 7) Subscription update source endpoint
  - 8) Owner center subscription request endpoint
  - 9) Subscription update target endpoint
- f. List of subscriptions that have failed, 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

- 7) Subscription update source endpoint
- 8) Owner center subscription request endpoint
- 9) Subscription update target endpoint
- 10) Failure date and time
- 11) Failure code or reason
- 12) Failure description
- 13) Receiving or sending flag

#### 3.3.1.6.5.2 Optional List of Currently Active Subscriptions Content:

The currently active subscriptions list content may include the following status information:

- a. For each subscription contained within the subscriptions sending data list:
  - 1) Subscription name
  - 2) Subscription request received date and time
  - 3) Subscription first message sent date and time
  - 4) Most recent update message send date and time
  - 5) Most recent update message size (in bytes)
  - 6) Total number of messages sent within a specified time interval
  - 7) Time interval for the total number of messages sent
  - 8) Number of assets included within the last message sent
  - 9) List of errors encountered within a specified time interval
  - 10) Time interval for the list of errors
- b. For each subscription contained within the subscriptions receiving data list:
  - 1) Subscription name
  - 2) Subscription request received date and time
  - 3) Subscription first message sent date and time
  - 4) Last update message received date and time
  - 5) Last update message size (in bytes)
  - 6) Total number of messages received within a specified time interval
  - 7) Time interval for the total number of messages received
  - 8) Number of assets included within the last message received
  - 9) List of errors encountered within a specified time interval
  - 10) Time interval for the list of errors
- c. For each subscription contained within the failed subscriptions list:
  - 1) Subscription name”

#### 3.5.3.2. Recommendations for Section 3.3.2 Regarding Security and Authentication Requirements

Section 3.3.2 is the only requirements section within volume 1 that describes the authentication tags within the XSD. It is listed as optional content. Other dialogs refer to this section when discussing the authentication tags within their specification elements, and all are described as optional elements.

Security is a broad and complex topic with respect to systems engineering and protection. Transportation systems are increasingly vulnerable to security incidents and are likely targets to disrupt critical infrastructure. Both criminal and state actors are likely to target critical transportation infrastructure. As transportation systems become more connected, the likelihood of a malicious attack increases along with the disruptive impacts of such an attack. Security requirements reach outside of the data structure itself and need to be addressed at many different levels, such as networking, hardware, software, systems integration and connected systems, communication protocols, data storage, human factors and social engineering, and others.

As a result, it is recommended that a separate volume be added to the TMDD specification that specifically addresses security requirements. Within this volume, specific requirements and recommendations, along with references to external guidance and standards can be provided. Such a strategy also allows the security related information to be updated separately from that of the data standards and software protocols to ensure it stays up-to-date and relevant with the latest security related information and standards.

It is recommended that the paragraph in section 3.3.2.4.2.1 starting with “Most organizations have well-defined security policies and procedures...” be replaced with the following:

“Volume 3 of the TMDD specification provides additional information regarding security requirements and recommendations for implementation of the standard.”

It is also recommended that the optional authentication tags within the specification remain for compatibility reasons and remain optional, as for more advanced security mechanisms, they may not add additional benefit. It is, however, recommended that the new volume 3 have technology specific minimum-security requirements.

### 3.5.3.3.Recommendations for Event Information, Section 3.3.3

Event information, as detailed in previous reports, has several specific and important recommendations, including:

1. Event time recommendations
2. Event location recommendations
3. Event lane location recommendations
4. Enumeration recommendations
5. Implementation recommendations

#### *3.5.3.3.1. Recommendations for Section 3.3.3.6.4.1.2.4*

Experience has shown that even event start time under real-life conditions can be difficult to establish and subject to interpretation. Real examples experienced in the field have indicated that even within the same TMC and operators that sit within feet of each other provide vastly

different interpretations of what event start time is entered into an ATMS. It is recommended that section 3.3.3.6.4.1.2.4 be changed to the following:

**“3.3.3.6.4.1.2.4 Event Start Date/Time**

If the event category type is “current,” the owner center shall provide the date and time the event started as part of the event time information. Event start date/time is always the start date/time of the event itself, if known, or the date/time at which it was reported. It is not the date/time upon which the event was entered into the system or some other date/time.”

Implementation guidance suggesting that critical fields such as this should be implemented within system user interfaces to provide guidance to operators with respect and, if possible, entry validation within the user interface.

*3.5.3.3.2. Recommendations for Section 3.3.3.6.4.7*

Event location in TMDD provides four options for describing a location:

- Area location
- Link location
- Landmark location
- Geographic location

Unfortunately, this requires any integration between centers to agree on which and how many of the options to support. Getting “off-the-shelf” compatibility is unlikely to occur with four options. Additional complexity is added to this problem when the additional details of how these locations are structured, with an example being those elements that require link information. Link information that references the network related dialogs that describe links and nodes requires a shared definition of those links and nodes between two systems. This is unlikely to occur in two systems developed by different vendors (often even the same vendor) or that involve one or more legacy systems. Practical limitations mean that this is often implemented using general road numbering and naming systems to describe links rather than a fully described network.

However, each of the four options are capable of describing different types of locations, and each has its specific set of appropriate use cases. There are no simple solutions to the problems presented in identifying a location in a standard way.

It is recommended that the standard allow locations to be defined using a more standardized network description. The All Road Network of Linear Referenced Data (ARNOLD) (3) or other standard GIS related data sets provide options that would allow systems developers to have standardized road network descriptions shared across different applications with common methods of reference and identification between systems. Once standardized network methods and sources are selected, the standard should update location and network related dialogs, messages, dataframes, and data elements to utilize the attributes of the common network description(s) selected.

Certainly, any reference to a standardized network generates concerns related to accuracy and the frequency at which the standardized network is maintained. However, that concern is generally an issue regardless of the source of a network, and the selection of a standardized network ensures that all parties are using the same geospatial dataset and updates applied to one party are, at the same time, available to all parties.

### *3.5.3.3.3. Recommendations for Section 3.3.3.6.4.9*

It is recommended that section 3.3.3.6.4.9 include, beyond the recommendations in section 3.4.1 of this document regarding lanes-status include the following implementation guidance:

“When describing the event lanes information, all lanes shall be described with an explicit description of the lane status. For instance, if a roadway contains a left and right shoulder along with five through lanes and a single HOV lane, there shall be a minimum of 4 event lanes entries, with one for each lane type. In addition, the implementation shall provide an individual event-lane entry for each combination lane type and lanes status. For example, if the left and right shoulders are both open, two through lanes blocked, three through lanes open, and the HOV lane open, there would be five event lanes entry; one for the open right shoulder; one for the open left shoulder; one for the two blocked through lanes; one for the three open through lanes; and, one for the open HOV lane.”

### *3.5.3.3.4. Recommendations for Enumerations*

As discussed in section 3.4.1, enumerations related to the descriptions of events should be reviewed to minimize the number of allowed enumerations to ensure clarity and common definition across implementations of the standard.

### *3.5.3.3.5. Recommendations for Implementation Guidance*

It is recommended that the committee generate several example implementations of the event data type, with input from multiple stakeholders, to assist in a common implementation across system implementations. These samples should cover multiple types of events, planned and scheduled, traffic incidents, construction, and others as well as the full event lifecycle from planning and initiation to close.

## 3.5.3.4. Recommendations for Section 3.3.4 Regarding Road Network Data

As mentioned earlier in 3.5.3.3.2, road network data presents difficult challenges when exchanging information between systems and utilizing common references across implementations. As stated within that section, it is recommended that this entire data exchange related to road networks, links, nodes, routes, and their status be replaced with a standard that

utilizes standard road network datasets such as ARNOLD or others. These standard datasets may be state or federally defined, but should be available to all jurisdictions and organizations that may be sharing and exchanging information via the standard.

As mentioned for other dataframes and data elements, additional implementation guidance, defined by multiple stakeholders at the national level, should be included, as should smaller enumeration sets for individual data elements.

### 3.5.3.5. Recommendations for Device Inventories (Section 3.3.5.1.2 and related)

Device inventories, regardless of the inventory described, have a fundamental issue as described within TMDD. Inventories can only be exchanged as a full inventory set. While this is sufficient to describe any inventory, as an inventory set grows, the message size generated to describe the inventory can become unusably large. This creates issues with regards to the capabilities of hardware and software to respond to requests and construct the required message as well as excessive message transmission sizes and issues for the consuming external centers systems. This is a particular problem when dealing with “second-level” inventories, or inventories of inventories, such as intersection signal plan inventories which can become very large indeed.

A solution to this problem is to allow systems to send a requested inventory in an incremental fashion. The most important change needed to allow such a solution is to add an action to the inventory elements to tell the receiving external center if the element being sent is to be added, deleted, or updated. In this way a large inventory can be sent as a set of “inventories of one”, one message with an action for each element in the inventory.

Additionally, an inventory verification dialog could be added that would be a minimal list of the ids for elements within a specific inventory, along with an optional set of dates and actions indicating when add, delete, and update messages have been sent regarding each individual element within the inventory. This could then be requested by an external center at any time to verify it still has a complete and accurate set of inventory elements. In the case of any errors identified in inventory processing, a partial (utilizing a device filter), or full inventory refresh could be requested at any time.

Of course, the primary objection to such an approach would be that this solution requires that the owner center maintain the state of the inventory as sent to any external center. This is true, but it is a solution that allows the exchange of large inventory sets in a performant manner with minimal effort. In addition, the solution proposed is an optional approach and does not require incremental updates within the specification. It only allows such an implementation when the requirements and project needs dictate its use.

The following changes to volume 1 are recommended to implement such a method of requesting and receiving incremental inventories.

Section 3.3.5.1.1.1.2, add the following:



“3.3.5.1.1.1.2.3 Device update method

If the owner center supports it, the external center may request an incremental update process that splits large inventory and other types of supported updates in an incremental manner, with a device inventory action added to the record sent indicating the type of action the external center should take to its inventory of owner center devices, schedules, or plans. Device update types include incremental, full, or refresh with the following expected result:

Full (default) – the owner center provides a full inventory record within a single message that fulfills the external center’s request

Incremental – the owner center provides individual messages for each individual inventory item, with an action to add, update, or delete the item from the external center’s record of the owner center’s inventory.

Refresh – the owner center should use the incremental method listed above to provide a full inventory record as if no previous inventory has been sent to the external center.”

Section 3.3.5.1.2.1.2, add the following:

“3.3.5.1.2.1.2.18 Device Inventory Action

If the external center provided a request for incremental inventory updates, the owner center shall provide the action to be performed for the inventory record. Possible actions include:

add – indicates the external center should add the inventory item to its record of the owner center’s complete inventory

delete – indicates the external center should remove the inventory item from its record of the owner center’s complete inventory

update – indicates the external center should replace an existing record of the inventory item within its record of the owner center’s complete inventory

Implementation guidance: Note that any partial inventory requests using a device filter based on device-id or section-id should always send the following based on specific conditions of the inventory:

- When no record exists matching a specific item being requested a delete action is sent with the id within the filter
- When a record exists matching a specific item being requested an update action is sent with the id within the filter”

This same approach should be used in similar “inventory-like” requests that do not use the device inventory header, including but not limited to:

- Intersection signal timing pattern inventory
- Section timing pattern inventory
- Detector inventory
- Intersection signal control schedule
- Section control schedule
- Ramp meter control schedule
- Ramp meter plan inventory
- DMS message inventory

The standard should be reviewed for other “inventory-like” messages that would benefit from this approach, but do not utilize the device inventory header, and changes should be made as appropriate. Messages such as the intersection signal timing pattern inventory are particularly likely to be very large for a full inventory, and as such, would benefit significantly from such an approach.

### 3.5.3.6. Recommendations for Section 3.3.5.1.6 Regarding Cancel Control

It is not clear within the specification how to return local control of a device to the owning center. Past experience with implementation of the standard have met with different options, including sending another control request requesting plan 0 be implemented within an intersection signal control request, or sending a cancel control request for the last executed control request, or even sending a cancel control request for the first requested control request within a series of control requests. Many implementations desire to maintain the cancel control request solely for control requests that had not yet been implemented. As a result, some clarity regarding the return of a device to normal local control, relinquishing control of the device by the external center command is necessary within the specification to improve compatibility between implementations of the standard.

Add the following at the beginning of Section 3.3.5.1.6:

“External centers need to be able to cancel previously sent control requests. These previous control requests may be scheduled for a future time or may have already been successfully implemented by the owner center. They may or may not have a requested expiration date/time.

In cases where the external center wishes to cancel a previously sent control request, regardless of the status of that request, and return control to the owner center for normal operations, the external center shall send a cancel control request to the owner center. Upon successful completion of the request by the owner center, control of the device shall return to the owner center.”

### 3.5.3.7. Recommendations for a New Section Regarding Response Plan Requirements

With the increase of multi-jurisdictional responses to events and the increased demand for integration of systems to manage the responses to these events in a more automated and systematic way, there is a need for a set of dialogs to implement response plans. Section 3.5.2.3 proposed additional user needs to capture a set of fundamental needs for implementation and execution of response plans and the management of their life-cycle.

The following is recommended for addition to the specification to add requirements to address those user needs (Note that this is numbered as 3.3.8, however, this could alternatively be added within the requirements detailing events or another more suitable location):

#### “3.3.8 Response Plan Development, Implementation, and Termination

Response plans are generally multi-center, and possibly multi-organization, responses to events to mitigate the typical impacts of events on traffic. They often have a specific lifecycle with the following stages:

- Event identification (requirements for this are covered in Section 3.3.3 regarding Events)
- Response plan development and review
- Response plan approval or rejection
- Response plan execution (requirements for this are covered in their respective commands to control field devices)
- Updates to the response plan, either as a response to an event update or to changing traffic conditions
- Request for response plan termination
- Termination response plan generation
- Termination response plan approval
- Termination response plan execution
- Response plan activity logs

The requirements to implement such a response plan lifecycle are as follows:

#### 3.3.8.1 Need to Share Proposed Responses to an Event

The requirements to share one or more proposed responses to an event are as follows:

##### 3.3.8.1.1 Send Response Plan Information Upon Request

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

##### 3.3.8.1.2 Publish Response Plan Information

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

#### 3.3.8.1.3 Subscribe to Response Plan Information

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

#### 3.3.8.1.4 Contents of the Response Plan Request

An external center shall send response plan requests to an owner center.

##### 3.3.8.1.4.1 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

##### 3.3.8.1.4.2 Optional Response Plan Information Request Content

If the owner center supports it, the response plan information request sent from the external center to the owner center may contain:

###### 3.3.8.1.4.2.1 Authentication information

The external center shall provide the authentication information as part of the response plan request. The authentication information sent from an external center to an owner center provided the protected service or information shall include:

- a. Username of the requesting operator
- b. Password of the requesting operator

###### 3.3.8.1.4.2.2 Request time

If the owner center supports it, the response plan information request may include the time of the response plan request.

###### 3.3.8.1.4.2.3 Corridor identifier

If the owner center supports it, the response plan information request may include an identifier of the transportation corridor affected by the event and response plan

###### 3.3.8.1.4.2.4 Response plan request filter

If the owner center supports it, the response plan information request may include a response plan filter to apply to the request. The response plan filter must include the event id. The response plan filter may include the following:

- a. An evaluation cycle list

## TMDD Standards Update Recommendations – Data Structures

- b. A response plan rank list
- c. A response plan id list
- d. A plan type
- e. A response plan status list

### 3.3.8.1.5 Contents of the Response Plan Information Response

The owner center shall send response plan information to external centers.

#### 3.3.8.1.5.1 Required Response Plan Information Response Content

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

- a. Event identifier
- b. List of evaluation cycles

#### 3.3.8.1.5.2 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 details

#### 3.3.8.1.5.3 Optional Evaluation Cycle Content

An evaluation cycle sent from an owner center to an external center may include the following:

- a. Traffic State
- b. Response plan list

#### 3.3.8.1.5.3.1 Required Response Plan Content

Each response plan shall the following response plan information:

- a. The response plan request header associated with the response plan request received from the external center.
- b. A response plan header

##### 3.3.8.1.5.3.1.1 Response Plan Header Content

###### 3.3.8.1.5.3.1.1.1 Required Response Plan Header Content

The response plan header shall contain the following required information:

## TMDD Standards Update Recommendations – Data Structures

- a. Event identifier
- b. Response plan identifier
- c. Plan type
- d. Evaluation cycle

### 3.3.8.1.5.3.1.1.2 Optional Response Plan Header Content

The response plan header may contain one or more of the following:

- a. A ranking of the response plan within the response plan list sent for the evaluation cycle
- b. The submission time of the response plan for approval

### 3.3.8.1.5.3.2 Optional Response Plan Content

The response plan may also include one or more of the following:

- a. Activity start time
- b. Projected activity end time
- c. List of agencies participating in the response plan activities
- d. List of detours included within the response plan
- e. List of ramp meter control actions included within the response plan
- f. List of intersection signal control actions included within the response plan
- g. List of DMS control actions included within the response plan
- h. List of HAR message control actions included within the response plan
- i. List of other informational messages included within the response plan such as 511 messaging
- j. List of LCS schedule cancellations included within the response plan
- k. List of personnel deployment actions included within the response plan
- l. List of device control cancellations included within the response plan
- m. Aggregate approval decision for the response plan as a result of individual organization approvals
- n. List of individual approval decisions from all participating agencies
- o. Response plan implementation status details
- p. List of response plan log details

### 3.3.8.2 Need to Share 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

## TMDD Standards Update Recommendations – Data Structures

- 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

### 3.3.8.2.1 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.

### 3.3.8.2.2 Publish Response Plan Status

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

### 3.3.8.2.3 Subscribe to Response Plan Status

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

### 3.3.8.2.4 Contents of the Response Plan Status Information Request

The response plan status request shall contain the following:

- a. A response plan request header
- b. A response plan request filter
- c. An authentication object with username and password

### 3.3.8.2.5 Contents of the Response Plan Status Response

The response plan status response shall contain the following:

#### 3.3.8.2.5.1 Required Response Plan Status Response Content

The response plan status response shall contain the following elements:

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

### 3.3.8.3 Need to Share Response Plan Activity Log

Owner centers need to share a log of the response plan activities, such as the full set of response plans considered, approved, and executed, the commands sent to each external center, the results of those commands (success or error), and other information.

#### 3.3.8.3.1 Send Response Plan Activity Log Upon Request

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

#### 3.3.8.3.2 Publish Response Activity Log

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

#### 3.3.8.3.3 Subscribe to Response Plan Status

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

#### 3.3.8.3.4 Contents of the Response Plan Activity Log Information Request

The response plan status request shall contain the following:

- a. A response plan request header
- b. A response plan request filter
- c. An authentication object with username and password

#### 3.3.8.3.5 Contents of the Response Plan Activity Log Response

The response plan activity log response shall contain the following:

##### 3.3.8.3.5.1 Required Response Plan Activity Log Response Content

The response plan status response shall contain the following elements:

- a. The response plan request header
- b. The response plan header
- c. A list of response plan log details

##### 3.3.8.3.5.1.1 Contents of the response plan log details

The response plan log details shall contain the following:

##### 3.3.8.3.5.1.1.1 Required response plan log details content

The response plan 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 set to the device involved in the response plan
- d. The response plan command status for each command sent
- e. The text of any acknowledgement sent in response to a command

##### 3.3.8.3.5.1.1.1 Optional response plan log details

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

#### 3.3.8.4 Need to Approve Response Plans

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. As a result, an exchange of requests for approval and the response to those requests (either approval or disapproval) must be exchanged between the owner center and external centers involved within the response.

#### 3.3.8.4.1 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.

#### 3.3.8.4.2 Publish Response Approval

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

#### 3.3.8.4.3 Subscribe to Response Plan Approval

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

#### 3.3.8.4.4 Contents of the Response Plan Approval Request

The response plan approval request shall contain the following:

- a. A response plan request header
- b. A response plan request filter
- c. An authentication object with username and password

#### 3.3.8.4.5 Contents of the Response Plan Approval Response

The response plan approval response shall contain the following:

##### 3.3.8.4.5.1 Required Response Plan Approval Response Content

The response plan status response shall contain the following elements:

- a. The response plan request header
- b. The response plan header
- c. A response plan approval decision
- d. A list of individual organization approval decisions

##### 3.3.8.4.5.1.1 Contents of the response approval decision

The response plan approval decision shall contain the following:

##### 3.3.8.4.5.1.1.1 Required response approval decision content

The response plan approval decision shall contain the following elements:

- a. The organization providing the decision
- b. The decision
- c. An indication of the method of approval (automated, manual)

3.3.8.4.5.1.1.1 Optional response plan approval decision details

The response plan approval decision may contain the time of decision.”

Note that termination of response plans, within the Connected Corridors program, was designed to operate a little differently than perhaps a standard implementation might. For the event response plan process, subscriptions were used for sharing events, response plans and their approvals. Termination plans, being a response plan with the type “termination”, were shared via the same subscription used for response plans. The termination request did not result in a termination plan being returned, but rather an acknowledgement of the receipt of the request. A synchronous request/response implementation of this process might instead return the response plan. However, often systems may take some time to develop and return such a plan. In this case, subscriptions may be better suited. However, for this recommendation, we are adding an optional element to the response object to a termination request to include a response plan of the type termination. The following is recommended to be added as section 3.3.8.5 to Volume 1 of the standard.

“3.3.8.5 Need to Terminate a Response Plan

When an organization or center determines that event response actions are complete or need to be terminated, a center must inform other centers that it wishes to terminate the event response activities. To accomplish this, a center may request response plan termination. Upon receiving such a request, a termination response plan can be provided that returns all devices to normal operation. The termination response plan can be provided following the agreed upon process by all centers as a response plan with the plan type as a termination plan.

3.3.8.5.1 Send Response Plan Termination Acknowledgement Upon Request

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

3.3.8.5.4 Contents of the Response Plan Termination Request

The response plan termination request shall contain the following:

- a. A response plan request header
- b. An event identifier
- c. An authentication object with username and password

The response plan termination request may optionally include a list of response plans to be terminated. If the list is blank, all response plans for the specified event are to be terminated.

3.3.8.5.5 Contents of the Response Plan Termination Request Response

The response plan termination request response shall contain a list of response plan termination items that include the following:

3.3.8.5.5.1 Required Response Plan Termination Request Response Content

The response plan termination request response shall contain a list of response plan terminations that include the following elements:

- a. The response plan request header
- b. The event identifier
- c. The identifier of the response plan being terminated
- d. The status of the request

#### 3.3.8.5.5.2 Optional Response Plan Termination Request Response Content

The response plan termination request response may contain the following within a response plan termination:

- a. The time of the last request status update
- b. The response plan for terminating the response (termination plan)”

### 3.6. UPDATES TO VOLUME 1, TABLE 4

Upon acceptance of any of these recommendations, Table 4 should be updated to include any new requirements added, such as response plans. In addition, it may need updating as, while generally it is not specific to the names of specific messages or dialogs, it at times references specific request types such as Event Information or Device Information. Such references are in conflict with the WS-I compliance issues mentioned in Section 4.6.

## 4. RECOMMENDATIONS FOR CURRENT TMDD V3.1 VOLUME 2:

### 4.1. DATA STRUCTURE HIGH LEVEL RECOMMENDATIONS

#### 4.1.1. ADDITIONAL DATA FORMATS AND TRANSMISSION PROTOCOLS

Volume 2 provides XML representations for all dialogs, messages, data frames and elements specified within the standard. One of the primary recommendations of this project is for the TMDD standard to allow representations and protocols beyond XML and SOAP (“Change the TMDD standard to allow additional data transmission formats beyond XML. Create a list of recommended data formats and implementation guidance for each format.”). It is recommended that the standard provide these additional representations in formats that are allowed under the standard.

Data formats that should be considered for describing and transmitting TMDD data include:

- JSON and JSON schema
- Apache Avro and Avro schema
- Protocol Buffers

Examples of a JSON schema translation for a modified TMDD XSD XML schema that captures some of the recommendations within this report is provided in Appendix A. This JSON schema is autogenerated and will require review as well as additional modification to incorporate the full set of recommendations in this and the other reports submitted within this project before finalization. Additional modifications should also be considered for splitting the schema logically with correct namespace and references to make the schema usable for personnel responsible for system development and maintenance.

#### 4.1.2. COMPARTMENTALIZATION OF DIALOGS AND MESSAGES

Another recommended structure modification is to create individual schema documents for each message. The current schema is daunting when first encountered in both its size and complexity. Development tools for operating on XSD schemas, especially when moving between XML and other formats will not work on complicated schemas with so many layers and external references. Combining the full TMDD specification into a single XSD creates extensive complication and overhead for projects not using the full set of TMDD communications. Splitting TMDD into multiple schemas specific to each message or another abstraction level will simplify its use and likely extend the use of the standard.

## 4.2. SUGGESTED MODIFICATIONS TO SECTION 2

To accommodate additional data formats and transmissions protocols, it is recommended that Section 2 be modified to provide the following:

### 4.2.1. TMDD COMMUNICATION METHODS

A new section should be added to the standard to enumerate the recommended communication methods provided for within the standard. The following could be used as the basis for such a section:

#### “Allowed Communication Methods

TMDD provides for several different communication protocols, specified in Volume 3 of the standard. These communication protocols provide for data specified in multiple data formats, including:

- XML
- JSON
- Others as determined by the committee

These communication formats can be shared between systems using multiple methods, including, but not limited to:

- SOAP-based web services
- REST-based web services
- Messaging systems such as ActiveMQ
- Kafka or other clustered messaging or processing systems

Volume II provides specifications for TMDD implementation in any of the recommended data formats. See Volume III for specific information regarding implementation with a specific data exchange protocol.”

It is important to note that the committee may wish to choose an alternative to the WSDL method of SOAP based service description if considering a REST-based implementation of TMDD. This document will not address the specifics of a REST-based implementation and does not provide suggestions for JSON alternatives to WSDL based elements within Volume II.

### 4.2.2. XML-BASED SPECIFICATION SEPARATION

Sections 2.1 through 2.6 should be revised to discuss data format only and remove information related to the SOAP-based transfer protocol. WSDL related information and the tutorial sections

should be moved to Volume III. What information is retained should be placed under a separate heading “XML Based Schema”

#### 4.2.3. JSON-BASED SPECIFICATION ADDITION

A new section should be created with similar content to what remains of sections 2.1 through 2.6 for JSON based communications. The following provides a sample for such a section:

##### JSON Schema Files

The JSON Schema Files are normative to the standard. These files contain the source design of the TMDD used in developing Volume II. These electronic files have been verified using software tools to be correct JSON schema syntax. A description of each JSON TMDD electronic design file is included below:

File	Format	Description
TMDD.JSON	JSON schema	Full representation of the TMDD schema for JSON documents.

Note: It is recommended that individual schemas for each message be provided within the list above within the specification. The list of messages utilized within an implementation may vary depending upon the technology and method implemented. For instance, a REST-based web service implementation will utilize request messages similar to SOAP based communications. However, a Kafka-based messaging implementation should be implemented without such request messages. In general, a messaging approach will use the messaging system, negotiations between organizations, and the configuration of the messaging system as well as sending and receiving systems to establish communications rather than specific request messages and subscription request messages.

##### TMDD JSON Schema

Volume II presents JSON fragment representations of dialogs, messages, data frames and data elements.

### 4.3. DATA DEFINITIONS – MODIFICATIONS TO SECTION 3

*NOTE: The JSON schema representations within this section are not intended as final representations of a standard. Additional effort is required to develop a working version of the standard JSON representation.*

4.3.1. SECTION 3 INTRODUCTION MODIFICATIONS

Section 3’s introductory header section should be revised as follows:

**3 TMDD Schema Data Concept Definitions**

This section contains the data concept definitions of TMDD for the following: object classes, dialogs, messages, data frames and data elements. The following apply:

1. The title used for each data concept.
2. With the exception of object classes, data concepts are organized by object class.
3. With the exception of object classes, each data concept defined is an XML, JSON, and other\* representation.
4. The SOAP-based XML representation of interface dialogs is that of WSDL (as defined in the NTCIP 2306) – See Volume III.
5. The XML representation of messages, data frames and data elements are that of the XML Schema (as defined in SAE J2630).
6. The JSON representation of messages, data frames and data elements are that of the JSON Schema.
7. \*Add others as required for other specified formats

\* Other formats that are allowed by the committee, such as protocol buffers or others should be added here.

Data concepts that refer to design elements in external standards are preceded by prefixes, such as "NTCIP:" for XML and other representations.

The external references are:

File	XML Representations	JSON Representations	Other*
J2354 - Message Set for Advanced Traveler Information Systems	ATIS:	“\$ref”:<url to ATIS JSON representation>	
NTCIP 2306, Application Profile for XML Message Encoding and Transport in ITS Center-to-Center Communications	C2C:	“\$ref”:<url to C2C JSON representation>	
SAE J2540-2, ITIS Phrase Lists	ITIS:	“\$ref”:<url to ITIS JSON representation>	
SAE J2266, Location Referencing Message Specification (LRMS)	LRMS:	“\$ref”:<url to LRMS JSON representation>	

NTCIP 1200-series data definitions	NTCIP:	“\$ref”:<url to NTCIP JSON representation>	
TMDD Extensions	tmddExt:	“\$ref”:<url to tmddExt JSON representation>	

\* Each allowed data format should have a column providing its specific representation

#### 4.3.2. INVENTORY ACTION AND UPDATE METHOD

Update Section 3.3.5.6 as follows:

##### “3.3.5.6 deviceInformationRequest

###### 3.3.5.6.1 deviceInformationRequest XML Representation

```
<xs:complexType name="DeviceInformationRequest">
  <xs:annotation>
    <xs:documentation>
      <objectClass>Device</objectClass>
      <definition>The information content necessary to request an owner
center to provide inventory, status, schedule, or timing plan information for a given
set of devices.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="authentication" type="Authentication" minOccurs="0"/>
    <xs:element name="organization-information" type="OrganizationInformation"/>
    <xs:element name="organization-requesting" type="OrganizationInformation"
minOccurs="0"/>
    <xs:element name="device-type" type="Device-type"/>
    <xs:element name="device-information-type" type="Device-information-type"/>
    <xs:element name="device-update-method" type="Device-update-method-type"
minOccurs="0"/>
    <xs:element name="device-filter" type="DeviceInformationRequestFilter"
minOccurs="0"/>

    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

###### 3.3.5.6.2 deviceInformationRequest JSON Representation



```
"DeviceInformationRequest": {
  "type": "object",
  "required": [
    "organizationinformation",
    "devicetype",
    "deviceinformationtype"
  ],
  "properties": {
    "authentication": {"$ref": "#/definitions/Authentication"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
    "devicetype": {"type": "string"},
    "deviceinformationtype": {"type": "string"},
    "deviceupdatemethod": {"type": "string"},
    "devicefilter": {"$ref": "#/definitions/DeviceInformationRequestFilter"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}
```

Update 3.3.5.9 as follows:

### **“3.3.5.9 deviceInventoryHeader**

#### 3.3.5.9.1 deviceInventoryHeader XML Representation

```
<xs:complexType name="DeviceInventoryHeader">
  <xs:annotation>
    <xs:documentation>
      <objectClass>Device</objectClass>
      <definition>The information content header included with all device
inventories.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="restrictions" type="Restrictions" minOccurs="0"/>
    <xs:element name="organization-information" type="OrganizationInformation"/>
    <xs:element name="device-id" type="Organization-resource-identifier"/>
    <xs:element name="device-location" type="Irms:GeoLocation"/>
    <xs:element name="device-name" type="Organization-resource-name"/>
  </xs:sequence>
</xs:complexType>
```

```

        <xs:element name="device-description" type="Organization-resource-name"
minOccurs="0"/>
        <xs:element name="device-control-type" type="Device-control-type"
minOccurs="0"/>
        <xs:element name="controller-description" type="Organization-resource-name"
minOccurs="0"/>
        <xs:element name="network-id" type="Transportation-network-identifier"
minOccurs="0"/>
        <xs:element name="node-id" type="Transportation-network-identifier"
minOccurs="0"/>
        <xs:element name="node-name" type="Transportation-network-name"
minOccurs="0"/>
        <xs:element name="link-id" type="Transportation-network-identifier"
minOccurs="0"/>
        <xs:element name="link-name" type="Transportation-network-name"
minOccurs="0"/>
        <xs:element name="link-direction" type="Link-direction" minOccurs="0"/>
        <xs:element name="linear-reference" type="Link-location-linear-reference"
minOccurs="0"/>
        <xs:element name="linear-reference-version" type="Link-location-linearreference-
version" minOccurs="0"/>
        <xs:element name="route-designator" type="Link-route-designator"
minOccurs="0"/>
        <xs:element name="device-url" type="UrlReference" minOccurs="0"/>
        <xs:element name="last-update-time" type="DateTimeZone" minOccurs="0"/>
        <xs:element name="device-inventory-action" type="Device-inventory-action-type"
minOccurs="0"/>
        <xs:element ref="tmddExt:deviceInventoryHeaderExt" minOccurs="1"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

```

### 3.3.5.9.2 deviceInventoryHeader JSON Representation

```

"DeviceInventoryHeader": {
  "type": "object",
  "required": [
    "organizationinformation",
    "deviceid",
    "devicelocation",
    "devicename"
  ],
  "properties": {

```

```

    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "deviceid": {"type": "string"},
    "devicelocation": {"$ref": "#/definitions/GeoLocation"},
    "devicename": {"type": "string"},
    "devicedescription": {"type": "string"},
    "devicecontroltype": {"type": "string"},
    "controllerdescription": {"type": "string"},
    "networkid": {"type": "string"},
    "nodeid": {"type": "string"},
    "nodename": {"type": "string"},
    "linkid": {"type": "string"},
    "linkname": {"type": "string"},
    "linkdirection": {"type": "string"},
    "linearreference": {"type": "string"},
    "linearreferenceversion": {"type": "integer"},
    "routedesignator": {"type": "string"},
    "deviceurl": {"$ref": "#/definitions/UrlReference"},
    "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
    "deviceinventoryaction": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

```

Update 3.3.6.10 as follows:

### “3.3.6.10 dMSMessageInventory

#### 3.3.6.10.1 dMSMessageInventory XML Representation

```

<xs:complexType name="DMSMessageInventory">
  <xs:annotation>
    <xs:documentation>
      <objectClass>DMS</objectClass>
      <definition>The information content describing an owner center's
dynamic message library for a single device.</definition>
    </xs:documentation>
  </xs:annotation>
</xs:sequence>

```

```

    <xs:element name="restrictions" type="Restrictions" minOccurs="0"/>
    <xs:element name="organization-information" type="OrganizationInformation"/>
    <xs:element name="device-id" type="Organization-resource-identifier"/>
    <xs:element name="message-memory-type"
type="ntcip:DmsMessageMemoryType"/>
    <xs:element name="message-number" type="ntcip:DmsMsgTableSource"/>
    <xs:element name="message" type="ntcip:DmsMessageMultiString"/>
    <xs:element name="message-owner-organization-information"
type="OrganizationInformation"/>
    <xs:element name="enable-beacon-flag" type="Binary-flag"/>
    <xs:element name="message-run-time-priority"
type="ntcip:DmsMessageRunTimePriority"/>
    <xs:element name="message-status" type="ntcip:DmsMessageStatus"/>
    <xs:element name="last-update-time" type="DateTimeZone" minOccurs="0"/>
    <xs:element name="device-inventory-action" type="Device-inventory-action-
type" minOccurs="0"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:sequence>

```

### 3.3.6.10.2 dMSMessageInventory JSON Representation

```

"DMSMessageInventory": {
  "type": "object",
  "required": [
    "organizationinformation",
    "deviceid",
    "messagenumber",
    "message",
    "messageownerorganizationinformation",
    "enablebeaconflag",
    "messengeruntimepriority",
    "messagestatus"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "deviceid": {"type": "string"},
    "messagememorytype": {"type": "string"},
    "messagenumber": {"type": "string"},
    "message": {"type": "string"},
    "messageownerorganizationinformation": {"$ref":
"#/definitions/OrganizationInformation"},
    "enablebeaconflag": {"type": "string"},

```

```

    "messengeruntimepriority": {"type": "integer"},
    "messagestatus": {"type": "string"},
    "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
    "deviceinventoryaction": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

```

Update 3.3.12.20 as follows:

### “3.3.12.20 intersectionSignalTimingPatternInventory

#### 3.3.12.20.1 intersectionSignalTimingPatternInventory XML Representation

```

<xs:complexType name="IntersectionSignalTimingPatternInventory">
  <xs:annotation>
    <xs:documentation>
      <objectClass>IntersectionSignal</objectClass>
      <definition>The information content describing an entry in an owner
center's traffic signal timing pattern inventory.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="restrictions" type="Restrictions" minOccurs="0"/>
    <xs:element name="organization-information" type="OrganizationInformation"/>
    <xs:element name="device-id" type="Organization-resource-identifier"/>
    <xs:element name="timing-pattern-id" type="Organization-resourceidentifier"/>
    <xs:element name="timing-pattern-name" type="Organization-resource-name"
minOccurs="0"/>
    <xs:element name="cycle-length" type="ntcip:PatternCycleTime"/>
    <xs:element name="offset-time" type="ntcip:PatternOffsetTime"/>
    <xs:element name="phase-tp-list">
      <xs:complexType>
        <xs:sequence maxOccurs="40">
          <xs:element name="phases"
type="IntersectionSignalTPInventoryPhase"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
</xs:element>

```

```

        <xs:element name="sequence-information" minOccurs="0">
            <xs:complexType>
                <xs:sequence maxOccurs="8">
                    <xs:element name="sequence-information"
type="IntersectionSignalSequenceData"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
        <xs:element name="last-update-time" type="DateTimeZone" minOccurs="0"/>
        <xs:element name="device-inventory-action" type="Device-inventory-action-
type" minOccurs="0"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

```

### 3.3.12.20.2 intersectionSignalTimingPatternInventory JSON Representation

```

"IntersectionSignalTimingPatternInventory": {
    "type": "object",
    "required": [
        "organizationinformation",
        "deviceid",
        "timingpatternid",
        "cyclelength",
        "offsettime",
        "phasetplist"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "deviceid": {"type": "string"},
        "timingpatternid": {"type": "string"},
        "timingpatternname": {"type": "string"},
        "cyclelength": {"type": "integer"},
        "offsettime": {"type": "integer"},
        "phasetplist": {"$ref":
"#/definitions/IntersectionSignalTimingPatternInventory.phasetplist"},
        "sequenceinformation": {"$ref":
"#/definitions/IntersectionSignalTimingPatternInventory.sequenceinformation"},
        "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "deviceinventoryaction": {"type": "string"},
        "Any": {
            "type": "array",

```

```
        "items": {"type": "object"},
        "minItems": 0
    }
}
}
```

Add section 3.4.5.7.18 as follows:

#### **“3.4.5.7.18 device-update-method-type**

3.4.5.7.18 device-update-method-type XML representation

```
<xs:simpleType name="Device-update-method-type">
  <xs:annotation>
    <xs:documentation>
      <objectClass>Device</objectClass>
      <valueDomainTerm>cd</valueDomainTerm>
      <units/>
    </xs:documentation>
  </xs:annotation>
  <xs:union>
    <xs:simpleType>
      <xs:restriction base="xs:unsignedInt">
        <xs:minInclusive value="1"/>
        <xs:maxInclusive value="4"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="full"/>
        <xs:enumeration value="incremental"/>
        <xs:enumeration value="refresh"/>
        <xs:enumeration value="other"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:union>
</xs:simpleType>
```

Add section 3.4.5.7.19 as follows:

#### **“3.4.5.7.19 device-inventory-action-type**

### 3.4.5.7.19 device-inventory-action-type XML Representation

```

<xs:simpleType name="Device-inventory-action-type">
  <xs:annotation>
    <xs:documentation>
      <objectClass>Device</objectClass>
      <valueDomainTerm>cd</valueDomainTerm>
      <units/>
    </xs:documentation>
  </xs:annotation>
  <xs:union>
    <xs:simpleType>
      <xs:restriction base="xs:unsignedInt">
        <xs:minInclusive value="1"/>
        <xs:maxInclusive value="4"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType>
      <xs:restriction base="xs:string">
        <xs:enumeration value="add"/>
        <xs:enumeration value="delete"/>
        <xs:enumeration value="update"/>
        <xs:enumeration value="other"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:union>
</xs:simpleType>”
“

```

### 4.3.3. MULTIPARTY ORGANIZATION INFORMATION

Change 3.3.16.3 to add the ability to exchange other organizations information in multi-party information exchanges as follows: (Allows exchange of orgids and other information that may be in messages re: assets not owned by an org

#### “3.3.16.3 organizationInformation

##### 3.3.16.3.1 organizationInformation XML Representation

```

<xs:complexType name="OrganizationInformation">
  <xs:annotation>
    <xs:documentation>
      <objectClass>Organization</objectClass>
      <definition>The information content describing an organization

```



```

information for a single organization.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="organization-id" type="Organization-resource-identifier"/>
    <xs:element name="organization-name" type="Organization-resource-name"
minOccurs="0"/>
    <xs:element name="organization-location" type="Organization-location-fips"
minOccurs="0"/>
    <xs:element name="organization-function" type="Organization-function"
minOccurs="0"/>
    <xs:element name="organization-contact-details" type="ContactDetails"
minOccurs="0"/>
    <xs:element name="center-contact-list" minOccurs="0">
      <xs:complexType>
        <xs:sequence maxOccurs="1024">
          <xs:element name="center-contact-details"
type="OrganizationCenterInformation"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="secondary-organization-list" minOccurs="0">
      <xs:complexType>
        <xs:sequence maxOccurs="1024">
          <xs:element name="secondary-organization"
type="OrganizationInformation"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="last-update-time" type="DateTimeZone" minOccurs="0"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>”

```

### 3.3.16.3.2 organizationInformation JSON Representation

```

"OrganizationInformation": {
  "type": "object",
  "required": ["organizationid"],
  "properties": {
    "organizationid": {"type": "string"},
    "organizationname": {"type": "string"},
    "organizationlocation": {"type": "string"},

```

```

        "organizationfunction": {"type": "string"},
        "organizationcontactdetails": {"$ref": "#/definitions/ContactDetails"},
        "centercontactlist": {"$ref": "#/definitions/OrganizationInformation.centercontactlist"},
        "secondaryorganizationlist": {"$ref":
"#/definitions/OrganizationInformation.secondaryorganizationlist"},
        "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}

```

#### 4.3.4. ADDITIONAL CONNECTION MANAGEMENT

Add the following dialogs to section 3.1.3

##### 3.1.3.3 dIAvailableDialogsRequest

###### 3.1.3.3.1 Dialog Reference

See Clause 2.4.1 Generic Request Response Dialog

###### 3.1.3.3.2 XML Representation

```

<message xmlns="http://schemas.xmlsoap.org/wsdl/"
name="MSG_AvailableDialogsRequest">
    <part name="message" element="tmdd:availableDialogsRequestMsg"/>
</message>
<message xmlns="http://schemas.xmlsoap.org/wsdl/"
name="MSG_AvailableDialogsResponse">
    <part name="message" element="tmdd:availableDialogsResponseMsg"/>
</message>
<message xmlns="http://schemas.xmlsoap.org/wsdl/" name="MSG_ErrorReport">
    <part name="message" element="tmdd:errorReportMsg"/>
</message>
<operation xmlns="http://schemas.xmlsoap.org/wsdl/"
name="DIAvailableDialogsRequest">
    <documentation>
        <objectClass>ConnectionManagement</objectClass>
        <objectClass>ExternalCenter</objectClass>
        <objectClass>OwnerCenter</objectClass>
    </documentation>

```

```

        <definitions>A request-response dialog that allows an external center to
        request that an owner center reply with a list of available dialogs</definitions>
    </documentation>
    <input message="tns:MSG_AvailableDialogsRequest"/>
    <output message="tns:MSG_AvailableDialogsResponse"/>
    <fault name="errorReport" message="tns:MSG_ErrorReport"/>
</operation>

```

### 3.1.3.4 dlActiveSubscriptionStatusRequest

#### 3.1.3.4.1 Dialog Reference

See Clause 2.4.1 Generic Request Response Dialog

#### 3.1.3.4.2 XML Representation

```

<message xmlns="http://schemas.xmlsoap.org/wsdl/"
name="MSG_ActiveSubscriptionStatusRequest">
    <part name="message" element="tmdd: activeSubscriptionStatusRequestMsg"/>
</message>
<message xmlns="http://schemas.xmlsoap.org/wsdl/"
name="MSG_ActiveSubscriptionStatusResponse">
    <part name="message" element="tmdd: activeSubscriptionStatusResponseMsg"/>
</message>
<message xmlns="http://schemas.xmlsoap.org/wsdl/" name="MSG_ErrorReport">
    <part name="message" element="tmdd:errorReportMsg"/>
</message>
<operation xmlns="http://schemas.xmlsoap.org/wsdl/"
name="DIActiveSubscriptionStatusRequest">
    <documentation>
        <objectClass>ConnectionManagement</objectClass>
        <objectClass>ExternalCenter</objectClass>
        <objectClass>OwnerCenter</objectClass>
        <definitions>A request-response dialog that allows an external center to
        request that an owner center reply with the status of existing subscription communications with
        the external center</definitions>
    </documentation>
    <input message="tns:MSG_ActiveSubscriptionStatusRequest"/>
    <output message="tns:MSG_ActiveSubscriptionStatusResponse"/>
    <fault name="errorReport" message="tns:MSG_ErrorReport"/>
</operation>

```

### 3.1.3.5 dlActiveSubscriptionStatusSubscription –

### 3.1.3.5.1 Dialog Reference

See Clause 2.4.1 Generic Subscription Dialog

### 3.1.3.4.2 XML Representation

```
<message xmlns="http://schemas.xmlsoap.org/wsdl/"
name="MSG_ActiveSubscriptionStatusSubscription">
  <part name="message" element="tmdd: activeSubscriptionStatusRequestMsg"/>
</message>
<message xmlns="http://schemas.xmlsoap.org/wsdl/" name="MSG_ConfirmationReceipt">
  <part name="message" element="c2c:c2cMessageReceipt"/>
</message>
<message xmlns="http://schemas.xmlsoap.org/wsdl/" name="MSG_ErrorReport">
  <part name="message" element="tmdd:errorReportMsg"/>
</message>
<operation xmlns="http://schemas.xmlsoap.org/wsdl/"
name="DIActiveSubscriptionStatusSubscription">
  <documentation>
    <objectClass>ConnectionManagement</objectClass>
    <objectClass>ExternalCenter</objectClass>
    <objectClass>OwnerCenter</objectClass>
    <definition>A request-response dialog that allows an external center to
request a subscription to an owner center's status of existing subscription communications with
the external center</definition>
  </documentation>
  <input message="tns:MSG_ActiveSubscriptionStatusSubscription"/>
  <output message="tns:MSG_ConfirmationReceipt"/>
  <fault name="errorReport" message="tns:MSG_ErrorReport"/>
</operation>
```

Add the following to section 3.1.22

### “3.1.22.2 dlActiveSubscriptionStatusUpdate

#### 3.1.22.2.1 Pre Conditions

An owner center shall provide updates to an external center upon acceptance of a dlActiveSubscriptionStatusSubscription Dialog

#### 3.1.22.2.2 Dialog Reference

See Clause 2.4.3 General Publication Update Dialog

### 3.1.22.2.3 XML Representation

```

<message xmlns="http://schemas.xmlsoap.org/wsdl/"
name="MSG_ActiveSubscriptionStatusUpdate">
    <part name="message" element="tmdd:activeSubscriptionStatusResponseMsg"/>
</message>
<message xmlns="http://schemas.xmlsoap.org/wsdl/" name="MSG_ConfirmationReceipt">
    <part name="message" element="c2c:c2cMessageReceipt"/>
</message>
<message xmlns="http://schemas.xmlsoap.org/wsdl/" name="MSG_ErrorReport">
    <part name="message" element="tmdd:errorReportMsg"/>
</message>
<operation xmlns="http://schemas.xmlsoap.org/wsdl/"
name="DIActiveSubscriptionStatusUpdate">
    <documentation>
        <objectClass>ConnectionManagement</objectClass>
        <objectClass>ExternalCenter</objectClass>
        <objectClass>OwnerCenter</objectClass>
        <definition>A publication dialog that allows an owner center to provide to
an external center subscription status updates.</definition>
    </documentation>
<input message="tns:MSG_CenterActiveVerificationUpdate"/>
    <output message="tns:MSG_ConfirmationReceipt"/>
<fault name="errorReport" message="tns:MSG_ErrorReport"/>

```

Add the following to section 3.2.3

“ 3.2.3.4 availableDialogsRequestMsg

#### 3.2.3.4.1 availableDialogsRequestMsg XML Representation

```

<xs:element name=" availableDialogsRequestMsg "
type="AvailableDialogsRequest">
    <xs:annotation>
        <xs:documentation>
            <objectClass>ConnectionManagement</objectClass>
            <definition>The information content necessary to request an owner
centers available dialogs.</definition>
            <requirement>REQXXXX</requirement>
        </xs:documentation>
    </xs:annotation>
</xs:element>

```

#### 3.2.3.4.2 availableDialogsRequestMsg JSON Representation

```
{
  "type": "object",
  "properties": {
    "availableDialogsRequestMsg": {"$ref": "#/definitions/AvailableDialogsRequest"}
  }
}
```

#### 3.2.3.5 availableDialogsResponseMsg

##### 3.2.3.5.1 availableDialogsResponseMsg XML Representation

```
<xs:element name="availableDialogsResponseMsg "
type="AvailableDialogsResponse">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>The information content necessary to provide an owner
centers available dialogs.</definition>
      <requirement>REQXXXX</requirement>
    </xs:documentation>
  </xs:annotation>
</xs:element>
```

##### 3.2.3.5.2 availableDialogsResponseMsg JSON Representation

```
{
  "type": "object",
  "properties": {
    "availableDialogsResponseMsg": {"$ref": "#/definitions/AvailableDialogsResponse"}
  }
}
```

#### 3.2.3.6 activeSubscriptionStatusRequestMsg

##### 3.2.3.5.1 activeSubscriptionStatusRequestMsg XML Representation

```
<xs:element name="activeSubscriptionStatusRequestMsg "
type="ActiveSubscriptionStatusRequest">
  <xs:annotation>
```

```

        <xs:documentation>
            <objectClass>ConnectionManagement</objectClass>
            <definition>The information content necessary to request status of
            subscriptions with an owner center.</definition>
            <requirement>REQXXXX</requirement>
        </xs:documentation>
    </xs:annotation>
</xs:element>

```

### 3.2.3.5.2 activeSubscriptionStatusRequestMsg JSON Representation

```

{
  "type": "object",
  "properties": {
    " activeSubscriptionStatusRequestMsg ": {"$ref": "#/definitions/
ActiveSubscriptionStatusRequest "}
  }
}

```

### 3.2.3.7 activeSubscriptionStatusResponseMsg

#### 3.2.3.7.1 activeSubscriptionStatusResponseMsg XML Representation

```

<xs:element name=" activeSubscriptionStatusResponseMsg "
type="ActiveSubscriptionStatusResponse">
    <xs:annotation>
        <xs:documentation>
            <objectClass>ConnectionManagement</objectClass>
            <definition>The information content necessary to provide the status of
            subscriptions with an owner center.</definition>
            <requirement>REQXXXX</requirement>
        </xs:documentation>
    </xs:annotation>
</xs:element>

```

#### 3.2.3.7.1 activeSubscriptionStatusResponseMsg JSON Representation

```

{
  "type": "object",
  "properties": {
    "activeSubscriptionStatusResponseMsg": {"$ref":
"#/definitions/ActiveSubscriptionStatusResponse"}
  }
}

```

```
    }
  }
“
```

Add to Section 3.3.3 the following:

### “3.3.3.6 availableDialogsRequest

#### 3.3.3.6.1 availableDialogsRequest XML Representation

```
<xs:complexType name="AvailableDialogsRequest">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>The information content necessary to request an owner
        centers available dialogs.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="authentication" type="Authentication"/>
    <xs:element name="organization-requesting" type="OrganizationInformation"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

#### 3.3.3.6.2 availableDialogsRequest JSON Representation

```
"AvailableDialogsRequest": {
  "type": "object",
  "required": [
    "authentication",
    "organizationrequesting"
  ],
  "properties": {
    "authentication": {"$ref": "#/definitions/Authentication"},
    "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}
```



### 3.3.3.7 availableDialogsResponse

#### 3.3.3.7.1 availableDialogsResponse XML Representation

```

<xs:complexType name="AvailableDialogsResponse">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>The information content describing whether an owner center
is active.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="restrictions" type="Restrictions" minOccurs="0"/>
    <xs:element name="organization-information" type="OrganizationInformation"/>
    <xs:element name="center-id" type="Organization-resource-identifier"/>
    <xs:element name="center-name" type="Organization-resource-name"/>
    <xs:element name="dialog-list" type="Dialog-List">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="dialog" type="DialogInformation"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element ref="tmddExt:availableDialogsResponseExt"
minOccurs="1"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

```

#### 3.3.3.7.2 availableDialogsResponse JSON Representation

```

"AvailableDialogsResponse": {
  "type": "object",
  "required": [
    "organizationinformation",
    "centerid",
    "centername",
    "dialoglist",
    "availableDialogsResponseExt"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},

```

```

    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "centerid": {"type": "string"},
    "centername": {"type": "string"},
    "dialoglist": {"$ref": "#/definitions/AvailableDialogsResponse.dialoglist"},
    "availableDialogsResponseExt": {"$ref": "#/definitions/AvailableDialogsResponseExt"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

```

### 3.3.3.8 availableDialogsResponseExt

This data frame is defined in the TMDDvX.xsd schema.

#### 3.3.3.8.1 availableDialogsResponseExt XML Representation

```

<xs:element name="AvailableDialogsResponseExt"
type="AvailableDialogsResponseExt"/>
<xs:complexType name=" AvailableDialogsResponseExt ">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>Data frame extension containing additional information
content describing connection management available dialogs information.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="version-id" type="Version-identifier"/>
    <xs:element name="extension" type="TMDDExtension" minOccurs="1"/>
  </xs:sequence>
</xs:complexType>

```

#### 3.3.3.8.2 availableDialogsResponseExt JSON Representation

```

"AvailableDialogsResponseExt": {
  "type": "object",
  "required": [
    "versionid",
    "extension"
  ],
  "properties": {

```

```

    "versionid": {"type": "integer"},
    "extension": {"$ref": "#/definitions/TMDDExtension"}
  }
}

```

### 3.3.3.9 activeSubscriptionStatusRequest

#### 3.3.3.9.1 activeSubscriptionStatusRequest XML Representation

```

<xs:complexType name="ActiveSubscriptionStatusRequest">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>The information content necessary to request the status of
      subscriptions between centers.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="authentication" type="Authentication"/>
    <xs:element name="organization-requesting" type="OrganizationInformation"/>
    <xs:element name="failed-subscription-reporting-time-frame"
    type="FailedSubscriptionReportingTimeFrame"/>
    <xs:element name="subscription-status-filter" type="SubscriptionStatusFilter"
    minOccurs="0"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0"
    maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

```

#### 3.3.3.9.2 activeSubscriptionStatusRequest JSON Representation

```

"ActiveSubscriptionStatusRequest": {
  "type": "object",
  "required": [
    "authentication",
    "organizationrequesting",
    "failedsubscriptionreportingtimeframe"
  ],
  "properties": {
    "authentication": {"$ref": "#/definitions/Authentication"},
    "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
    "failedsubscriptionreportingtimeframe": {"$ref":
    "#/definitions/FailedSubscriptionReportingTimeFrame"},
    "subscriptionstatusfilter": {"$ref": "#/definitions/SubscriptionStatusFilter"},

```

```

    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

```

### 3.3.3.10 activeSubscriptionStatusResponse

#### 3.3.3.10.1 activeSubscriptionStatusResponse XML Representation

```

<xs:complexType name="ActiveSubscriptionStatusResponse">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>The information content describing the status of subscriptions
      between centers</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="restrictions" type="Restrictions" minOccurs="0"/>
    <xs:element name="organization-information" type="OrganizationInformation"/>
    <xs:element name="center-id" type="Organization-resource-identifier"/>
    <xs:element name="center-name" type="Organization-resource-name"/>
    <xs:element name="sending-dialog-status-list">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="dialog-status" type="DialogStatus"
            minOccurs="0"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="receiving-dialog-status-list">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="dialog-status" type="DialogStatus"
            minOccurs="0"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="failed-dialog-status-list">
      <xs:complexType>
        <xs:sequence>

```

```

                <xs:element name="dialog-status" type="DialogStatus"
                    minOccurs="0"/>
            </xs:sequence>
        </xs:complexType>
    </xs:element>
    <xs:element ref="tmddExt: activeSubscriptionStatusResponseExt"
minOccurs="1"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

```

### 3.3.3.10.2 activeSubscriptionStatusResponse JSON Representation

```

"ActiveSubscriptionStatusResponse": {
  "type": "object",
  "required": [
    "organizationinformation",
    "centerid",
    "centername",
    "sendingdialogstatuslist",
    "receivingdialogstatuslist",
    "faileddialogstatuslist",
    "activeSubscriptionStatusResponseExt"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "centerid": {"type": "string"},
    "centername": {"type": "string"},
    "sendingdialogstatuslist": {"$ref":
"#/definitions/ActiveSubscriptionStatusResponse.sendingdialogstatuslist"},
    "receivingdialogstatuslist": {"$ref":
"#/definitions/ActiveSubscriptionStatusResponse.receivingdialogstatuslist"},
    "faileddialogstatuslist": {"$ref":
"#/definitions/ActiveSubscriptionStatusResponse.faileddialogstatuslist"},
    "activeSubscriptionStatusResponseExt": {"$ref":
"#/definitions/ActiveSubscriptionStatusResponseExt"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

```

### 3.3.3.11 activeSubscriptionStatusResponseExt

#### 3.3.3.11.1 activeSubscriptionStatusResponseExt XML Representation

This data frame is defined in the TMDDvX.xsd schema.

```
<xs:element name="ActiveSubscriptionStatusResponseExt"
type="ActiveSubscriptionStatusResponseExt"/>
<xs:complexType name="ActiveSubscriptionStatusResponseExt">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>Data frame extension containing additional information
content describing the status of subscriptions between centers.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="version-id" type="Version-identifier"/>
    <xs:element name="extension" type="TMDDExtension" minOccurs="1"/>
  </xs:sequence>
</xs:complexType>
```

#### 3.3.3.11.2 activeSubscriptionStatusResponseExt JSON Representation

```
"ActiveSubscriptionStatusResponseExt": {
  "type": "object",
  "required": [
    "versionid",
    "extension"
  ],
  "properties": {
    "versionid": {"type": "integer"},
    "extension": {"$ref": "#/definitions/TMDDExtension"}
  }
}
```

### 3.3.3.12 dialogInformation

#### 3.3.3.12.1 dialogInformation XML Representation

```
<xs:complexType name="DialogInformation">
  <xs:annotation>
    <xs:documentation>
```

```

        <objectClass>ConnectionManagement</objectClass>
        <definition>The information content describing an owner center's available
        dialogs.</definition>
    </xs:documentation>
</xs:annotation>
<xs:element name="dialog-name" type="DialogName" minOccurs="1"/>
<xs:element name="supported-dialog-subscription-type-list" minOccurs="0">
    <xs:complexType>
        <xs:sequence maxOccurs="3">
            <xs:element name="supported-subscription-type"
type="SubscriptionTypeItem">
                </xs:sequence>
            </xs:complexType>
        </xs:element>
        <xs:element name="supported-data-types" minOccurs="0">
            <xs:complexType>
                <xs:sequence minOccurs="1">
                    <xs:element name="supported-data-type" type="DataType">
                        </xs:sequence>
                    </xs:complexType>
                </xs:element>
                <xs:element name="supported-dialog-behavior-list" minOccurs="0">
                    <xs:complexType>
                        <xs:sequence minOccurs="0">
                            <xs:element name="supported-dialog-behavior"
type="DialogBehavior"/>
                        </xs:sequence>
                    </xs:complexType>
                </xs:element>
                <xs:element name="min-message-time-interval" type="MinMessageTimeInterval"
minOccurs="0"/>
                <xs:element name="min-field-polling-interval" type="MinFieldPollingInterval"
minOccurs="0"/>
                <xs:element name="onchange-trigger-fields" type="OnChangeTriggerFields"
minOccurs="0"/>
                <xs:element name="maximum-devices" type="MaximumDevices" minOccurs="0"/>
            </complexType>
        </xs:element>
    </xs:complexType>
</xs:element>

```

### 3.3.3.12.2 dialogInformation JSON Representation

```

"DialogInformation": {
    "type": "object",
    "required": ["dialogname"],
    "properties": {

```

```

        "dialogname": {"$ref": "#/definitions/DialogName"},
        "supporteddialogsubscriptiontypelist": {"$ref":
"#/definitions/DialogInformation.supporteddialogsubscriptiontypelist"},
        "supporteddatatypes": {"$ref": "#/definitions/DialogInformation.supporteddatatypes"},
        "supporteddialogbehaviorlist": {"$ref":
"#/definitions/DialogInformation.supporteddialogbehaviorlist"},
        "minmessagetimeinterval": {"type": "integer"},
        "minfieldpollinginterval": {"type": "integer"},
        "onchangetriggerfields": {"type": "string"},
        "maximumdevices": {"type": "integer"}
    }
}

```

### 3.3.3.13 dialogStatus

#### 3.3.3.13.1 dialogStatus XML Representation

```

<xs:complexType name="DialogStatus">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>The information content describing the status of a centers
      subscription with another center.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:element name="subscription-request-dialog-name" type="DialogName"/>
  <xs:element name="data-update-dialog-name" type="DialogName"/>
  <xs:element name="data-type" type="DataType"/>
  <xs:element name="subscription-type" type="SubscriptionTypeItem"/>
  <xs:element name="subscription-parameter-list">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="subscription-parameter"
type="SubscriptionParameter"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="SubscriptionIdentifier" type="SubscriptionID"/>
  <xs:element name="SubscriptionName" type="SubscriptionName" minOccurs="0"/>
  <xs:element name="subscription-update-source-endpoint" type="SourceAddress"/>
  <xs:element name="subscription-return-address" type="ReturnAddress"/>
  <xs:element name="owner-center-subscription-request-endpoint"
type="SourceAddress"/>

```



```
<xs:element name="subscription-failure-details" type="SubscriptionFailureDetails"
minOccurs="0"/>
</xs:complexType>
```

### 3.3.3.13.2 dialogStatus JSON Representation

```
"DialogStatus": {
  "type": "object",
  "required": [
    "subscriptionrequestdialogname",
    "dataupdatedialogname",
    "datatype",
    "subscriptiontype",
    "subscriptionparameterlist",
    "SubscriptionIdentifier",
    "subscriptionupdatesourceendpoint",
    "subscriptionreturnaddress",
    "ownercentersubscriptionrequestendpoint"
  ],
  "properties": {
    "subscriptionrequestdialogname": {"$ref": "#/definitions/DialogName"},
    "dataupdatedialogname": {"$ref": "#/definitions/DialogName"},
    "datatype": {"$ref": "#/definitions/DataType"},
    "subscriptiontype": {"type": "string"},
    "subscriptionparameterlist": {"$ref":
"#/definitions/DialogStatus.subscriptionparameterlist"},
    "SubscriptionIdentifier": {"type": "string"},
    "SubscriptionName": {"type": "string"},
    "subscriptionupdatesourceendpoint": {"type": "string"},
    "subscriptionreturnaddress": {"type": "string"},
    "ownercentersubscriptionrequestendpoint": {"type": "string"},
    "subscriptionfailuredetails": {"$ref": "#/definitions/SubscriptionFailureDetails"}
  }
}
```

### 3.3.3.14 subscriptionFailureDetails

#### 3.3.3.14.1 subscriptionFailureDetails XML Representation

```
<xs:complexType name="SubscriptionFailureDetails">
  <xs:annotation>
    <xs:documentation>
```

```
        <definition>Details regarding the failure of a subscription data
        exchange</definition>
    </xs:documentation>
</xs:annotation>
<xs:sequence><
    <xs:element name="failureCode" type="Error-report-code"/>
    <xs:element name="failureDescription" type="InformationalText"/>
</xs:sequence><
</xs:complexType>
```

#### 3.3.3.14.2 subscriptionFailureDetails JSON Representation

```
"SubscriptionFailureDetails": {
  "type": "object",
  "required": [
    "failureCode",
    "failureDescription"
  ],
  "properties": {
    "failureCode": {"type": "string"},
    "failureDescription": {"type": "string"}
  }
}
```

#### 3.3.3.15 failedSubscriptionReportingTimeFrame

##### 3.3.3.15.1 failedSubscriptionReportingTimeFrame XML Representation

```
<xs:complexType name="FailedSubscriptionReportingTimeFrame">
  <xs:annotation>
    <xs:documentation>
      <definition>Time frame of requested subscription failure reporting
      period</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="start" type="DateTimeZone"/>
    <xs:element name="end" type="DateTimeZone"/>
  </xs:sequence>
</xs:complexType>
```

##### 3.3.3.15.2 failedSubscriptionReportingTimeFrame JSON Representation

```
"FailedSubscriptionReportingTimeFrame": {
  "type": "object",
  "required": [
    "start",
    "end"
  ],
  "properties": {
    "start": {"$ref": "#/definitions/DateTimeZone"},
    "end": {"$ref": "#/definitions/DateTimeZone"}
  }
}
```

### 3.3.3.16 subscriptionStatusFilter

#### 3.3.3.16.1 subscriptionStatusFilter XML Representation

```
<xs:complexType name="SubscriptionStatusFilter">
  <xs:annotation>
    <xs:documentation>
      <objectClass>Connection Management</objectClass>
      <definition>The information content describing filters that can be
applied to a subscription.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="sendingReceivingFlag" type="sendingReceivingFlag"
minOccurs="0"/>
    <xs:element name="subscriptionRequestDialogName" type="DialogName"
minOccurs="0"/>>
    <xs:element name="subscriptionIdentifier" type="SubscriptionID"
minOccurs="0"/>
    <xs:element name="data-type" type="DataType" minOccurs="0"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

#### 3.3.3.16.2 subscriptionStatusFilter JSON Representation

```
"SubscriptionStatusFilter": {
  "type": "object",
  "properties": {
    "sendingReceivingFlag": {"$ref": "#/definitions/SendingReceivingFlag"},
    "subscriptionRequestDialogName": {"$ref": "#/definitions/DialogName"},

```

```

    "subscriptionIdentifier": {"type": "string"},
    "datatype": {"$ref": "#/definitions/DataType"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

```

### 3.3.3.17 sendingReceivingFlag

#### 3.3.3.17.1 sendingReceivingFlag XML Representation

```

<xs:complexType name="SendingReceivingFlag">
  <xs:annotation>
    <xs:documentation>
      <definition>Flags indicating if center is sending or receiving
      subscription</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="isSending" type="Binary-flag"/>
    <xs:element name="isReceiving" type="Binary-flag"/>
  </xs:sequence><
</xs:complexType>

```

#### 3.3.3.17.2 sendingReceivingFlag JSON Representation

```

"SendingReceivingFlag": {
  "type": "object",
  "properties": {
    "isSending": {"type": "string"},
    "isReceiving": {"type": "string"}
  }
}

```

### 3.3.3.18 subscriptionParameter

#### 3.3.3.18.1 subscriptionParameter XML Representation

```

<xs:complexType name="SubscriptionParameter">
  <xs:annotation>
    <xs:documentation>

```

```

        <definition>A Subscription parameter name and value pair</definition>
    </xs:documentation>
</xs:annotation>
<xs:sequence>
    <xs:element name="parameterName" type="xs:string"/>
    <xs:element name="parameterValue" type="xs:string"/>
</xs:sequence>
</xs:complexType>”

```

### 3.3.3.18.2 subscriptionParameter JSON Representation

```

"SubscriptionParameter": {
  "type": "object",
  "required": [
    "parameterName",
    "parameterValue"
  ],
  "properties": {
    "parameterName": {"type": "string"},
    "parameterValue": {"type": "string"}
  }
}

```

Add the following to Section 3.4.3:

### “3.4.3.4 dialogName

#### 3.4.3.4.1 dialogName XML Representation

```

<xs:simpleType name="DialogName">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>The name of a dialog supported by a center.</definition>
      <valueDomainTerm>txt</valueDomainTerm>
      <units/>
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="ArchivedDataTrafficMonitoringMetadataRequest"/>
    <xs:enumeration value="ArchivedDataProcessingDocumentationMetadataRequest"/>
    <xs:enumeration value="CCTVInventoryRequest"/>
    <xs:enumeration value="CCTVStatusRequest"/>
  </xs:restriction>
</xs:simpleType>

```

```

<xs:enumeration value="CCTVControlRequest"/>
<xs:enumeration value="CenterActiveVerificationRequest"/>
<xs:enumeration value="CenterActiveVerificationSubscription"/>
<xs:enumeration value="AvailableDialogsRequest"/>
<xs:enumeration value="ActiveSubscriptionStatusRequest"/>
<xs:enumeration value="ActiveSubscriptionStatusSubscription"/>
<xs:enumeration value="DetectorInventoryRequest"/>
<xs:enumeration value="DetectorStatusRequest"/>
<xs:enumeration value="DetectorDataRequest"/>
<xs:enumeration value="DetectorDataSubscription"/>
<xs:enumeration value="DetectorMaintenanceHistoryRequest"/>
<xs:enumeration value="DeviceCancelControlRequest"/>
<xs:enumeration value="DeviceControlStatusRequest"/>
<xs:enumeration value="DeviceInformationSubscription"/>
<xs:enumeration value="DMSInventoryRequest"/>
<xs:enumeration value="DMSStatusRequest"/>
<xs:enumeration value="DMSMessageInventoryRequest"/>
<xs:enumeration value="DMSMessageInventorySubscription"/>
<xs:enumeration value="DMSMessageAppearanceRequest"/>
<xs:enumeration value="DMSFontTableRequest"/>
<xs:enumeration value="DMSControlRequest"/>
<xs:enumeration value="DMSPriorityQueueRequest"/>
<xs:enumeration value="ESSInventoryRequest"/>
<xs:enumeration value="ESSStatusRequest"/>
<xs:enumeration value="ESSObservationMetadataRequest"/>
<xs:enumeration value="ESSObservationReportRequest"/>
<xs:enumeration value="FullEventUpdateRequest"/>
<xs:enumeration value="EventIndexRequest"/>
<xs:enumeration value="ActionLogRequest"/>
<xs:enumeration value="FullEventUpdateSubscription"/>
<xs:enumeration value="EventIndexSubscription"/>
<xs:enumeration value="ActionLogSubscription"/>
<xs:enumeration value="GateInventoryRequest"/>
<xs:enumeration value="GateStatusRequest"/>
<xs:enumeration value="GateControlRequest"/>
<xs:enumeration value="GateControlScheduleRequest"/>
<xs:enumeration value="HARInventoryRequest"/>
<xs:enumeration value="HARMessageInventoryRequest"/>
<xs:enumeration value="HARStatusRequest"/>
<xs:enumeration value="HARControlRequest"/>
<xs:enumeration value="HARControlScheduleRequest"/>
<xs:enumeration value="HARPriorityQueueRequest"/>
<xs:enumeration value="IntersectionSignalInventoryRequest"/>
<xs:enumeration value="IntersectionSignalStatusRequest"/>

```

```

<xs:enumeration value="IntersectionSignalTimingPatternInventoryRequest"/>
<xs:enumeration value="IntersectionSignalTimingPatternInventorySubscription"/>
<xs:enumeration value="IntersectionSignalControlRequest"/>
<xs:enumeration value="IntersectionSignalControlScheduleRequest"/>
<xs:enumeration value="IntersectionSignalPriorityQueueRequest"/>
<xs:enumeration value="LCSInventoryRequest"/>
<xs:enumeration value="LCSStatusRequest"/>
<xs:enumeration value="LCSControlRequest"/>
<xs:enumeration value="LCSControlScheduleRequest"/>
<xs:enumeration value="LinkInventoryRequest"/>
<xs:enumeration value="LinkStatusRequest"/>
<xs:enumeration value="NodeInventoryRequest"/>
<xs:enumeration value="NodeStatusRequest"/>
<xs:enumeration value="OrganizationInformationRequest"/>
<xs:enumeration value="OrganizationInformationSubscription"/>
<xs:enumeration value="RampMeterInventoryRequest"/>
<xs:enumeration value="RampMeterStatusRequest"/>
<xs:enumeration value="RampMeterControlRequest"/>
<xs:enumeration value="RampMeterControlScheduleRequest"/>
<xs:enumeration value="RampMeterPriorityQueueRequest"/>
<xs:enumeration value="RampMeterPlanInventoryRequest"/>
<xs:enumeration value="RampMeterPlanInventorySubscription"/>
<xs:enumeration value="ResponsePlanApprovalRequest"/>
<xs:enumeration value="ResponsePlanApprovalSubscription"/>
<xs:enumeration value="ResponsePlanLogRequest"/>
<xs:enumeration value="ResponsePlanLogSubscription"/>
<xs:enumeration value="ResponsePlanStatusRequest"/>
<xs:enumeration value="ResponsePlanStatusSubscription"/>
<xs:enumeration value="ResponsePlanRequest"/>
<xs:enumeration value="RspnsePlanSubscription"/>
<xs:enumeration value="ResponsePlanTerminationRequest"/>
<xs:enumeration value="RouteInventoryRequest"/>
<xs:enumeration value="RouteStatusRequest"/>
<xs:enumeration value="SectionStatusRequest"/>
<xs:enumeration value="SectionControlRequest"/>
<xs:enumeration value="SectionControlScheduleRequest"/>
<xs:enumeration value="SectionControlStatusRequest"/>
<xs:enumeration value="SectionPriorityQueueRequest"/>
<xs:enumeration value="SectionSignalTimingPatternInventoryRequest"/>
<xs:enumeration value="SectionSignalTimingPatternInventorySubscription"/>
<xs:enumeration value="TrafficNetworkInformationSubscription"/>
<xs:enumeration value="VideoSwitchInventoryRequest"/>
<xs:enumeration value="VideoSwitchStatusRequest"/>
<xs:enumeration value="VideoSwitchControlRequest"/>

```

```

<xs:enumeration value="CCTVInventoryUpdate"/>
<xs:enumeration value="CCTVStatusUpdate"/>
<xs:enumeration value="CenterActiveVerificationUpdate"/>
<xs:enumeration value="ActiveSubscriptionStatusUpdate"/>
<xs:enumeration value="DetectorInventoryUpdate"/>
<xs:enumeration value="DetectorStatusUpdate"/>
<xs:enumeration value="DetectorDataUpdate"/>
<xs:enumeration value="DMSInventoryUpdate"/>
<xs:enumeration value="DMSMessageInventoryUpdate"/>
<xs:enumeration value="DMSStatusUpdate"/>
<xs:enumeration value="ESSInventoryUpdate"/>
<xs:enumeration value="ESSStatusUpdate"/>
<xs:enumeration value="ESSObservationReportUpdate"/>
<xs:enumeration value="FullEventUpdateUpdate"/>
<xs:enumeration value="EventIndexUpdate"/>
<xs:enumeration value="ActionLogUpdate"/>
<xs:enumeration value="GateInventoryUpdate"/>
<xs:enumeration value="GateStatusUpdate"/>
<xs:enumeration value="GateControlScheduleUpdate"/>
<xs:enumeration value="HARInventoryUpdate"/>
<xs:enumeration value="HARMessageInventoryUpdate"/>
<xs:enumeration value="HARStatusUpdate"/>
<xs:enumeration value="HARControlScheduleUpdate"/>
<xs:enumeration value="IntersectionSignalInventoryUpdate"/>
<xs:enumeration value="IntersectionSignalTimingPatternInventoryUpdate"/>
<xs:enumeration value="IntersectionSignalStatusUpdate"/>
<xs:enumeration value="IntersectionSignalControlScheduleUpdate"/>
<xs:enumeration value="LCSInventoryUpdate"/>
<xs:enumeration value="LCSStatusUpdate"/>
<xs:enumeration value="LCSControlScheduleUpdate"/>
<xs:enumeration value="OrganizationInformationUpdate"/>
<xs:enumeration value="RampMeterInventoryUpdate"/>
<xs:enumeration value="RampMeterStatusUpdate"/>
<xs:enumeration value="RampMeterControlScheduleUpdate"/>
<xs:enumeration value="RampMeterPlanInventoryUpdate"/>
<xs:enumeration value="ResponsePlanApprovalUpdate"/>
<xs:enumeration value="ResponsePlanLogUpdate"/>
<xs:enumeration value="ResponsePlanStatusUpdate"/>
<xs:enumeration value="ResponsePlanUpdate"/>
<xs:enumeration value="SectionStatusUpdate"/>
<xs:enumeration value="SectionControlScheduleUpdate"/>
<xs:enumeration value="SectionSignalTimingPatternInventoryUpdate"/>
<xs:enumeration value="LinkInventoryUpdate"/>
<xs:enumeration value="LinkStatusUpdate"/>

```



```

    <xs:enumeration value="NodeInventoryUpdate"/>
    <xs:enumeration value="NodeStatusUpdate"/>
    <xs:enumeration value="RouteInventoryUpdate"/>
    <xs:enumeration value="RouteStatusUpdate"/>
    <xs:enumeration value="VideoSwitchInventoryUpdate"/>
    <xs:enumeration value="VideoSwitchStatusUpdate"/>
  </xs:restriction>
</xs:simpleType>

```

#### 3.4.3.4.2 dialogName JSON Representation

```

"DialogName": {
  "allOf": [
    {"type": "string"},
    {
      "enum": [
        "ArchivedDataTrafficMonitoringMetadataRequest",
        "ArchivedDataProcessingDocumentationMetadataRequest",
        "CCTVInventoryRequest",
        "CCTVStatusRequest",
        "CCTVControlRequest",
        "CenterActiveVerificationRequest",
        "CenterActiveVerificationSubscription",
        "AvailableDialogsRequest",
        "ActiveSubscriptionStatusRequest",
        "ActiveSubscriptionStatusSubscription",
        "DetectorInventoryRequest",
        "DetectorStatusRequest",
        "DetectorDataRequest",
        "DetectorDataSubscription",
        "DetectorMaintenanceHistoryRequest",
        "DeviceCancelControlRequest",
        "DeviceControlStatusRequest",
        "DeviceInformationSubscription",
        "DMSInventoryRequest",
        "DMSStatusRequest",
        "DMSMessageInventoryRequest",
        "DMSMessageInventorySubscription",
        "DMSMessageAppearanceRequest",
        "DMSFontTableRequest",
        "DMSControlRequest",
        "DMSPriorityQueueRequest",
        "ESSInventoryRequest",
        "ESSStatusRequest",

```

## TMDD Standards Update Recommendations – Data Structures

"ESSObservationMetadataRequest",  
"ESSObservationReportRequest",  
"FullEventUpdateRequest",  
"EventIndexRequest",  
"ActionLogRequest",  
"FullEventUpdateSubscription",  
"EventIndexSubscription",  
"ActionLogSubscription",  
"GateInventoryRequest",  
"GateStatusRequest",  
"GateControlRequest",  
"GateControlScheduleRequest",  
"HARInventoryRequest",  
"HARMessageInventoryRequest",  
"HARStatusRequest",  
"HARControlRequest",  
"HARControlScheduleRequest",  
"HARPriorityQueueRequest",  
"IntersectionSignalInventoryRequest",  
"IntersectionSignalStatusRequest",  
"IntersectionSignalTimingPatternInventoryRequest",  
"IntersectionSignalTimingPatternInventorySubscription",  
"IntersectionSignalControlRequest",  
"IntersectionSignalControlScheduleRequest",  
"IntersectionSignalPriorityQueueRequest",  
"LCSInventoryRequest",  
"LCSStatusRequest",  
"LCSControlRequest",  
"LCSControlScheduleRequest",  
"LinkInventoryRequest",  
"LinkStatusRequest",  
"NodeInventoryRequest",  
"NodeStatusRequest",  
"OrganizationInformationRequest",  
"OrganizationInformationSubscription",  
"RampMeterInventoryRequest",  
"RampMeterStatusRequest",  
"RampMeterControlRequest",  
"RampMeterControlScheduleRequest",  
"RampMeterPriorityQueueRequest",  
"RampMeterPlanInventoryRequest",  
"RampMeterPlanInventorySubscription",  
"ResponsePlanApprovalRequest",  
"ResponsePlanApprovalSubscription",

"ResponsePlanLogRequest",  
"ResponsePlanLogSubscription",  
"ResponsePlanStatusRequest",  
"ResponsePlanStatusSubscription",  
"ResponsePlanRequest",  
"ResponsePlanSubscription",  
"ResponsePlanTerminationRequest",  
"RouteInventoryRequest",  
"RouteStatusRequest",  
"SectionStatusRequest",  
"SectionControlRequest",  
"SectionControlScheduleRequest",  
"SectionControlStatusRequest",  
"SectionPriorityQueueRequest",  
"SectionSignalTimingPatternInventoryRequest",  
"SectionSignalTimingPatternInventorySubscription",  
"TrafficNetworkInformationSubscription",  
"VideoSwitchInventoryRequest",  
"VideoSwitchStatusRequest",  
"VideoSwitchControlRequest",  
"CCTVInventoryUpdate",  
"CCTVStatusUpdate",  
"CenterActiveVerificationUpdate",  
"ActiveSubscriptionStatusUpdate",  
"DetectorInventoryUpdate",  
"DetectorStatusUpdate",  
"DetectorDataUpdate",  
"DMSInventoryUpdate",  
"DMSMessageInventoryUpdate",  
"DMSStatusUpdate",  
"ESSInventoryUpdate",  
"ESSStatusUpdate",  
"ESSObservationReportUpdate",  
"FullEventUpdateUpdate",  
"EventIndexUpdate",  
"ActionLogUpdate",  
"GateInventoryUpdate",  
"GateStatusUpdate",  
"GateControlScheduleUpdate",  
"HARInventoryUpdate",  
"HARMessageInventoryUpdate",  
"HARStatusUpdate",  
"HARControlScheduleUpdate",  
"IntersectionSignalInventoryUpdate",

```
        "IntersectionSignalTimingPatternInventoryUpdate",
        "IntersectionSignalStatusUpdate",
        "IntersectionSignalControlScheduleUpdate",
        "LCSInventoryUpdate",
        "LCSStatusUpdate",
        "LCSControlScheduleUpdate",
        "OrganizationInformationUpdate",
        "RampMeterInventoryUpdate",
        "RampMeterStatusUpdate",
        "RampMeterControlScheduleUpdate",
        "RampMeterPlanInventoryUpdate",
        "ResponsePlanApprovalUpdate",
        "ResponsePlanLogUpdate",
        "ResponsePlanStatusUpdate",
        "ResponsePlanUpdate",
        "SectionStatusUpdate",
        "SectionControlScheduleUpdate",
        "SectionSignalTimingPatternInventoryUpdate",
        "LinkInventoryUpdate",
        "LinkStatusUpdate",
        "NodeInventoryUpdate",
        "NodeStatusUpdate",
        "RouteInventoryUpdate",
        "RouteStatusUpdate",
        "VideoSwitchInventoryUpdate",
        "VideoSwitchStatusUpdate"
    ]
}
]
```

### 3.4.3.5 dataType

#### 3.4.3.5.1 dataType XML Representation

```
<xs:simpleType name="DataType">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>The type of a data being exchanged.</definition>
      <valueDomainTerm>txt</valueDomainTerm>
      <units/>
    </xs:documentation>
  </xs:annotation>
</xs:simpleType>
```

```

<xs:restriction base="xs:string">
  <xs:enumeration value="CCTVInventory"/>
  <xs:enumeration value="CCTVStatus"/>
  <xs:enumeration value="CenterActiveVerification"/>
  <xs:enumeration value="Dialog"/>
  <xs:enumeration value="DialogStatus"/>
  <xs:enumeration value="DetectorInventory"/>
  <xs:enumeration value="DetectorStatus"/>
  <xs:enumeration value="DetectorData"/>
  <xs:enumeration value="DMSInventory"/>
  <xs:enumeration value="DMSMessageInventory"/>
  <xs:enumeration value="DMSStatus"/>
  <xs:enumeration value="ESSInventory"/>
  <xs:enumeration value="ESSStatus"/>
  <xs:enumeration value="ESSObservationReport"/>
  <xs:enumeration value="FullEventUpdate"/>
  <xs:enumeration value="EventIndex"/>
  <xs:enumeration value="ActionLog"/>
  <xs:enumeration value="GateInventory"/>
  <xs:enumeration value="GateStatus"/>
  <xs:enumeration value="GateControlSchedule"/>
  <xs:enumeration value="HARInventory"/>
  <xs:enumeration value="HARMessageInventory"/>
  <xs:enumeration value="HARStatus"/>
  <xs:enumeration value="HARControlSchedule"/>
  <xs:enumeration value="IntersectionSignalInventory"/>
  <xs:enumeration value="IntersectionSignalTiminPatternInventory"/>
  <xs:enumeration value="IntersectionSignalStatus"/>
  <xs:enumeration value="IntersectionSignalControlSchedule"/>
  <xs:enumeration value="LCSInventory"/>
  <xs:enumeration value="LCSStatus"/>
  <xs:enumeration value="LCSControlSchedule"/>
  <xs:enumeration value="OrganizationInformation"/>
  <xs:enumeration value="RampMeterInventory"/>
  <xs:enumeration value="RampMeterStatus"/>
  <xs:enumeration value="RampMeterControlSchedule"/>
  <xs:enumeration value="RampMeterPlanInventory"/>
  <xs:enumeration value="ResponsePlanApproval"/>
  <xs:enumeration value="ResponsePlanLog"/>
  <xs:enumeration value="ResponsePlanStatus"/>
  <xs:enumeration value="ResponsePlan"/>
  <xs:enumeration value="SectionStatus"/>
  <xs:enumeration value="SectionControlSchedule"/>
  <xs:enumeration value="SectionSignalTimingPatternInventory"/>

```

```

        <xs:enumeration value="LinkInventory"/>
        <xs:enumeration value="LinkStatus"/>
        <xs:enumeration value="NodeInventory"/>
        <xs:enumeration value="NodeStatus"/>
        <xs:enumeration value="RouteInventory"/>
        <xs:enumeration value="RouteStatus"/>
        <xs:enumeration value="VideoSwitchInventory"/>
        <xs:enumeration value="VideoSwitchStatus"/>
    </xs:restriction>
</xs:simpleType>

```

#### 3.4.3.5.2 dataType JSON Representation

```

"DataType": {
  "allOf": [
    {"type": "string"},
    {
      "enum": [
        "CCTVInventory",
        "CCTVStatus",
        "CenterActiveVerification",
        "Dialog",
        "DialogStatus",
        "DetectorInventory",
        "DetectorStatus",
        "DetectorData",
        "DMSInventory",
        "DMSMessageInventory",
        "DMSStatus",
        "ESSInventory",
        "ESSStatus",
        "ESSObservationReport",
        "FullEventUpdate",
        "EventIndex",
        "ActionLog",
        "GateInventory",
        "GateStatus",
        "GateControlSchedule",
        "HARInventory",
        "HARMessageInventory",
        "HARStatus",
        "HARControlSchedule",
        "IntersectionSignalInventory",
        "IntersectionSignalTiminPatternInventory",

```

```

        "IntersectionSignalStatus",
        "IntersectionSignalControlSchedule",
        "LCSInventory",
        "LCSStatus",
        "LCSControlSchedule",
        "OrganizationInformation",
        "RampMeterInventory",
        "RampMeterStatus",
        "RampMeterControlSchedule",
        "RampMeterPlanInventory",
        "ResponsePlanApproval",
        "ResponsePlanLog",
        "ResponsePlanStatus",
        "ResponsePlan",
        "SectionStatus",
        "SectionControlSchedule",
        "SectionSignalTimingPatternInventory",
        "LinkInventory",
        "LinkStatus",
        "NodeInventory",
        "NodeStatus",
        "RouteInventory",
        "RouteStatus",
        "VideoSwitchInventory",
        "VideoSwitchStatus"
    ]
}
]
}

```

### 3.4.3.6 dialogBehavior

#### 3.4.3.6.1 dialogBehavior XML Representation

```

<xs:simpleType name="DialogBehavior">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>A description of the behavior attributes of a TMDD
      dialog.</definition>
      <valueDomainTerm>txt</valueDomainTerm>
      <units/>
    </xs:documentation>
  </xs:annotation>

```

```

    <xs:restriction base="xs:string">
      <xs:enumeration value="full inventory supported"/>
      <xs:enumeration value="incremental inventory supported"/>
      <xs:enumeration value="complete dataset on first message"/>
      <xs:enumeration value="periodic subscription update message provided only
when change present"/>
    </xs:restriction>
  </xs:simpleType>

```

#### 3.4.3.6.2 dialogBehavior JSON Representation

```

"DialogBehavior": {
  "allOf": [
    {"type": "string"},
    {
      "enum": [
        "full inventory supported",
        "incremental inventory supported",
        "complete dataset on first message",
        "periodic subscription update message provided only when change present"
      ]
    }
  ]
}

```

#### 3.4.3.7 minMessageTimeInterval

##### 3.4.3.7.1 minMessageTimeInterval XML Representation

```

<xs:simpleType name="MinMessageTimeInterval">
  <xs:annotation>
    <xs:documentation>
      <objectClass>ConnectionManagement</objectClass>
      <definition>The minimum available time between messages used for the
dialog. Often based on the owner systems capability to trigger lookup for and
identify updates.</definition>
      <valueDomainTerm>qty</valueDomainTerm>
      <units>milliseconds</units>
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:unsignedInt">
    <xs:minInclusive value="1"/>
    <xs:maxInclusive value="86400000"/>
  </xs:restriction>

```



```
</xs:simpleType>
```

### 3.4.3.8 minFieldPollingInterval

#### 3.4.3.8.1 minFieldPollingInterval XML Representation

```
<xs:simpleType name="MinFieldPollingInterval">  
  <xs:annotation>  
    <xs:documentation>  
      <objectClass>ConnectionManagement</objectClass>  
      <definition>The minimum available time between field device polling  
events.</definition>  
      <valueDomainTerm>qty</valueDomainTerm>  
      <units>milliseconds</units>  
    </xs:documentation>  
  </xs:annotation>  
  <xs:restriction base="xs:unsignedInt">  
    <xs:minInclusive value="1"/>  
    <xs:maxInclusive value="86400000"/>  
  </xs:restriction>  
</xs:simpleType>
```

### 3.4.3.9 onChangeTriggerFields

#### 3.4.3.9.1 onChangeTriggerFields XML Representation

```
<xs:simpleType name="OnChangeTriggerFields">  
  <xs:annotation>  
    <xs:documentation>  
      <objectClass>ConnectionManagement</objectClass>  
      <definition>The fields whos values, when changed, trigger an update  
message in an onChange subscription.</definition>  
      <valueDomainTerm>txt</valueDomainTerm>  
      <units/>  
    </xs:documentation>  
  </xs:annotation>  
  <xs:restriction base="xs:string"/>  
</xs:simpleType>
```

### 3.4.3.10 maximumDevices

#### 3.4.3.10.1 maximumDevices XML Representation

```
<xs:simpleType name="MaximumDevices">
```

```

<xs:annotation>
  <xs:documentation>
    <objectClass>ConnectionManagement</objectClass>
    <definition>The maximum number of devices allowed within a
message.</definition>
    <valueDomainTerm>qty</valueDomainTerm>
    <units/>
  </xs:documentation>
</xs:annotation>
<xs:restriction base="xs:unsignedInt"/>
</xs:simpleType>

```

### 3.4.3.11 sourceAddress

#### 3.4.3.11 sourceAddress XML Representation

```

<xs:simpleType name="SourceAddress">
  <xs:annotation>
    <xs:documentation>
      <definition>A URL indicating the URL of the source of a message. Any set of
ASCII characters up to 128.</definition>
      <valueDomainTerm>txt</valueDomainTerm>
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="128"/>
  </xs:restriction>
</xs:simpleType>

```

## 4.4. ENUMERATIONS

The TMDD standard currently suffers from lists of enumerations throughout the standard that are often duplicative, non-specific, or that cannot describe sufficiently the possible alternatives required for the field being enumerated. A few examples include:

### 4.4.1. EVENT-EFFECTIVE-PERIOD-QUALIFIER

Event-effective-period-qualifier provides the following alternatives:

```

<xs:restriction base="xs:string">
  <xs:enumeration value="not specified"/>
  <xs:enumeration value="morning"/>

```

```
<xs:enumeration value="afternoon"/>
<xs:enumeration value="evening"/>
<xs:enumeration value="night"/>
<xs:enumeration value="day time"/>
<xs:enumeration value="off peak periods"/>
<xs:enumeration value="at peak periods"/>
<xs:enumeration value="until further notice"/>
<xs:enumeration value="morning peak"/>
<xs:enumeration value="afternoon peak"/>
<xs:enumeration value="middayperiods"/>
</xs:restriction>
```

While a human operator will certainly be able to distinguish the difference between each of these, systems developers for ITS systems must account for each possibility and determine the various systems options for each alternative. Consider the following – an event at 3:00 pm. Any of the following enumerations could be used to describe the event, depending upon the location of the event:

- afternoon
- off peak periods
- at peak periods
- afternoon peak
- midday periods

How is the correct value assigned and how should an ITS system interpret the value and make a decision regarding any actions to be taken? The enumerations are not determinant, making the use of the field difficult to use or at worst meaningless for any ITS system to take any automated action.

The enumeration list should be reviewed for simplification, and perhaps separated into multiple fields with increasing levels of detail at lower levels within field relationships. Additionally, implementation guidance to provide specific definitions of the terms would ensure consistent implementation of terms such as morning, afternoon, evening, and night.

#### 4.4.2. EVENT-INCIDENT-STATUS

Event-incident-status provides the following alternatives:

```
<xs:restriction base="xs:string">
  <xs:enumeration value="planned"/>
  <xs:enumeration value="forecast"/>
  <xs:enumeration value="contingency plan"/>
  <xs:enumeration value="response plan activated"/>
```

```

<xs:enumeration value="reported"/>
<xs:enumeration value="confirmed"/>
<xs:enumeration value="responding"/>
<xs:enumeration value="current"/>
<xs:enumeration value="updated"/>
<xs:enumeration value="clearing"/>
<xs:enumeration value="ended"/>
<xs:enumeration value="delete"/>
<xs:enumeration value="cancelled"/>
<xs:enumeration value="postponed"/>
<xs:enumeration value="reopened"/>
<xs:enumeration value="new"/>
<xs:enumeration value="other"/>
</xs:restriction>

```

An event could potentially be in more than one of the listed status values. For instance, it could be a contingency plan with a response plan activated being updated with a termination plan to end the event response. In this case, which enumeration best captures the state? In this case, review of the enumerations, selecting clear, unambiguous, and deterministic alternatives that are specific to the event only, and not secondary items such as a response plan (better addressed in a response plan message set) would be beneficial to those implementing and utilizing ITS systems based on TMDD.

#### 4.4.3. ORGANIZATION-INFORMATION-FORWARDING-RESTRICTIONS:

The options for organization-information-forwarding-restrictions include:

```

<xs:restriction base="xs:string">
  <xs:enumeration value="unrestricted"/>
  <xs:enumeration value="recipient organization only"/>
  <xs:enumeration value="law enforcement only"/>
  <xs:enumeration value="not to public"/>
  <xs:enumeration value="other"/>
</xs:restriction>

```

For Connected Corridors, the information was shared across multiple organizations, and the ICM system was owned by Caltrans, but use was shared by the state, LA County, and several cities. In this case the message was sent by Caltrans from its ATMS to the ICM system. Technically, the recipient organization was the same as the sending organization. Other than “unrestricted”, none of the options would describe any option to share the event information with those using the ICM system. In addition, none of those options other than “unrestricted” would allow the ICM system to share the information with other agencies such as transit agencies, 511, or others. In this case, the options are insufficient to describe the distribution allowed by the sender unless the sender is willing to share the information publicly.

A better option would be to provide a list of specific privileges to specific agencies, with “public” an option within the list of agencies. Additionally, allowing within the structure to capture the owning organization of the information would allow subsequent receivers of the information to understand not only restrictions to distribution, but ownership of the data to ensure proper data custody and, if needed, to properly negotiate or request specific distribution rights to other parties.

### 4.4.4. ENUMERATIONS RECOMMENDATIONS

This report does not attempt to update or change the lists of enumerations, as this is best considered by a wider audience, including TMC personnel, consumers and analysts of the information being described, ITS systems architects and designers, and vendors of ITS solutions. However, review of each enumeration list within the standard is recommended to address the issues identified in this report.

## 4.5. IMPLEMENTATION GUIDANCE

TMDD provides limited implementation guidance, primarily in the following areas:

- Defining project use cases and requirements and mapping them to the TMDD communication standard to select appropriate TMDD exchange methods
- General usage of dialogs, messages, data frames and data elements.
- Patterns of usage of request/response and subscription data exchange methods
- Handling of NULL values
- Making standard compliant project specific modifications via extensions and changes to enumerations

In general, this guidance is provided at higher levels of dialog selection and usage and project high level implementation requirements, with little or no guidance at the level of detail required to ensure consistent implementation of the standard.

One of the recommendations of this project is to increase guidance regarding more detailed levels of implementation, specifically at the level of messages, data frames and individual data elements. Implementing such a recommendation makes the standard more universal and more likely to result in vendor products that have significantly improved interoperability, resulting in lower system integration costs, reduced project expenses, and improved on-time schedule performance in ITS systems programs.

This additional implementation guidance would significantly improve the ability to integrate products directly off the shelf and open opportunities for more integration and cooperation

between federal, state, regional, and local operators of ITS systems. Topics of implementation guidance that are likely to provide significant benefits to vendors and operators include:

- Data Semantics including
  - Detailed field definitions
  - Detailed enumeration definitions
  - Common and accepted usage and practice
- Temporal standards

We will use the FullEventUpdateMsg to illustrate each of these suggested additions for implementation guidance and provide examples of how they might be applied. Consider the example of describing an event within the FullEventUpdate message as shown in Figure 2. This message contains a fictional event used as a test message in the Connected Corridors project. While it seems straightforward, there are a number of opportunities within the fields of this message for differences in definition and implementation between vendors and projects. We will examine several of these opportunities for ambiguity and “off-the-shelf” compatibility between TMDD implementations.

# TMDD Standards Update Recommendations – Data Structures

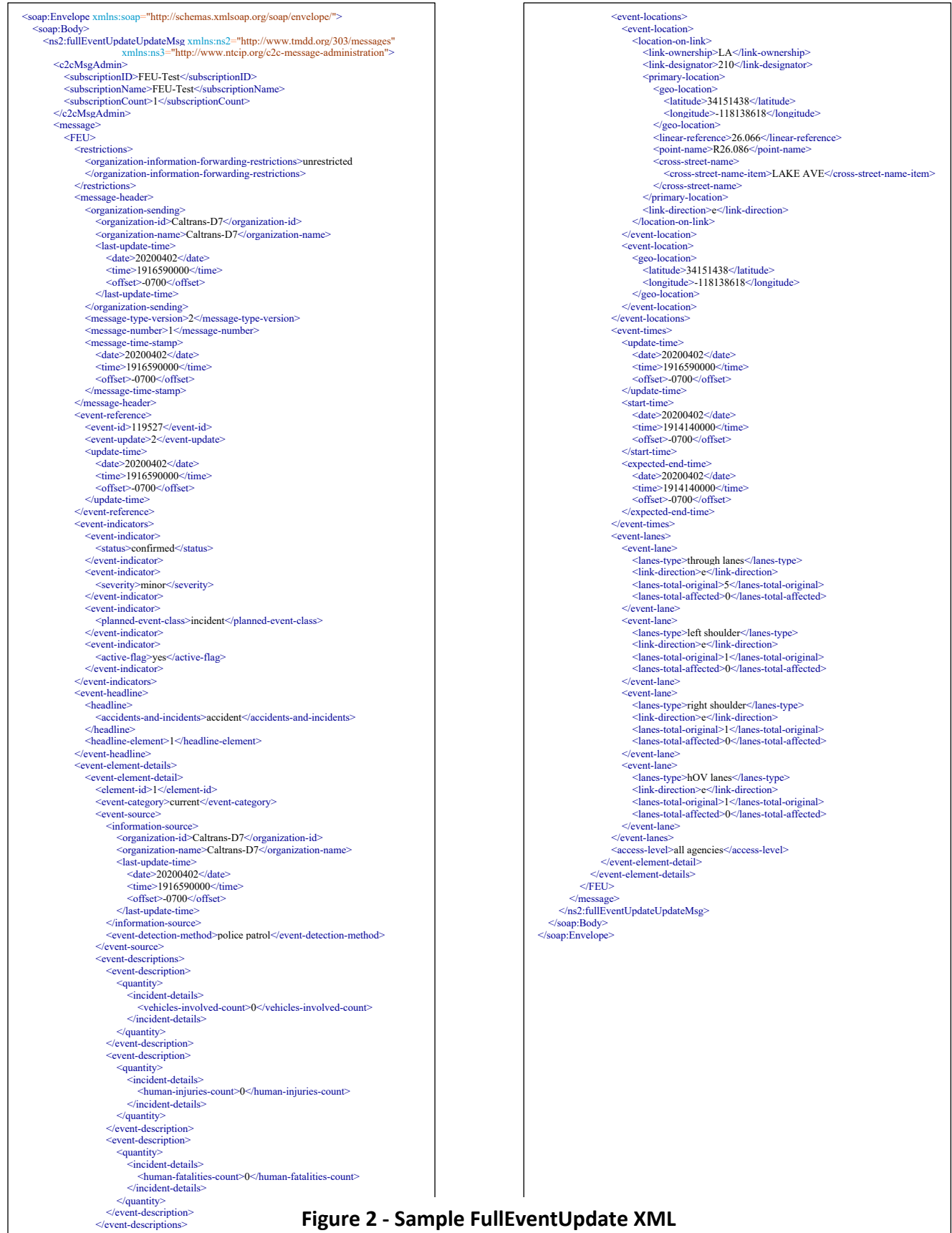


Figure 2 - Sample FullEventUpdate XML

#### 4.5.1. SEMANTICS

Key to any universally accepted and usable data exchange standard is the semantics of the data involved and ensuring that universally accepted definitions for data elements in addition to data content and structure are present. Data element enumeration and structure are insufficient to ensure successful data exchange. Such data semantics definition must include:

- Clear and unambiguous data definitions or universal agreement on common definitions for every data element
- Clear and unambiguous data definitions or universal agreement on common definitions for every possible enumeration
- In limited cases, a description of common and accepted usage and practice

We will provide one or more examples of each of these data semantics elements.

##### 4.5.1.1. Field Definitions

Field definitions often seem self-explanatory. Experience in the field implementing solutions between different jurisdictions and different vendors often provides ample evidence that this is not always the case.

Reviewing the event times within the sample message:

```
<event-times>
  <update-time>
    <date>20200402</date>
    <time>1916590000</time>
    <offset>-0700</offset>
  </update-time>
  <start-time>
    <date>20200402</date>
    <time>1914140000</time>
    <offset>-0700</offset>
  </start-time>
  <expected-end-time>
    <date>20200402</date>
    <time>1914140000</time>
    <offset>-0700</offset>
  </expected-end-time>
</event-times>
```

The following is the specification provided schema for event-times:

```
<xs:complexType name="EventTimes">
```



```

<xs:annotation>
  <xs:documentation>
    <objectClass>Event</objectClass>
  <definition>The information content describing a schedule of start and end times
associated with an event.</definition>
  </xs:documentation>
</xs:annotation>
<xs:sequence>
  <xs:element name="update-time" type="DateTimeZone"/>
  <xs:element name="valid-period" type="ValidPeriod" minOccurs="0"/>
  <xs:element name="schedule-element-ids" minOccurs="0">
    <xs:complexType>
      <xs:sequence maxOccurs="20">
        <xs:element name="event-schedule-element-identifier"
type="Event-schedule-element-identifier"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="sequence-time" type="DateTimeZone" minOccurs="0"/>
  <xs:element name="start-time" type="DateTimeZone" minOccurs="0"/>
  <xs:element name="alternate-start-time" type="DateTimeZone" minOccurs="0"/>
  <xs:element name="alternate-end-time" type="DateTimeZone" minOccurs="0"/>
  <xs:element name="expected-start-time" type="DateTimeZone" minOccurs="0"/>
  <xs:element name="expected-end-time" type="DateTimeZone" minOccurs="0"/>
  <xs:element name="recurrent-times" minOccurs="0">
    <xs:complexType>
      <xs:sequence maxOccurs="64">
        <xs:element name="recurrent-time"
type="RecurrentTime"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="planned-event-continuous-flag" type="Binary-flag"
minOccurs="0"/>
  <xs:element ref="tmddExt:eventTimesExt" minOccurs="1"/>
  <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>

```

No additional definition of each of the fields within the schema are provided. In the example of start time, experience has shown that the time reported in the field could vary significantly from what was required for its intended use. In the case of the Connected Corridors program, determining potential queue growth based on the elapsed time since the incident start time was

one intended use of the event start time. While this was due to different operators within the TMC recording different times based on their understanding, without a definition within the standard, systems designers are unlikely to have the same understanding of the definition of many fields, which drives how systems are designed to validate user input. It is recommended that with each dataframe definition, which provides the context for each individual field, a definition be provided for each field represented within that dataframe following the XSD and other format schemas. An example for eventTimes is provided:

Note: eventTimes is a likely candidate for simplification.

### “3.3.8.27 eventTimes

#### 3.3.8.27.1 eventTimes XML Representation

```
<xs:complexType name="EventTimes">
  <xs:annotation>
    <xs:documentation>
      <objectClass>Event</objectClass>
      <definition>The information content describing a schedule of start and end times
      associated with an event.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="update-time" type="DateTimeZone"/>
    <xs:element name="valid-period" type="ValidPeriod" minOccurs="0"/>
    <xs:element name="schedule-element-ids" minOccurs="0">
      <xs:complexType>
        <xs:sequence maxOccurs="20">
          <xs:element name="event-schedule-element-identifier"
            type="Event-schedule-element-identifier"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="sequence-time" type="DateTimeZone" minOccurs="0"/>
    <xs:element name="start-time" type="DateTimeZone" minOccurs="0"/>
    <xs:element name="alternate-start-time" type="DateTimeZone" minOccurs="0"/>
    <xs:element name="alternate-end-time" type="DateTimeZone" minOccurs="0"/>
    <xs:element name="expected-start-time" type="DateTimeZone" minOccurs="0"/>
    <xs:element name="expected-end-time" type="DateTimeZone" minOccurs="0"/>
    <xs:element name="recurrent-times" minOccurs="0">
      <xs:complexType>
        <xs:sequence maxOccurs="64">
          <xs:element name="recurrent-time"
            type="RecurrentTime"/>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

```

                </xs:sequence>
            </xs:complexType>
        </xs:element>
        <xs:element name="planned-event-continuous-flag" type="Binary-flag"
minOccurs="0"/>
        <xs:element ref="tmddExt:eventTimesExt" minOccurs="1"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

```

### 3.3.8.27.2 eventTimes JSON Representation

```

"EventTimes": {
  "type": "object",
  "required": ["updatetime"],
  "properties": {
    "updatetime": {"$ref": "#/definitions/DateTimeZone"},
    "validperiod": {"$ref": "#/definitions/ValidPeriod"},
    "scheduleelementids": {"$ref": "#/definitions/EventTimes.scheduleelementids"},
    "sequencetime": {"$ref": "#/definitions/DateTimeZone"},
    "starttime": {"$ref": "#/definitions/DateTimeZone"},
    "alternatestarttime": {"$ref": "#/definitions/DateTimeZone"},
    "alternateendtime": {"$ref": "#/definitions/DateTimeZone"},
    "expectedstarttime": {"$ref": "#/definitions/DateTimeZone"},
    "expectedendtime": {"$ref": "#/definitions/DateTimeZone"},
    "recurrenttimes": {"$ref": "#/definitions/EventTimes.recurrenttimes"},
    "plannedeventcontinuousflag": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

```

### 3.3.8.27.3 eventTimes Field Definitions

Field	Definition
updatetime	The date time of the last update to the event record.
validperiod	The period for which the event is expected to take place

Field	Definition
scheduleelementids	Numeric identifier(s) for the event time element
sequencetime	Date time of the event element(s)
starttime	Actual start date time of the event. Use the earliest available date time for the event. For example, if the event has a first unconfirmed report, followed by a confirmation by camera or on-site personnel, followed by an incident record time at a TMC, use the date time of the unconfirmed report for the starttime.
alternatestarttime	For planned events, a future alternative planned start date time that has been designated for contingency or other purposes.
alternateendtime	For planned events, a future alternative planned end date time that has been designated for contingency or other purposes.
expectedstarttime	For planned events, an expected start date time for the event element.
expectedendtime	For planned events, an expected end date time for the event element.
recurrenttimes	Recurring time periods and optionally scheduled times associated with an event.
plannedeventcontinuousflag	A flag indicating that the event is a planned ongoing event

“

#### 4.5.1.2. Field Enumeration Definitions

Field enumerations would benefit from definition within the standard as well. Often the fields are self-explanatory, but there are times where the distinction between the different fields may not be clear. The fontStatus TMDD element is an example within the standard that provides clear definitions of each status value and such an approach could be used more often, especially in cases where there is potential overlap in the definition between fields.

The event incident status discussed earlier (4.4.2) is an example where, if all the possible enumerations provide value and are necessary, some additional information to distinguish when each option should be utilized would be valuable. A table within the standard providing the distinguishing characteristics such as the following would benefit interoperability between implementations of TMDD:

Enumeration Value	Definition
planned	The event is planned, but has not yet started.
forecast	The event is not planned and may not occur, but predictive activities indicate there is a possibility of occurrence.
contingency plan	A contingency plan has been activated for the event.
response plan activated	An active response plan has been activated for the event.
reported	The event has been reported, but not yet confirmed.
confirmed	The event has been confirmed by official activities and actions are authorized as needed.
responding	The event has field activities (freeway patrol, law enforcement, or other) responding to confirm or provide support actions for the event.
current	The event has just started. Further reports may provide additional status or activity.
updated	This report provides updated information regarding the event. No other status change.
clearing	Field elements are clearing any lane blockage or disabled vehicles.
ended	The event has ended. All event related event management activities have completed.
delete	Delete event record. Event record sent in error.
cancelled	Planned event has been cancelled.
postponed	Planned event has been postponed.
reopened	Event record previously ended is reopened.
new	Event is a new, previously unreported event.
other	Other status

#### 4.5.1.3. Usage and practice

Often there are multiple methods of transmitting data, providing flexibility for systems in describing specific activities, state, or actions. In providing flexibility, the ability to provide interoperability between different systems without extensive modification suffers.

A good example of this is how the TMDD specification provides for description of an event location. Below are snippets of elements within the eventElementDetail and subsequent data frames/elements that describe an event location.

```
<xs:element name="event-locations" minOccurs="0">
  <xs:complexType>
    <xs:sequence maxOccurs="20">
      <xs:element name="event-location" type="EventLocation"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

-----

The specification provides for up to 20 event locations to be defined for each event element detail. Each event location may be described in one of five ways – AreaLocation, LinkLocation, LandmarkLocation, GeoLocation, or in a custom format defined by the specific implementation.

```
<xs:complexType name="EventLocation">
  <xs:annotation>
    <xs:documentation>
      <objectClass>Event</objectClass>
      <definition>The information content describing a point, area, landmark,
or link associated with an event.</definition>
    </xs:documentation>
  </xs:annotation>
  <xs:choice>
    <xs:element name="area-location" type="AreaLocation"/>
    <xs:element name="location-on-link" type="LinkLocation"/>
    <xs:element name="landmark" type="LandmarkLocation"/>
    <xs:element name="geo-location" type="lrms:GeoLocation"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:choice>
</xs:complexType>
```

-----

The AreaLocation type is relatively simple with an identifier, name, rank, and upward reference providing for hierarchical referencing of defined area locations. It would be beneficial to provide some common usage of the AreaLocation type, with examples, especially to assist in understanding how to use the event-location-rank and upward-area-reference elements. It is unclear from the standard how these are utilized.

```
<xs:complexType name="AreaLocation">
  <xs:annotation>
```

```

        <xs:documentation>
            <objectClass>Event</objectClass>
            <definition>The information content describing an area location
associated with an event.</definition>
        </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="area-id" type="Event-location-area-identifier"
minOccurs="0"/>
        <xs:element name="area-name" type="Event-area-name" minOccurs="0"/>
        <xs:element name="location-rank" type="Event-location-rank" minOccurs="0"/>
        <xs:element name="upward-area-reference" type="AreaLocation"
minOccurs="0"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

```

-----

LinkLocation is the second choice of types. This provides for the ability to describe position based on a link definition. For complex transportation systems this can be the best description of a specific position on a highway or road. However, in practice links can be defined in many ways and may not be referenced to a link-node network described within TMDD. Sharing of road networks via TMDD and translation of road network definitions between different systems is often difficult and expensive. This creates significant barriers to interoperability between systems. Some description of expected practice in addition to standard road networks that can be commonly used such as the All Road Network of Linear Referenced Data (ARNOLD) or Open Street Maps within systems would significantly improve opportunities for better interoperability. Referencing location based on state postmile or mile post definitions or other state and local road linear reference systems would ensure systems within the same state have common implementations that facilitate information exchange. Implementation of a standard for ITS systems within California would benefit state ITS implementations and reduce integration costs.

```

<xs:complexType name="LinkLocation">
    <xs:annotation>
        <xs:documentation>
            <objectClass>Event</objectClass>
            <definition>The information content describing a link-based location
associated with an event.</definition>
        </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="link-ownership" type="Transportation-network-name"
minOccurs="0"/>

```

```

        <xs:element name="link-designator" type="Link-route-designator"
minOccurs="0"/>
        <xs:element name="second-link-designator" type="Link-route-designator"
minOccurs="0"/>
        <xs:element name="link-id" type="Transportation-network-identifier"
minOccurs="0"/>
        <xs:element name="link-name" type="Transportation-network-name"
minOccurs="0"/>
        <xs:element name="primary-location" type="PointOnLink"/>
        <xs:element name="secondary-location" type="PointOnLink" minOccurs="0"/>
        <xs:element name="link-direction" type="Link-direction" minOccurs="0"/>
        <xs:element name="link-alignment" type="Link-alignment" minOccurs="0"/>
        <xs:element name="linear-reference-version" type="Link-location-linearreference-
version" minOccurs="0"/>
        <xs:element name="alternate-designations" minOccurs="0">
            <xs:complexType>
                <xs:sequence maxOccurs="8">
                    <xs:element name="alternate-designation"
type="LinkLocation"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
        <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

```

-----

Landmark location is the third option. Like Area location, the advantage of this type of definition is simplicity, with the disadvantage of some limitations with respect to specificity. GeoLocation as an added element alleviates the disadvantage, but a simpler method may be to eliminate the Landmark location. Again, some guidance for appropriate use would be beneficial.

```

<xs:complexType name="LandmarkLocation">
    <xs:annotation>
        <xs:documentation>
            <objectClass>Event</objectClass>
            <definition>The information content describing a landmark location
associated with an event.</definition>
        </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="landmark-type" type="Event-location-landmark-type"/>
        <xs:element name="landmark-name" type="Event-landmark-name"/>
    </xs:sequence>

```



```

        <xs:element name="landmark-point-name" type="Event-landmark-name"
minOccurs="0"/>
        <xs:element name="location-rank" type="Event-location-rank" minOccurs="0"/>
        <xs:element name="geo-location" type="lrms:GeoLocation" minOccurs="0"/>
        <xs:element name="upward-area-reference" type="AreaLocation"
minOccurs="0"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

```

-----

GeoLocation as the fourth option has significant advantage for placing information within a map display, but can create difficulty with respect to reference to a roadway system. The issue of placing lat/long and elevation on a three dimensional road system, especially where a freeway or elevated road segments cross limits usage of GeoLocation.

```

<xs:complexType name="GeoLocation">
    <xs:annotation>
        <xs:documentation>
            <definition>The GeoLocation data frame conveys a two- or
            threedimensional geographic location based on coordinates. The standard
            horizontal datum for a spot location is WGS-84; other horizontal datums can be
            specified by HorizontalDatum. Vertical Datum is an option within
            height.</definition>
            <standard>SAE J2266</standard>
            <identifier>lrmsDataFrames geoLocation(1)</identifier>
        </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="latitude" type="Latitude"/>
        <xs:element name="longitude" type="Longitude"/>
        <xs:element name="horizontalDatum" type="HorizontalDatum" minOccurs="0"/>
        <xs:element name="height" type="Height" minOccurs="0"/>
    </xs:sequence>
</xs:complexType>

```

-----

“any” is the last location description method provided. This is a method defined solely by the implementer. Its use would likely not be interoperable with other systems. It should not be recommended.

A better method for event location may be to specify usage guidelines similar to the following:

## TMDD Standards Update Recommendations – Data Structures

Area Method – used for describing location of large area events such as concerts, sporting events, large holiday events, festivals, etc. May consist of many specific event elements which should be described separately with links to the primary event record. Specific event elements should use other methods.

Link Method – used for describing road or transportation link event locations. This should be a primary description method for any event locations that can be described in reference to a known transportation network. Standard transportation networks should be defined at the state level and utilized as the reference network for this method.

Landmark Method – deprecated.

GeoLocation – used for describing events with very specific point locations but without a transportation network reference.

“any/other” – vendor or implementation specific location definition. Not recommended.

### 4.5.2. TEMPORAL STANDARDS

A lack of temporal standards for time-based elements leads to inconsistencies between systems, especially when data is acquired from multiple sources, each with their own update and refresh capabilities and frequencies. The variety of systems, vendors, system architectures, field communication methods and capabilities, network capabilities and bandwidth, hardware and firmware, and program budgets all contribute to the temporal differences between data exchanged between systems.

Consider an example of intersection signal information, including signal status and sensor data, received from several different sources – a state source, county source, and two city sources.

The system for the state and one of the city sources utilize the same vendor system and interface, with similar field capabilities. Update methods (subscription on-change) is the same for each. Each installation is based on a single application server and database with limits to its ability to generate TMDD messages at a rate necessary to keep up with large numbers of intersections within its C2C interface. Operating status, current plan, and ring status is available, but limitations of the TMC software scalability often result in signal status messages being dropped before being sent. Sensor data is available every 30 seconds.

The county source depends on field network communications with limited bandwidth capabilities and has a significant number of intersections within its jurisdiction. As a result of the field network limitations and the number of devices, the county has configured firmware within controllers to limit the frequency and content of messages sent by controllers to the TMC. This limits the status information available for C2C communications to reporting current plan and operating status. Sensor data is available every minute.

The other city has made significant investments in its traffic management capabilities and has improved reporting frequencies from its field controllers and improved data center capabilities to allow some scalability with improved ability to handle larger message volumes within its C2C interfaces. As a result, it is capable of C2C communications at high message volumes and increased reporting frequency. Sensor data is available every 30 seconds.

For a system consuming information from all four intersection signal data sources, the mismatch in data reported and data reporting frequencies can create significant limitations in the capabilities of the receiving system. This adds complexity to the algorithms and development of the systems along with the limitations in their ability to use the information provided for improved predictive capabilities, artificial intelligence, and other advanced data techniques. At best, it provides geographic areas of degraded performance and functionality for regions with limited data and impacts on the borders between regions with differing data capabilities.

To address this problem, the standard should provide minimum and recommended temporal characteristics for time-based data such as subscription refresh rates along with improved minimum standards for data content. An example of this might look like the following (using intersection signal status and detector data messages).

Detector data messages:

Recommended data refresh interval for each sensor – freeway loop: 30 seconds

Recommended data refresh interval for each sensor – intersection loop: 30 seconds

Minimum data refresh interval for each sensor – freeway loop: 1 minute

Minimum data refresh interval for each sensor – intersection loop: 1 minute

Intersection signal status messages:

Level of detail – ring status

Recommended data message interval capability for each intersection signal – 0.5 seconds

Level of detail – current plan, operating status

Recommended data message interval capability for each intersection signal – 5 seconds

### 4.6. WS-I COMPATIBILITY RECOMMENDATIONS FOR SOAP-BASED MESSAGING

The current TMDD standard violates two WS-I requirements. These are:

- Multipart messages - When using a document/literal style SOAP binding for an operation with messages (input, output, or fault) that are defined with multiple parts, only one of those parts should be bound to the SOAP body in order to be compliant with the WS-I Basic Profile 2.0.

## TMDD Standards Update Recommendations – Data Structures

- Unique body parts - When using document/literal style of SOAP binding, each operation must have a unique signature in order for SOAP call to be successfully dispatched.

These two requirements are violated multiple times throughout the standard. Some examples include:

dlCCTVInventoryUpdate violates the multipart message requirement.

Usage of the MsgDeviceInformationRequest violates the unique body parts requirement.

In order to address this the Caltrans Connected Corridors program altered the WSDL and XSD within TMDD in the following ways:

### 4.6.1. MULTIPART MESSAGE REQUIREMENT ALTERNATIVE

For the dlCCTVInventoryUpdate dialog, a simple method to address this is illustrated in Figure 3.

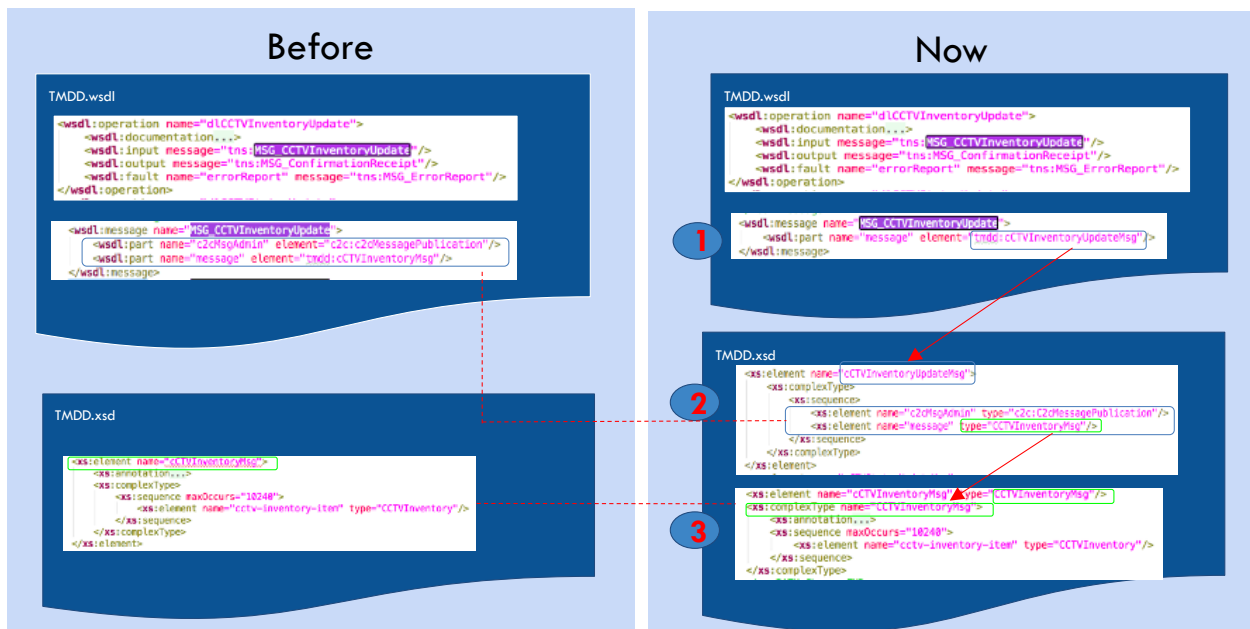


Figure 3 Multipart Message Violation Fix

As can be seen in the “Before” image of the figure, the MSG\_CCTVInventoryUpdate message has two parts described within the tmd.wsdl, the c2cMsgAdmin and the message parts. To correct this, the “Now” image shows that the MSG\_CCTVInventoryUpdate message is changed to one part, the cCCTVInventoryUpdateMsg. The cCCTVInventoryUpdateMsg is described within the TMDD.xsd with two elements, the c2cMsgAdmin and message elements with their respective types, with the message being type CCTVInventoryMsg. A complex type CCTVInventoryMsg is explicitly added to the TMDD.xsd.

## TMDD Standards Update Recommendations – Data Structures

The following TMDD WSDL elements are recommended to be updated for the multipart message issue:

- MSG\_CCTVInventoryUpdate
- MSG\_CCTVStatusUpdate
- MSG\_CenterActiveVerificationSubscription
- MSG\_CenterActiveVerificationUpdate
- MSG\_DetectorInventoryUpdate
- MSG\_DetectorStatusUpdate
- MSG\_DetectorDataUpdate
- MSG\_DeviceInformationSubscription
- MSG\_DMSInventoryUpdate
- MSG\_DMSStatusUpdate
- MSG\_DMSMessageInventorySubscription
- MSG\_DMSMessageInventoryUpdate
- MSG\_ESSInventoryUpdate
- MSG\_ESSStatusUpdate
- MSG\_ESSObservationReportUpdate
- MSG\_EventSubscription
- MSGFullEventUpdateUpdate
- MSG\_EventIndexUpdate
- MSG\_ActionLogUpdate
- MSG\_GateInventoryUpdate
- MSG\_GateStatusUpdate
- MSG\_GateControlScheduleUpdate
- MSG\_HARInventoryUpdate
- MSG\_HARStatusUpdate
- MSG\_HARControlScheduleUpdate
- MSG\_HARMessageInventoryUpdate
- MSG\_IntersectionSignalInventoryUpdate
- MSG\_IntersectionSignalStatusUpdate
- MSG\_IntersectionSignalTimingPatternInventorySubscription
- MSG\_IntersectionSignalTimingPatternInventoryUpdate
- MSG\_IntersectionSignalControlScheduleUpdate
- MSG\_LCSInventoryUpdate
- MSG\_LCSStatusUpdate
- MSG\_LCSControlScheduleUpdate
- MSG\_LinkInventoryUpdate
- MSG\_LinkStatusUpdate
- MSG\_NodeInventoryUpdate
- MSG\_NodeStatusUpdate
- MSG\_OrganizationInformationSubscription

## TMDD Standards Update Recommendations – Data Structures

- MSG\_OrganizationInformationUpdate
- MSG\_RampMeterInventoryUpdate
- MSG\_RampMeterStatusUpdate
- MSG\_RampMeterControlScheduleUpdate
- MSG\_RampMeterPlanInventorySubscription
- MSG\_RampMeterPlanInventoryUpdate
- MSG\_RouteInventoryUpdate
- MSG\_RouteStatusUpdate
- MSG\_SectionStatusUpdate
- MSG\_SectionControlScheduleUpdate
- MSG\_SectionSignalTimingPatternInventorySubscription
- MSG\_SectionSignalTimingPatternInventoryUpdate
- MSG\_TrafficNetworkStatusSubscription
- MSG\_VideoSwitchInventoryUpdate
- MSG\_VideoSwitchStatusUpdate

### 4.6.2. UNIQUE BODY PARTS REQUIREMENT ALTERNATIVE

For the MSGDeviceInformationRequest message, a simple method to address this is illustrated in Figure 4.

**Before**

```
TMDD.wsdl
<message name="MSG_DeviceInformationRequest" >
  <part name="message" element="tns:deviceInformationRequestMsg" />
</message>

<operation name="dlGateInventoryRequest">
  <documentation...>
  <input message="tns:MSG_DeviceInformationRequest" />
  <output message="tns:MSG_GateInventory" />
  <fault name="errorReport" message="tns:MSG_ErrorReport" />
</operation>
<operation name="dlGateStatusRequest">
  <documentation...>
  <input message="tns:MSG_DeviceInformationRequest" />
  <output message="tns:MSG_GateStatus" />
  <fault name="errorReport" message="tns:MSG_ErrorReport" />
</operation>
```

**Now**

```
TMDD.wsdl
<wsdl:message name="MSG_GateInventoryRequest">
  <wsdl:part name="message" element="tns:gateInventoryRequestMsg" />
</wsdl:message>
<wsdl:message name="MSG_GateStatusRequest">
  <wsdl:part name="message" element="tns:gateStatusRequestMsg" />
</wsdl:message>

<wsdl:operation name="dlGateInventoryRequest">
  <wsdl:documentation...>
  <wsdl:input message="tns:MSG_GateInventoryRequest" />
  <wsdl:output message="tns:MSG_GateInventory" />
  <wsdl:fault name="errorReport" message="tns:MSG_ErrorReport" />
</wsdl:operation>
<wsdl:operation name="dlGateStatusRequest">
  <wsdl:documentation...>
  <wsdl:input message="tns:MSG_GateStatusRequest" />
  <wsdl:output message="tns:MSG_GateStatus" />
  <wsdl:fault name="errorReport" message="tns:MSG_ErrorReport" />
</wsdl:operation>
```

TMDD.xsd

```
<xsd:element name="gateInventoryRequestMsg" type="DeviceInformationRequest" />
<xsd:element name="gateStatusRequestMsg" type="DeviceInformationRequest" />
```

**Figure 4 Unique Body Parts Violation Fix**

As can be seen in the “Before” image of the figure, dlGateInventoryRequest and dlGateStatusRequest both utilize the MSG\_DeviceInformationRequest input message. As a result, the same input message does not have a unique return message or signature. To correct this, the

“Now” image assigns each dialog its unique request message, the MSG\_GateInventoryRequest and MSG\_GateStatusRequest and each message is described within the WSDL and XSD. Each element referencing the specific request message is provided a type of DeviceInformationRequest within the XSD.

The following TMDD WSDL changes, adding the following messages to replace the MSG\_DevicePriorityQueueRequest are recommended for the unique body parts message issue:

- MSG\_DMSPriorityQueueRequest
- MSG\_HARPriorityQueueRequest
- MSG\_IntersectionSignalPriorityQueueRequest
- MSG\_RampMeterPriorityQueueRequest
- MSG\_SectionPriorityQueueRequest

The following TMDD WSDL changes, adding the following messages to replace the MSG\_DeviceInformationRequest are recommended for the unique body parts message issue:

- MSG\_CCTVInventoryRequest
- MSG\_CCTVStatusRequest
- MSG\_DetectorInventoryRequest
- MSG\_DetectorStatusRequest
- MSG\_DMSInventoryRequest
- MSG\_DMSStatusRequest
- MSG\_ESSInventoryRequest
- MSG\_ESSStatusRequest
- MSG\_ESSObservationMetadataRequest
- MSG\_ESSObservationReportRequest
- MSG\_GateInventoryRequest
- MSG\_GateStatusRequest
- MSG\_GateControlScheduleRequest
- MSG\_HARInventoryRequest
- MSG\_HARMessageInventoryRequest
- MSG\_HARStatusRequest
- MSG\_HARControlScheduleRequest
- MSG\_IntersectionSignalInventoryRequest
- MSG\_IntersectionSignalStatusRequest
- MSG\_IntersectionSignalControlScheduleRequest
- MSG\_CSStatusRequest
- MSG\_CSControlScheduleRequest
- MSG\_RampMeterInventoryRequest
- MSG\_RampMeterStatusRequest
- MSG\_RampMeterControlScheduleRequest

## TMDD Standards Update Recommendations – Data Structures

- MSG\_SectionStatusRequest
- MSG\_SectionControlScheduleRequest
- MSG\_VideoSwitchInventoryRequest
- MSG\_VideoSwitchStatusRequest
- MSG\_CSInventoryRequest

The following messages are recommended to replace the MSG\_EventRequest message:

- MSG\_FullEventUpdateRequest
- MSG\_EventIndexRequest
- MSG\_ActionLogRequest

The following messages are recommended to replace the MSG\_EventSubscription message:

- MSG\_FullEventUpdateSubscription
- MSG\_EventIndexSubscription
- MSG\_ActionLogSubscription

The following messages are recommended to replace the MSG\_TrafficNetworkInformationRequest message:

- MSG\_LinkInventoryRequest
- MSG\_LinkStatusRequest
- MSG\_NodeInventoryRequest
- MSG\_NodeStatusRequest
- MSG\_RouteInventoryRequest
- MSG\_RouteStatusRequest



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## 5. REFERENCES

1. **Engineers, Institute of Transportation.** Traffic Management Data Dictionary (TMDD) Standard for the Center-to-Center Communications. *Institute of Transportation Engineers*. [Online] 2020. <https://www.ite.org/technical-resources/standards/tmdd/>.
2. **W3C.** Latest SOAP Versions. *W3C*. [Online] 2004. <https://www.w3.org/TR/soap/>.
3. **US DOT FHWA.** Certified Public Road Mileage Data and ARNOLD. *Policy and Governmental Affairs Office of Highway Policy Information*. [Online] February 10, 2014. <https://www.fhwa.dot.gov/policyinformation/hpms/arnold.cfm>.

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## APPENDIX A – EXAMPLE TMDD JSON SCHEMA

```

{
  "$schema": "https://JSON-schema.org/draft/2019-09/schema#",
  "definitions": {
    "Authentication": {
      "type": "object",
      "required": [
        "userid",
        "password"
      ],
    },
    "properties": {
      "userid": {"type": "string"},
      "password": {"type": "string"},
      "operatorid": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "ContactDetails": {
    "type": "object",
    "required": ["contactid"],
    "properties": {
      "contactid": {"type": "string"},
      "personname": {"type": "string"},
      "persontitle": {"type": "string"},
      "phonenumber": {"type": "string"},
      "phonealternate": {"type": "string"},
      "mobilephonenumber": {"type": "string"},
      "mobilephoneid": {"type": "string"},
      "faxnumber": {"type": "string"},
      "pagenumber": {"type": "string"},
      "pagerid": {"type": "string"},
      "emailaddress": {"type": "string"},
      "radiounit": {"type": "string"},
      "addressline1": {"type": "string"},
      "addressline2": {"type": "string"},
      "city": {"type": "string"},
      "state": {"type": "string"},
      "zipcode": {"type": "string"},
    }
  }
}

```

## TMDD Standards Update Recommendations – Data Structures

```
    "country": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "Distance": {
    "type": "object",
    "required": [
      "m",
      "mDec",
      "mm",
      "mmDec",
      "dm",
      "dmDec",
      "yd",
      "ydDec",
      "ft",
      "ftDec",
      "in",
      "inDec",
      "mi",
      "miDec",
      "km",
      "kmDec",
      "block",
      "blkDec"
    ],
    "properties": {
      "m": {"type": "integer"},
      "mDec": {"type": "number"},
      "mm": {"type": "integer"},
      "mmDec": {"type": "number"},
      "dm": {"type": "integer"},
      "dmDec": {"type": "number"},
      "yd": {"type": "integer"},
      "ydDec": {"type": "number"},
      "ft": {"type": "integer"},
      "ftDec": {"type": "number"},
      "in": {"type": "integer"},
      "inDec": {"type": "number"},
      "mi": {"type": "integer"},

```

```

        "miDec": {"type": "number"},
        "km": {"type": "integer"},
        "kmDec": {"type": "number"},
        "block": {"type": "integer"},
        "blkDec": {"type": "number"}
    }
},
"Height": {
    "type": "object",
    "required": [
        "altitude",
        "verticalLevel"
    ],
    "properties": {
        "altitude": {"$ref": "#/definitions/Distance"},
        "verticalDatum": {"type": "string"},
        "verticalLevel": {"type": "integer"}
    }
},
"GeoLocation": {
    "type": "object",
    "required": [
        "latitude",
        "longitude"
    ],
    "properties": {
        "latitude": {"type": "integer"},
        "longitude": {"type": "integer"},
        "horizontalDatum": {"type": "string"},
        "height": {"$ref": "#/definitions/Height"}
    }
},
"OrganizationCenterInformation": {
    "type": "object",
    "required": ["centerid"],
    "properties": {
        "centerid": {"type": "string"},
        "centername": {"type": "string"},
        "centerlocation": {"$ref": "#/definitions/GeoLocation"},
        "centerdescription": {"type": "string"},
        "centertype": {"type": "string"},
        "centercontactdetails": {"$ref": "#/definitions/ContactDetails"},
        "Any": {
            "type": "array",

```

## TMDD Standards Update Recommendations – Data Structures

```
        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"OrganizationInformation.centercontactlist": {
    "type": "object",
    "required": ["centercontactdetails"],
    "properties": {
        "centercontactdetails": {
            "type": "array",
            "items": {"$ref": "#/definitions/OrganizationCenterInformation"},
            "maxItems": 1024,
            "minItems": 1
        }
    }
},
"OrganizationInformation.secondaryorganizationlist": {
    "type": "object",
    "required": ["secondaryorganization"],
    "properties": {
        "secondaryorganization": {
            "type": "array",
            "items": {"$ref": "#/definitions/OrganizationInformation"},
            "maxItems": 1024,
            "minItems": 1
        }
    }
},
"DateTimeZone": {
    "type": "object",
    "required": [
        "date",
        "time"
    ],
    "properties": {
        "date": {"type": "string"},
        "time": {"type": "string"},
        "offset": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
```

```

    }
  },
  "OrganizationInformation": {
    "type": "object",
    "required": ["organizationid"],
    "properties": {
      "organizationid": {"type": "string"},
      "organizationname": {"type": "string"},
      "organizationlocation": {"type": "string"},
      "organizationfunction": {"type": "string"},
      "organizationcontactdetails": {"$ref": "#/definitions/ContactDetails"},
      "centercontactlist": {"$ref": "#/definitions/OrganizationInformation.centercontactlist"},
      "secondaryorganizationlist": {"$ref":
"#/definitions/OrganizationInformation.secondaryorganizationlist"},
      "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},
  "DeviceInformationRequestFilter.deviceidlist": {
    "type": "object",
    "required": ["deviceid"],
    "properties": {
      "deviceid": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 10000,
        "minItems": 1
      }
    }
  }
},
  "DeviceInformationRequestFilter.networkidlist": {
    "type": "object",
    "required": ["networkid"],
    "properties": {
      "networkid": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 255,
        "minItems": 1
      }
    }
  }
}

```



```

    }
  },
  "DeviceInformationRequestFilter.linkidlist": {
    "type": "object",
    "required": ["link"],
    "properties": {
      "link": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 255,
        "minItems": 1
      }
    }
  },
  "DeviceInformationRequestFilter.linkdesignatorlist": {
    "type": "object",
    "required": ["linkdesignator"],
    "properties": {
      "linkdesignator": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 255,
        "minItems": 1
      }
    }
  },
  "LinearReferenceRange": {
    "type": "object",
    "required": [
      "linearreferencestart",
      "linearreferenceend"
    ],
    "properties": {
      "linearreferencestart": {"type": "string"},
      "linearreferenceend": {"type": "string"}
    }
  },
  "DeviceInformationRequestFilter.sectionidlist": {
    "type": "object",
    "required": ["sectionid"],
    "properties": {
      "sectionid": {
        "type": "array",
        "items": {"type": "string"},

```

```

        "maxItems": 10240,
        "minItems": 1
    }
}
},
"DeviceInformationRequestFilter.patternidlist": {
    "type": "object",
    "required": ["patternid"],
    "properties": {
        "patternid": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 256,
            "minItems": 1
        }
    }
},
"DeviceInformationRequestFilter.centeridlist": {
    "type": "object",
    "required": ["centerid"],
    "properties": {
        "centerid": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 256,
            "minItems": 1
        }
    }
},
"DeviceInformationRequestFilter": {
    "type": "object",
    "properties": {
        "deviceidlist": {"$ref": "#/definitions/DeviceInformationRequestFilter.deviceidlist"},
        "networkidlist": {"$ref": "#/definitions/DeviceInformationRequestFilter.networkidlist"},
        "linkidlist": {"$ref": "#/definitions/DeviceInformationRequestFilter.linkidlist"},
        "linkdesignatorlist": {"$ref":
"#/definitions/DeviceInformationRequestFilter.linkdesignatorlist"},
        "linearreference": {"$ref": "#/definitions/LinearReferenceRange"},
        "sectionidlist": {"$ref": "#/definitions/DeviceInformationRequestFilter.sectionidlist"},
        "patternidlist": {"$ref": "#/definitions/DeviceInformationRequestFilter.patternidlist"},
        "centeridlist": {"$ref": "#/definitions/DeviceInformationRequestFilter.centeridlist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},

```

```

        "minItems": 0
    }
}
},
"DeviceInformationRequest": {
    "type": "object",
    "required": [
        "organizationinformation",
        "devicetype",
        "deviceinformationtype"
    ],
    "properties": {
        "authentication": {"$ref": "#/definitions/Authentication"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
        "devicetype": {"type": "string"},
        "deviceinformationtype": {"type": "string"},
        "deviceupdatemethod": {"type": "string"},
        "devicefilter": {"$ref": "#/definitions/DeviceInformationRequestFilter"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"Restrictions": {
    "type": "object",
    "required": ["organizationinformationforwardingrestrictions"],
    "properties": {
        "organizationinformationforwardingrestrictions": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"SectionControlSchedule.deviceidlist": {
    "type": "object",
    "required": ["deviceid"],
    "properties": {
        "deviceid": {
            "type": "array",

```

```

        "items": {"type": "string"},
        "maxItems": 255,
        "minItems": 1
    }
}
},
"SectionControlSchedule": {
    "type": "object",
    "required": [
        "organizationinformation",
        "sectionid",
        "timebaseschedulenummer",
        "timebaseschedulemonth",
        "timebasescheduleday",
        "timebasescheduledate",
        "timebasescheduledayplan",
        "dayplanhour",
        "dayplanminute",
        "lastupdatetime",
        "deviceidlist",
        "requestcontrolmode",
        "timingpatternid"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "sectionid": {"type": "string"},
        "timebaseschedulenummer": {"type": "integer"},
        "timebaseschedulemonth": {"type": "integer"},
        "timebasescheduleday": {"type": "integer"},
        "timebasescheduledate": {"type": "integer"},
        "timebasescheduledayplan": {"type": "integer"},
        "dayplanhour": {"type": "integer"},
        "dayplanminute": {"type": "integer"},
        "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "deviceidlist": {"$ref": "#/definitions/SectionControlSchedule.deviceidlist"},
        "requestcontrolmode": {"type": "string"},
        "timingpatternid": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
}

```

```

    },
    "SectionControlScheduleMsg": {
      "type": "object",
      "required": ["sectioncontrolscheduleitem"],
      "properties": {
        "sectioncontrolscheduleitem": {
          "type": "array",
          "items": {"$ref": "#/definitions/SectionControlSchedule"},
          "maxItems": 1024,
          "minItems": 1
        }
      }
    }
  },
  "UrlReference": {
    "type": "object",
    "required": ["urlreference"],
    "properties": {
      "urlreference": {"type": "string"},
      "urlreferencemedium": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},
"DeviceInventoryHeader": {
  "type": "object",
  "required": [
    "organizationinformation",
    "deviceid",
    "devicelocation",
    "devicename"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "deviceid": {"type": "string"},
    "devicelocation": {"$ref": "#/definitions/GeoLocation"},
    "devicename": {"type": "string"},
    "devicedescription": {"type": "string"},
    "devicecontroltype": {"type": "string"},
    "controllerdescription": {"type": "string"},
    "networkid": {"type": "string"},
  }
}

```

```

    "nodeid": {"type": "string"},
    "nodename": {"type": "string"},
    "linkid": {"type": "string"},
    "linkname": {"type": "string"},
    "linkdirection": {"type": "string"},
    "linearreference": {"type": "string"},
    "linearreferenceversion": {"type": "integer"},
    "routedesignator": {"type": "string"},
    "deviceurl": {"$ref": "#/definitions/UrlReference"},
    "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
    "deviceinventoryaction": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"CCTVInventory.cctvrequestssupportedlist": {
  "type": "object",
  "required": ["cctvrequestssupported"],
  "properties": {
    "cctvrequestssupported": {
      "type": "array",
      "items": {"type": "string"},
      "maxItems": 16,
      "minItems": 1
    }
  }
},
"CCTVInventory.cctvimagelist": {
  "type": "object",
  "required": ["cctvimage"],
  "properties": {
    "cctvimage": {
      "type": "array",
      "items": {"type": "string"},
      "maxItems": 8,
      "minItems": 1
    }
  }
},
"CCTVInventory": {
  "type": "object",

```

```

    "required": [
      "deviceinventoryheader",
      "cctvrequestssupportedlist",
      "cctvimagelist"
    ],
    "properties": {
      "deviceinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
      "cctvrequestssupportedlist": {"$ref":
"#/definitions/CCTVInventory.cctvrequestssupportedlist"},
      "cctvimagelist": {"$ref": "#/definitions/CCTVInventory.cctvimagelist"},
      "cctvtitlingtext": {"type": "string"},
      "cctvcameratype": {"type": "string"},
      "cctvcamerapanleftlimit": {"type": "integer"},
      "cctvcamerapanrightlimit": {"type": "integer"},
      "cctvcameratiltuplimit": {"type": "integer"},
      "cctvcameratiltdownlimit": {"type": "integer"},
      "cctvcamerazoomlimit": {"type": "integer"},
      "cctvcamerafocuslimit": {"type": "integer"},
      "cctvcameraairislimit": {"type": "integer"},
      "cctvcameraenvironmental": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "CCTVInventoryMsg": {
    "type": "object",
    "required": ["cctvinventoryitem"],
    "properties": {
      "cctvinventoryitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/CCTVInventory"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "C2cMessagePublication": {
    "type": "object",
    "required": [
      "subscriptionID",
      "subscriptionCount"
    ]
  }

```

```

    ],
    "properties": {
      "informationalText": {"type": "string"},
      "subscriptionID": {"type": "string"},
      "subscriptionName": {"type": "string"},
      "subscriptionFrequency": {"type": "integer"},
      "subscriptionCount": {"type": "integer"}
    }
  },
  "HARMessageInventory": {
    "type": "object",
    "required": [
      "organizationinformation",
      "deviceid",
      "messagenumber",
      "currentmessage"
    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "deviceid": {"type": "string"},
      "messagenumber": {"type": "string"},
      "currentmessage": {"type": "string"},
      "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "HARMessageInventoryMsg": {
    "type": "object",
    "required": ["harmessageinventoryitem"],
    "properties": {
      "harmessageinventoryitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/HARMessageInventory"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "hARMessageInventoryUpdateMsg": {

```



## TMDD Standards Update Recommendations – Data Structures

```
"type": "object",
"required": [
  "c2cMsgAdmin",
  "message"
],
"properties": {
  "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
  "message": {"$ref": "#/definitions/HARMessageInventoryMsg"}
}
},
"DeviceControlScheduleHeader": {
  "type": "object",
  "required": [
    "organizationinformation",
    "deviceid",
    "timebaseschedulenummer",
    "timebaseschedulemonth",
    "timebasescheduleday",
    "timebasescheduledate",
    "timebasescheduledayplan",
    "dayplanhour",
    "dayplanminute",
    "lastupdatetime"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "deviceid": {"type": "string"},
    "timebaseschedulenummer": {"type": "integer"},
    "timebaseschedulemonth": {"type": "integer"},
    "timebasescheduleday": {"type": "integer"},
    "timebasescheduledate": {"type": "integer"},
    "timebasescheduledayplan": {"type": "integer"},
    "dayplanhour": {"type": "integer"},
    "dayplanminute": {"type": "integer"},
    "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}
},
"RampMeterControlSchedule": {
```

```

    "type": "object",
    "required": [
      "devicecontrolscheduleheader",
      "meteredlaneidentifier",
      "actionnumber"
    ],
    "properties": {
      "devicecontrolscheduleheader": {"$ref": "#/definitions/DeviceControlScheduleHeader"},
      "meteredlaneidentifier": {"type": "integer"},
      "actionnumber": {"type": "integer"},
      "meteractioncontrol": {"type": "string"},
      "meterrequestedplan": {"type": "integer"},
      "meterrequestedrate": {"type": "integer"},
      "metervehiclespergreen": {"type": "integer"},
      "minmeterrate": {"type": "integer"},
      "maxmeterrate": {"type": "integer"},
      "meterlaneusagemode": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "RampMeterControlScheduleMsg": {
    "type": "object",
    "required": ["rampmetercontrolscheduleitem"],
    "properties": {
      "rampmetercontrolscheduleitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/RampMeterControlSchedule"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "MessageHeader.organizationsreceiving": {
    "type": "object",
    "required": ["organizationsreceivingitem"],
    "properties": {
      "organizationsreceivingitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/OrganizationInformation"},
        "maxItems": 100,

```

```

        "minItems": 1
    }
}
},
"MessageHeader.organizationsresponding": {
    "type": "object",
    "required": ["organizationsrespondingitem"],
    "properties": {
        "organizationsrespondingitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/OrganizationInformation"},
            "maxItems": 100,
            "minItems": 1
        }
    }
},
"MessageHeader": {
    "type": "object",
    "required": [
        "organizationsending",
        "messagetypeversion",
        "messagenumber",
        "messagetimestamp"
    ],
    "properties": {
        "organizationsending": {"$ref": "#/definitions/OrganizationInformation"},
        "organizationsreceiving": {"$ref":
"#/definitions/MessageHeader.organizationsreceiving"},
        "organizationsresponding": {"$ref":
"#/definitions/MessageHeader.organizationsresponding"},
        "messagetypeversion": {"type": "integer"},
        "messagenumber": {"type": "integer"},
        "messagetimestamp": {"$ref": "#/definitions/DateTimeZone"},
        "messageexpirytime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"EventReference": {
    "type": "object",
    "required": [

```

```

    "eventid",
    "eventupdate",
    "updatetime"
  ],
  "properties": {
    "eventid": {"type": "string"},
    "eventupdate": {"type": "integer"},
    "responseplanid": {"type": "string"},
    "updatetime": {"$ref": "#/definitions/DateTimeZone"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ProjectReference": {
  "type": "object",
  "required": [
    "projectreference",
    "permitreference",
    "projectcontacts",
    "projectdescription"
  ],
  "properties": {
    "projectreference": {"type": "string"},
    "permitreference": {"type": "string"},
    "projectcontacts": {"$ref": "#/definitions/OrganizationInformation"},
    "projectdescription": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"FullEventUpdate.projectreferences": {
  "type": "object",
  "properties": {
    "projectreference": {
      "type": "array",
      "items": {"$ref": "#/definitions/ProjectReference"},
      "maxItems": 64,
      "minItems": 0
    }
  }
}

```

```

    }
  }
},
"EventIndicator": {
  "type": "object",
  "required": [
    "status",
    "durationexceededflag",
    "prioritylevel",
    "severity",
    "impactlevel",
    "activeflag",
    "plannedeventclass"
  ],
  "properties": {
    "status": {"type": "string"},
    "durationexceededflag": {"type": "string"},
    "prioritylevel": {"type": "integer"},
    "severity": {"type": "string"},
    "impactlevel": {"type": "integer"},
    "activeflag": {"type": "string"},
    "plannedeventclass": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}
},
"FullEventUpdate.eventindicators": {
  "type": "object",
  "properties": {
    "eventindicator": {
      "type": "array",
      "items": {"$ref": "#/definitions/EventIndicator"},
      "maxItems": 64,
      "minItems": 0
    }
  }
}
},
"DeviceReference": {
  "type": "object",
  "required": ["deviceid"],
  "properties": {

```

```

    "deviceid": {"type": "string"},
    "devicetype": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "OtherReference": {
    "type": "object",
    "required": [
      "tripreference",
      "responsibleevent",
      "relatedevent",
      "previousevent",
      "splitevent",
      "mergedevent",
      "siblingevent",
      "associateddevice",
      "associatedurl"
    ],
    "properties": {
      "tripreference": {"type": "string"},
      "responsibleevent": {"$ref": "#/definitions/EventReference"},
      "relatedevent": {"$ref": "#/definitions/EventReference"},
      "previousevent": {"$ref": "#/definitions/EventReference"},
      "splitevent": {"$ref": "#/definitions/EventReference"},
      "mergedevent": {"$ref": "#/definitions/EventReference"},
      "siblingevent": {"$ref": "#/definitions/EventReference"},
      "associateddevice": {"$ref": "#/definitions/DeviceReference"},
      "associatedurl": {"$ref": "#/definitions/UrlReference"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "FullEventUpdate.otherreferences": {
    "type": "object",
    "required": ["otherreference"],
    "properties": {
      "otherreference": {

```

## TMDD Standards Update Recommendations – Data Structures

```
    "type": "array",
    "items": {"$ref": "#/definitions/OtherReference"},
    "maxItems": 64,
    "minItems": 1
  }
}
},
"EventType": {
  "type": "object",
  "required": [
    "trafficconditions",
    "accidentsandincidents",
    "closures",
    "roadwork",
    "obstruction",
    "delaystatuscancellation",
    "unusualdriving",
    "mobilesituation",
    "devicestatus",
    "restrictionclass",
    "incidentResponseStatus",
    "disasters",
    "disturbances",
    "sportingevents",
    "specialevents",
    "parkinginformation",
    "systeminformation",
    "weatherconditions",
    "precipitation",
    "winds",
    "visibilityandairquality",
    "temperature",
    "pavementconditions",
    "winterdrivingrestrictions",
    "winterdrivingindex",
    "suggestionAdvice",
    "warningAdvice",
    "adviceInstructionsRecommendations",
    "adviceInstructionsMandatory",
    "laneRoadway",
    "alternateRoute",
    "transitMode",
    "vehicleGroupAffected",
    "travelerGroupAffected",
```

## TMDD Standards Update Recommendations – Data Structures

```
"responderGroupAffected",
"incidentResponseEquipment",
"transitOperations",
"transitIncident",
"transitConstruction"
],
"properties": {
  "trafficconditions": {"type": "string"},
  "accidentsandincidents": {"type": "string"},
  "closures": {"type": "string"},
  "roadwork": {"type": "string"},
  "obstruction": {"type": "string"},
  "delaystatuscancellation": {"type": "string"},
  "unusualdriving": {"type": "string"},
  "mobilesituation": {"type": "string"},
  "devicestatus": {"type": "string"},
  "restrictionclass": {"type": "string"},
  "incidentResponseStatus": {"type": "string"},
  "disasters": {"type": "string"},
  "disturbances": {"type": "string"},
  "sportingevents": {"type": "string"},
  "specialevents": {"type": "string"},
  "parkinginformation": {"type": "string"},
  "systeminformation": {"type": "string"},
  "weatherconditions": {"type": "string"},
  "precipitation": {"type": "string"},
  "winds": {"type": "string"},
  "visibilityandairquality": {"type": "string"},
  "temperature": {"type": "string"},
  "pavementconditions": {"type": "string"},
  "winterdrivingrestrictions": {"type": "string"},
  "winterdrivingindex": {"type": "string"},
  "suggestionAdvice": {"type": "string"},
  "warningAdvice": {"type": "string"},
  "adviceInstructionsRecommendations": {"type": "string"},
  "adviceInstructionsMandatory": {"type": "string"},
  "laneRoadway": {"type": "string"},
  "alternateRoute": {"type": "string"},
  "transitMode": {"type": "string"},
  "vehicleGroupAffected": {"type": "string"},
  "travelerGroupAffected": {"type": "string"},
  "responderGroupAffected": {"type": "string"},
  "incidentResponseEquipment": {"type": "string"},
  "transitOperations": {"type": "string"},
}
```



```

    "transitIncident": {"type": "string"},
    "transitConstruction": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "EventHeadline": {
    "type": "object",
    "required": ["headline"],
    "properties": {
      "headline": {"$ref": "#/definitions/EventType"},
      "headlineelement": {"type": "integer"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "EventSource": {
    "type": "object",
    "properties": {
      "informationsource": {"$ref": "#/definitions/OrganizationInformation"},
      "eventdetectionmethod": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "EventAdvice": {
    "type": "object",
    "required": [
      "suggestion",
      "warning",
      "instructionrecommendation",
      "instructionmandatory",
      "alternateroute"
    ],
    "properties": {

```

```

    "suggestion": {"type": "string"},
    "warning": {"type": "string"},
    "instructionrecommendation": {"type": "string"},
    "instructionmandatory": {"type": "string"},
    "alternateroute": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"EventQualifier": {
  "type": "object",
  "required": [
    "qualifierngeneric",
    "locationgeneric",
    "laneroadway",
    "transitmode",
    "vehiclegroupaffected",
    "travelergroupaffected",
    "respondergroupaffected",
    "incidentresponseequipment",
    "transitlocations",
    "incidentresponsestatus"
  ],
  "properties": {
    "qualifierngeneric": {"type": "string"},
    "locationgeneric": {"type": "string"},
    "laneroadway": {"type": "string"},
    "transitmode": {"type": "string"},
    "vehiclegroupaffected": {"type": "string"},
    "travelergroupaffected": {"type": "string"},
    "respondergroupaffected": {"type": "string"},
    "incidentresponseequipment": {"type": "string"},
    "transitlocations": {"type": "string"},
    "incidentresponsestatus": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}
},

```

```

"DataExtent": {
  "type": "object",
  "required": [
    "lengthaffected",
    "proportionaffected",
    "abovealtitude",
    "belowaltitude"
  ],
  "properties": {
    "lengthaffected": {"type": "integer"},
    "proportionaffected": {"type": "integer"},
    "abovealtitude": {"type": "integer"},
    "belowaltitude": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"DataLinkState": {
  "type": "object",
  "required": [
    "delay",
    "peakdelay",
    "alternateroutedelay",
    "alternateroutepeakdelay",
    "headway",
    "traveltime",
    "capacityexisting",
    "traveltimeincrease",
    "speedaverage",
    "speedvehicleestimated",
    "descriptiontime",
    "density",
    "occupancy",
    "volume"
  ],
  "properties": {
    "delay": {"type": "integer"},
    "peakdelay": {"type": "integer"},
    "alternateroutedelay": {"type": "integer"},
    "alternateroutepeakdelay": {"type": "integer"},
    "headway": {"type": "integer"},
  }
}

```

```

    "traveltime": {"type": "integer"},
    "capacityexisting": {"type": "integer"},
    "traveltimeincrease": {"type": "integer"},
    "speedaverage": {"type": "integer"},
    "speedvehicleestimated": {"type": "integer"},
    "descriptiontime": {"type": "integer"},
    "density": {"type": "integer"},
    "occupancy": {"type": "integer"},
    "volume": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"DataIncidentDetails": {
  "type": "object",
  "required": [
    "vehiclesinvolvedcount",
    "carsinvolvedcount",
    "trucksinvolvedcount",
    "busesinvolvedcount",
    "humanfatalitiescount",
    "humaninjuriescount",
    "humanmajorinjuriescount",
    "humanminorinjuriescount"
  ],
  "properties": {
    "vehiclesinvolvedcount": {"type": "integer"},
    "carsinvolvedcount": {"type": "integer"},
    "trucksinvolvedcount": {"type": "integer"},
    "busesinvolvedcount": {"type": "integer"},
    "humanfatalitiescount": {"type": "integer"},
    "humaninjuriescount": {"type": "integer"},
    "humanmajorinjuriescount": {"type": "integer"},
    "humanminorinjuriescount": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},

```

```

>DataRoadWeather": {
  "type": "object",
  "required": [
    "avgwinddirection",
    "avgwindspeed",
    "avgwindgustspeed",
    "airtemperature",
    "dewpointtemp",
    "maxtemp",
    "mintemp",
    "relativehumidity",
    "atmosphericpressure",
    "preciprate",
    "snowfallaccumrate",
    "visibility",
    "uvindex",
    "probability"
  ],
  "properties": {
    "avgwinddirection": {"type": "integer"},
    "avgwindspeed": {"type": "integer"},
    "avgwindgustspeed": {"type": "integer"},
    "airtemperature": {"type": "integer"},
    "dewpointtemp": {"type": "integer"},
    "maxtemp": {"type": "integer"},
    "mintemp": {"type": "integer"},
    "relativehumidity": {"type": "integer"},
    "atmosphericpressure": {"type": "integer"},
    "preciprate": {"type": "integer"},
    "snowfallaccumrate": {"type": "integer"},
    "visibility": {"type": "integer"},
    "uvindex": {"type": "integer"},
    "probability": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
>DataParking": {
  "type": "object",
  "required": [
    "parkingspaces",

```

```

    "parkingoccupancy"
  ],
  "properties": {
    "parkingspaces": {"type": "integer"},
    "parkingoccupancy": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"DataSurfaceConditions": {
  "type": "object",
  "required": [
    "waterdepth",
    "adjacentsnowdepth",
    "roadwaysnowdepth",
    "roadwaysnowpackdepth",
    "icethickness",
    "surfacetemperature",
    "pavementtemperature",
    "surfacewaterdepth",
    "surfacesalinity",
    "surfacefreezepoint",
    "mobilefriction"
  ],
  "properties": {
    "waterdepth": {"type": "integer"},
    "adjacentsnowdepth": {"type": "integer"},
    "roadwaysnowdepth": {"type": "integer"},
    "roadwaysnowpackdepth": {"type": "integer"},
    "icethickness": {"type": "integer"},
    "surfacetemperature": {"type": "integer"},
    "pavementtemperature": {"type": "integer"},
    "surfacewaterdepth": {"type": "integer"},
    "surfacesalinity": {"type": "integer"},
    "surfacefreezepoint": {"type": "integer"},
    "mobilefriction": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

```

```

    }
  },
  "DataLinkRestrictions": {
    "type": "object",
    "required": [
      "speedlimitadvisory",
      "speedlimit",
      "speedlimittruck",
      "restrictionlength",
      "restrictionheight",
      "restrictionwidth",
      "restrictionweightvehicle",
      "restrictionweightaxle",
      "restrictionaxlecount"
    ],
    "properties": {
      "speedlimitadvisory": {"type": "integer"},
      "speedlimit": {"type": "integer"},
      "speedlimittruck": {"type": "integer"},
      "restrictionlength": {"type": "integer"},
      "restrictionheight": {"type": "integer"},
      "restrictionwidth": {"type": "integer"},
      "restrictionweightvehicle": {"type": "integer"},
      "restrictionweightaxle": {"type": "integer"},
      "restrictionaxlecount": {"type": "integer"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "EventQuantity": {
    "type": "object",
    "required": [
      "extent",
      "linkstate",
      "incidentdetails",
      "roadweather",
      "parkingdata",
      "surfaceconditions",
      "linkrestrictions"
    ],
    "properties": {

```

```

    "extent": {"$ref": "#/definitions/DataExtent"},
    "linkstate": {"$ref": "#/definitions/DataLinkState"},
    "incidentdetails": {"$ref": "#/definitions/DataIncidentDetails"},
    "roadweather": {"$ref": "#/definitions/DataRoadWeather"},
    "parkingdata": {"$ref": "#/definitions/DataParking"},
    "surfaceconditions": {"$ref": "#/definitions/DataSurfaceConditions"},
    "linkrestrictions": {"$ref": "#/definitions/DataLinkRestrictions"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"AreaLocation": {
  "type": "object",
  "properties": {
    "areaid": {"type": "string"},
    "areaname": {"type": "string"},
    "locationrank": {"type": "integer"},
    "upwardareareference": {"$ref": "#/definitions/AreaLocation"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"LandmarkLocation": {
  "type": "object",
  "required": [
    "landmarktype",
    "landmarkname"
  ],
  "properties": {
    "landmarktype": {"type": "string"},
    "landmarkname": {"type": "string"},
    "landmarkpointname": {"type": "string"},
    "locationrank": {"type": "integer"},
    "geolocation": {"$ref": "#/definitions/GeoLocation"},
    "upwardareareference": {"$ref": "#/definitions/AreaLocation"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
    }
  }
}

```



```

        "minItems": 0
    }
}
},
"PointOnLink.crossstreetdesignator": {
    "type": "object",
    "required": ["crossstreetidentifier"],
    "properties": {
        "crossstreetidentifier": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 8,
            "minItems": 1
        }
    }
}
},
"PointOnLink.crossstreetname": {
    "type": "object",
    "required": ["crossstreetnameitem"],
    "properties": {
        "crossstreetnameitem": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 8,
            "minItems": 1
        }
    }
}
},
"PointOnLink.signeddestination": {
    "type": "object",
    "required": ["signeddestinationitem"],
    "properties": {
        "signeddestinationitem": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 8,
            "minItems": 1
        }
    }
}
},
"PointOnLink": {
    "type": "object",
    "required": ["geolocation"],
    "properties": {

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    "geolocation": {"$ref": "#/definitions/GeoLocation"},
    "linearreference": {"type": "string"},
    "linkname": {"type": "string"},
    "pointname": {"type": "string"},
    "crossstreetdesignator": {"$ref": "#/definitions/PointOnLink.crossstreetdesignator"},
    "crossstreetname": {"$ref": "#/definitions/PointOnLink.crossstreetname"},
    "signeddestination": {"$ref": "#/definitions/PointOnLink.signeddestination"},
    "locationrank": {"type": "integer"},
    "landmarktype": {"type": "string"},
    "upwardareareference": {"$ref": "#/definitions/AreaLocation"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"LinkLocation.alternatedesignations": {
  "type": "object",
  "required": ["alternatedesignation"],
  "properties": {
    "alternatedesignation": {
      "type": "array",
      "items": {"$ref": "#/definitions/LinkLocation"},
      "maxItems": 8,
      "minItems": 1
    }
  }
},
"LinkLocation": {
  "type": "object",
  "required": ["primarylocation"],
  "properties": {
    "linkownership": {"type": "string"},
    "linkdesignator": {"type": "string"},
    "secondlinkdesignator": {"type": "string"},
    "linkid": {"type": "string"},
    "linkname": {"type": "string"},
    "primarylocation": {"$ref": "#/definitions/PointOnLink"},
    "secondarylocation": {"$ref": "#/definitions/PointOnLink"},
    "linkdirection": {"type": "string"},
    "linkalignment": {"type": "string"},
    "linearreferenceversion": {"type": "integer"},
    "alternatedesignations": {"$ref": "#/definitions/LinkLocation.alternatedesignations"},

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        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    },
    "AlternateRouteDetail.locationonalternateroute": {
        "type": "object",
        "required": ["locationonalternaterouteitem"],
        "properties": {
            "locationonalternaterouteitem": {
                "type": "array",
                "items": {"$ref": "#/definitions/LinkLocation"},
                "maxItems": 10,
                "minItems": 1
            }
        }
    },
    "AlternateRouteDetail": {
        "type": "object",
        "required": ["alternateroutetype"],
        "properties": {
            "alternateroutetype": {"type": "string"},
            "destination": {"$ref": "#/definitions/LandmarkLocation"},
            "locationonalternateroute": {"$ref":
"/definitions/AlternateRouteDetail.locationonalternateroute"},
            "Any": {
                "type": "array",
                "items": {"type": "object"},
                "minItems": 0
            }
        }
    },
    "AdditionalText": {
        "type": "object",
        "required": ["description"],
        "properties": {
            "description": {"type": "string"},
            "language": {"type": "string"},
            "reportmedium": {"type": "string"},
            "Any": {
                "type": "array",
                "items": {"type": "object"},
            }
        }
    }
}

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        "minItems": 0
    }
}
},
"EventDescription": {
    "type": "object",
    "required": [
        "phrase",
        "cause",
        "advice",
        "qualifier",
        "quantity",
        "relatedlandmark",
        "detour",
        "additionaltext",
        "qualifiertime"
    ],
    "properties": {
        "phrase": {"$ref": "#/definitions/EventType"},
        "cause": {"$ref": "#/definitions/EventType"},
        "advice": {"$ref": "#/definitions/EventAdvice"},
        "qualifier": {"$ref": "#/definitions/EventQualifier"},
        "quantity": {"$ref": "#/definitions/EventQuantity"},
        "relatedlandmark": {"$ref": "#/definitions/LandmarkLocation"},
        "detour": {"$ref": "#/definitions/AlternateRouteDetail"},
        "additionaltext": {"$ref": "#/definitions/AdditionalText"},
        "qualifiertime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"EventElementDetail.eventdescriptions": {
    "type": "object",
    "required": ["eventdescription"],
    "properties": {
        "eventdescription": {
            "type": "array",
            "items": {"$ref": "#/definitions/EventDescription"},
            "maxItems": 1024,
            "minItems": 1
        }
    }
}

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    }
  },
  "EventLocation": {
    "type": "object",
    "required": [
      "arealocation",
      "locationonlink",
      "landmark",
      "geolocation"
    ],
    "properties": {
      "arealocation": {"$ref": "#/definitions/AreaLocation"},
      "locationonlink": {"$ref": "#/definitions/LinkLocation"},
      "landmark": {"$ref": "#/definitions/LandmarkLocation"},
      "geolocation": {"$ref": "#/definitions/GeoLocation"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},
"EventElementDetail.eventlocations": {
  "type": "object",
  "required": ["eventlocation"],
  "properties": {
    "eventlocation": {
      "type": "array",
      "items": {"$ref": "#/definitions/EventLocation"},
      "maxItems": 20,
      "minItems": 1
    }
  }
},
"EventPeriod": {
  "type": "object",
  "required": ["daysoftheweek"],
  "properties": {
    "daysoftheweek": {"type": "string"},
    "effectiveperiodqualifier": {"type": "string"},
    "holidayday": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
    }
  }
}

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        "minItems": 0
    }
}
},
"ValidPeriod.effectiveperiods": {
    "type": "object",
    "required": ["effectiveperiod"],
    "properties": {
        "effectiveperiod": {
            "type": "array",
            "items": {"$ref": "#/definitions/EventPeriod"},
            "maxItems": 16,
            "minItems": 1
        }
    }
},
"ValidPeriod": {
    "type": "object",
    "required": [
        "expectedendtime",
        "estimatedduration",
        "effectiveperiods"
    ],
    "properties": {
        "expectedendtime": {"$ref": "#/definitions/DateTimeZone"},
        "estimatedduration": {"type": "integer"},
        "effectiveperiods": {"$ref": "#/definitions/ValidPeriod.effectiveperiods"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"EventTimes.scheduleelementids": {
    "type": "object",
    "required": ["eventscheduleelementidentifier"],
    "properties": {
        "eventscheduleelementidentifier": {
            "type": "array",
            "items": {"type": "integer"},
            "maxItems": 20,
            "minItems": 1
        }
    }
}

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    }
  },
  "RecurrentTime.scheduletimes": {
    "type": "object",
    "required": ["time"],
    "properties": {
      "time": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 64,
        "minItems": 1
      }
    }
  },
  "RecurrentTime": {
    "type": "object",
    "required": [
      "recurrentperiod",
      "utcoffset"
    ],
    "properties": {
      "recurrentperiod": {"$ref": "#/definitions/EventPeriod"},
      "scheduletimes": {"$ref": "#/definitions/RecurrentTime.scheduletimes"},
      "utcoffset": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "EventTimes.recurrenttimes": {
    "type": "object",
    "required": ["recurrenttime"],
    "properties": {
      "recurrenttime": {
        "type": "array",
        "items": {"$ref": "#/definitions/RecurrentTime"},
        "maxItems": 64,
        "minItems": 1
      }
    }
  },
  "EventTimes": {

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"type": "object",
"required": ["updatetime"],
"properties": {
  "updatetime": {"$ref": "#/definitions/DateTimeZone"},
  "validperiod": {"$ref": "#/definitions/ValidPeriod"},
  "scheduleelementids": {"$ref": "#/definitions/EventTimes.scheduleelementids"},
  "sequencetime": {"$ref": "#/definitions/DateTimeZone"},
  "starttime": {"$ref": "#/definitions/DateTimeZone"},
  "alternatestarttime": {"$ref": "#/definitions/DateTimeZone"},
  "alternateendtime": {"$ref": "#/definitions/DateTimeZone"},
  "expectedstarttime": {"$ref": "#/definitions/DateTimeZone"},
  "expectedendtime": {"$ref": "#/definitions/DateTimeZone"},
  "recurrenttimes": {"$ref": "#/definitions/EventTimes.recurrenttimes"},
  "plannedeventcontinuousflag": {"type": "string"},
  "Any": {
    "type": "array",
    "items": {"type": "object"},
    "minItems": 0
  }
}
},
"EventLane.eventlanesaffected": {
  "type": "object",
  "required": ["lanes"],
  "properties": {
    "lanes": {
      "type": "array",
      "items": {"type": "integer"},
      "maxItems": 64,
      "minItems": 1
    }
  }
},
"EventLane": {
  "type": "object",
  "properties": {
    "lanestype": {"type": "string"},
    "linkdirection": {"type": "string"},
    "lanestotaloriginal": {"type": "integer"},
    "lanestotalaffected": {"type": "integer"},
    "eventlanesaffected": {"$ref": "#/definitions/EventLane.eventlanesaffected"},
    "lanesstatus": {"type": "string"},
    "Any": {
      "type": "array",

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        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"EventElementDetail.eventlanes": {
    "type": "object",
    "required": ["eventlane"],
    "properties": {
        "eventlane": {
            "type": "array",
            "items": {"$ref": "#/definitions/EventLane"},
            "maxItems": 256,
            "minItems": 1
        }
    }
},
"EventTransitLocation": {
    "type": "object",
    "required": ["transitrouteid"],
    "properties": {
        "transitrouteid": {"type": "string"},
        "transitdirection": {"type": "string"},
        "transitstopdetail": {"type": "string"},
        "transitlocationtext": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"EventElementDetail.eventtransitlocations": {
    "type": "object",
    "required": ["eventtransitlocationitem"],
    "properties": {
        "eventtransitlocationitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/EventTransitLocation"},
            "maxItems": 100,
            "minItems": 1
        }
    }
},
}

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"Hazmat": {
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  "properties": {
    "hazmatcode": {"type": "integer"},
    "placardcode": {"type": "integer"},
    "placarddisplayedaccuracy": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"EventElementDetail.eventhazmatdetails": {
  "type": "object",
  "required": ["eventhazmatdetailsitem"],
  "properties": {
    "eventhazmatdetailsitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/Hazmat"},
      "maxItems": 100,
      "minItems": 1
    }
  }
},
"GeometrySpatialData": {
  "type": "object",
  "required": ["geometrywkt"],
  "properties": {
    "geometrywkt": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"EventElementDetail": {
  "type": "object",
  "required": ["eventtimes"],
  "properties": {
    "elementid": {"type": "integer"},
    "scheduleelementid": {"type": "integer"},
    "eventcategory": {"type": "string"},

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    "eventsource": {"$ref": "#/definitions/EventSource"},
    "eventdescriptions": {"$ref": "#/definitions/EventElementDetail.eventdescriptions"},
    "eventlocations": {"$ref": "#/definitions/EventElementDetail.eventlocations"},
    "eventtimes": {"$ref": "#/definitions/EventTimes"},
    "eventname": {"type": "string"},
    "eventlanes": {"$ref": "#/definitions/EventElementDetail.eventlanes"},
    "eventtransitlocations": {"$ref":
"/definitions/EventElementDetail.eventtransitlocations"},
    "eventhazmatdetails": {"$ref": "#/definitions/EventElementDetail.eventhazmatdetails"},
    "confidencelevel": {"type": "string"},
    "accesslevel": {"type": "string"},
    "eventzoneofinfluence": {"$ref": "#/definitions/GeometrySpatialData"},
    "Any": {
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      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"FullEventUpdate.eventelementdetails": {
  "type": "object",
  "required": ["eventelementdetail"],
  "properties": {
    "eventelementdetail": {
      "type": "array",
      "items": {"$ref": "#/definitions/EventElementDetail"},
      "maxItems": 64,
      "minItems": 1
    }
  }
},
"EventComments": {
  "type": "object",
  "required": ["eventcomment"],
  "properties": {
    "eventcomment": {"type": "string"},
    "operatorid": {"type": "string"},
    "operatorcomment": {"type": "string"},
    "language": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

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    }
  },
  "FullReportText": {
    "type": "object",
    "required": [
      "reportmedium",
      "description"
    ],
    "properties": {
      "reportmedium": {"type": "string"},
      "description": {"type": "string"},
      "language": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},
"FullEventUpdate.fullreporttexts": {
  "type": "object",
  "required": ["fullreporttext"],
  "properties": {
    "fullreporttext": {
      "type": "array",
      "items": {"$ref": "#/definitions/FullReportText"},
      "maxItems": 100,
      "minItems": 1
    }
  }
},
"FullEventUpdate": {
  "type": "object",
  "required": ["messageheader"],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "messageheader": {"$ref": "#/definitions/MessageHeader"},
    "eventreference": {"$ref": "#/definitions/EventReference"},
    "projectreferences": {"$ref": "#/definitions/FullEventUpdate.projectreferences"},
    "eventindicators": {"$ref": "#/definitions/FullEventUpdate.eventindicators"},
    "otherreferences": {"$ref": "#/definitions/FullEventUpdate.otherreferences"},
    "eventheadline": {"$ref": "#/definitions/EventHeadline"},
    "eventelementdetails": {"$ref": "#/definitions/FullEventUpdate.eventelementdetails"},
    "eventcomments": {"$ref": "#/definitions/EventComments"},
  }
}

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    "fullreporttexts": {"$ref": "#/definitions/FullEventUpdate.fullreporttexts"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "FEUMsg": {
    "type": "object",
    "required": ["FEU"],
    "properties": {
      "FEU": {
        "type": "array",
        "items": {"$ref": "#/definitions/FullEventUpdate"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "ResponsePlanRequestHeader": {
    "type": "object",
    "required": [
      "organizationsending",
      "organizationreceiving",
      "requestid",
      "corridorid"
    ],
    "properties": {
      "organizationsending": {"$ref": "#/definitions/OrganizationInformation"},
      "organizationreceiving": {"$ref": "#/definitions/OrganizationInformation"},
      "requestid": {"type": "string"},
      "requesttime": {"$ref": "#/definitions/DateTimeZone"},
      "corridorid": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "ResponsePlanRequestFilter.evaluationcyclelist": {
    "type": "object",
    "required": ["evaluationcycle"],

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    "properties": {
      "evaluationcycle": {
        "type": "array",
        "items": {"type": "integer"},
        "maxItems": 128,
        "minItems": 1
      }
    }
  },
  "ResponsePlanRequestFilter.responseplanranklist": {
    "type": "object",
    "required": ["responseplanrank"],
    "properties": {
      "responseplanrank": {
        "type": "array",
        "items": {"type": "integer"},
        "maxItems": 128,
        "minItems": 1
      }
    }
  },
  "ResponsePlanRequestFilter.responseplanidlist": {
    "type": "object",
    "required": ["responseplanid"],
    "properties": {
      "responseplanid": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 128,
        "minItems": 1
      }
    }
  },
  "ResponsePlanRequestFilter.responseplanstatuslist": {
    "type": "object",
    "required": ["responseplanstatus"],
    "properties": {
      "responseplanstatus": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 128,
        "minItems": 1
      }
    }
  }
}

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    },
    "ResponsePlanRequestFilter": {
      "type": "object",
      "required": ["eventid"],
      "properties": {
        "eventid": {"type": "string"},
        "evaluationcyclelist": {"$ref":
"#/definitions/ResponsePlanRequestFilter.evaluationcyclelist"},
        "responseplanranklist": {"$ref":
"#/definitions/ResponsePlanRequestFilter.responseplanranklist"},
        "responseplanidlist": {"$ref":
"#/definitions/ResponsePlanRequestFilter.responseplanidlist"},
        "plantype": {"type": "string"},
        "responseplanstatuslist": {"$ref":
"#/definitions/ResponsePlanRequestFilter.responseplanstatuslist"},
        "Any": {
          "type": "array",
          "items": {"type": "object"},
          "minItems": 0
        }
      }
    }
  },
  "ResponsePlanLogRequest": {
    "type": "object",
    "required": [
      "authentication",
      "responseplanrequestheader",
      "responseplanrequestfilter"
    ],
    "properties": {
      "authentication": {"$ref": "#/definitions/Authentication"},
      "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
      "responseplanrequestfilter": {"$ref": "#/definitions/ResponsePlanRequestFilter"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},
"DeviceStatusHeader": {
  "type": "object",
  "required": [
    "organizationinformation",

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    "deviceid",
    "devicestatus"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "deviceid": {"type": "string"},
    "devicestatus": {"type": "string"},
    "centerid": {"type": "string"},
    "devicecommstatus": {"type": "string"},
    "operatorid": {"type": "string"},
    "eventid": {"type": "string"},
    "responseplanid": {"type": "string"},
    "lastcommtime": {"$ref": "#/definitions/DateTimeZone"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"GateStatus": {
  "type": "object",
  "required": [
    "devicestatusheader",
    "gatestatus"
  ],
  "properties": {
    "devicestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
    "gatestatus": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"GateStatusMsg": {
  "type": "object",
  "required": ["gatestatusitem"],
  "properties": {
    "gatestatusitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/GateStatus"},
    }
  }
}

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        "maxItems": 10240,
        "minItems": 1
    }
}
},
"DeviceControlRequestHeader": {
    "type": "object",
    "required": [
        "authentication",
        "organizationrequesting",
        "deviceid",
        "requestid"
    ],
    "properties": {
        "authentication": {"$ref": "#/definitions/Authentication"},
        "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
        "deviceid": {"type": "string"},
        "requestid": {"type": "string"},
        "eventid": {"type": "string"},
        "responseplanid": {"type": "string"},
        "commandrequestpriority": {"type": "integer"},
        "commandstarttime": {"$ref": "#/definitions/DateTimeZone"},
        "commandendtime": {"$ref": "#/definitions/DateTimeZone"},
        "commandrequesttime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"HARControlDetails": {
    "type": "object",
    "required": [
        "harmessage",
        "harmessagenumber"
    ],
    "properties": {
        "harmessage": {"type": "string"},
        "harmessagenumber": {"type": "string"}
    }
}
},
"HARControlRequest": {
    "type": "object",

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"required": [
  "devicecontrolrequestheader",
  "harrequestcommand",
  "harcommandparameters"
],
"properties": {
  "devicecontrolrequestheader": {"$ref": "#/definitions/DeviceControlRequestHeader"},
  "harrequestcommand": {"type": "string"},
  "harcommandparameters": {"$ref": "#/definitions/HARControlDetails"},
  "Any": {
    "type": "array",
    "items": {"type": "object"},
    "minItems": 0
  }
}
},
"DialogInformation.supporteddialogsubscriptiontypelist": {
  "type": "object",
  "required": ["supportedsubscriptiontype"],
  "properties": {
    "supportedsubscriptiontype": {
      "type": "array",
      "items": {"type": "string"},
      "maxItems": 3,
      "minItems": 1
    }
  }
},
"DialogInformation.supporteddatatypes": {
  "type": "object",
  "required": ["supporteddatatype"],
  "properties": {
    "supporteddatatype": {"$ref": "#/definitions/DataType"}
  }
},
"DialogInformation.supporteddialogbehaviorlist": {
  "type": "object",
  "required": ["supporteddialogbehavior"],
  "properties": {
    "supporteddialogbehavior": {"$ref": "#/definitions/DialogBehavior"}
  }
},
"DialogInformation": {
  "type": "object",

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    "required": ["dialogname"],
    "properties": {
      "dialogname": {"$ref": "#/definitions/DialogName"},
      "supporteddialogsubscriptiontypelist": {"$ref":
"#/definitions/DialogInformation.supporteddialogsubscriptiontypelist"},
      "supporteddatatypes": {"$ref": "#/definitions/DialogInformation.supporteddatatypes"},
      "supporteddialogbehaviorlist": {"$ref":
"#/definitions/DialogInformation.supporteddialogbehaviorlist"},
      "minmessagetimeinterval": {"type": "integer"},
      "minfieldpollinginterval": {"type": "integer"},
      "onchangetriggerfields": {"type": "string"},
      "maximumdevices": {"type": "integer"}
    }
  },
  "AvailableDialogsResponse.dialoglist": {
    "type": "object",
    "required": ["dialogInformation"],
    "properties": {
      "dialogInformation": {"$ref": "#/definitions/DialogInformation"}
    }
  },
  "TMDDExtension": {
    "type": "object",
    "properties": {
      "Any": {
        "type": "array",
        "items": {},
        "minItems": 0
      }
    }
  },
  "AvailableDialogsResponseExt": {
    "type": "object",
    "required": [
      "versionid",
      "extension"
    ],
    "properties": {
      "versionid": {"type": "integer"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },
  "AvailableDialogsResponse": {
    "type": "object",

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"required": [
  "organizationinformation",
  "centerid",
  "centername",
  "dialoglist",
  "availableDialogsResponseExt"
],
"properties": {
  "restrictions": {"$ref": "#/definitions/Restrictions"},
  "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
  "centerid": {"type": "string"},
  "centername": {"type": "string"},
  "dialoglist": {"$ref": "#/definitions/AvailableDialogsResponse.dialoglist"},
  "availableDialogsResponseExt": {"$ref": "#/definitions/AvailableDialogsResponseExt"},
  "Any": {
    "type": "array",
    "items": {"type": "object"},
    "minItems": 0
  }
}
},
"DetectorMaintenanceHistoryRequest": {
  "type": "object",
  "required": ["deviceinformationrequestheader"],
  "properties": {
    "deviceinformationrequestheader": {"$ref": "#/definitions/DeviceInformationRequest"},
    "detectorstationid": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ESSInventoryDetails": {
  "type": "object",
  "required": ["esssensorinventoryheader"],
  "properties": {
    "esssensorinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
    "lanenumber": {"type": "integer"},
    "sensorlocationelevation": {"type": "integer"},
    "sensorlocationheight": {"type": "integer"},
    "sensortype": {"type": "string"},
    "sensoroperationtype": {"type": "string"},
  }
}

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        "sensormobilitytype": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    },
    "ESSInventory.essinventorylist": {
        "type": "object",
        "properties": {
            "esssensor": {
                "type": "array",
                "items": {"$ref": "#/definitions/ESSInventoryDetails"},
                "maxItems": 64,
                "minItems": 0
            }
        }
    },
    "ESSInventory": {
        "type": "object",
        "required": [
            "deviceinventoryheader",
            "essinventorylist"
        ],
        "properties": {
            "deviceinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
            "essinventorylist": {"$ref": "#/definitions/ESSInventory.essinventorylist"},
            "Any": {
                "type": "array",
                "items": {"type": "object"},
                "minItems": 0
            }
        }
    },
    "ESSInventoryMsg": {
        "type": "object",
        "required": ["essinventoryitem"],
        "properties": {
            "essinventoryitem": {
                "type": "array",
                "items": {"$ref": "#/definitions/ESSInventory"},
                "maxItems": 10240,
                "minItems": 1
            }
        }
    }
}

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    }
  }
},
"ESSObservationType": {
  "type": "object",
  "required": [
    "weatherdata",
    "pavementdata",
    "subsurfacedata"
  ],
  "properties": {
    "weatherdata": {"type": "string"},
    "pavementdata": {"type": "string"},
    "subsurfacedata": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ESSObservationReportDetail": {
  "type": "object",
  "required": [
    "esssensorid",
    "essobservationtimestamp",
    "essobservationtype"
  ],
  "properties": {
    "esssensorid": {"type": "string"},
    "essobservationtimestamp": {"$ref": "#/definitions/DateTimeZone"},
    "essobservationtype": {"$ref": "#/definitions/ESSObservationType"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ESSObservationReport.essdatalist": {
  "type": "object",
  "properties": {
    "esssensor": {
      "type": "array",

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        "items": {"$ref": "#/definitions/ESSObservationReportDetail"},
        "maxItems": 64,
        "minItems": 0
    }
}
},
"ESSObservationReport": {
    "type": "object",
    "required": [
        "organizationinformation",
        "stationid",
        "essdatalist"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "stationid": {"type": "string"},
        "essdatalist": {"$ref": "#/definitions/ESSObservationReport.essdatalist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"ESSObservationReportMsg": {
    "type": "object",
    "required": ["essobservationreportitem"],
    "properties": {
        "essobservationreportitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/ESSObservationReport"},
            "maxItems": 10240,
            "minItems": 1
        }
    }
}
},
"eSSObservationReportUpdateMsg": {
    "type": "object",
    "required": [
        "c2cMsgAdmin",
        "message"
    ],
    "properties": {

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        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/ESSObservationReportMsg"}
    }
},
"RampMeterLaneStatusDetails": {
    "type": "object",
    "required": [
        "meteredlanestatusheader",
        "meterimplementedaction"
    ],
    "properties": {
        "meteredlanestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
        "meterimplementedaction": {"type": "string"},
        "requestedmetercommandsource": {"type": "string"},
        "implementedmetercommandsource": {"type": "string"},
        "meterimplementedplan": {"type": "integer"},
        "meterimplementedrate": {"type": "integer"},
        "meterimplementedvehiclespergreen": {"type": "integer"},
        "meterrequestedaction": {"type": "string"},
        "meterrequestedplan": {"type": "integer"},
        "meterrequestedrate": {"type": "integer"},
        "meterrequestedvehiclespergreen": {"type": "integer"},
        "operationalminmeterrate": {"type": "integer"},
        "operationalmaxmeterrate": {"type": "integer"},
        "meterdemanddetectorstatus": {"type": "string"},
        "meterpassagedetectorstatus": {"type": "string"},
        "meterqueuedetectorstatus": {"type": "string"},
        "metercyclecount": {"type": "integer"},
        "meteredlanevehiclecount": {"type": "integer"},
        "meterqueuedetectedflag": {"type": "string"},
        "meteredlaneviolationcount": {"type": "integer"},
        "hallowmeterbypass": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"RampMeterStatus.meteredstatuslist": {
    "type": "object",
    "properties": {
        "meteredlane": {
            "type": "array",

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        "items": {"$ref": "#/definitions/RampMeterLaneStatusDetails"},
        "maxItems": 24,
        "minItems": 0
    }
}
},
"RampMeterStatus": {
    "type": "object",
    "required": [
        "devicestatusheader",
        "meteredstatuslist"
    ],
    "properties": {
        "devicestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
        "meteredstatuslist": {"$ref": "#/definitions/RampMeterStatus.meteredstatuslist"},
        "mainlineflowrate": {"type": "integer"},
        "mainlinevehicleoccupancy": {"type": "integer"},
        "mainlinevehiclespeed": {"type": "integer"},
        "operationalterationauthorization": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"RampMeterStatusMsg": {
    "type": "object",
    "required": ["rampmeterstatusitem"],
    "properties": {
        "rampmeterstatusitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/RampMeterStatus"},
            "maxItems": 10240,
            "minItems": 1
        }
    }
}
},
"SectionStatus.deviceidlist": {
    "type": "object",
    "required": ["deviceid"],
    "properties": {
        "deviceid": {
            "type": "array",

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        "items": {"type": "string"},
        "maxItems": 255,
        "minItems": 1
    }
}
},
"SectionStatus": {
    "type": "object",
    "required": [
        "organizationinformation",
        "sectionid",
        "deviceidlist",
        "sectioncontrolmode",
        "timingpatternid"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "sectionid": {"type": "string"},
        "sectionname": {"type": "string"},
        "deviceidlist": {"$ref": "#/definitions/SectionStatus.deviceidlist"},
        "sectioncontrolmode": {"type": "string"},
        "timingpatternid": {"type": "string"},
        "timingpatternname": {"type": "string"},
        "cycletime": {"type": "integer"},
        "operatorid": {"type": "string"},
        "eventid": {"type": "string"},
        "responseplanid": {"type": "string"},
        "lastcommtime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"SectionStatusMsg": {
    "type": "object",
    "required": ["sectionstatusitem"],
    "properties": {
        "sectionstatusitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/SectionStatus"},
            "maxItems": 10240,

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        "minItems": 1
    }
}
},
"EventDetails": {
    "type": "object",
    "required": [
        "eventid",
        "starttime",
        "fulleventupdate"
    ],
    "properties": {
        "eventid": {"type": "string"},
        "starttime": {"$ref": "#/definitions/DateTimeZone"},
        "endtime": {"$ref": "#/definitions/DateTimeZone"},
        "fulleventupdate": {"$ref": "#/definitions/FullEventUpdate"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"ResponsePlanHeader": {
    "type": "object",
    "required": [
        "eventid",
        "responseplanid",
        "plantype",
        "evaluationcycle"
    ],
    "properties": {
        "eventid": {"type": "string"},
        "responseplanid": {"type": "string"},
        "plantype": {"type": "string"},
        "evaluationcycle": {"type": "integer"},
        "responseplanrank": {"type": "integer"},
        "submissiontime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
}

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    },
    "ResponsePlanDetails.agencylist": {
      "type": "object",
      "required": ["agency"],
      "properties": {
        "agency": {
          "type": "array",
          "items": {"$ref": "#/definitions/OrganizationInformation"},
          "maxItems": 255,
          "minItems": 1
        }
      }
    }
  },
  "RouteInventoryList.routelinkidlist": {
    "type": "object",
    "required": ["link"],
    "properties": {
      "link": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 255,
        "minItems": 1
      }
    }
  }
},
"RouteInventoryList.alternateroutenamelist": {
  "type": "object",
  "required": ["routename"],
  "properties": {
    "routename": {
      "type": "array",
      "items": {"type": "string"},
      "maxItems": 255,
      "minItems": 1
    }
  }
}
},
"RouteInventoryList.routenodeidlist": {
  "type": "object",
  "required": ["nodeid"],
  "properties": {
    "nodeid": {
      "type": "array",
      "items": {"type": "string"},
    }
  }
}

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        "maxItems": 255,
        "minItems": 1
    }
}
},
"RouteInventoryList": {
    "type": "object",
    "required": [
        "networkid",
        "routeid",
        "routelinkidlist",
        "routetype"
    ],
    "properties": {
        "networkid": {"type": "string"},
        "networkname": {"type": "string"},
        "routeid": {"type": "string"},
        "routelinkidlist": {"$ref": "#/definitions/RouteInventoryList.routelinkidlist"},
        "routetype": {"type": "string"},
        "routename": {"type": "string"},
        "alternateroutenamelist": {"$ref":
"#/definitions/RouteInventoryList.alternateroutenamelist"},
        "routelength": {"type": "integer"},
        "routenodeidlist": {"$ref": "#/definitions/RouteInventoryList.routenodeidlist"},
        "routeurl": {"$ref": "#/definitions/UrlReference"},
        "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"ResponsePlanDetails.detourlist": {
    "type": "object",
    "required": ["detour"],
    "properties": {
        "detour": {
            "type": "array",
            "items": {"$ref": "#/definitions/RouteInventoryList"},
            "maxItems": 255,
            "minItems": 1
        }
    }
}
}

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    },
    "RampControlDetails": {
      "type": "object",
      "properties": {
        "meterrequestedplan": {"type": "integer"},
        "meterrequestedrate": {"type": "integer"}
      }
    },
    "RampMeterLaneControlDetails": {
      "type": "object",
      "required": [
        "meteredlaneidentifier",
        "meterrequestcommand"
      ],
      "properties": {
        "meteredlaneidentifier": {"type": "integer"},
        "meterrequestcommand": {"type": "string"},
        "metercommandparameters": {"$ref": "#/definitions/RampControlDetails"},
        "Any": {
          "type": "array",
          "items": {"type": "object"},
          "minItems": 0
        }
      }
    },
    "RampMeterControlRequest.meteredlanelist": {
      "type": "object",
      "properties": {
        "meteredlane": {
          "type": "array",
          "items": {"$ref": "#/definitions/RampMeterLaneControlDetails"},
          "maxItems": 24,
          "minItems": 0
        }
      }
    },
    "RampMeterControlRequest": {
      "type": "object",
      "required": [
        "devicecontrolrequestheader",
        "meteredlanelist"
      ],
      "properties": {
        "devicecontrolrequestheader": {"$ref": "#/definitions/DeviceControlRequestHeader"},

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    "meteredlanelist": {"$ref": "#/definitions/RampMeterControlRequest.meteredlanelist"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "ResponsePlanDetails.rampmeteringcontrolactionlist": {
    "type": "object",
    "required": ["rampmeteringcontrolaction"],
    "properties": {
      "rampmeteringcontrolaction": {
        "type": "array",
        "items": {"$ref": "#/definitions/RampMeterControlRequest"},
        "maxItems": 255,
        "minItems": 1
      }
    }
  },
  "IntersectionSignalControlDetails": {
    "type": "object",
    "properties": {
      "requesttimingmode": {"type": "string"},
      "timingpatternid": {"type": "string"},
      "offsetadjustment": {"type": "integer"}
    }
  },
  "IntersectionSignalControlRequest": {
    "type": "object",
    "required": [
      "devicecontrolrequestheader",
      "intersectionrequestcommand",
      "intersectioncommandparameters"
    ],
    "properties": {
      "devicecontrolrequestheader": {"$ref": "#/definitions/DeviceControlRequestHeader"},
      "intersectionrequestcommand": {"type": "string"},
      "intersectioncommandparameters": {"$ref":
"/definitions/IntersectionSignalControlDetails"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
}

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    }
  }
},
"ResponsePlanDetails.intersectioncontrollist": {
  "type": "object",
  "required": ["intersectioncontrol"],
  "properties": {
    "intersectioncontrol": {
      "type": "array",
      "items": {"$ref": "#/definitions/IntersectionSignalControlRequest"},
      "maxItems": 255,
      "minItems": 1
    }
  }
},
"DMSControlDetails": {
  "type": "object",
  "required": [
    "dmsmessage",
    "messagenumber"
  ],
  "properties": {
    "dmsmessage": {"type": "string"},
    "messagenumber": {"type": "string"}
  }
},
"DMSControlRequest": {
  "type": "object",
  "required": [
    "devicecontrolrequestheader",
    "dmsrequestcommand",
    "dmscommandparameters"
  ],
  "properties": {
    "devicecontrolrequestheader": {"$ref": "#/definitions/DeviceControlRequestHeader"},
    "dmsrequestcommand": {"type": "string"},
    "dmscommandparameters": {"$ref": "#/definitions/DMSControlDetails"},
    "dmsbeaconcontrol": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}
}

```



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    },
    "ResponsePlanDetails.dmsmessagelist": {
      "type": "object",
      "required": ["dmsmessage"],
      "properties": {
        "dmsmessage": {
          "type": "array",
          "items": {"$ref": "#/definitions/DMSControlRequest"},
          "maxItems": 255,
          "minItems": 1
        }
      }
    },
    "ResponsePlanDetails.harmessagelist": {
      "type": "object",
      "required": ["harmessage"],
      "properties": {
        "harmessage": {
          "type": "array",
          "items": {"$ref": "#/definitions/HARControlRequest"},
          "maxItems": 255,
          "minItems": 1
        }
      }
    },
    "InformationalMessage": {
      "type": "object",
      "required": [
        "recipient",
        "informationaltext"
      ],
      "properties": {
        "recipient": {"$ref": "#/definitions/OrganizationInformation"},
        "informationaltext": {"type": "string"},
        "Any": {
          "type": "array",
          "items": {"type": "object"},
          "minItems": 0
        }
      }
    },
    "ResponsePlanDetails.informationalmessagelist": {
      "type": "object",
      "required": ["informationalmessage"],

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    "properties": {
      "informationalmessage": {
        "type": "array",
        "items": {"$ref": "#/definitions/InformationalMessage"},
        "maxItems": 255,
        "minItems": 1
      }
    }
  },
  "DeviceCancelControlRequest": {
    "type": "object",
    "required": [
      "authentication",
      "organizationrequesting",
      "deviceid",
      "requestid"
    ],
    "properties": {
      "authentication": {"$ref": "#/definitions/Authentication"},
      "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
      "deviceid": {"type": "string"},
      "requestid": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "ResponsePlanDetails.Icsschedulecancellationlist": {
    "type": "object",
    "required": ["Icsschedulecancellation"],
    "properties": {
      "Icsschedulecancellation": {
        "type": "array",
        "items": {"$ref": "#/definitions/DeviceCancelControlRequest"},
        "maxItems": 255,
        "minItems": 1
      }
    }
  },
  "ResponsePlanPersonnelDeployment": {
    "type": "object",
    "required": [

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    "personnelorganization",
    "personnelcontactdetails",
    "activitystarttime",
    "deploymentinstructions",
    "contactforquestions",
    "contactonsite"
  ],
  "properties": {
    "personnelorganization": {"$ref": "#/definitions/OrganizationInformation"},
    "personnelcontactdetails": {"$ref": "#/definitions/ContactDetails"},
    "activitystarttime": {"$ref": "#/definitions/DateTimeZone"},
    "activityendtime": {"$ref": "#/definitions/DateTimeZone"},
    "deploymentlocation": {"$ref": "#/definitions/GeoLocation"},
    "deploymentinstructions": {"type": "string"},
    "contactforquestions": {"$ref": "#/definitions/ContactDetails"},
    "contactonsite": {"$ref": "#/definitions/ContactDetails"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ResponsePlanDetails.personneldeploymentlist": {
  "type": "object",
  "required": ["personneldeployment"],
  "properties": {
    "personneldeployment": {
      "type": "array",
      "items": {"$ref": "#/definitions/ResponsePlanPersonnelDeployment"},
      "maxItems": 255,
      "minItems": 1
    }
  }
},
"ResponsePlanDetails.devicecancellationlist": {
  "type": "object",
  "required": ["devicecancellation"],
  "properties": {
    "devicecancellation": {
      "type": "array",
      "items": {"$ref": "#/definitions/DeviceCancelControlRequest"},
      "maxItems": 255,
      "minItems": 1
    }
  }
}

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    }
  }
},
"ResponsePlanAgencyApproval": {
  "type": "object",
  "required": [
    "organizationapproving",
    "approvaldecision",
    "approvalautomationlevel"
  ],
  "properties": {
    "organizationapproving": {"$ref": "#/definitions/OrganizationInformation"},
    "approvaldecision": {"type": "string"},
    "decisiontime": {"$ref": "#/definitions/DateTimeZone"},
    "approvalautomationlevel": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ResponsePlanDetails.agencyapprovaldecisionlist": {
  "type": "object",
  "required": ["agencyapproval"],
  "properties": {
    "agencyapproval": {
      "type": "array",
      "items": {"$ref": "#/definitions/ResponsePlanAgencyApproval"},
      "maxItems": 255,
      "minItems": 1
    }
  }
},
"ResponsePlanImplementation": {
  "type": "object",
  "required": [
    "planimplementationstatus",
    "eventterminationstatus",
    "responseplanterminationapprovallevel",
    "responseplanterminationapprovalstatus",
    "responseplanterminationstatus"
  ],
  "properties": {

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    "planimplementationstatus": {"type": "string"},
    "implementationtime": {"$ref": "#/definitions/DateTimeZone"},
    "implementationterminationtime": {"$ref": "#/definitions/DateTimeZone"},
    "eventterminationstatus": {"type": "string"},
    "responseplanterminationapprovallevel": {"type": "string"},
    "responseplanterminationapprovalstatus": {"type": "string"},
    "responseplanterminationstatus": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ResponsePlanLogDetails": {
  "type": "object",
  "required": [
    "commandstatus",
    "objecttype",
    "objectid",
    "commandtext",
    "commandacknowledgementtext"
  ],
  "properties": {
    "commandstatus": {"type": "string"},
    "objecttype": {"type": "string"},
    "objectid": {"type": "string"},
    "commandtext": {"type": "string"},
    "commandacknowledgementtext": {"type": "string"},
    "commandsenttime": {"$ref": "#/definitions/DateTimeZone"},
    "acknowledgementreceivedtime": {"$ref": "#/definitions/DateTimeZone"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ResponsePlanDetails.logdetaillist": {
  "type": "object",
  "required": ["responseplanlogdetails"],
  "properties": {
    "responseplanlogdetails": {
      "type": "array",

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        "items": {"$ref": "#/definitions/ResponsePlanLogDetails"},
        "maxItems": 1024,
        "minItems": 1
    }
}
},
"ResponsePlanDetails": {
    "type": "object",
    "required": [
        "responseplanrequestheader",
        "responseplanheader"
    ],
    "properties": {
        "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
        "responseplanheader": {"$ref": "#/definitions/ResponsePlanHeader"},
        "activitystarttime": {"$ref": "#/definitions/DateTimeZone"},
        "activityendtime": {"$ref": "#/definitions/DateTimeZone"},
        "agencylist": {"$ref": "#/definitions/ResponsePlanDetails.agencylist"},
        "detourlist": {"$ref": "#/definitions/ResponsePlanDetails.detourlist"},
        "rampmeteringcontrolactionlist": {"$ref":
"#/definitions/ResponsePlanDetails.rampmeteringcontrolactionlist"},
        "intersectioncontrollist": {"$ref":
"#/definitions/ResponsePlanDetails.intersectioncontrollist"},
        "dmsmessagelist": {"$ref": "#/definitions/ResponsePlanDetails.dmsmessagelist"},
        "harmessagelist": {"$ref": "#/definitions/ResponsePlanDetails.harmessagelist"},
        "informationalmessagelist": {"$ref":
"#/definitions/ResponsePlanDetails.informationalmessagelist"},
        "lcsschedulecancellationlist": {"$ref":
"#/definitions/ResponsePlanDetails.lcsschedulecancellationlist"},
        "personneldeploymentlist": {"$ref":
"#/definitions/ResponsePlanDetails.personneldeploymentlist"},
        "devicecancellationlist": {"$ref":
"#/definitions/ResponsePlanDetails.devicecancellationlist"},
        "aggregateapprovaldecision": {"$ref": "#/definitions/ResponsePlanAgencyApproval"},
        "agencyapprovaldecisionlist": {"$ref":
"#/definitions/ResponsePlanDetails.agencyapprovaldecisionlist"},
        "responseplanimplementation": {"$ref": "#/definitions/ResponsePlanImplementation"},
        "logdetaillist": {"$ref": "#/definitions/ResponsePlanDetails.logdetaillist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}

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    },
    "EvaluationCycleDetails.responseplanlist": {
      "type": "object",
      "required": ["responseplandetails"],
      "properties": {
        "responseplandetails": {
          "type": "array",
          "items": {"$ref": "#/definitions/ResponsePlanDetails"},
          "maxItems": 128,
          "minItems": 1
        }
      }
    }
  },
  "EvaluationCycleDetails": {
    "type": "object",
    "required": [
      "evaluationcycle",
      "evaluationcyclereason",
      "evaluationstarttime",
      "evaluationcycleduration",
      "rankedresponseplancount",
      "submittedresponseplancount",
      "eventdetails"
    ],
    "properties": {
      "evaluationcycle": {"type": "integer"},
      "evaluationcyclereason": {"type": "string"},
      "evaluationstarttime": {"$ref": "#/definitions/DateTimeZone"},
      "evaluationcycleduration": {"type": "integer"},
      "rankedresponseplancount": {"type": "integer"},
      "submittedresponseplancount": {"type": "integer"},
      "eventdetails": {"$ref": "#/definitions/EventDetails"},
      "trafficstate": {"type": "string"},
      "responseplanlist": {"$ref": "#/definitions/EvaluationCycleDetails.responseplanlist"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},
"IncidentResponse.evaluationcyclelist": {
  "type": "object",
  "properties": {

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        "evaluationcycledetail": {
            "type": "array",
            "items": {"$ref": "#/definitions/EvaluationCycleDetails"},
            "maxItems": 64,
            "minItems": 0
        }
    },
    "IncidentResponse": {
        "type": "object",
        "required": [
            "eventid",
            "evaluationcyclelist"
        ],
        "properties": {
            "eventid": {"type": "string"},
            "evaluationcyclelist": {"$ref": "#/definitions/IncidentResponse.evaluationcyclelist"},
            "Any": {
                "type": "array",
                "items": {"type": "object"},
                "minItems": 0
            }
        }
    },
    "ResponsePlanMsg": {
        "type": "object",
        "required": ["incidentresponseitem"],
        "properties": {
            "incidentresponseitem": {
                "type": "array",
                "items": {"$ref": "#/definitions/IncidentResponse"},
                "maxItems": 64,
                "minItems": 1
            }
        }
    },
    "responsePlanUpdateMsg": {
        "type": "object",
        "required": [
            "c2cMsgAdmin",
            "message"
        ],
        "properties": {
            "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},

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        "message": {"$ref": "#/definitions/ResponsePlanMsg"}
    }
},
"rampMeterControlScheduleUpdateMsg": {
    "type": "object",
    "required": [
        "c2cMsgAdmin",
        "message"
    ],
    "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/RampMeterControlScheduleMsg"}
    }
},
"IntersectionSignalControlSchedule": {
    "type": "object",
    "required": [
        "devicecontrolscheduleheader",
        "requestcontrolmode",
        "timingpatternid"
    ],
    "properties": {
        "devicecontrolscheduleheader": {"$ref": "#/definitions/DeviceControlScheduleHeader"},
        "requestcontrolmode": {"type": "string"},
        "timingpatternid": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"IntersectionSignalControlScheduleMsg": {
    "type": "object",
    "required": ["intersectioncontrolscheduleitem"],
    "properties": {
        "intersectionsignalcontrolscheduleitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/IntersectionSignalControlSchedule"},
            "maxItems": 524288,
            "minItems": 1
        }
    }
},

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"intersectionSignalControlScheduleUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/IntersectionSignalControlScheduleMsg"}
  }
},
"fullEventUpdateUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/FEUMsg"}
  }
},
"IntersectionSignalTPInventoryPhase": {
  "type": "object",
  "required": [
    "phaseidentifier",
    "coordinatedphase",
    "splitmode",
    "phasesplit"
  ],
  "properties": {
    "phaseidentifier": {"type": "integer"},
    "coordinatedphase": {"type": "integer"},
    "splitmode": {"type": "string"},
    "phasesplit": {"type": "integer"},
    "maximumgreenduration": {"type": "integer"},
    "minimumgreenduration": {"type": "integer"},
    "vehicleclearanceduration": {"type": "integer"},
    "vehicleredduration": {"type": "integer"},
    "minimumwalkduration": {"type": "integer"},
    "pedestrianclearanceduration": {"type": "integer"},
    "steadydontwalkduration": {"type": "integer"},
    "Any": {
      "type": "array",

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        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"SectionSignalTimingPatternInventory.phasetplist": {
    "type": "object",
    "required": ["phases"],
    "properties": {
        "phases": {
            "type": "array",
            "items": {"$ref": "#/definitions/IntersectionSignalTPInventoryPhase"},
            "maxItems": 40,
            "minItems": 1
        }
    }
},
"IntersectionSignalSequenceData.sequencedata": {
    "type": "object",
    "required": ["phaseidentifier"],
    "properties": {
        "phaseidentifier": {
            "type": "array",
            "items": {"type": "integer"},
            "maxItems": 16,
            "minItems": 1
        }
    }
},
"IntersectionSignalSequenceData": {
    "type": "object",
    "required": [
        "ringidentifier",
        "sequencedata"
    ],
    "properties": {
        "ringidentifier": {"type": "string"},
        "sequencedata": {"$ref": "#/definitions/IntersectionSignalSequenceData.sequencedata"}
    }
},
"SectionSignalTimingPatternInventory.sequenceinformation": {
    "type": "object",
    "required": ["sequenceinformation"],
    "properties": {

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        "sequenceinformation": {
            "type": "array",
            "items": {"$ref": "#/definitions/IntersectionSignalSequenceData"},
            "maxItems": 8,
            "minItems": 1
        }
    },
    "SectionSignalTimingPatternInventory": {
        "type": "object",
        "required": [
            "intersectionid",
            "cyclelength",
            "offsettime",
            "phasetplist"
        ],
        "properties": {
            "intersectionid": {"type": "string"},
            "cyclelength": {"type": "integer"},
            "offsettime": {"type": "integer"},
            "phasetplist": {"$ref": "#/definitions/SectionSignalTimingPatternInventory.phasetplist"},
            "sequenceinformation": {"$ref":
"#/definitions/SectionSignalTimingPatternInventory.sequenceinformation"}
        }
    },
    "SectionTimingPatternInventory.intersectiontplist": {
        "type": "object",
        "properties": {
            "intersectiontiming": {
                "type": "array",
                "items": {"$ref": "#/definitions/SectionSignalTimingPatternInventory"},
                "maxItems": 128,
                "minItems": 0
            }
        }
    },
    "SectionTimingPatternInventory": {
        "type": "object",
        "required": [
            "organizationinformation",
            "sectionid",
            "sectiontimingpatternid",
            "sectioncyclelength",
            "intersectiontplist"
        ]
    }

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    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "sectionid": {"type": "string"},
      "sectiontimingpatternid": {"type": "string"},
      "sectiontimingpatternname": {"type": "string"},
      "sectioncyclelength": {"type": "integer"},
      "intersectiontplist": {"$ref":
"#/definitions/SectionTimingPatternInventory.intersectiontplist"},
      "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "SectionSignalTimingPatternInventoryMsg": {
    "type": "object",
    "required": ["signalsectiontimingpatterninventoryitem"],
    "properties": {
      "signalsectiontimingpatterninventoryitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/SectionTimingPatternInventory"},
        "maxItems": 512000,
        "minItems": 1
      }
    }
  },
  "DMSMessageAppearance": {
    "type": "object",
    "required": [
      "organizationinformation",
      "deviceid",
      "dmssigntype"
    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "deviceid": {"type": "string"},
      "dmssigntype": {"type": "string"},
      "signHeightPixels": {"type": "integer"},
      "signWidthPixels": {"type": "integer"},

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    "signHeight": {"type": "integer"},
    "signWidth": {"type": "integer"},
    "charHeightPixels": {"type": "integer"},
    "charWidthPixels": {"type": "integer"},
    "dmsverticalborder": {"type": "integer"},
    "dmshorizontalborder": {"type": "integer"},
    "dmsverticalpixelpitch": {"type": "integer"},
    "dmshorizontalpixelpitch": {"type": "integer"},
    "dmsmaxpages": {"type": "integer"},
    "dmsmaxmessagelength": {"type": "integer"},
    "dmscolorscheme": {"type": "string"},
    "dmsmultitagsupport": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"dMSMessageAppearanceMsg": {
  "type": "object",
  "required": ["dmsmessageappearanceitem"],
  "properties": {
    "dmsmessageappearanceitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/DMSMessageAppearance"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"ResponsePlanStatusRequest": {
  "type": "object",
  "required": [
    "authentication",
    "responseplanrequestheader",
    "responseplanrequestfilter"
  ],
  "properties": {
    "authentication": {"$ref": "#/definitions/Authentication"},
    "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
    "responseplanrequestfilter": {"$ref": "#/definitions/ResponsePlanRequestFilter"},
    "Any": {
      "type": "array",

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        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"RouteStatusList": {
    "type": "object",
    "required": [
        "networkid",
        "routeid",
        "routestatus"
    ],
    "properties": {
        "networkid": {"type": "string"},
        "routeid": {"type": "string"},
        "routestatus": {"type": "string"},
        "routename": {"type": "string"},
        "detourrouteineffectflag": {"type": "string"},
        "surfacecondition": {"type": "string"},
        "routecapacity": {"type": "integer"},
        "levelofservice": {"type": "string"},
        "saturationflag": {"type": "string"},
        "routedatastoredtype": {"type": "string"},
        "routetrafficdataalgorithm": {"type": "string"},
        "delay": {"type": "integer"},
        "alternateroutedelay": {"type": "integer"},
        "headway": {"type": "integer"},
        "traveltime": {"type": "integer"},
        "traveltimeincrease": {"type": "integer"},
        "volume": {"type": "integer"},
        "speedaverage": {"type": "integer"},
        "density": {"type": "integer"},
        "occupancy": {"type": "integer"},
        "currentspeedadvisory": {"type": "integer"},
        "speedlimitunits": {"type": "string"},
        "eventdescriptiontime": {"type": "integer"},
        "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},

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"RouteStatus.routestatuslist": {
  "type": "object",
  "required": ["route"],
  "properties": {
    "route": {
      "type": "array",
      "items": {"$ref": "#/definitions/RouteStatusList"},
      "maxItems": 255,
      "minItems": 1
    }
  }
},
"RouteStatus": {
  "type": "object",
  "required": [
    "organizationinformation",
    "routestatuslist"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "routestatuslist": {"$ref": "#/definitions/RouteStatus.routestatuslist"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"RouteStatusMsg": {
  "type": "object",
  "required": ["routestatusitem"],
  "properties": {
    "routestatusitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/RouteStatus"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"routeStatusUpdateMsg": {
  "type": "object",
  "required": [

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        "c2cMsgAdmin",
        "message"
    ],
    "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/RouteStatusMsg"}
    }
},
"OrganizationInformationRequest.centeridlist": {
    "type": "object",
    "required": ["centerid"],
    "properties": {
        "centerid": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 1024,
            "minItems": 1
        }
    }
},
"OrganizationInformationRequest": {
    "type": "object",
    "required": [
        "organizationrequesting",
        "organizationinformationtype"
    ],
    "properties": {
        "authentication": {"$ref": "#/definitions/Authentication"},
        "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
        "organizationinformationtype": {"type": "string"},
        "organizationid": {"type": "string"},
        "centeridlist": {"$ref": "#/definitions/OrganizationInformationRequest.centeridlist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"SubscriptionAction": {
    "type": "object",
    "required": ["subscriptionActionitem"],
    "properties": {
        "subscriptionActionitem": {

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        "type": "array",
        "items": {"type": "string"},
        "maxItems": 10,
        "minItems": 1
    }
}
},
"SubscriptionType": {
    "type": "object",
    "required": ["subscriptionTypeitem"],
    "properties": {
        "subscriptionTypeitem": {"type": "string"}
    }
},
"SubscriptionTimeFrame": {
    "type": "object",
    "required": [
        "start",
        "end"
    ],
    "properties": {
        "start": {
            "type": "string",
            "format": "date-time"
        },
        "end": {
            "type": "string",
            "format": "date-time"
        }
    }
},
"BroadcastAlerts": {
    "type": "object",
    "required": ["broadcastAlert"],
    "properties": {
        "broadcastAlert": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 2,
            "minItems": 1
        }
    }
},
"C2cMessageSubscription": {

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    "type": "object",
    "required": [
      "returnAddress",
      "subscriptionAction",
      "subscriptionType",
      "subscriptionID",
      "subscriptionFrequency"
    ],
    "properties": {
      "informationalText": {"type": "string"},
      "returnAddress": {"type": "string"},
      "subscriptionAction": {"$ref": "#/definitions/SubscriptionAction"},
      "subscriptionType": {"$ref": "#/definitions/SubscriptionType"},
      "subscriptionID": {"type": "string"},
      "subscriptionName": {"type": "string"},
      "subscriptionTimeFrame": {"$ref": "#/definitions/SubscriptionTimeFrame"},
      "subscriptionFrequency": {"type": "integer"},
      "broadcastAlerts": {"$ref": "#/definitions/BroadcastAlerts"}
    }
  },
  "ResponsePlanRequest": {
    "type": "object",
    "required": [
      "authentication",
      "responseplanrequestheader"
    ],
    "properties": {
      "authentication": {"$ref": "#/definitions/Authentication"},
      "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
      "responseplanrequestfilter": {"$ref": "#/definitions/ResponsePlanRequestFilter"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "responsePlanSubscriptionMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {

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        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
        "message": {"$ref": "#/definitions/ResponsePlanRequest"}
    },
    "IntersectionSignalPhaseSplit": {
        "type": "object",
        "required": [
            "phaseidentifier",
            "phaseduration"
        ],
        "properties": {
            "phaseidentifier": {"type": "integer"},
            "phaseduration": {"type": "integer"},
            "Any": {
                "type": "array",
                "items": {"type": "object"},
                "minItems": 0
            }
        }
    },
    "IntersectionSignalStatus.phasesplitlist": {
        "type": "object",
        "required": ["phasesplit"],
        "properties": {
            "phasesplit": {
                "type": "array",
                "items": {"$ref": "#/definitions/IntersectionSignalPhaseSplit"},
                "maxItems": 40,
                "minItems": 1
            }
        }
    },
    "IntersectionSignalRingStatus": {
        "type": "object",
        "required": [
            "ringidentifier",
            "ringstatus"
        ],
        "properties": {
            "ringidentifier": {"type": "string"},
            "ringstatus": {"type": "integer"}
        }
    },
    "IntersectionSignalStatus.ringstatuslist": {

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    "type": "object",
    "required": ["ringstatus"],
    "properties": {
      "ringstatus": {
        "type": "array",
        "items": {"$ref": "#/definitions/IntersectionSignalRingStatus"},
        "maxItems": 8,
        "minItems": 1
      }
    }
  },
  "IntersectionSignalPhaseStatusGroup": {
    "type": "object",
    "required": [
      "phasesstatusgroupnumber",
      "phasesstatusgroupgreens"
    ],
    "properties": {
      "phasesstatusgroupnumber": {"type": "integer"},
      "phasesstatusgroupgreens": {"type": "integer"},
      "phasesstatusgroupyellows": {"type": "integer"},
      "phasesstatusgroupreds": {"type": "integer"},
      "phasesstatusgroupwalks": {"type": "integer"},
      "phasesstatusgroupppedclears": {"type": "integer"},
      "phasesstatusgroupdontwalks": {"type": "integer"},
      "phasesstatusgrouprightonredprohib": {"type": "integer"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "IntersectionSignalStatus.phasesstatus": {
    "type": "object",
    "required": ["phasesstatusgroup"],
    "properties": {
      "phasesstatusgroup": {
        "type": "array",
        "items": {"$ref": "#/definitions/IntersectionSignalPhaseStatusGroup"},
        "maxItems": 5,
        "minItems": 1
      }
    }
  }
}

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    },
    "IntersectionSignalOverlapStatusGroup": {
      "type": "object",
      "required": [
        "overlapstatusgroupnumber",
        "overlapstatusgroupgreens"
      ],
      "properties": {
        "overlapstatusgroupnumber": {"type": "integer"},
        "overlapstatusgroupgreens": {"type": "integer"},
        "overlapstatusgroupyellows": {"type": "integer"},
        "overlapstatusgroupreds": {"type": "integer"},
        "Any": {
          "type": "array",
          "items": {"type": "object"},
          "minItems": 0
        }
      }
    }
  },
  "IntersectionSignalStatus.overlapstatus": {
    "type": "object",
    "required": ["overlapstatusgroup"],
    "properties": {
      "overlapstatusgroup": {
        "type": "array",
        "items": {"$ref": "#/definitions/IntersectionSignalOverlapStatusGroup"},
        "maxItems": 2,
        "minItems": 1
      }
    }
  },
  "IntersectionSignalStatus.activespecialfunctionslist": {
    "type": "object",
    "required": ["specialfunctions"],
    "properties": {
      "specialfunctions": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 8,
        "minItems": 1
      }
    }
  },
  "IntersectionSignalStatus": {

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"type": "object",
"required": [
  "devicestatusheader",
  "signalcontrolsource",
  "plannedsignaltimingmode",
  "currentsignaltimingmode"
],
"properties": {
  "devicestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
  "signalcontrolsource": {"type": "string"},
  "plannedsignaltimingmode": {"type": "string"},
  "currentsignaltimingmode": {"type": "string"},
  "sectionid": {"type": "string"},
  "plannedsignaltimingmodedescription": {"type": "string"},
  "timingpatternidcurrent": {"type": "string"},
  "timingpatternndescription": {"type": "string"},
  "actuationmode": {"type": "string"},
  "timingphaseplanmode": {"type": "string"},
  "cyclelengthplanned": {"type": "integer"},
  "cyclelengthcurrent": {"type": "integer"},
  "cyclelengthprevious": {"type": "integer"},
  "cyclelengthmaster": {"type": "integer"},
  "cyclecounter": {"type": "integer"},
  "cyclecountermaster": {"type": "integer"},
  "offsetreference": {"type": "string"},
  "offsettimeplanned": {"type": "integer"},
  "offsettimecurrent": {"type": "integer"},
  "offsettimeprevious": {"type": "integer"},
  "controllertimestamp": {"$ref": "#/definitions/DateTimeZone"},
  "phasesplitlist": {"$ref": "#/definitions/IntersectionSignalStatus.phasesplitlist"},
  "ringstatuslist": {"$ref": "#/definitions/IntersectionSignalStatus.ringstatuslist"},
  "phasestatus": {"$ref": "#/definitions/IntersectionSignalStatus.phasestatus"},
  "overlapstatus": {"$ref": "#/definitions/IntersectionSignalStatus.overlapstatus"},
  "activespecialfunctionslist": {"$ref":
"#/definitions/IntersectionSignalStatus.activespecialfunctionslist"},
  "preemptprioritydescription": {"type": "string"},
  "operationagency": {"type": "string"},
  "maintenanceagency": {"type": "string"},
  "operationalterationauthorization": {"type": "string"},
  "Any": {
    "type": "array",
    "items": {"type": "object"},
    "minItems": 0
  }
}

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    }
  },
  "IntersectionSignalStatusMsg": {
    "type": "object",
    "required": ["intersectionSignalStatusItem"],
    "properties": {
      "intersectionSignalStatusItem": {
        "type": "array",
        "items": {"$ref": "#/definitions/IntersectionSignalStatus"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "intersectionSignalStatusUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/IntersectionSignalStatusMsg"}
    }
  },
  "ArchivedDataTrafficMonitoringMetadata.datasetroadwaynetworkidlist": {
    "type": "object",
    "required": ["datasetroadwaynetworkidlist"],
    "properties": {
      "datasetroadwaynetworkidlist": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 20480,
        "minItems": 1
      }
    }
  },
  "ArchivedDataTrafficMonitoringMetadata.datasetlinkidlist": {
    "type": "object",
    "required": ["datasetlinkidlist"],
    "properties": {
      "datasetlinkidlist": {
        "type": "array",
        "items": {"type": "string"},
      }
    }
  }
}

```



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        "maxItems": 20480,
        "minItems": 1
    }
}
},
"ArchivedDataTrafficMonitoringMetadata.datasetroutedesignatorlist": {
    "type": "object",
    "required": ["datasetroutedesignator"],
    "properties": {
        "datasetroutedesignator": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 2048,
            "minItems": 1
        }
    }
},
"ArchivedDataTrafficMonitoringMetadata.datasetlinearreferencelist": {
    "type": "object",
    "required": ["datasetlinearreference"],
    "properties": {
        "datasetlinearreference": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 2048,
            "minItems": 1
        }
    }
},
"ArchivedDataTrafficMonitoringMetadata": {
    "type": "object",
    "required": [
        "organizationinformation",
        "datasettype",
        "datasetdescription",
        "datacollectiontimeperiodstart",
        "datacollectiontimeperiodend",
        "datasetpublicationdatetime"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "datasettype": {"type": "string"},
        "datasetdescription": {"type": "string"},
    }
}

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    "datacollectiontimeperiodstart": {"$ref": "#/definitions/DateTimeZone"},
    "datacollectiontimeperiodend": {"$ref": "#/definitions/DateTimeZone"},
    "datasetpublicationdatetime": {"$ref": "#/definitions/DateTimeZone"},
    "datasetpurpose": {"type": "string"},
    "datasettitle": {"type": "string"},
    "datasetversion": {"type": "string"},
    "datasetpublicationinformation": {"type": "string"},
    "datasetprogressstatus": {"type": "string"},
    "datasetmaintenancefrequency": {"type": "string"},
    "dataseturl": {"$ref": "#/definitions/UrlReference"},
    "datasetroadwaynetworkidlist": {"$ref":
"#/definitions/ArchivedDataTrafficMonitoringMetadata.datasetroadwaynetworkidlist"},
    "datasetlinkidlist": {"$ref":
"#/definitions/ArchivedDataTrafficMonitoringMetadata.datasetlinkidlist"},
    "datasetroutedesignatorlist": {"$ref":
"#/definitions/ArchivedDataTrafficMonitoringMetadata.datasetroutedesignatorlist"},
    "datasetlinearreferencelist": {"$ref":
"#/definitions/ArchivedDataTrafficMonitoringMetadata.datasetlinearreferencelist"},
    "datasetlinearreferenceversion": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "archivedDataTrafficMonitoringMetadataMsg": {
    "type": "object",
    "required": ["archiveddatatrafficmonitoringmetadataitem"],
    "properties": {
      "archiveddatatrafficmonitoringmetadataitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/ArchivedDataTrafficMonitoringMetadata"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "DetectorMaintenanceHistoryDetail": {
    "type": "object",
    "required": ["detectorid"],
    "properties": {
      "stationid": {"type": "string"},
      "detectorid": {"type": "string"},

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    "detectortype": {"type": "string"},
    "detectorinstallationdate": {"$ref": "#/definitions/DateTimeZone"},
    "detectorcalibrationdate": {"$ref": "#/definitions/DateTimeZone"},
    "detectorcalibrationmethod": {"type": "string"},
    "detectorlastoperationaldate": {"$ref": "#/definitions/DateTimeZone"},
    "detectorlastnonoperationaldate": {"$ref": "#/definitions/DateTimeZone"},
    "detectorrepairdescription": {"type": "string"},
    "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"DetectorMaintenanceHistory.detectorhistorylist": {
  "type": "object",
  "properties": {
    "detector": {
      "type": "array",
      "items": {"$ref": "#/definitions/DetectorMaintenanceHistoryDetail"},
      "maxItems": 65535,
      "minItems": 0
    }
  }
},
"DetectorMaintenanceHistory": {
  "type": "object",
  "required": [
    "organizationinformation",
    "detectorhistorylist"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "detectorhistorylist": {"$ref":
"#/definitions/DetectorMaintenanceHistory.detectorhistorylist"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
},

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"detectorMaintenanceHistoryMsg": {
  "type": "object",
  "required": ["detectormaintenancehistoryitem"],
  "properties": {
    "detectormaintenancehistoryitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/DetectorMaintenanceHistory"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"OrganizationInformationMsg": {
  "type": "object",
  "required": ["organizationinformationitem"],
  "properties": {
    "organizationinformationitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/OrganizationInformation"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"organizationInformationUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/OrganizationInformationMsg"}
  }
},
"AvailableDialogsRequest": {
  "type": "object",
  "required": [
    "authentication",
    "organizationrequesting"
  ],
  "properties": {
    "authentication": {"$ref": "#/definitions/Authentication"},
    "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},

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    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "gateStatusUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/GateStatusMsg"}
    }
  },
  "ArchivedDataProcessingDocumentationMetadataRequest": {
    "type": "object",
    "required": [
      "authentication",
      "organizationinformation"
    ],
    "properties": {
      "authentication": {"$ref": "#/definitions/Authentication"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "DMSSMessageAppearanceRequestType": {
    "type": "object",
    "required": [
      "dmsmessage",
      "messagenumber",
      "returncurrentmessagesnapshot"
    ],
    "properties": {
      "dmsmessage": {"type": "string"},
      "messagenumber": {"type": "string"},

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        "returncurrentmessagesnapshot": {"type": "string"}
    },
    "DMSMessageAppearanceRequest": {
        "type": "object",
        "required": [
            "deviceinformationrequestheader",
            "dmsmessageappearance"
        ],
        "properties": {
            "deviceinformationrequestheader": {"$ref": "#/definitions/DeviceInformationRequest"},
            "dmsmessageappearance": {"$ref":
"/definitions/DMSMessageAppearanceRequestType"},
            "Any": {
                "type": "array",
                "items": {"type": "object"},
                "minItems": 0
            }
        }
    },
    "rampMeterPlanInventorySubscriptionMsg": {
        "type": "object",
        "required": [
            "c2cMsgAdmin",
            "message"
        ],
        "properties": {
            "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
            "message": {"$ref": "#/definitions/DeviceInformationRequest"}
        }
    },
    "ResponsePlanTerminationRequest.responseplanidlist": {
        "type": "object",
        "required": ["responseplanid"],
        "properties": {
            "responseplanid": {
                "type": "array",
                "items": {"type": "string"},
                "maxItems": 128,
                "minItems": 1
            }
        }
    },
    "ResponsePlanTerminationRequest": {

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    "type": "object",
    "required": [
      "authentication",
      "responseplanrequestheader",
      "eventid"
    ],
    "properties": {
      "authentication": {"$ref": "#/definitions/Authentication"},
      "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
      "eventid": {"type": "string"},
      "responseplanidlist": {"$ref":
"#/definitions/ResponsePlanTerminationRequest.responseplanidlist"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "DevicePriorityQueueRequest.deviceidlist": {
    "type": "object",
    "required": ["deviceid"],
    "properties": {
      "deviceid": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 10000,
        "minItems": 1
      }
    }
  },
  "DevicePriorityQueueRequest": {
    "type": "object",
    "required": [
      "organizationrequesting",
      "deviceidlist"
    ],
    "properties": {
      "authentication": {"$ref": "#/definitions/Authentication"},
      "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
      "deviceidlist": {"$ref": "#/definitions/DevicePriorityQueueRequest.deviceidlist"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},

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        "minItems": 0
    }
}
},
"DMSMessageInventory": {
    "type": "object",
    "required": [
        "organizationinformation",
        "deviceid",
        "messagenumber",
        "message",
        "messageownerorganizationinformation",
        "enablebeaconflag",
        "messengeruntimepriority",
        "messagestatus"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "deviceid": {"type": "string"},
        "messagememorytype": {"type": "string"},
        "messagenumber": {"type": "string"},
        "message": {"type": "string"},
        "messageownerorganizationinformation": {"$ref":
"#/definitions/OrganizationInformation"},
        "enablebeaconflag": {"type": "string"},
        "messengeruntimepriority": {"type": "integer"},
        "messagestatus": {"type": "string"},
        "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "deviceinventoryaction": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"DMSMessageInventoryMsg": {
    "type": "object",
    "required": ["dmsmessageinventoryitem"],
    "properties": {
        "dmsmessageinventoryitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/DMSMessageInventory"},

```



## TMDD Standards Update Recommendations – Data Structures

```
        "maxItems": 10240,
        "minItems": 1
    }
}
},
"dMSMessageInventoryUpdateMsg": {
    "type": "object",
    "required": [
        "c2cMsgAdmin",
        "message"
    ],
    "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/DMSMessageInventoryMsg"}
    }
},
"DMSStatus": {
    "type": "object",
    "required": [
        "devicestatusheader",
        "currentmessage"
    ],
    "properties": {
        "devicestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
        "currentmessage": {"type": "string"},
        "messagenumber": {"type": "string"},
        "messagetimerremaining": {"type": "integer"},
        "messagesourcemode": {"type": "string"},
        "messagebeacon": {"type": "integer"},
        "locationwhennotinuse": {"$ref": "#/definitions/GeoLocation"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"DMSStatusMsg": {
    "type": "object",
    "required": ["dmsstatusitem"],
    "properties": {
        "dmsstatusitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/DMSStatus"},
        }
    }
}
```

```

        "maxItems": 10240,
        "minItems": 1
    }
}
},
"RouteInventory.routeinventorylist": {
    "type": "object",
    "required": ["route"],
    "properties": {
        "route": {
            "type": "array",
            "items": {"$ref": "#/definitions/RouteInventoryList"},
            "maxItems": 255,
            "minItems": 1
        }
    }
},
"RouteInventory": {
    "type": "object",
    "required": [
        "organizationinformation",
        "routeinventorylist"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "routeinventorylist": {"$ref": "#/definitions/RouteInventory.routeinventorylist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"RouteInventoryMsg": {
    "type": "object",
    "required": ["routeinventoryitem"],
    "properties": {
        "routeinventoryitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/RouteInventory"},
            "maxItems": 10240,
            "minItems": 1
        }
    }
}

```

```

    }
  },
  "DetectorInventoryDetails.detectionlanes": {
    "type": "object",
    "required": ["lanes"],
    "properties": {
      "lanes": {
        "type": "array",
        "items": {"type": "integer"},
        "maxItems": 64,
        "minItems": 1
      }
    }
  },
  "DetectorInventoryDetails": {
    "type": "object",
    "required": [
      "detectorinventoryheader",
      "detectortype"
    ],
    "properties": {
      "detectorinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
      "detectortype": {"type": "string"},
      "detectionlanes": {"$ref": "#/definitions/DetectorInventoryDetails.detectionlanes"},
      "isdetectorspeedtrapflag": {"type": "string"},
      "vehicleclassificationbin1": {"type": "integer"},
      "vehicleclassificationbin2": {"type": "integer"},
      "vehicleclassificationbin3": {"type": "integer"},
      "vehicleclassificationbin4": {"type": "integer"},
      "vehicleclassificationbin5": {"type": "integer"},
      "vehicleclassificationbin6": {"type": "integer"},
      "reportingsystem": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "DetectorInventory.detectorinventorylist": {
    "type": "object",
    "properties": {
      "detector": {
        "type": "array",

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        "items": {"$ref": "#/definitions/DetectorInventoryDetails"},
        "maxItems": 65535,
        "minItems": 0
    }
}
},
"DetectorInventory": {
    "type": "object",
    "required": ["detectorinventorylist"],
    "properties": {
        "detectorstationinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
        "detectorinventorylist": {"$ref":
"/definitions/DetectorInventory.detectorinventorylist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"DetectorInventoryMsg": {
    "type": "object",
    "required": ["detectorinventoryitem"],
    "properties": {
        "detectorinventoryitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/DetectorInventory"},
            "maxItems": 10240,
            "minItems": 1
        }
    }
},
"detectorInventoryUpdateMsg": {
    "type": "object",
    "required": [
        "c2cMsgAdmin",
        "message"
    ],
    "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/DetectorInventoryMsg"}
    }
},
"dMSStatusUpdateMsg": {

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    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/DMSStatusMsg"}
    }
  },
  "ArchivedDataProcessingDocumentationMetadata": {
    "type": "object",
    "required": [
      "organizationinformation",
      "lastupdateddate",
      "processingmetadataname",
      "processingmetadataversion"
    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "lastupdateddate": {"$ref": "#/definitions/DateTimeZone"},
      "processingmetadataname": {"type": "string"},
      "processingmetadataversion": {"type": "string"},
      "publicationdatetime": {"$ref": "#/definitions/DateTimeZone"},
      "processingmethodname": {"type": "string"},
      "processingmethoddescription": {"type": "string"},
      "processingmethodapplicationrules": {"type": "string"},
      "processingmethodresults": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "archivedDataProcessingDocumentationMetadataMsg": {
    "type": "object",
    "required": ["archiveddataprocessingdocumentationmetadaitem"],
    "properties": {
      "archiveddataprocessingdocumentationmetadaitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/ArchivedDataProcessingDocumentationMetadata"},
        "maxItems": 10240,

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        "minItems": 1
    }
}
},
"GateControlSchedule": {
    "type": "object",
    "required": [
        "devicecontrolscheduleheader",
        "gatecontrol"
    ],
    "properties": {
        "devicecontrolscheduleheader": {"$ref": "#/definitions/DeviceControlScheduleHeader"},
        "gatecontrol": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"GateControlScheduleMsg": {
    "type": "object",
    "required": ["gatecontrolscheduleitem"],
    "properties": {
        "gatecontrolscheduleitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/GateControlSchedule"},
            "maxItems": 10240,
            "minItems": 1
        }
    }
}
},
"ActionLog": {
    "type": "object",
    "required": [
        "eventid",
        "actionlogelementid",
        "actiontime",
        "actiondescription",
        "actiontype"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "eventid": {"type": "string"},
    }
}

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    "actionlogelementid": {"type": "integer"},
    "actiontime": {"$ref": "#/definitions/DateTimeZone"},
    "actiondescription": {"type": "string"},
    "actiontype": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "ActionLogMsg": {
    "type": "object",
    "required": ["logentry"],
    "properties": {
      "logentry": {
        "type": "array",
        "items": {"$ref": "#/definitions/ActionLog"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "actionLogUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/ActionLogMsg"}
    }
  },
  "DeviceInformationSubscription": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
      "message": {"$ref": "#/definitions/DeviceInformationRequest"}
    }
  }
}

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    },
    "HARStatus": {
      "type": "object",
      "required": [
        "devicestatusheader",
        "harcurrenmessage"
      ],
      "properties": {
        "devicestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
        "harcurrenmessage": {"type": "string"},
        "messagebeacon": {"type": "integer"},
        "messagenumber": {"type": "string"},
        "Any": {
          "type": "array",
          "items": {"type": "object"},
          "minItems": 0
        }
      }
    }
  },
  "HARStatusMsg": {
    "type": "object",
    "required": ["harstatusitem"],
    "properties": {
      "harstatusitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/HARStatus"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "TrafficNetworkInformationRequest.networkidentifiers": {
    "type": "object",
    "required": ["networkidentifier"],
    "properties": {
      "networkidentifier": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 32,
        "minItems": 1
      }
    }
  },
  "TrafficNetworkInformationRequest.roadwaynetworkidlist": {

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    "type": "object",
    "required": ["roadwaynetworkid"],
    "properties": {
      "roadwaynetworkid": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 1024,
        "minItems": 1
      }
    }
  },
  "TrafficNetworkInformationRequest": {
    "type": "object",
    "required": [
      "organizationrequesting",
      "networkinformationtype"
    ],
    "properties": {
      "authentication": {"$ref": "#/definitions/Authentication"},
      "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
      "networkinformationtype": {"type": "string"},
      "networkidentifiers": {"$ref":
"#/definitions/TrafficNetworkInformationRequest.networkidentifiers"},
      "roadwaynetworkidlist": {"$ref":
"#/definitions/TrafficNetworkInformationRequest.roadwaynetworkidlist"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "CCTVStatus.cctvimagelist": {
    "type": "object",
    "properties": {
      "cctvimage": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 8,
        "minItems": 0
      }
    }
  },
  "CCTVStatus": {

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```

    "type": "object",
    "required": ["devicestatusheader"],
    "properties": {
      "devicestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
      "cctverror": {"type": "string"},
      "cctvimagelist": {"$ref": "#/definitions/CCTVStatus.cctvimagelist"},
      "cctvpositionpreset": {"type": "integer"},
      "cctvpositionpan": {"type": "string"},
      "cctvpositiontilt": {"type": "string"},
      "cctvpositionzoomlens": {"type": "string"},
      "cctvpositionirislens": {"type": "string"},
      "cctvpositionfocuslens": {"type": "string"},
      "cctvenvironmentalstatus": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "CCTVStatusMsg": {
    "type": "object",
    "required": ["cctvstatusitem"],
    "properties": {
      "cctvstatusitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/CCTVStatus"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "cCCTVStatusUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/CCTVStatusMsg"}
    }
  },
  "LCSCControlSchedule": {

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    "type": "object",
    "required": [
      "devicecontrolscheduleheader",
      "lanerequestcommand"
    ],
    "properties": {
      "devicecontrolscheduleheader": {"$ref": "#/definitions/DeviceControlScheduleHeader"},
      "lanerequestcommand": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "LCSControlScheduleMsg": {
    "type": "object",
    "required": ["lcscontrolscheduleitem"],
    "properties": {
      "lcscontrolscheduleitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/LCSControlSchedule"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "ICSControlScheduleUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/LCSControlScheduleMsg"}
    }
  },
  "IntersectionSignalTimingPatternInventoryRequest": {
    "type": "object",
    "required": ["deviceinformationrequestheader"],
    "properties": {
      "deviceinformationrequestheader": {"$ref": "#/definitions/DeviceInformationRequest"},
      "timingpatternid": {"type": "string"},

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    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "sectionSignalTimingPatternInventorySubscriptionMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
      "message": {"$ref": "#/definitions/IntersectionSignalTimingPatternInventoryRequest"}
    }
  },
  "sectionSignalTimingPatternInventoryUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/SectionSignalTimingPatternInventoryMsg"}
    }
  },
  "IntersectionSignalInventoryLinkList": {
    "type": "object",
    "required": ["linkid"],
    "properties": {
      "linkid": {"type": "string"},
      "linkdirection": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "IntersectionSignalInventory.intersectionlinklist": {
    "type": "object",

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    "required": ["link"],
    "properties": {
      "link": {
        "type": "array",
        "items": {"$ref": "#/definitions/IntersectionSignalInventoryLinkList"},
        "maxItems": 32,
        "minItems": 1
      }
    }
  },
  "IntersectionSignalMovement.turningmovementlanes": {
    "type": "object",
    "required": ["lanes"],
    "properties": {
      "lanes": {
        "type": "array",
        "items": {"type": "integer"},
        "maxItems": 64,
        "minItems": 1
      }
    }
  },
  "IntersectionSignalMovement": {
    "type": "object",
    "required": [
      "movementidentifier",
      "approachlinkid",
      "approachvector",
      "turningmovementcode"
    ],
    "properties": {
      "movementidentifier": {"type": "string"},
      "approachlinkid": {"type": "string"},
      "departinglinkid": {"type": "string"},
      "crossingpoint": {"$ref": "#/definitions/GeoLocation"},
      "approachvector": {"type": "integer"},
      "turningmovementcode": {"type": "string"},
      "turningmovementlanes": {"$ref":
"#/definitions/IntersectionSignalMovement.turningmovementlanes"},
      "turningmovementtext": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
}

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    }
  }
},
"IntersectionSignalInventory.movementlist": {
  "type": "object",
  "required": ["intersectionmovements"],
  "properties": {
    "intersectionmovements": {
      "type": "array",
      "items": {"$ref": "#/definitions/IntersectionSignalMovement"},
      "maxItems": 64,
      "minItems": 1
    }
  }
},
"IntersectionSignalInventoryPhase.concurrentphaseslist": {
  "type": "object",
  "required": ["phaseidentifier"],
  "properties": {
    "phaseidentifier": {
      "type": "array",
      "items": {"type": "integer"},
      "maxItems": 16,
      "minItems": 1
    }
  }
},
"IntersectionSignalInventoryPhase.activemovementslist": {
  "type": "object",
  "required": ["movementidentifier"],
  "properties": {
    "movementidentifier": {
      "type": "array",
      "items": {"type": "string"},
      "maxItems": 16,
      "minItems": 1
    }
  }
},
"IntersectionSignalInventoryPhase": {
  "type": "object",
  "required": [
    "phaseidentifier",
    "coordinatedphase",

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        "concurrentphaseslist"
    ],
    "properties": {
        "phaseidentifier": {"type": "integer"},
        "coordinatedphase": {"type": "integer"},
        "concurrentphaseslist": {"$ref":
"#/definitions/IntersectionSignalInventoryPhase.concurrentphaseslist"},
        "activemovementslist": {"$ref":
"#/definitions/IntersectionSignalInventoryPhase.activemovementslist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"IntersectionSignalInventory.phaselist": {
    "type": "object",
    "required": ["phases"],
    "properties": {
        "phases": {
            "type": "array",
            "items": {"$ref": "#/definitions/IntersectionSignalInventoryPhase"},
            "maxItems": 40,
            "minItems": 1
        }
    }
},
"IntersectionSignalOverlapPhase.overlapincludedphases": {
    "type": "object",
    "required": ["phaseidentifier"],
    "properties": {
        "phaseidentifier": {
            "type": "array",
            "items": {"type": "integer"},
            "maxItems": 8,
            "minItems": 1
        }
    }
},
"IntersectionSignalOverlapPhase.activemovementslist": {
    "type": "object",
    "required": ["movementidentifier"],
    "properties": {

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        "movementidentifier": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 16,
            "minItems": 1
        }
    },
    "IntersectionSignalOverlapPhase": {
        "type": "object",
        "required": [
            "overlapidentifier",
            "overlapincludedphases"
        ],
        "properties": {
            "overlapidentifier": {"type": "integer"},
            "overlapincludedphases": {"$ref":
"#/definitions/IntersectionSignalOverlapPhase.overlapincludedphases"},
            "activemovementslist": {"$ref":
"#/definitions/IntersectionSignalOverlapPhase.activemovementslist"},
            "Any": {
                "type": "array",
                "items": {"type": "object"},
                "minItems": 0
            }
        }
    },
    "IntersectionSignalInventory.overlapphaselist": {
        "type": "object",
        "required": ["overlapphases"],
        "properties": {
            "overlapphases": {
                "type": "array",
                "items": {"$ref": "#/definitions/IntersectionSignalOverlapPhase"},
                "maxItems": 16,
                "minItems": 1
            }
        }
    },
    "IntersectionSignalRing.ringphaseassignment": {
        "type": "object",
        "required": ["ringphaseidentifier"],
        "properties": {
            "ringphaseidentifier": {

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        "type": "array",
        "items": {"type": "integer"},
        "maxItems": 16,
        "minItems": 1
    }
}
},
"IntersectionSignalRing": {
    "type": "object",
    "required": [
        "ringidentifier",
        "ringphaseassignment"
    ],
    "properties": {
        "ringidentifier": {"type": "string"},
        "ringphaseassignment": {"$ref":
"#/definitions/IntersectionSignalRing.ringphaseassignment"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"IntersectionSignalInventory.ringlist": {
    "type": "object",
    "required": ["rings"],
    "properties": {
        "rings": {
            "type": "array",
            "items": {"$ref": "#/definitions/IntersectionSignalRing"},
            "maxItems": 16,
            "minItems": 1
        }
    }
},
"IntersectionSignalSpecialFunctions": {
    "type": "object",
    "required": ["specialfunctionidentifier"],
    "properties": {
        "specialfunctionidentifier": {"type": "integer"},
        "specialfunctiondescription": {"type": "string"},
        "Any": {
            "type": "array",

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        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"IntersectionSignalInventory.specialfunctionslist": {
    "type": "object",
    "required": ["specialfunctions"],
    "properties": {
        "specialfunctions": {
            "type": "array",
            "items": {"$ref": "#/definitions/IntersectionSignalSpecialFunctions"},
            "maxItems": 16,
            "minItems": 1
        }
    }
},
"IntersectionSignalInventory": {
    "type": "object",
    "required": [
        "deviceinventoryheader",
        "intersectionname"
    ],
    "properties": {
        "deviceinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
        "intersectionname": {"type": "string"},
        "controllermasterid": {"type": "string"},
        "intersectionlinklist": {"$ref":
"#/definitions/IntersectionSignalInventory.intersectionlinklist"},
        "movementlist": {"$ref": "#/definitions/IntersectionSignalInventory.movementlist"},
        "phaselist": {"$ref": "#/definitions/IntersectionSignalInventory.phaselist"},
        "overlapphaselist": {"$ref":
"#/definitions/IntersectionSignalInventory.overlapphaselist"},
        "ringlist": {"$ref": "#/definitions/IntersectionSignalInventory.ringlist"},
        "specialfunctionslist": {"$ref":
"#/definitions/IntersectionSignalInventory.specialfunctionslist"},
        "timereferencecode": {"type": "string"},
        "patternsyncreference": {"type": "integer"},
        "signalcontrollertype": {"type": "string"},
        "signalcontrollerfirmware": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}

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    }
  }
},
"IntersectionSignalInventoryMsg": {
  "type": "object",
  "required": ["intersectionsiginventoryitem"],
  "properties": {
    "intersectionsiginventoryitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/IntersectionSignalInventory"},
      "maxItems": 16384,
      "minItems": 1
    }
  }
},
"rampMeterStatusUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/RampMeterStatusMsg"}
  }
},
"sectionStatusUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/SectionStatusMsg"}
  }
},
"RequestHeader.organizationrequesting": {
  "type": "object",
  "required": ["organizationsrequesteditem"],
  "properties": {
    "organizationsrequesteditem": {
      "type": "array",
      "items": {"$ref": "#/definitions/OrganizationInformation"},

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        "maxItems": 20,
        "minItems": 1
    }
}
},
"RequestHeader": {
    "type": "object",
    "required": [
        "organizationinformation",
        "messagetypeid",
        "messagetypeversion",
        "messagetimestamp"
    ],
    "properties": {
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "organizationrequesting": {"$ref":
"#/definitions/RequestHeader.organizationrequesting"},
        "messagetypeid": {"type": "integer"},
        "messagetypeversion": {"type": "integer"},
        "messagenumber": {"type": "integer"},
        "messagetimestamp": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"RequestType.eventids": {
    "type": "object",
    "required": ["eventid"],
    "properties": {
        "eventid": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 64,
            "minItems": 1
        }
    }
}
},
"RequestType.responseplanids": {
    "type": "object",
    "required": ["responseplanid"],
    "properties": {

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        "responseplanid": {
            "type": "array",
            "items": {"type": "string"},
            "maxItems": 64,
            "minItems": 1
        }
    },
    "RequestType": {
        "type": "object",
        "required": ["requestfocus"],
        "properties": {
            "requestfocus": {"type": "string"},
            "eventids": {"$ref": "#/definitions/RequestType.eventids"},
            "responseplanids": {"$ref": "#/definitions/RequestType.responseplanids"},
            "Any": {
                "type": "array",
                "items": {"type": "object"},
                "minItems": 0
            }
        }
    },
    "RequestFilter.hazmatcode": {
        "type": "object",
        "required": ["hazmatcodeitem"],
        "properties": {
            "hazmatcodeitem": {
                "type": "array",
                "items": {"type": "integer"},
                "maxItems": 10,
                "minItems": 1
            }
        }
    },
    "RequestFilter.placardcode": {
        "type": "object",
        "required": ["placardcodeitem"],
        "properties": {
            "placardcodeitem": {
                "type": "array",
                "items": {"type": "integer"},
                "maxItems": 10,
                "minItems": 1
            }
        }
    }
}

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    }
  },
  "RequestFilter.organizationsrequested": {
    "type": "object",
    "required": ["organizationsrequesteditem"],
    "properties": {
      "organizationsrequesteditem": {
        "type": "array",
        "items": {"$ref": "#/definitions/OrganizationInformation"},
        "maxItems": 20,
        "minItems": 1
      }
    }
  },
  "RequestFilter": {
    "type": "object",
    "properties": {
      "category": {"type": "string"},
      "prioritylevel": {"type": "integer"},
      "confidencelevel": {"type": "string"},
      "accesslevel": {"type": "string"},
      "actionrequestflag": {"type": "string"},
      "severity": {"type": "string"},
      "hazmatcode": {"$ref": "#/definitions/RequestFilter.hazmatcode"},
      "placardcode": {"$ref": "#/definitions/RequestFilter.placardcode"},
      "organizationsrequested": {"$ref":
"#/definitions/RequestFilter.organizationsrequested"},
      "headline": {"$ref": "#/definitions/EventType"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "EventFilterRequest.requestfilters": {
    "type": "object",
    "required": ["requestfilter"],
    "properties": {
      "requestfilter": {
        "type": "array",
        "items": {"$ref": "#/definitions/RequestFilter"},
        "maxItems": 64,
        "minItems": 1
      }
    }
  }
}

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    }
  }
},
"RequestLocation.arealocations": {
  "type": "object",
  "required": ["arealocation"],
  "properties": {
    "arealocation": {
      "type": "array",
      "items": {"$ref": "#/definitions/AreaLocation"},
      "maxItems": 20,
      "minItems": 1
    }
  }
},
"RequestLocation.linkdesignator": {
  "type": "object",
  "required": ["linkdesignatoritem"],
  "properties": {
    "linkdesignatoritem": {
      "type": "array",
      "items": {"type": "string"},
      "maxItems": 20,
      "minItems": 1
    }
  }
},
"RequestLocation": {
  "type": "object",
  "required": [
    "arealocations",
    "linkcategories",
    "linkdesignator"
  ],
  "properties": {
    "arealocations": {"$ref": "#/definitions/RequestLocation.arealocations"},
    "linkcategories": {"type": "string"},
    "linkdesignator": {"$ref": "#/definitions/RequestLocation.linkdesignator"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

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    },
    "EventFilterRequest.requestlocations": {
      "type": "object",
      "required": ["requestlocation"],
      "properties": {
        "requestlocation": {
          "type": "array",
          "items": {"$ref": "#/definitions/RequestLocation"},
          "maxItems": 64,
          "minItems": 1
        }
      }
    }
  },
  "RequestTimes": {
    "type": "object",
    "properties": {
      "starttime": {"$ref": "#/definitions/DateTimeZone"},
      "endtime": {"$ref": "#/definitions/DateTimeZone"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},
"EventFilterRequest": {
  "type": "object",
  "required": [
    "requestheader",
    "requesttype"
  ],
  "properties": {
    "authentication": {"$ref": "#/definitions/Authentication"},
    "requestheader": {"$ref": "#/definitions/RequestHeader"},
    "requesttype": {"$ref": "#/definitions/RequestType"},
    "requestfilters": {"$ref": "#/definitions/EventFilterRequest.requestfilters"},
    "requestlocations": {"$ref": "#/definitions/EventFilterRequest.requestlocations"},
    "requesttimes": {"$ref": "#/definitions/RequestTimes"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

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    },
    "EventSubscription": {
      "type": "object",
      "required": [
        "c2cMsgAdmin",
        "message"
      ],
      "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
        "message": {"$ref": "#/definitions/EventFilterRequest"}
      }
    },
    "RampMeterPlanInventory": {
      "type": "object",
      "required": [
        "organizationinformation",
        "deviceid",
        "meterplan",
        "meterlevel",
        "meterrate",
        "flowratethreshhold",
        "occupancythreshhold",
        "speedthreshhold"
      ],
      "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "deviceid": {"type": "string"},
        "meterplan": {"type": "string"},
        "meterlevel": {"type": "integer"},
        "meterrate": {"type": "integer"},
        "flowratethreshhold": {"type": "integer"},
        "occupancythreshhold": {"type": "integer"},
        "speedthreshhold": {"type": "integer"},
        "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
          "type": "array",
          "items": {"type": "object"},
          "minItems": 0
        }
      }
    },
    "RampMeterPlanInventoryMsg": {
      "type": "object",

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    "required": ["rampmeterplaninventoryitem"],
    "properties": {
      "rampmeterplaninventoryitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/RampMeterPlanInventory"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "rampMeterPlanInventoryUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/RampMeterPlanInventoryMsg"}
    }
  },
  "DeviceControlResponse": {
    "type": "object",
    "required": [
      "organizationinformation",
      "deviceid",
      "requestid",
      "requeststatus"
    ],
    "properties": {
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "deviceid": {"type": "string"},
      "requestid": {"type": "string"},
      "operatorid": {"type": "string"},
      "operatorlockid": {"type": "string"},
      "requeststatus": {"type": "string"},
      "operatorlastrevised": {"$ref": "#/definitions/DateTimeZone"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},

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"DMSMessageInventoryRequest": {
  "type": "object",
  "required": ["deviceinformationrequestheader"],
  "properties": {
    "deviceinformationrequestheader": {"$ref": "#/definitions/DeviceInformationRequest"},
    "messagenumber": {"type": "string"},
    "messagememorytype": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"dMSMessageInventorySubscriptionMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
    "message": {"$ref": "#/definitions/DMSMessageInventoryRequest"}
  }
},
"intersectionSignalTimingPatternInventorySubscriptionMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
    "message": {"$ref": "#/definitions/IntersectionSignalTimingPatternInventoryRequest"}
  }
},
"SectionControlStatusRequest": {
  "type": "object",
  "required": [
    "organizationrequesting",
    "sectionid",
    "requestid"
  ],
  "properties": {

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    "authentication": {"$ref": "#/definitions/Authentication"},
    "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
    "sectionid": {"type": "string"},
    "requestid": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ResponsePlanApprovalRequest": {
  "type": "object",
  "required": [
    "authentication",
    "responseplanrequestheader"
  ],
  "properties": {
    "authentication": {"$ref": "#/definitions/Authentication"},
    "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
    "responseplanrequestfilter": {"$ref": "#/definitions/ResponsePlanRequestFilter"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"DevicePriorityQueueItem": {
  "type": "object",
  "required": [
    "organizationrequesting",
    "commandrequestpriority"
  ],
  "properties": {
    "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
    "commandrequestpriority": {"type": "integer"},
    "operatorid": {"type": "string"},
    "requestid": {"type": "string"},
    "eventid": {"type": "string"},
    "responseplanid": {"type": "string"},
    "commandstarttime": {"$ref": "#/definitions/DateTimeZone"},
    "commandendtime": {"$ref": "#/definitions/DateTimeZone"}
  }
}

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    },
    "DevicePriorityQueueHeader.devicepriorityqueuelist": {
      "type": "object",
      "required": ["devicepriorityqueueitem"],
      "properties": {
        "devicepriorityqueueitem": {
          "type": "array",
          "items": {"$ref": "#/definitions/DevicePriorityQueueItem"},
          "maxItems": 8,
          "minItems": 1
        }
      }
    }
  },
  "DevicePriorityQueueHeader": {
    "type": "object",
    "required": [
      "deviceid",
      "devicetype",
      "currentdevicepriority",
      "devicepriorityqueuelist"
    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "deviceid": {"type": "string"},
      "devicetype": {"type": "string"},
      "currentdevicepriority": {"type": "integer"},
      "devicepriorityqueuelist": {"$ref":
"#/definitions/DevicePriorityQueueHeader.devicepriorityqueuelist"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},
"HARPriorityQueue": {
  "type": "object",
  "required": [
    "devicepriorityqueueheader",
    "harrequestcommand",
    "harqueueparameters"
  ],
  "properties": {
    "devicepriorityqueueheader": {"$ref": "#/definitions/DevicePriorityQueueHeader"},

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    "harrequestcommand": {"type": "string"},
    "harqueueparameters": {"$ref": "#/definitions/HARControlDetails"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"harPriorityQueueMsg": {
  "type": "object",
  "required": ["harpriorityqueueitem"],
  "properties": {
    "harpriorityqueueitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/HARPriorityQueue"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"SectionControlResponse": {
  "type": "object",
  "required": [
    "organizationinformation",
    "sectionid",
    "requestid",
    "requeststatus"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "sectionid": {"type": "string"},
    "requestid": {"type": "string"},
    "operatorid": {"type": "string"},
    "requeststatus": {"type": "string"},
    "operatorlastrevised": {"$ref": "#/definitions/DateTimeZone"},
    "requestcontrolmode": {"type": "string"},
    "timingpatternid": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

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    }
  },
  "SubscriptionParameter": {
    "type": "object",
    "required": [
      "parameterName",
      "parameterValue"
    ],
    "properties": {
      "parameterName": {"type": "string"},
      "parameterValue": {"type": "string"}
    }
  },
  "DialogStatus.subscriptionparameterlist": {
    "type": "object",
    "required": ["subscriptionparameter"],
    "properties": {
      "subscriptionparameter": {"$ref": "#/definitions/SubscriptionParameter"}
    }
  },
  "SubscriptionFailureDetails": {
    "type": "object",
    "required": [
      "failureCode",
      "failureDescription"
    ],
    "properties": {
      "failureCode": {"type": "string"},
      "failureDescription": {"type": "string"}
    }
  },
  "DialogStatus": {
    "type": "object",
    "required": [
      "subscriptionrequestdialogname",
      "dataupdatedialogname",
      "datatype",
      "subscriptiontype",
      "subscriptionparameterlist",
      "SubscriptionIdentifier",
      "subscriptionupdatesourceendpoint",
      "subscriptionreturnaddress",
      "ownercentersubscriptionrequestendpoint"
    ],

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    "properties": {
      "subscriptionrequestdialogname": {"$ref": "#/definitions/DialogName"},
      "dataupdatedialogname": {"$ref": "#/definitions/DialogName"},
      "datatype": {"$ref": "#/definitions/DataType"},
      "subscriptiontype": {"type": "string"},
      "subscriptionparameterlist": {"$ref":
"#/definitions/DialogStatus.subscriptionparameterlist"},
      "SubscriptionIdentifier": {"type": "string"},
      "SubscriptionName": {"type": "string"},
      "subscriptionupdatesourceendpoint": {"type": "string"},
      "subscriptionreturnaddress": {"type": "string"},
      "ownercentersubscriptionrequestendpoint": {"type": "string"},
      "subscriptionfailedetails": {"$ref": "#/definitions/SubscriptionFailureDetails"}
    }
  },
  "ActiveSubscriptionStatusResponse.sendingdialogstatuslist": {
    "type": "object",
    "properties": {
      "dialogstatus": {"$ref": "#/definitions/DialogStatus"}
    }
  },
  "ActiveSubscriptionStatusResponse.receivingdialogstatuslist": {
    "type": "object",
    "properties": {
      "dialogstatus": {"$ref": "#/definitions/DialogStatus"}
    }
  },
  "ActiveSubscriptionStatusResponse.faileddialogstatuslist": {
    "type": "object",
    "properties": {
      "dialogstatus": {"$ref": "#/definitions/DialogStatus"}
    }
  },
  "ActiveSubscriptionStatusResponseExt": {
    "type": "object",
    "required": [
      "versionid",
      "extension"
    ],
    "properties": {
      "versionid": {"type": "integer"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },

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"ActiveSubscriptionStatusResponse": {
  "type": "object",
  "required": [
    "organizationinformation",
    "centerid",
    "centername",
    "sendingdialogstatuslist",
    "receivingdialogstatuslist",
    "faileddialogstatuslist",
    "activeSubscriptionStatusResponseExt"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "centerid": {"type": "string"},
    "centername": {"type": "string"},
    "sendingdialogstatuslist": {"$ref":
"#/definitions/ActiveSubscriptionStatusResponse.sendingdialogstatuslist"},
    "receivingdialogstatuslist": {"$ref":
"#/definitions/ActiveSubscriptionStatusResponse.receivingdialogstatuslist"},
    "faileddialogstatuslist": {"$ref":
"#/definitions/ActiveSubscriptionStatusResponse.faileddialogstatuslist"},
    "activeSubscriptionStatusResponseExt": {"$ref":
"#/definitions/ActiveSubscriptionStatusResponseExt"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"activeSubscriptionStatusUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/ActiveSubscriptionStatusResponse"}
  }
},
"ResponsePlanStatusDetails": {
  "type": "object",

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    "required": [
      "responseplanheader",
      "responseplanstatus",
      "statuslastrevised"
    ],
    "properties": {
      "responseplanheader": {"$ref": "#/definitions/ResponsePlanHeader"},
      "responseplanstatus": {"type": "string"},
      "statuslastrevised": {"$ref": "#/definitions/DateTimeZone"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "ResponsePlanStatus.responseplanstatusdetailslist": {
    "type": "object",
    "required": ["responseplanstatusdetails"],
    "properties": {
      "responseplanstatusdetails": {
        "type": "array",
        "items": {"$ref": "#/definitions/ResponsePlanStatusDetails"},
        "maxItems": 64,
        "minItems": 1
      }
    }
  },
  "ResponsePlanStatus": {
    "type": "object",
    "required": [
      "responseplanrequestheader",
      "responseplanstatusdetailslist"
    ],
    "properties": {
      "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
      "responseplanstatusdetailslist": {"$ref":
"#/definitions/ResponsePlanStatus.responseplanstatusdetailslist"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
}

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    },
    "ResponsePlanStatusMsg": {
      "type": "object",
      "required": ["responseplanstatusitems"],
      "properties": {
        "responseplanstatusitems": {
          "type": "array",
          "items": {"$ref": "#/definitions/ResponsePlanStatus"},
          "maxItems": 64,
          "minItems": 1
        }
      }
    },
    "responsePlanStatusUpdateMsg": {
      "type": "object",
      "required": [
        "c2cMsgAdmin",
        "message"
      ],
      "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/ResponsePlanStatusMsg"}
      }
    },
    "IntersectionSignalTimingPatternInventory.phasetplist": {
      "type": "object",
      "required": ["phases"],
      "properties": {
        "phases": {
          "type": "array",
          "items": {"$ref": "#/definitions/IntersectionSignalTPInventoryPhase"},
          "maxItems": 40,
          "minItems": 1
        }
      }
    },
    "IntersectionSignalTimingPatternInventory.sequenceinformation": {
      "type": "object",
      "required": ["sequenceinformation"],
      "properties": {
        "sequenceinformation": {
          "type": "array",
          "items": {"$ref": "#/definitions/IntersectionSignalSequenceData"},
          "maxItems": 8,

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        "minItems": 1
    }
}
},
"IntersectionSignalTimingPatternInventory": {
    "type": "object",
    "required": [
        "organizationinformation",
        "deviceid",
        "timingpatternid",
        "cyclelength",
        "offsettime",
        "phasetplist"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "deviceid": {"type": "string"},
        "timingpatternid": {"type": "string"},
        "timingpatternname": {"type": "string"},
        "cyclelength": {"type": "integer"},
        "offsettime": {"type": "integer"},
        "phasetplist": {"$ref":
"#/definitions/IntersectionSignalTimingPatternInventory.phasetplist"},
        "sequenceinformation": {"$ref":
"#/definitions/IntersectionSignalTimingPatternInventory.sequenceinformation"},
        "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "deviceinventoryaction": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"IntersectionSignalTimingPatternInventoryMsg": {
    "type": "object",
    "required": ["intersectionsignaltimingpatterninventoryitem"],
    "properties": {
        "intersectionsignaltimingpatterninventoryitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/IntersectionSignalTimingPatternInventory"},
            "maxItems": 512000,
            "minItems": 1
        }
    }
}

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    }
  }
},
"DetectorDataDetail": {
  "type": "object",
  "required": [
    "detectorid",
    "detectiontimestamp"
  ],
  "properties": {
    "stationid": {"type": "string"},
    "detectorid": {"type": "string"},
    "detectiontimestamp": {"$ref": "#/definitions/DateTimeZone"},
    "vehiclecount": {"type": "integer"},
    "vehicleoccupancy": {"type": "integer"},
    "starttime": {"$ref": "#/definitions/DateTimeZone"},
    "endtime": {"$ref": "#/definitions/DateTimeZone"},
    "detectordatatype": {"type": "string"},
    "vehiclespeed": {"type": "integer"},
    "queuelength": {"type": "integer"},
    "vehiclestops": {"type": "integer"},
    "vehiclecountbin1": {"type": "integer"},
    "vehiclecountbin2": {"type": "integer"},
    "vehiclecountbin3": {"type": "integer"},
    "vehiclecountbin4": {"type": "integer"},
    "vehiclecountbin5": {"type": "integer"},
    "vehiclecountbin6": {"type": "integer"},
    "vehiclecountbin7": {"type": "integer"},
    "detectorstatus": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"DetectorData.detectordatalist": {
  "type": "object",
  "properties": {
    "detectordatadetail": {
      "type": "array",
      "items": {"$ref": "#/definitions/DetectorDataDetail"},
      "maxItems": 65535,
      "minItems": 0
    }
  }
}

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    }
  },
  "DetectorData": {
    "type": "object",
    "required": [
      "organizationinformation",
      "detectordatalist"
    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "detectordatalist": {"$ref": "#/definitions/DetectorData.detectordatalist"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "DetectorDataMsg": {
    "type": "object",
    "required": ["detectordataitem"],
    "properties": {
      "detectordataitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/DetectorData"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "detectorDataUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/DetectorDataMsg"}
    }
  },
  "ErrorReport": {

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    "type": "object",
    "required": [
      "organizationinformation",
      "organizationrequesting",
      "errorcode",
      "errortext"
    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
      "errorcode": {"type": "string"},
      "errortext": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "RampMeterInventoryDetails.associateddetectors": {
    "type": "object",
    "required": ["detectorid"],
    "properties": {
      "detectorid": {
        "type": "array",
        "items": {"type": "string"},
        "maxItems": 32,
        "minItems": 1
      }
    }
  },
  "RampMeterInventoryDetails": {
    "type": "object",
    "required": [
      "meteredlaneinventoryheader",
      "rampexitroadwayname"
    ],
    "properties": {
      "meteredlaneinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
      "rampexitroadwayname": {"type": "string"},
      "lanenumber": {"type": "integer"},
      "lanetype": {"type": "string"},
      "associateddetectors": {"$ref":

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"#/definitions/RampMeterInventoryDetails.associateddetectors"},
  "absoluteminimummeteringrate": {"type": "integer"},
  "absolutemaximummeteringrate": {"type": "integer"},
  "systemminimummeteringrate": {"type": "integer"},
  "systemmaximummeteringrate": {"type": "integer"},
  "signalcontrollertype": {"type": "string"},
  "signalcontrollermeteringprogram": {"type": "string"},
  "queuesensordistance": {"type": "integer"},
  "Any": {
    "type": "array",
    "items": {"type": "object"},
    "minItems": 0
  }
},
"RampMeterInventory.meteredinventorylist": {
  "type": "object",
  "properties": {
    "meteredlane": {
      "type": "array",
      "items": {"$ref": "#/definitions/RampMeterInventoryDetails"},
      "maxItems": 24,
      "minItems": 0
    }
  }
},
"RampMeterInventory": {
  "type": "object",
  "required": [
    "deviceinventoryheader",
    "meteredinventorylist"
  ],
  "properties": {
    "deviceinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
    "meteredinventorylist": {"$ref":
"#/definitions/RampMeterInventory.meteredinventorylist"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"RampMeterInventoryMsg": {

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    "type": "object",
    "required": ["rampmeterinventoryitem"],
    "properties": {
      "rampmeterinventoryitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/RampMeterInventory"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "rampMeterInventoryUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/RampMeterInventoryMsg"}
    }
  },
  "NodeInventoryList": {
    "type": "object",
    "required": [
      "networkid",
      "nodeid",
      "nodelocation"
    ],
    "properties": {
      "networkid": {"type": "string"},
      "networkname": {"type": "string"},
      "nodeid": {"type": "string"},
      "nodename": {"type": "string"},
      "nodedescription": {"type": "string"},
      "noderoutedesignator": {"type": "string"},
      "nodedirection": {"type": "string"},
      "linearreference": {"type": "string"},
      "linearreferenceversion": {"type": "integer"},
      "nodetype": {"type": "string"},
      "nodelocation": {"$ref": "#/definitions/GeoLocation"},
      "nodelinksnumber": {"type": "integer"},
      "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
      "Any": {

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        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"NodeInventory.nodeinventorylist": {
    "type": "object",
    "required": ["node"],
    "properties": {
        "node": {
            "type": "array",
            "items": {"$ref": "#/definitions/NodeInventoryList"},
            "maxItems": 10240,
            "minItems": 1
        }
    }
},
"NodeInventory": {
    "type": "object",
    "required": [
        "organizationinformation",
        "nodeinventorylist"
    ],
    "properties": {
        "restrictions": {"$ref": "#/definitions/Restrictions"},
        "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
        "nodeinventorylist": {"$ref": "#/definitions/NodeInventory.nodeinventorylist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"NodeInventoryMsg": {
    "type": "object",
    "required": ["nodeinventoryitem"],
    "properties": {
        "nodeinventoryitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/NodeInventory"},
            "maxItems": 10240,
            "minItems": 1
        }
    }
}

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    }
  }
},
"nodeInventoryUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/NodeInventoryMsg"}
  }
},
"VSVideoChannelData": {
  "type": "object",
  "required": [
    "channelid",
    "channelName",
    "channeltitlingtext"
  ],
  "properties": {
    "channelid": {"type": "string"},
    "channelName": {"type": "string"},
    "channeltitlingtext": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"VideoSwitchInventory.inputchannellist": {
  "type": "object",
  "required": ["inputchannel"],
  "properties": {
    "inputchannel": {
      "type": "array",
      "items": {"$ref": "#/definitions/VSVideoChannelData"},
      "maxItems": 2048,
      "minItems": 1
    }
  }
},

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"VideoSwitchInventory.outputchannellist": {
  "type": "object",
  "required": ["outputchannel"],
  "properties": {
    "outputchannel": {
      "type": "array",
      "items": {"$ref": "#/definitions/VSSVideoChannelData"},
      "maxItems": 2048,
      "minItems": 1
    }
  }
},
"VideoSwitchInventory": {
  "type": "object",
  "required": [
    "deviceinventoryheader",
    "inputchannellist",
    "outputchannellist"
  ],
  "properties": {
    "deviceinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
    "inputchannellist": {"$ref": "#/definitions/VideoSwitchInventory.inputchannellist"},
    "outputchannellist": {"$ref": "#/definitions/VideoSwitchInventory.outputchannellist"},
    "inputchannelcount": {"type": "integer"},
    "outputchannelcount": {"type": "integer"},
    "requestsupportedtype": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"VideoSwitchInventoryMsg": {
  "type": "object",
  "required": ["videoswitchinventoryitem"],
  "properties": {
    "videoswitchinventoryitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/VideoSwitchInventory"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
}

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},
"DMSCharacterTableEntry": {
  "type": "object",
  "required": [
    "characternumber",
    "characterwidth",
    "characterbitmap"
  ],
  "properties": {
    "characternumber": {"type": "integer"},
    "characterwidth": {"type": "integer"},
    "characterbitmap": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"DMSFontTable.characterTable": {
  "type": "object",
  "required": ["characterTableEntry"],
  "properties": {
    "characterTableEntry": {
      "type": "array",
      "items": {"$ref": "#/definitions/DMSCharacterTableEntry"},
      "maxItems": 65535,
      "minItems": 1
    }
  }
},
"DMSFontTable": {
  "type": "object",
  "required": [
    "organizationinformation",
    "deviceid",
    "defaultFont",
    "fontNumber",
    "fontHeight",
    "fontCharSpacing",
    "fontLineSpacing",
    "fontVersionID",
    "fontStatus",
    "characterTable"
  ]
}

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    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "deviceid": {"type": "string"},
      "defaultFont": {"type": "integer"},
      "fontNumber": {"type": "integer"},
      "fontHeight": {"type": "integer"},
      "fontCharSpacing": {"type": "integer"},
      "fontLineSpacing": {"type": "integer"},
      "fontVersionID": {"type": "integer"},
      "fontStatus": {"type": "string"},
      "characterTable": {"$ref": "#/definitions/DMSFontTable.characterTable"},
      "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "dMSFontTableMsg": {
    "type": "object",
    "required": ["dmsfonttableitem"],
    "properties": {
      "dmsfonttableitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/DMSFontTable"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "HARInventory": {
    "type": "object",
    "required": [
      "deviceinventoryheader",
      "devicebeacon"
    ],
    "properties": {
      "deviceinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
      "devicebeacon": {"type": "string"},
      "harcharacteristics": {"type": "string"},
      "harfrequencydescription": {"type": "string"},
    }
  }
}

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        "harcallsign": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    },
    "HARInventoryMsg": {
        "type": "object",
        "required": ["harinventoryitem"],
        "properties": {
            "harinventoryitem": {
                "type": "array",
                "items": {"$ref": "#/definitions/HARInventory"},
                "maxItems": 10240,
                "minItems": 1
            }
        }
    },
    "hARInventoryUpdateMsg": {
        "type": "object",
        "required": [
            "c2cMsgAdmin",
            "message"
        ],
        "properties": {
            "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
            "message": {"$ref": "#/definitions/HARInventoryMsg"}
        }
    },
    "SectionControlDetails": {
        "type": "object",
        "properties": {
            "requestcontrolmode": {"type": "string"},
            "timingpatternid": {"type": "string"},
            "sectionoffsetadjustment": {"type": "integer"}
        }
    },
    "SectionPriorityQueue": {
        "type": "object",
        "required": [
            "devicepriorityqueueheader",
            "sectionrequestcommand",

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        "sectionqueueparameters"
    ],
    "properties": {
        "devicepriorityqueueheader": {"$ref": "#/definitions/DevicePriorityQueueHeader"},
        "sectionrequestcommand": {"type": "string"},
        "sectionqueueparameters": {"$ref": "#/definitions/SectionControlDetails"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"ResponsePlanApproval.agencyapprovaldecisionlist": {
    "type": "object",
    "required": ["agencyapproval"],
    "properties": {
        "agencyapproval": {
            "type": "array",
            "items": {"$ref": "#/definitions/ResponsePlanAgencyApproval"},
            "maxItems": 255,
            "minItems": 1
        }
    }
},
"ResponsePlanApproval": {
    "type": "object",
    "required": [
        "responseplanrequestheader",
        "responseplanheader",
        "aggregateapprovaldecision",
        "agencyapprovaldecisionlist"
    ],
    "properties": {
        "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
        "responseplanheader": {"$ref": "#/definitions/ResponsePlanHeader"},
        "aggregateapprovaldecision": {"$ref": "#/definitions/ResponsePlanAgencyApproval"},
        "agencyapprovaldecisionlist": {"$ref":
"#/definitions/ResponsePlanApproval.agencyapprovaldecisionlist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}

```



## TMDD Standards Update Recommendations – Data Structures

```
    }
  },
  "ResponsePlanApprovalMsg": {
    "type": "object",
    "required": ["responseplanapprovalitems"],
    "properties": {
      "responseplanapprovalitems": {
        "type": "array",
        "items": {"$ref": "#/definitions/ResponsePlanApproval"},
        "maxItems": 64,
        "minItems": 1
      }
    }
  },
  "SectionControlRequest": {
    "type": "object",
    "required": [
      "authentication",
      "organizationrequesting",
      "sectionid",
      "requestid",
      "sectionrequestcommand",
      "sectioncommandparameters"
    ],
    "properties": {
      "authentication": {"$ref": "#/definitions/Authentication"},
      "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
      "sectionid": {"type": "string"},
      "requestid": {"type": "string"},
      "sectionrequestcommand": {"type": "string"},
      "sectioncommandparameters": {"$ref": "#/definitions/SectionControlDetails"},
      "eventid": {"type": "string"},
      "responseplanid": {"type": "string"},
      "commandrequestpriority": {"type": "integer"},
      "commandbeginntime": {"$ref": "#/definitions/DateTimeZone"},
      "commandendtime": {"$ref": "#/definitions/DateTimeZone"},
      "commandrequesttime": {"$ref": "#/definitions/DateTimeZone"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
}
```

```

"DetectorStatusDetails": {
  "type": "object",
  "required": ["detectorstatusheader"],
  "properties": {
    "detectorstatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
    "detectorlanenumber": {"type": "integer"},
    "lanedirection": {"type": "string"},
    "detectoroutputmode": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"DetectorStatus.detectorstatuslist": {
  "type": "object",
  "properties": {
    "detector": {
      "type": "array",
      "items": {"$ref": "#/definitions/DetectorStatusDetails"},
      "maxItems": 65535,
      "minItems": 0
    }
  }
},
"DetectorStatus": {
  "type": "object",
  "required": ["detectorstatuslist"],
  "properties": {
    "detectorstationstatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
    "detectorstatuslist": {"$ref": "#/definitions/DetectorStatus.detectorstatuslist"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"DetectorStatusMsg": {
  "type": "object",
  "required": ["detectorstatusitem"],
  "properties": {
    "detectorstatusitem": {

```

## TMDD Standards Update Recommendations – Data Structures

```
        "type": "array",
        "items": {"$ref": "#/definitions/DetectorStatus"},
        "maxItems": 10240,
        "minItems": 1
    }
}
},
"harStatusUpdateMsg": {
    "type": "object",
    "required": [
        "c2cMsgAdmin",
        "message"
    ],
    "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/HARStatusMsg"}
    }
},
"EventIndex": {
    "type": "object",
    "required": [
        "feurl",
        "eventupdatetime",
        "eventid",
        "eventupdate",
        "status"
    ],
    "properties": {
        "feurl": {"$ref": "#/definitions/UrlReference"},
        "fileupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "eventupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "eventid": {"type": "string"},
        "eventupdate": {"type": "integer"},
        "status": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"EventIndexMsg": {
    "type": "object",
    "required": ["eventIndex"],
```

```

    "properties": {
      "eventIndex": {
        "type": "array",
        "items": {"$ref": "#/definitions/EventIndex"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "VideoSwitchControlRequest": {
    "type": "object",
    "required": [
      "devicecontrolrequestheader",
      "inputchannelid",
      "outputchannelid"
    ],
    "properties": {
      "devicecontrolrequestheader": {"$ref": "#/definitions/DeviceControlRequestHeader"},
      "inputchannelid": {"type": "string"},
      "outputchannelid": {"type": "string"},
      "channeltitlingtext": {"type": "string"},
      "setoutputchannellock": {"type": "string"},
      "framespersecond": {"type": "integer"},
      "frameheightpixels": {"type": "integer"},
      "framewidthpixels": {"type": "integer"},
      "videofORMAT": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "eventIndexUpdateMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
      "message": {"$ref": "#/definitions/EventIndexMsg"}
    }
  },
}

```

```

"LCSInventory": {
  "type": "object",
  "required": [
    "deviceinventoryheader",
    "controlledlanenumber"
  ],
  "properties": {
    "deviceinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
    "controlledlanenumber": {"type": "integer"},
    "linklanecount": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"LCSInventoryMsg": {
  "type": "object",
  "required": ["lcsinventoryitem"],
  "properties": {
    "lcsinventoryitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/LCSInventory"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"ICSInventoryUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/LCSInventoryMsg"}
  }
},
"detectorStatusUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",

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```

        "message"
    ],
    "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/DetectorStatusMsg"}
    }
},
"LinkStatusList.lanenumbers": {
    "type": "object",
    "required": ["lanes"],
    "properties": {
        "lanes": {
            "type": "array",
            "items": {"type": "integer"},
            "maxItems": 64,
            "minItems": 1
        }
    }
},
"LinkStatusList": {
    "type": "object",
    "required": [
        "networkid",
        "linkid",
        "linkstatus"
    ],
    "properties": {
        "networkid": {"type": "string"},
        "linkid": {"type": "string"},
        "linkname": {"type": "string"},
        "linkstatus": {"type": "string"},
        "linkdirection": {"type": "string"},
        "lanesnumberopen": {"type": "integer"},
        "prioritytype": {"type": "string"},
        "restrictionaxlecount": {"type": "integer"},
        "restrictionheight": {"type": "integer"},
        "restrictionlength": {"type": "integer"},
        "restrictionweight": {"type": "integer"},
        "restrictionwidth": {"type": "integer"},
        "restrictionweightaxle": {"type": "integer"},
        "restrictionunits": {"type": "string"},
        "surfacecondition": {"type": "string"},
        "saturationflag": {"type": "string"},
        "oversaturatedthreshold": {"type": "integer"},
    }
}

```

```

    "levelofservice": {"type": "string"},
    "lanenumbers": {"$ref": "#/definitions/LinkStatusList.lanenumbers"},
    "linkdatastored": {"type": "string"},
    "detectionmethod": {"type": "string"},
    "linktrafficaidgorithm": {"type": "string"},
    "stops": {"type": "integer"},
    "delay": {"type": "integer"},
    "alternateroutedelay": {"type": "integer"},
    "headway": {"type": "integer"},
    "traveltime": {"type": "integer"},
    "capacityexisting": {"type": "integer"},
    "traveltimeincrease": {"type": "integer"},
    "speedaverage": {"type": "integer"},
    "speedvehicleestimated": {"type": "integer"},
    "speedlimit": {"type": "integer"},
    "advisoryspeedlimit": {"type": "integer"},
    "truckspeedlimit": {"type": "integer"},
    "speedlimitunits": {"type": "string"},
    "density": {"type": "integer"},
    "occupancy": {"type": "integer"},
    "volume": {"type": "integer"},
    "eventdescriptiontime": {"type": "integer"},
    "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"LinkStatus.linkstatuslist": {
  "type": "object",
  "required": ["link"],
  "properties": {
    "link": {
      "type": "array",
      "items": {"$ref": "#/definitions/LinkStatusList"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"LinkStatus": {
  "type": "object",

```

```

"required": [
  "organizationinformation",
  "linkstatuslist"
],
"properties": {
  "restrictions": {"$ref": "#/definitions/Restrictions"},
  "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
  "linkstatuslist": {"$ref": "#/definitions/LinkStatus.linkstatuslist"},
  "Any": {
    "type": "array",
    "items": {"type": "object"},
    "minItems": 0
  }
}
},
"LinkStatusMsg": {
  "type": "object",
  "required": ["linkstatusitem"],
  "properties": {
    "linkstatusitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/LinkStatus"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"linkStatusUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/LinkStatusMsg"}
  }
},
"CenterActiveVerificationRequest": {
  "type": "object",
  "required": [
    "authentication",
    "organizationrequesting"
  ],

```



```

"properties": {
  "authentication": {"$ref": "#/definitions/Authentication"},
  "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
  "Any": {
    "type": "array",
    "items": {"type": "object"},
    "minItems": 0
  }
}
},
"NodeStatusList": {
  "type": "object",
  "required": [
    "networkid",
    "nodeid",
    "nodestatus"
  ],
  "properties": {
    "networkid": {"type": "string"},
    "networkname": {"type": "string"},
    "nodeid": {"type": "string"},
    "nodename": {"type": "string"},
    "nodestatus": {"type": "string"},
    "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}
},
"NodeStatus.nodestatuslist": {
  "type": "object",
  "required": ["node"],
  "properties": {
    "node": {
      "type": "array",
      "items": {"$ref": "#/definitions/NodeStatusList"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
}
},
"NodeStatus": {

```

```

    "type": "object",
    "required": [
      "organizationinformation",
      "nodestatuslist"
    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "nodestatuslist": {"$ref": "#/definitions/NodeStatus.nodestatuslist"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "NodeStatusMsg": {
    "type": "object",
    "required": ["nodestatusitem"],
    "properties": {
      "nodestatusitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/NodeStatus"},
        "maxItems": 10240,
        "minItems": 1
      }
    }
  },
  "CenterActiveVerificationResponse": {
    "type": "object",
    "required": [
      "organizationinformation",
      "centerid",
      "centername"
    ],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "centerid": {"type": "string"},
      "centername": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
}

```

```

    }
  }
},
"HARControlSchedule": {
  "type": "object",
  "required": [
    "devicecontrolscheduleheader",
    "messagenumber"
  ],
  "properties": {
    "devicecontrolscheduleheader": {"$ref": "#/definitions/DeviceControlScheduleHeader"},
    "messagenumber": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"HARControlScheduleMsg": {
  "type": "object",
  "required": ["harcontrolscheduleitem"],
  "properties": {
    "harcontrolscheduleitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/HARControlSchedule"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"hARControlScheduleUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/HARControlScheduleMsg"}
  }
},
"DMSInventory": {
  "type": "object",

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```

"required": [
  "deviceinventoryheader",
  "dmssigntype"
],
"properties": {
  "deviceinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
  "dmssigntype": {"type": "string"},
  "signTechnology": {"type": "integer"},
  "signHeightPixels": {"type": "integer"},
  "signWidthPixels": {"type": "integer"},
  "signHeight": {"type": "integer"},
  "signWidth": {"type": "integer"},
  "charHeightPixels": {"type": "integer"},
  "charWidthPixels": {"type": "integer"},
  "dmsbeacontype": {"type": "string"},
  "dmsverticalborder": {"type": "integer"},
  "dmshorizontalborder": {"type": "integer"},
  "dmsverticalpixelpitch": {"type": "integer"},
  "dmshorizontalpixelpitch": {"type": "integer"},
  "dmsmaxpages": {"type": "integer"},
  "dmsmaxmessagelength": {"type": "integer"},
  "dmscolorscheme": {"type": "string"},
  "dmsmultitagssupport": {"type": "string"},
  "displaylinecount": {"type": "integer"},
  "characterperlinecount": {"type": "integer"},
  "Any": {
    "type": "array",
    "items": {"type": "object"},
    "minItems": 0
  }
}
},
"DMSInventoryMsg": {
  "type": "object",
  "required": ["dmsinventoryitem"],
  "properties": {
    "dmsinventoryitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/DMSInventory"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
}
},

```

```

"DMSPriorityQueue": {
  "type": "object",
  "required": [
    "devicepriorityqueueheader",
    "dmsrequestcommand",
    "dmsqueueparameters"
  ],
  "properties": {
    "devicepriorityqueueheader": {"$ref": "#/definitions/DevicePriorityQueueHeader"},
    "dmsrequestcommand": {"type": "string"},
    "dmsqueueparameters": {"$ref": "#/definitions/DMSControlDetails"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"dMSPriorityQueueMsg": {
  "type": "object",
  "required": ["dmspriorityqueueitem"],
  "properties": {
    "dmspriorityqueueitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/DMSPriorityQueue"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"DeviceControlStatusRequest": {
  "type": "object",
  "required": [
    "organizationrequesting",
    "deviceid",
    "requestid"
  ],
  "properties": {
    "authentication": {"$ref": "#/definitions/Authentication"},
    "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
    "deviceid": {"type": "string"},
    "requestid": {"type": "string"},
    "Any": {
      "type": "array",

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        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"DetectorDataRequest": {
    "type": "object",
    "required": ["deviceinformationrequestheader"],
    "properties": {
        "deviceinformationrequestheader": {"$ref": "#/definitions/DeviceInformationRequest"},
        "detectorstationid": {"type": "string"},
        "detectordatatype": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"LCSStatus": {
    "type": "object",
    "required": [
        "devicestatusheader",
        "lanecurrentstate",
        "linkdirection"
    ],
    "properties": {
        "devicestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
        "lanecurrentstate": {"type": "string"},
        "linkdirection": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"LCSStatusMsg": {
    "type": "object",
    "required": ["lcsstatusitem"],
    "properties": {
        "lcsstatusitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/LCSStatus"},
        }
    }
}

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        "maxItems": 10240,
        "minItems": 1
    }
}
},
"GateInventory": {
    "type": "object",
    "required": ["deviceinventoryheader"],
    "properties": {
        "deviceinventoryheader": {"$ref": "#/definitions/DeviceInventoryHeader"},
        "linklanecount": {"type": "integer"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"GateInventoryMsg": {
    "type": "object",
    "required": ["gateinventoryitem"],
    "properties": {
        "gateinventoryitem": {
            "type": "array",
            "items": {"$ref": "#/definitions/GateInventory"},
            "maxItems": 10240,
            "minItems": 1
        }
    }
}
},
"gateInventoryUpdateMsg": {
    "type": "object",
    "required": [
        "c2cMsgAdmin",
        "message"
    ],
    "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/GateInventoryMsg"}
    }
}
},
"RampMeterPriorityQueue": {
    "type": "object",
    "required": [

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    "devicepriorityqueueheader",
    "meterrequestcommand"
  ],
  "properties": {
    "devicepriorityqueueheader": {"$ref": "#/definitions/DevicePriorityQueueHeader"},
    "meteredlaneidentifier": {"type": "string"},
    "meterrequestcommand": {"type": "string"},
    "meterqueueparameters": {"$ref": "#/definitions/RampControlDetails"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"rampMeterPriorityQueueMsg": {
  "type": "object",
  "required": ["rampmeterpriorityqueueitem"],
  "properties": {
    "rampmeterpriorityqueueitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/RampMeterPriorityQueue"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"nodeStatusUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/NodeStatusMsg"}
  }
},
"DMSFontTableRequest": {
  "type": "object",
  "required": ["deviceinformationrequestheader"],
  "properties": {
    "deviceinformationrequestheader": {"$ref": "#/definitions/DeviceInformationRequest"},
    "fontNumber": {"type": "integer"},

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    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  },
  "centerActiveVerificationSubscriptionMsg": {
    "type": "object",
    "required": [
      "c2cMsgAdmin",
      "message"
    ],
    "properties": {
      "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
      "message": {"$ref": "#/definitions/CenterActiveVerificationRequest"}
    }
  },
  "ESSSensorStatusDetails": {
    "type": "object",
    "required": ["devicestatusheader"],
    "properties": {
      "devicestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "ESSStatus.esssensorlist": {
    "type": "object",
    "properties": {
      "esssensor": {
        "type": "array",
        "items": {"$ref": "#/definitions/ESSSensorStatusDetails"},
        "maxItems": 64,
        "minItems": 0
      }
    }
  },
  "ESSStatus": {
    "type": "object",
    "required": [

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```

    "esstationstatusheader",
    "esssensorlist"
  ],
  "properties": {
    "esstationstatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},
    "esssensorlist": {"$ref": "#/definitions/ESSStatus.esssensorlist"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ESSStatusMsg": {
  "type": "object",
  "required": ["esstatusitem"],
  "properties": {
    "esstatusitem": {
      "type": "array",
      "items": {"$ref": "#/definitions/ESSStatus"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"dMSInventoryUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/DMSInventoryMsg"}
  }
},
"EffectiveSchedule": {
  "type": "object",
  "required": [
    "timebaseschedulemonth",
    "timebasescheduleday",
    "timebasescheduledate",
    "dayplanhour",
    "dayplanminute",

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        "lastupdatetime"
    ],
    "properties": {
        "timebaseschedulemonth": {"type": "integer"},
        "timebasescheduleday": {"type": "integer"},
        "timebasescheduledate": {"type": "integer"},
        "dayplanhour": {"type": "integer"},
        "dayplanminute": {"type": "integer"},
        "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"LinkRestrictions.detourtimerrestrictionslist": {
    "type": "object",
    "required": ["detourtimerrestrictions"],
    "properties": {
        "detourtimerrestrictions": {
            "type": "array",
            "items": {"$ref": "#/definitions/EffectiveSchedule"},
            "maxItems": 65535,
            "minItems": 1
        }
    }
},
"LinkRestrictions.hovtimerrestrictionslist": {
    "type": "object",
    "required": ["hovtimerrestrictions"],
    "properties": {
        "hovtimerrestrictions": {
            "type": "array",
            "items": {"$ref": "#/definitions/EffectiveSchedule"},
            "maxItems": 65535,
            "minItems": 1
        }
    }
},
"LinkRestrictions": {
    "type": "object",
    "properties": {
        "detourtimerrestrictionslist": {"$ref":

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"#/definitions/LinkRestrictions.detourtimerrestrictionslist"},
    "hovlanecount": {"type": "integer"},
    "hovrestrictiontype": {"type": "string"},
    "hovtimerrestrictionslist": {"$ref":
"#/definitions/LinkRestrictions.hovtimerrestrictionslist"},
    "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"LinkInventoryList": {
    "type": "object",
    "required": [
        "networkid",
        "linkid",
        "linktype",
        "linkbeginnodeid",
        "linkbeginnodeidlocation",
        "linkendnodeid",
        "linkendnodeidlocation"
    ],
    "properties": {
        "networkid": {"type": "string"},
        "networkname": {"type": "string"},
        "linkid": {"type": "string"},
        "linkname": {"type": "string"},
        "alternatelinkname": {"type": "string"},
        "linkroutedesignator": {"type": "string"},
        "secondarylinkroutedesignator": {"type": "string"},
        "linktype": {"type": "string"},
        "linkbeginnodeid": {"type": "string"},
        "linkbeginnodeidlocation": {"$ref": "#/definitions/GeoLocation"},
        "linkendnodeid": {"type": "string"},
        "linkendnodeidlocation": {"$ref": "#/definitions/GeoLocation"},
        "linearreference": {"type": "string"},
        "linearreferenceversion": {"type": "integer"},
        "linklength": {"type": "integer"},
        "linkcapacity": {"type": "integer"},
        "linkspeedlimit": {"type": "integer"},
        "linkspeedlimittruck": {"type": "integer"},
        "linkspeedlimitunits": {"type": "string"},
        "linkjurisdiction": {"type": "string"},

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    "linkowner": {"type": "string"},
    "leftshoulderwidth": {"type": "integer"},
    "rightshoulderwidth": {"type": "integer"},
    "laneseparator": {"type": "string"},
    "lastupdatetime": {"$ref": "#/definitions/DateTimeZone"},
    "linkrestrictions": {"$ref": "#/definitions/LinkRestrictions"},
    "leftturnbaylength": {"type": "integer"},
    "rightturnbaylength": {"type": "integer"},
    "linkgeomlocation": {"$ref": "#/definitions/GeometrySpatialData"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"LinkInventory.linkinventorylist": {
  "type": "object",
  "required": ["link"],
  "properties": {
    "link": {
      "type": "array",
      "items": {"$ref": "#/definitions/LinkInventoryList"},
      "maxItems": 65535,
      "minItems": 1
    }
  }
},
"LinkInventory": {
  "type": "object",
  "required": [
    "organizationinformation",
    "linkinventorylist"
  ],
  "properties": {
    "restrictions": {"$ref": "#/definitions/Restrictions"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "linkinventorylist": {"$ref": "#/definitions/LinkInventory.linkinventorylist"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

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    },
    "LinkInventoryMsg": {
      "type": "object",
      "required": ["linkinventoryitem"],
      "properties": {
        "linkinventoryitem": {
          "type": "array",
          "items": {"$ref": "#/definitions/LinkInventory"},
          "maxItems": 10240,
          "minItems": 1
        }
      }
    },
    },
    "linkInventoryUpdateMsg": {
      "type": "object",
      "required": [
        "c2cMsgAdmin",
        "message"
      ],
      "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/LinkInventoryMsg"}
      }
    },
    },
    "trafficNetworkInformationSubscriptionMsg": {
      "type": "object",
      "required": [
        "c2cMsgAdmin",
        "message"
      ],
      "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
        "message": {"$ref": "#/definitions/TrafficNetworkInformationRequest"}
      }
    },
    },
    "ResponsePlanLog.logdetaillist": {
      "type": "object",
      "required": ["responseplanlogdetails"],
      "properties": {
        "responseplanlogdetails": {
          "type": "array",
          "items": {"$ref": "#/definitions/ResponsePlanLogDetails"},
          "maxItems": 1024,
          "minItems": 1
        }
      }
    }
  }

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    }
  }
},
"ResponsePlanLog": {
  "type": "object",
  "required": [
    "responseplanrequestheader",
    "responseplanheader",
    "logdetaillist"
  ],
  "properties": {
    "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
    "responseplanheader": {"$ref": "#/definitions/ResponsePlanHeader"},
    "logdetaillist": {"$ref": "#/definitions/ResponsePlanLog.logdetaillist"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
"ResponsePlanLogMsg": {
  "type": "object",
  "required": ["responseplanlogentry"],
  "properties": {
    "responseplanlogentry": {
      "type": "array",
      "items": {"$ref": "#/definitions/ResponsePlanLog"},
      "maxItems": 1024,
      "minItems": 1
    }
  }
},
"routeInventoryUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/RouteInventoryMsg"}
  }
},

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"responsePlanLogUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/ResponsePlanLogMsg"}
  }
},
"responsePlanApprovalSubscriptionMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
    "message": {"$ref": "#/definitions/ResponsePlanApprovalRequest"}
  }
},
"responsePlanLogSubscriptionMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
    "message": {"$ref": "#/definitions/ResponsePlanLogRequest"}
  }
},
"ICSStatusUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/LCSStatusMsg"}
  }
},

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"intersectionSignalInventoryUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/IntersectionSignalInventoryMsg"}
  }
},
"ESSObservationDataSetMetadataDetail": {
  "type": "object",
  "required": [
    "essdatasetfilename",
    "essdatasetfiledirectorypath",
    "essdatasetfileaccessprotocol",
    "essdatasetfileaccessaddress",
    "essdatasetfileaccessportaddress",
    "essobservationcollectionfrequency",
    "essobservationcollectionoffset",
    "esshostserveroffsetminutes",
    "esshostservertimezone",
    "esshostserverdaylightsavingsineffectflag"
  ],
  "properties": {
    "essdatasetfilename": {"type": "string"},
    "essdatasetfiledirectorypath": {"type": "string"},
    "essdatasetfileaccessprotocol": {"type": "string"},
    "essdatasetfileaccessaddress": {"type": "string"},
    "essdatasetfileaccessportaddress": {"type": "integer"},
    "essobservationcollectionfrequency": {"type": "integer"},
    "essobservationcollectionoffset": {"type": "integer"},
    "esshostserveroffsetminutes": {"type": "integer"},
    "esshostservertimezone": {"type": "integer"},
    "esshostserverdaylightsavingsineffectflag": {"type": "string"},
    "userid": {"type": "string"},
    "password": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

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    },
    "ESSObservationMetadataItem": {
      "type": "object",
      "required": [
        "essobservationpositionalorder",
        "essobservationlabel",
        "essobservationunits",
        "essobservationdecimalscalingfactor"
      ],
      "properties": {
        "essobservationpositionalorder": {"type": "integer"},
        "essobservationlabel": {"type": "string"},
        "essobservationtype": {"type": "string"},
        "essobservationnullvalue": {"type": "string"},
        "essobservationunits": {"type": "string"},
        "essobservationdecimalscalingfactor": {"type": "number"},
        "Any": {
          "type": "array",
          "items": {"type": "object"},
          "minItems": 0
        }
      }
    },
    "ESSObservationMetadata.esscollectorconfiguration": {
      "type": "object",
      "required": ["esscollectormetadata"],
      "properties": {
        "esscollectormetadata": {
          "type": "array",
          "items": {"$ref": "#/definitions/ESSObservationMetadataItem"},
          "maxItems": 255,
          "minItems": 1
        }
      }
    },
    "ESSSensorMetadataDetail": {
      "type": "object",
      "required": [
        "stationid",
        "sensorid",
        "sensorinformationdistributiongroup",
        "essobservationtype",
        "sensormanufacturer",
        "sensormodelnumber",

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    "sensorindex"
  ],
  "properties": {
    "stationid": {"type": "string"},
    "sensorid": {"type": "string"},
    "sensordescription": {"type": "string"},
    "sensorinformationdistributiongroup": {"type": "string"},
    "sensorinstallationdate": {"$ref": "#/definitions/DateTimeZone"},
    "essobservationtype": {"type": "string"},
    "sensorminvaluerange": {"type": "integer"},
    "sensormaxvaluerange": {"type": "integer"},
    "sensormanufacturer": {"type": "string"},
    "sensormodelnumber": {"type": "string"},
    "sensorindex": {"type": "integer"},
    "sensorrateofchangeinterval": {"type": "integer"},
    "sensormaxpositiverateofchange": {"type": "number"},
    "sensormaxnegativerateofchange": {"type": "number"},
    "sensorpersistenceinterval": {"type": "integer"},
    "sensorpersistencethreshold": {"type": "number"},
    "sensorlikeinstrumentthreshold": {"type": "number"},
    "sensormaintenancecalibrationdate": {"$ref": "#/definitions/DateTimeZone"},
    "sensorlastmaintenancedate": {"$ref": "#/definitions/DateTimeZone"},
    "sensorserialnumber": {"type": "string"},
    "sensorresolution": {"type": "number"},
    "sensoraccuracy": {"type": "number"},
    "sensorminvalueoutput": {"type": "integer"},
    "sensormaxvalueoutput": {"type": "integer"},
    "sensortostationnorthsouthoffset": {"type": "number"},
    "sensortostationeastwestoffset": {"type": "number"},
    "sensortostationelevationoffset": {"type": "number"},
    "sensortosurfaceelevationoffset": {"type": "number"},
    "sensorembodiedmaterialdescription": {"type": "string"},
    "sensoroutputaverageinterval": {"type": "integer"},
    "sensoroutputinternalunits": {"type": "string"},
    "sensorlastoutofservicebegindatetime": {"$ref": "#/definitions/DateTimeZone"},
    "sensorlastoutofserviceenddatetime": {"$ref": "#/definitions/DateTimeZone"},
    "sensorsamplinginterval": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},

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"ESSObservationMetadata.esssensormetadatalist": {
  "type": "object",
  "required": ["esssensormetadatalist"],
  "properties": {
    "esssensormetadatalist": {
      "type": "array",
      "items": {"$ref": "#/definitions/ESSSensorMetadataDetail"},
      "maxItems": 255,
      "minItems": 1
    }
  }
},
"ESSSiteMetadataDetail": {
  "type": "object",
  "required": ["sitedescription"],
  "properties": {
    "siteid": {"type": "string"},
    "sitedescription": {"type": "string"},
    "sitedirectionsdescription": {"type": "string"},
    "siterepresentativeness": {"type": "string"},
    "siteobstructionsdescription": {"type": "string"},
    "sitelandscapedescription": {"type": "string"},
    "sitehasaccesscontrolflag": {"type": "string"},
    "siteroadwayname": {"type": "string"},
    "siteroadwaylinearreference": {"type": "string"},
    "siteroadwaylinearreferenceversion": {"type": "integer"},
    "siteroadwaylinearreferenceunits": {"type": "string"},
    "siteroadwaytostationdistance": {"type": "number"},
    "siteroadwaytostationelevation": {"type": "number"},
    "sitejurisdictionname": {"type": "string"},
    "sitestatecode": {"type": "string"},
    "sitecountrycode": {"type": "string"},
    "siteslopeangle": {"type": "integer"},
    "sitegradedirection": {"type": "integer"},
    "sitewindroughnessfromnorth": {"type": "integer"},
    "sitewindroughnessfromsouth": {"type": "integer"},
    "sitewindroughnessfromeast": {"type": "integer"},
    "sitewindroughnessfromwest": {"type": "integer"},
    "sitesoildescription": {"type": "string"},
    "sitesoilpercentsand": {"type": "integer"},
    "sitesoilpercentsilt": {"type": "integer"},
    "sitesoilpercentclay": {"type": "integer"},
    "Any": {
      "type": "array",

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        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"ESSStationMetadataDetail": {
    "type": "object",
    "required": [
        "stationcategory",
        "stationid",
        "stationlocation",
        "stationelevation"
    ],
    "properties": {
        "stationcategory": {"type": "string"},
        "stationid": {"type": "string"},
        "stationlocation": {"$ref": "#/definitions/GeoLocation"},
        "stationelevation": {"type": "integer"},
        "stationdescription": {"type": "string"},
        "stationtype": {"type": "integer"},
        "stationhorizontaldatum": {"type": "string"},
        "stationverticaldatum": {"type": "string"},
        "stationpowersource": {"type": "string"},
        "stationdoorstatus": {"type": "integer"},
        "stationbatterystatus": {"type": "integer"},
        "stationlinevolts": {"type": "integer"},
        "stationmaintenancegroupname": {"type": "string"},
        "stationmaintenancecontactinformation": {"$ref": "#/definitions/ContactDetails"},
        "stationmaintenancefrequency": {"type": "integer"},
        "stationmaintenancecalibrationfrequency": {"type": "integer"},
        "stationmaintenancestatus": {"type": "string"},
        "stationinstallationdate": {"$ref": "#/definitions/DateTimeZone"},
        "stationnumberofdevices": {"type": "integer"},
        "stationcommmethod": {"type": "string"},
        "stationtelephonenumber": {"type": "string"},
        "stationipaddress": {"type": "string"},
        "stationmanufacturer": {"type": "string"},
        "stationobservationcollectionfrequency": {"type": "integer"},
        "stationobservationcollectionoffset": {"type": "integer"},
        "stationtransmissionfrequency": {"type": "integer"},
        "stationtransmissionoffset": {"type": "integer"},
        "stationtransmissionformat": {"type": "string"},
        "Any": {
            "type": "array",

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        "items": {"type": "object"},
        "minItems": 0
    }
}
},
"ESSClimateRecordDetail": {
    "type": "object",
    "required": [
        "climateobservationmonth",
        "climateobservationmonthminvalue",
        "climatemonthmaxvalue"
    ],
    "properties": {
        "climateobservationmonth": {"type": "string"},
        "climateobservationmonthminvalue": {"type": "integer"},
        "climatemonthmaxvalue": {"type": "integer"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
},
"ESSDataCollectorInformation": {
    "type": "object",
    "required": [
        "datacollectordescription",
        "datacollectorinstallationdate",
        "datacollectormanufacturer",
        "datacollectorproductname",
        "datacollectormodelnumbersoftwareversion"
    ],
    "properties": {
        "datacollectordescription": {"type": "string"},
        "datacollectorinstallationdate": {"$ref": "#/definitions/DateTimeZone"},
        "datacollectormanufacturer": {"type": "string"},
        "datacollectorproductname": {"type": "string"},
        "datacollectormodelnumbersoftwareversion": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
}
}

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    },
    "ESSImageInformation": {
      "type": "object",
      "required": [
        "imagedescription",
        "imageurl"
      ],
      "properties": {
        "imagedescription": {"type": "string"},
        "imageurl": {"type": "string"},
        "Any": {
          "type": "array",
          "items": {"type": "object"},
          "minItems": 0
        }
      }
    }
  },
  "ESSObservationMetadata": {
    "type": "object",
    "required": ["essobservationdatasetmetadata"],
    "properties": {
      "restrictions": {"$ref": "#/definitions/Restrictions"},
      "essobservationdatasetmetadata": {"$ref":
"#/definitions/ESSObservationDataSetMetadataDetail"},
      "esscollectorconfiguration": {"$ref":
"#/definitions/ESSObservationMetadata.esscollectorconfiguration"},
      "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
      "esssensormetadatalist": {"$ref":
"#/definitions/ESSObservationMetadata.esssensormetadatalist"},
      "siteinformation": {"$ref": "#/definitions/ESSSiteMetadataDetail"},
      "stationinformation": {"$ref": "#/definitions/ESSStationMetadataDetail"},
      "climaterecordinformation": {"$ref": "#/definitions/ESSClimateRecordDetail"},
      "datacollectorinformation": {"$ref": "#/definitions/ESSDataCollectorInformation"},
      "imageinformation": {"$ref": "#/definitions/ESSImageInformation"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
},
  "eSSObservationMetadataMsg": {
    "type": "object",
    "required": ["essobservationmetadataitem"],

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"properties": {
  "essobservationmetadataitem": {
    "type": "array",
    "items": {"$ref": "#/definitions/ESSObservationMetadata"},
    "maxItems": 10240,
    "minItems": 1
  }
},
},
"ArchivedDataTrafficMonitoringMetadataRequest": {
  "type": "object",
  "required": [
    "organizationinformation",
    "organizationrequesting"
  ],
  "properties": {
    "authentication": {"$ref": "#/definitions/Authentication"},
    "organizationinformation": {"$ref": "#/definitions/OrganizationInformation"},
    "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
    "filterdatasettype": {"type": "string"},
    "filtercollectionperiodstart": {"$ref": "#/definitions/DateTimeZone"},
    "filtercollectionperiodend": {"$ref": "#/definitions/DateTimeZone"},
    "filterlocationcounty": {"type": "string"},
    "filterlocationstate": {"type": "string"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
},
},
"IntersectionSignalControlResponse": {
  "type": "object",
  "required": ["devicecontrolresponseheader"],
  "properties": {
    "devicecontrolresponseheader": {"$ref": "#/definitions/DeviceControlResponse"},
    "sectionid": {"type": "string"},
    "requestcontrolmode": {"type": "string"},
    "timingpatternid": {"type": "string"},
    "offsetadjustment": {"type": "integer"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

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    }
  }
},
"responsePlanStatusSubscriptionMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
    "message": {"$ref": "#/definitions/ResponsePlanStatusRequest"}
  }
},
"centerActiveVerificationUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/CenterActiveVerificationResponse"}
  }
},
"IntersectionSignalPriorityQueue": {
  "type": "object",
  "required": [
    "devicepriorityqueueheader",
    "intersectionrequestcommand",
    "intersectionqueueparameters"
  ],
  "properties": {
    "devicepriorityqueueheader": {"$ref": "#/definitions/DevicePriorityQueueHeader"},
    "intersectionrequestcommand": {"type": "string"},
    "intersectionqueueparameters": {"$ref":
"/definitions/IntersectionSignalControlDetails"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}
},

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"intersectionSignalPriorityQueueMsg": {
  "type": "object",
  "required": ["intersectionSignalPriorityQueueItem"],
  "properties": {
    "intersectionSignalPriorityQueueItem": {
      "type": "array",
      "items": {"$ref": "#/definitions/IntersectionSignalPriorityQueue"},
      "maxItems": 10240,
      "minItems": 1
    }
  }
},
"gateControlScheduleUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/GateControlScheduleMsg"}
  }
},
"eSSInventoryUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/ESSInventoryMsg"}
  }
},
"eSSStatusUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/ESSStatusMsg"}
  }
}

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    },
    "cCTVInventoryUpdateMsg": {
      "type": "object",
      "required": [
        "c2cMsgAdmin",
        "message"
      ],
      "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/CCTVInventoryMsg"}
      }
    },
    "sectionControlScheduleUpdateMsg": {
      "type": "object",
      "required": [
        "c2cMsgAdmin",
        "message"
      ],
      "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/SectionControlScheduleMsg"}
      }
    },
    "LCSControlRequest": {
      "type": "object",
      "required": [
        "devicecontrolrequestheader",
        "lcsrequestcommand"
      ],
      "properties": {
        "devicecontrolrequestheader": {"$ref": "#/definitions/DeviceControlRequestHeader"},
        "lcsrequestcommand": {"type": "string"},
        "Any": {
          "type": "array",
          "items": {"type": "object"},
          "minItems": 0
        }
      }
    },
    "FailedSubscriptionReportingTimeFrame": {
      "type": "object",
      "required": [
        "start",
        "end"
      ]
    }
  }

```

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    ],
    "properties": {
      "start": {"$ref": "#/definitions/DateTimeZone"},
      "end": {"$ref": "#/definitions/DateTimeZone"}
    }
  },
  "SendingReceivingFlag": {
    "type": "object",
    "properties": {
      "isSending": {"type": "string"},
      "isReceiving": {"type": "string"}
    }
  },
  "SubscriptionStatusFilter": {
    "type": "object",
    "properties": {
      "sendingReceivingFlag": {"$ref": "#/definitions/SendingReceivingFlag"},
      "subscriptionRequestDialogName": {"$ref": "#/definitions/DialogName"},
      "subscriptionIdentifier": {"type": "string"},
      "datatype": {"$ref": "#/definitions/DataType"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "ActiveSubscriptionStatusRequest": {
    "type": "object",
    "required": [
      "authentication",
      "organizationrequesting",
      "failedsubscriptionreportingtimeframe"
    ],
    "properties": {
      "authentication": {"$ref": "#/definitions/Authentication"},
      "organizationrequesting": {"$ref": "#/definitions/OrganizationInformation"},
      "failedsubscriptionreportingtimeframe": {"$ref": "#/definitions/FailedSubscriptionReportingTimeFrame"},
      "subscriptionstatusfilter": {"$ref": "#/definitions/SubscriptionStatusFilter"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  }
}

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    }
  }
},
"activeSubscriptionStatusSubscriptionMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
    "message": {"$ref": "#/definitions/ActiveSubscriptionStatusRequest"}
  }
},
"videoSwitchInventoryUpdateMsg": {
  "type": "object",
  "required": [
    "c2cMsgAdmin",
    "message"
  ],
  "properties": {
    "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
    "message": {"$ref": "#/definitions/VideoSwitchInventoryMsg"}
  }
},
"ResponsePlanTermination": {
  "type": "object",
  "required": [
    "responseplanrequestheader",
    "eventid",
    "responseplanid",
    "requeststatus"
  ],
  "properties": {
    "responseplanrequestheader": {"$ref": "#/definitions/ResponsePlanRequestHeader"},
    "eventid": {"type": "string"},
    "responseplanid": {"type": "string"},
    "requeststatus": {"type": "string"},
    "statuslastrevised": {"$ref": "#/definitions/DateTimeZone"},
    "Any": {
      "type": "array",
      "items": {"type": "object"},
      "minItems": 0
    }
  }
}

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    }
  },
  "ResponsePlanTerminationMsg": {
    "type": "object",
    "required": ["responseplanterminationitem"],
    "properties": {
      "responseplanterminationitem": {
        "type": "array",
        "items": {"$ref": "#/definitions/ResponsePlanTermination"},
        "maxItems": 64,
        "minItems": 1
      }
    }
  },
  "CCTVControlDetails": {
    "type": "object",
    "required": [
      "cctvpositionpreset",
      "cctvpositionpan",
      "cctvpositiontilt",
      "cctvpositionzoomlens",
      "cctvpositionirislens",
      "cctvpositionfocuslens",
      "cctvenvironment",
      "cctvtext",
      "cctvlock"
    ],
    "properties": {
      "cctvpositionpreset": {"type": "integer"},
      "cctvpositionpan": {"type": "string"},
      "cctvpositiontilt": {"type": "string"},
      "cctvpositionzoomlens": {"type": "string"},
      "cctvpositionirislens": {"type": "string"},
      "cctvpositionfocuslens": {"type": "string"},
      "cctvenvironment": {"type": "string"},
      "cctvtext": {"type": "string"},
      "cctvlock": {"type": "string"}
    }
  },
  "CCTVControlRequest": {
    "type": "object",
    "required": [
      "devicecontrolrequestheader",
      "cctvrequestcommand",

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        "ctvcommandparameters"
    ],
    "properties": {
        "devicecontrolrequestheader": {"$ref": "#/definitions/DeviceControlRequestHeader"},
        "ctvrequestcommand": {"type": "string"},
        "ctvcommandparameters": {"$ref": "#/definitions/CCTVControlDetails"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"organizationInformationSubscriptionMsg": {
    "type": "object",
    "required": [
        "c2cMsgAdmin",
        "message"
    ],
    "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessageSubscription"},
        "message": {"$ref": "#/definitions/OrganizationInformationRequest"}
    }
},
"GateControlRequest": {
    "type": "object",
    "required": [
        "devicecontrolrequestheader",
        "gaterequestcommand"
    ],
    "properties": {
        "devicecontrolrequestheader": {"$ref": "#/definitions/DeviceControlRequestHeader"},
        "gaterequestcommand": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"responsePlanApprovalUpdateMsg": {
    "type": "object",
    "required": [
        "c2cMsgAdmin",

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        "message"
    ],
    "properties": {
        "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
        "message": {"$ref": "#/definitions/ResponsePlanApprovalMsg"}
    }
},
"VSSwitchedChannelData": {
    "type": "object",
    "required": [
        "inputchannelid",
        "outputchannelid"
    ],
    "properties": {
        "inputchannelid": {"type": "string"},
        "outputchannelid": {"type": "string"},
        "channeltitlingtext": {"type": "string"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    }
},
"VideoSwitchDeviceStatus.switchedchannellist": {
    "type": "object",
    "required": ["switchedchannel"],
    "properties": {
        "switchedchannel": {
            "type": "array",
            "items": {"$ref": "#/definitions/VSSwitchedChannelData"},
            "maxItems": 1024,
            "minItems": 1
        }
    }
},
"VideoSwitchDeviceStatus": {
    "type": "object",
    "required": [
        "devicestatusheader",
        "switchedchannellist"
    ],
    "properties": {
        "devicestatusheader": {"$ref": "#/definitions/DeviceStatusHeader"},

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        "switchedchannellist": {"$ref":
"#/definitions/VideoSwitchDeviceStatus.switchedchannellist"},
        "Any": {
            "type": "array",
            "items": {"type": "object"},
            "minItems": 0
        }
    },
    "VideoSwitchStatusMsg": {
        "type": "object",
        "required": ["videoswitchstatusitem"],
        "properties": {
            "videoswitchstatusitem": {
                "type": "array",
                "items": {"$ref": "#/definitions/VideoSwitchDeviceStatus"},
                "maxItems": 10240,
                "minItems": 1
            }
        }
    },
    "videoSwitchStatusUpdateMsg": {
        "type": "object",
        "required": [
            "c2cMsgAdmin",
            "message"
        ],
        "properties": {
            "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
            "message": {"$ref": "#/definitions/VideoSwitchStatusMsg"}
        }
    },
    "intersectionSignalTimingPatternInventoryUpdateMsg": {
        "type": "object",
        "required": [
            "c2cMsgAdmin",
            "message"
        ],
        "properties": {
            "c2cMsgAdmin": {"$ref": "#/definitions/C2cMessagePublication"},
            "message": {"$ref": "#/definitions/IntersectionSignalTimingPatternInventoryMsg"}
        }
    },
    "SectionSignalTimingPatternInventoryRequest": {

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    "type": "object",
    "required": ["deviceinformationrequestheader"],
    "properties": {
      "deviceinformationrequestheader": {"$ref": "#/definitions/DeviceInformationRequest"},
      "sectiontimingpatternid": {"type": "string"},
      "Any": {
        "type": "array",
        "items": {"type": "object"},
        "minItems": 0
      }
    }
  },
  "C2cMessageReceipt": {
    "type": "object",
    "required": ["informationalText"],
    "properties": {
      "informationalText": {"type": "string"}
    }
  },
  "AuthorizationSet": {
    "type": "object",
    "required": [
      "userid",
      "password",
      "hashtime",
      "hash"
    ],
    "properties": {
      "userid": {"type": "string"},
      "password": {"type": "string"},
      "hashtime": {
        "type": "string",
        "format": "date-time"
      },
      "hash": {"type": "string"}
    }
  },
  "NodeAttribute": {
    "type": "object",
    "properties": {
      "yourName": {"type": "string"}
    }
  },
  "GridProfile": {

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    "type": "object",
    "properties": {
      "yourName": {"type": "string"}
    }
  },
  "GridPointPair": {
    "type": "object",
    "properties": {
      "yourName": {"type": "string"}
    }
  },
  "GridPoint": {
    "type": "object",
    "properties": {
      "yourName": {"type": "string"}
    }
  },
  "Grid": {
    "type": "object",
    "properties": {
      "yourName": {"type": "string"}
    }
  },
  "AdminAreaGroup": {
    "type": "object",
    "properties": {
      "yourName": {"type": "string"}
    }
  },
  "GridPointSequence": {
    "type": "object",
    "properties": {
      "yourName": {"type": "string"}
    }
  },
  "EventTimesExt": {
    "type": "object",
    "required": ["extension"],
    "properties": {
      "roadwayclearedtime": {"$ref": "#/definitions/DateTimeZone"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },
  "DetectorInventoryDetailsExt": {

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    "type": "object",
    "required": ["extension"],
    "properties": {
      "detectortypeextended": {"type": "string"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },
  "CenterActiveVerificationResponseExt": {
    "type": "object",
    "required": [
      "versionid",
      "extension"
    ],
    "properties": {
      "versionid": {"type": "integer"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },
  "DetectorMaintenanceHistoryDetailExt": {
    "type": "object",
    "required": ["extension"],
    "properties": {
      "detectortypeextended": {"type": "string"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },
  "TimeRange": {
    "type": "object",
    "required": [
      "starttime",
      "periodseconds",
      "extension"
    ],
    "properties": {
      "starttime": {"$ref": "#/definitions/DateTimeZone"},
      "periodseconds": {"type": "integer"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },
  "DeviceInformationRequestFilterExt": {
    "type": "object",
    "required": ["extension"],
    "properties": {
      "timerange": {"$ref": "#/definitions/TimeRange"},

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        "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
},
"HARMessageInventoryExt": {
    "type": "object",
    "required": ["extension"],
    "properties": {
        "currentmessageextended": {"type": "string"},
        "harpriority": {"type": "integer"},
        "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
},
"HARControlRequestExt.harbeaconcontrollist": {
    "type": "object",
    "required": ["harbeaconcontrol"],
    "properties": {
        "harbeaconcontrol": {
            "type": "array",
            "items": {"type": "integer"},
            "maxItems": 8,
            "minItems": 1
        }
    }
},
"HARControlRequestExt": {
    "type": "object",
    "required": ["extension"],
    "properties": {
        "harbeaconcontrollist": {"$ref":
"/definitions/HARControlRequestExt.harbeaconcontrollist"},
        "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
},
"IntersectionSignalStatusExt": {
    "type": "object",
    "required": [
        "signalcontrolsourceextended",
        "currentsignaltimingmodeextended",
        "extension"
    ],
    "properties": {
        "signalcontrolsourceextended": {"type": "string"},
        "currentsignaltimingmodeextended": {"type": "string"},
        "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
}

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    }
  },
  "HARInventoryExt": {
    "type": "object",
    "required": [
      "harmessageextended",
      "extension"
    ],
    "properties": {
      "harmessageextended": {"type": "string"},
      "harbeacon1location": {"$ref": "#/definitions/GeoLocation"},
      "harbeacon1description": {"type": "string"},
      "harbeacon2": {"type": "string"},
      "harbeacon2location": {"$ref": "#/definitions/GeoLocation"},
      "harbeacon2description": {"type": "string"},
      "harbeacon3": {"type": "string"},
      "harbeacon3location": {"$ref": "#/definitions/GeoLocation"},
      "harbeacon3description": {"type": "string"},
      "harbeacon4": {"type": "string"},
      "harbeacon4location": {"$ref": "#/definitions/GeoLocation"},
      "harbeacon4description": {"type": "string"},
      "harbeacon5": {"type": "string"},
      "harbeacon5location": {"$ref": "#/definitions/GeoLocation"},
      "harbeacon5description": {"type": "string"},
      "harbeacon6": {"type": "string"},
      "harbeacon6location": {"$ref": "#/definitions/GeoLocation"},
      "harbeacon6description": {"type": "string"},
      "harbeacon7": {"type": "string"},
      "harbeacon7location": {"$ref": "#/definitions/GeoLocation"},
      "harbeacon7description": {"type": "string"},
      "harbeacon8": {"type": "string"},
      "harbeacon8location": {"$ref": "#/definitions/GeoLocation"},
      "harbeacon8description": {"type": "string"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },
  "DeviceInventoryHeaderExt": {
    "type": "object",
    "required": ["extension"],
    "properties": {
      "deviceurl2": {"$ref": "#/definitions/UrlReference"},
      "deviceurl3": {"$ref": "#/definitions/UrlReference"},
      "deviceurl4": {"$ref": "#/definitions/UrlReference"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  }
}

```

```

    }
  },
  "DetectorDataDetailExt": {
    "type": "object",
    "required": ["extension"],
    "properties": {
      "vehicleclassbin1": {"type": "integer"},
      "vehicleclassbin2": {"type": "integer"},
      "vehicleclassbin3": {"type": "integer"},
      "vehicleclassbin4": {"type": "integer"},
      "vehicleclassbin5": {"type": "integer"},
      "vehicleclassbin6": {"type": "integer"},
      "vehicleclassbin7": {"type": "integer"},
      "vehicleclassbin8": {"type": "integer"},
      "vehicleclassbin9": {"type": "integer"},
      "vehicleclassbin10": {"type": "integer"},
      "vehicleclassbin11": {"type": "integer"},
      "vehicleclassbin12": {"type": "integer"},
      "vehicleclassbin13": {"type": "integer"},
      "vehicleclassbin14": {"type": "integer"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },
  "HARStatusExt": {
    "type": "object",
    "required": ["extension"],
    "properties": {
      "harcurrenmessageextended": {"type": "string"},
      "messageduration": {"type": "integer"},
      "messagebeacon2": {"type": "integer"},
      "messagebeacon3": {"type": "integer"},
      "messagebeacon4": {"type": "integer"},
      "messagebeacon5": {"type": "integer"},
      "messagebeacon6": {"type": "integer"},
      "messagebeacon7": {"type": "integer"},
      "messagebeacon8": {"type": "integer"},
      "extension": {"$ref": "#/definitions/TMDDExtension"}
    }
  },
  "DialogName": {
    "allOf": [
      {"type": "string"},
      {
        "enum": [

```

## TMDD Standards Update Recommendations – Data Structures

"ArchivedDataTrafficMonitoringMetadataRequest",  
"ArchivedDataProcessingDocumentationMetadataRequest",  
"CCTVInventoryRequest",  
"CCTVStatusRequest",  
"CCTVControlRequest",  
"CenterActiveVerificationRequest",  
"CenterActiveVerificationSubscription",  
"AvailableDialogsRequest",  
"ActiveSubscriptionStatusRequest",  
"ActiveSubscriptionStatusSubscription",  
"DetectorInventoryRequest",  
"DetectorStatusRequest",  
"DetectorDataRequest",  
"DetectorDataSubscription",  
"DetectorMaintenanceHistoryRequest",  
"DeviceCancelControlRequest",  
"DeviceControlStatusRequest",  
"DeviceInformationSubscription",  
"DMSInventoryRequest",  
"DMSStatusRequest",  
"DMSMessageInventoryRequest",  
"DMSMessageInventorySubscription",  
"DMSMessageAppearanceRequest",  
"DMSFontTableRequest",  
"DMSControlRequest",  
"DMSPriorityQueueRequest",  
"ESSInventoryRequest",  
"ESSStatusRequest",  
"ESSObservationMetadataRequest",  
"ESSObservationReportRequest",  
"FullEventUpdateRequest",  
"EventIndexRequest",  
"ActionLogRequest",  
"FullEventUpdateSubscription",  
"EventIndexSubscription",  
"ActionLogSubscription",  
"GateInventoryRequest",  
"GateStatusRequest",  
"GateControlRequest",  
"GateControlScheduleRequest",  
"HARInventoryRequest",  
"HARMessageInventoryRequest",  
"HARStatusRequest",  
"HARControlRequest",



"HARControlScheduleRequest",  
"HARPriorityQueueRequest",  
"IntersectionSignalInventoryRequest",  
"IntersectionSignalStatusRequest",  
"IntersectionSignalTimingPatternInventoryRequest",  
"IntersectionSignalTimingPatternInventorySubscription",  
"IntersectionSignalControlRequest",  
"IntersectionSignalControlScheduleRequest",  
"IntersectionSignalPriorityQueueRequest",  
"LCSInventoryRequest",  
"LCSStatusRequest",  
"LCSControlRequest",  
"LCSControlScheduleRequest",  
"LinkInventoryRequest",  
"LinkStatusRequest",  
"NodeInventoryRequest",  
"NodeStatusRequest",  
"OrganizationInformationRequest",  
"OrganizationInformationSubscription",  
"RampMeterInventoryRequest",  
"RampMeterStatusRequest",  
"RampMeterControlRequest",  
"RampMeterControlScheduleRequest",  
"RampMeterPriorityQueueRequest",  
"RampMeterPlanInventoryRequest",  
"RampMeterPlanInventorySubscription",  
"ResponsePlanApprovalRequest",  
"ResponsePlanApprovalSubscription",  
"ResponsePlanLogRequest",  
"ResponsePlanLogSubscription",  
"ResponsePlanStatusRequest",  
"ResponsePlanStatusSubscription",  
"ResponsePlanRequest",  
"ResponsePlanSubscription",  
"ResponsePlanTerminationRequest",  
"RouteInventoryRequest",  
"RouteStatusRequest",  
"SectionStatusRequest",  
"SectionControlRequest",  
"SectionControlScheduleRequest",  
"SectionControlStatusRequest",  
"SectionPriorityQueueRequest",  
"SectionSignalTimingPatternInventoryRequest",  
"SectionSignalTimingPatternInventorySubscription",

## TMDD Standards Update Recommendations – Data Structures

"TrafficNetworkInformationSubscription",  
"VideoSwitchInventoryRequest",  
"VideoSwitchStatusRequest",  
"VideoSwitchControlRequest",  
"CCTVInventoryUpdate",  
"CCTVStatusUpdate",  
"CenterActiveVerificationUpdate",  
"ActiveSubscriptionStatusUpdate",  
"DetectorInventoryUpdate",  
"DetectorStatusUpdate",  
"DetectorDataUpdate",  
"DMSInventoryUpdate",  
"DMSMessageInventoryUpdate",  
"DMSStatusUpdate",  
"ESSInventoryUpdate",  
"ESSStatusUpdate",  
"ESSObservationReportUpdate",  
"FullEventUpdateUpdate",  
"EventIndexUpdate",  
"ActionLogUpdate",  
"GateInventoryUpdate",  
"GateStatusUpdate",  
"GateControlScheduleUpdate",  
"HARInventoryUpdate",  
"HARMessageInventoryUpdate",  
"HARStatusUpdate",  
"HARControlScheduleUpdate",  
"IntersectionSignalInventoryUpdate",  
"IntersectionSignalTimingPatternInventoryUpdate",  
"IntersectionSignalStatusUpdate",  
"IntersectionSignalControlScheduleUpdate",  
"LCSInventoryUpdate",  
"LCSStatusUpdate",  
"LCSControlScheduleUpdate",  
"OrganizationInformationUpdate",  
"RampMeterInventoryUpdate",  
"RampMeterStatusUpdate",  
"RampMeterControlScheduleUpdate",  
"RampMeterPlanInventoryUpdate",  
"ResponsePlanApprovalUpdate",  
"ResponsePlanLogUpdate",  
"ResponsePlanStatusUpdate",  
"ResponsePlanUpdate",  
"SectionStatusUpdate",

## TMDD Standards Update Recommendations – Data Structures

```
        "SectionControlScheduleUpdate",
        "SectionSignalTimingPatternInventoryUpdate",
        "LinkInventoryUpdate",
        "LinkStatusUpdate",
        "NodeInventoryUpdate",
        "NodeStatusUpdate",
        "RouteInventoryUpdate",
        "RouteStatusUpdate",
        "VideoSwitchInventoryUpdate",
        "VideoSwitchStatusUpdate"
    ]
}
]
},
"DataType": {
    "allOf": [
        {"type": "string"},
        {
            "enum": [
                "CCTVInventory",
                "CCTVStatus",
                "CenterActiveVerification",
                "Dialog",
                "DialogStatus",
                "DetectorInventory",
                "DetectorStatus",
                "DetectorData",
                "DMSInventory",
                "DMSMessageInventory",
                "DMSStatus",
                "ESSInventory",
                "ESSStatus",
                "ESSObservationReport",
                "FullEventUpdate",
                "EventIndex",
                "ActionLog",
                "GateInventory",
                "GateStatus",
                "GateControlSchedule",
                "HARInventory",
                "HARMessageInventory",
                "HARStatus",
                "HARControlSchedule",
                "IntersectionSignalInventory",
```

## TMDD Standards Update Recommendations – Data Structures

```
    "IntersectionSignalTiminPatternInventory",
    "IntersectionSignalStatus",
    "IntersectionSignalControlSchedule",
    "LCSInventory",
    "LCSStatus",
    "LCSControlSchedule",
    "OrganizationInformation",
    "RampMeterInventory",
    "RampMeterStatus",
    "RampMeterControlSchedule",
    "RampMeterPlanInventory",
    "ResponsePlanApproval",
    "ResponsePlanLog",
    "ResponsePlanStatus",
    "ResponsePlan",
    "SectionStatus",
    "SectionControlSchedule",
    "SectionSignalTimingPatternInventory",
    "LinkInventory",
    "LinkStatus",
    "NodeInventory",
    "NodeStatus",
    "RouteInventory",
    "RouteStatus",
    "VideoSwitchInventory",
    "VideoSwitchStatus"
  ]
}
],
},
"DialogBehavior": {
  "allOf": [
    {"type": "string"},
    {
      "enum": [
        "full inventory supported",
        "incremental inventory supported",
        "complete dataset on first message",
        "periodic subscription update message provided only when change present"
      ]
    }
  ]
}
],
},
"WarningAdvice": {
```

```

    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "Temperature": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "WeatherConditions": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "LaneRoadway": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "SportingEvents": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "AssetStatus": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  }

```

```

    }
  ]
},
"Obstruction": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"GenericLocations": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"RestrictionClass": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"IncidentResponseStatus": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"Precipitation": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"Disasters": {

```

```

    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "SpecialEvents": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "UnusualDriving": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "SuggestionAdvice": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "PavementConditions": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "Qualifiers": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  }

```

## TMDD Standards Update Recommendations – Data Structures

```
    }
  ]
},
"IncidentResponseEquipment": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"ResponderGroupAffected": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"Roadwork": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"DelayStatusCancellation": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"AccidentsAndIncidents": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"ITIScodes": {
```



```

    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "VisibilityAndAirQuality": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "AdviceInstructionsMandatory": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "ParkingInformation": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "MobileSituation": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "AlternateRoute": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  }
}

```

```

    }
  ]
},
"Units": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"TravelerGroupAffected": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"Winds": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"TransitOperations": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"RoadsideAssets": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"VehicleGroupAffected": {

```

```

    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "Disturbances": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "SystemInformation": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "WinterDrivingRestrictions": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "Objects": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "AdviceInstructionsRecommendations": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  }
}

```

```

    }
  ]
},
"TransitMode": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"WinterDrivingIndex": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"DeviceStatus": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"Closures": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"TrafficConditions": {
  "allOf": [
    {"type": "string"},
    {
      "enum": ["insert-local-values-here"]
    }
  ]
},
"HorizontalDatum": {

```

```

    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "LRMethod": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "ExtendedPointType": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "PointType": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  },
  "VerticalDatum": {
    "allOf": [
      {"type": "string"},
      {
        "enum": ["insert-local-values-here"]
      }
    ]
  }
},
"anyOf": [
  {
    "type": "object",
    "properties": {

```

```

        "hARMessageInventoryUpdateMsg": {"$ref":
"#/definitions/hARMessageInventoryUpdateMsg"}
    },
    {
        "type": "object",
        "properties": {
            "eSSObservationReportUpdateMsg": {"$ref":
"#/definitions/eSSObservationReportUpdateMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "responsePlanUpdateMsg": {"$ref": "#/definitions/responsePlanUpdateMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "rampMeterControlScheduleUpdateMsg": {"$ref":
"#/definitions/rampMeterControlScheduleUpdateMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "intersectionSignalControlScheduleUpdateMsg": {"$ref":
"#/definitions/intersectionSignalControlScheduleUpdateMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "fullEventUpdateUpdateMsg": {"$ref": "#/definitions/fullEventUpdateUpdateMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "dMSMessageAppearanceMsg": {"$ref": "#/definitions/dMSMessageAppearanceMsg"}
        }
    }
}

```

```

    "type": "object",
    "properties": {
      "routeStatusUpdateMsg": {"$ref": "#/definitions/routeStatusUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "responsePlanSubscriptionMsg": {"$ref": "#/definitions/responsePlanSubscriptionMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "intersectionSignalStatusUpdateMsg": {"$ref": "#/definitions/intersectionSignalStatusUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "archivedDataTrafficMonitoringMetadataMsg": {"$ref": "#/definitions/archivedDataTrafficMonitoringMetadataMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "detectorMaintenanceHistoryMsg": {"$ref": "#/definitions/detectorMaintenanceHistoryMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "organizationInformationUpdateMsg": {"$ref": "#/definitions/organizationInformationUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "gateStatusUpdateMsg": {"$ref": "#/definitions/gateStatusUpdateMsg"}
    }
  }

```

## TMDD Standards Update Recommendations – Data Structures

```
    },
    {
      "type": "object",
      "properties": {
        "rampMeterPlanInventorySubscriptionMsg": {"$ref":
"#/definitions/rampMeterPlanInventorySubscriptionMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "dMSMessageInventoryUpdateMsg": {"$ref":
"#/definitions/dMSMessageInventoryUpdateMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "detectorInventoryUpdateMsg": {"$ref": "#/definitions/detectorInventoryUpdateMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "dMSStatusUpdateMsg": {"$ref": "#/definitions/dMSStatusUpdateMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "archivedDataProcessingDocumentationMetadataMsg": {"$ref":
"#/definitions/archivedDataProcessingDocumentationMetadataMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "actionLogUpdateMsg": {"$ref": "#/definitions/actionLogUpdateMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "cCTVStatusUpdateMsg": {"$ref": "#/definitions/cCTVStatusUpdateMsg"}
      }
    }
  ]
}
```



```

    }
  },
  {
    "type": "object",
    "properties": {
      "ICSControlScheduleUpdateMsg": {"$ref":
"#/definitions/ICSControlScheduleUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "sectionSignalTimingPatternInventorySubscriptionMsg": {"$ref":
"#/definitions/sectionSignalTimingPatternInventorySubscriptionMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "sectionSignalTimingPatternInventoryUpdateMsg": {"$ref":
"#/definitions/sectionSignalTimingPatternInventoryUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "rampMeterStatusUpdateMsg": {"$ref": "#/definitions/rampMeterStatusUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "sectionStatusUpdateMsg": {"$ref": "#/definitions/sectionStatusUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "rampMeterPlanInventoryUpdateMsg": {"$ref":
"#/definitions/rampMeterPlanInventoryUpdateMsg"}
    }
  },
  {
    "type": "object",

```

```

        "properties": {
            "dMSMessageInventorySubscriptionMsg": {"$ref":
"#/definitions/dMSMessageInventorySubscriptionMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "intersectionSignalTimingPatternInventorySubscriptionMsg": {"$ref":
"#/definitions/intersectionSignalTimingPatternInventorySubscriptionMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "hARPriorityQueueMsg": {"$ref": "#/definitions/hARPriorityQueueMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "activeSubscriptionStatusUpdateMsg": {"$ref":
"#/definitions/activeSubscriptionStatusUpdateMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "responsePlanStatusUpdateMsg": {"$ref":
"#/definitions/responsePlanStatusUpdateMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "detectorDataUpdateMsg": {"$ref": "#/definitions/detectorDataUpdateMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "rampMeterInventoryUpdateMsg": {"$ref":
"#/definitions/rampMeterInventoryUpdateMsg"}
        }
    }

```

```

    },
    {
      "type": "object",
      "properties": {
        "nodeInventoryUpdateMsg": {"$ref": "#/definitions/nodeInventoryUpdateMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "dMSFontTableMsg": {"$ref": "#/definitions/dMSFontTableMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "hARInventoryUpdateMsg": {"$ref": "#/definitions/hARInventoryUpdateMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "hARStatusUpdateMsg": {"$ref": "#/definitions/hARStatusUpdateMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "eventIndexUpdateMsg": {"$ref": "#/definitions/eventIndexUpdateMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "ICSInventoryUpdateMsg": {"$ref": "#/definitions/ICSInventoryUpdateMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "detectorStatusUpdateMsg": {"$ref": "#/definitions/detectorStatusUpdateMsg"}
      }
    },
    {

```

```

    "type": "object",
    "properties": {
      "linkStatusUpdateMsg": {"$ref": "#/definitions/linkStatusUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "hARControlScheduleUpdateMsg": {"$ref":
"#/definitions/hARControlScheduleUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "dMSPriorityQueueMsg": {"$ref": "#/definitions/dMSPriorityQueueMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "gateInventoryUpdateMsg": {"$ref": "#/definitions/gateInventoryUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "rampMeterPriorityQueueMsg": {"$ref": "#/definitions/rampMeterPriorityQueueMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "nodeStatusUpdateMsg": {"$ref": "#/definitions/nodeStatusUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "centerActiveVerificationSubscriptionMsg": {"$ref":
"#/definitions/centerActiveVerificationSubscriptionMsg"}
    }
  },
  {

```

## TMDD Standards Update Recommendations – Data Structures

```
    "type": "object",
    "properties": {
      "dMSInventoryUpdateMsg": {"$ref": "#/definitions/dMSInventoryUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "linkInventoryUpdateMsg": {"$ref": "#/definitions/linkInventoryUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "trafficNetworkInformationSubscriptionMsg": {"$ref":
"#/definitions/trafficNetworkInformationSubscriptionMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "routeInventoryUpdateMsg": {"$ref": "#/definitions/routeInventoryUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "responsePlanLogUpdateMsg": {"$ref": "#/definitions/responsePlanLogUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "responsePlanApprovalSubscriptionMsg": {"$ref":
"#/definitions/responsePlanApprovalSubscriptionMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "responsePlanLogSubscriptionMsg": {"$ref":
"#/definitions/responsePlanLogSubscriptionMsg"}
    }
  },
}
```

## TMDD Standards Update Recommendations – Data Structures

```
{
  "type": "object",
  "properties": {
    "ICSStatusUpdateMsg": {"$ref": "#/definitions/ICSStatusUpdateMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "intersectionSignalInventoryUpdateMsg": {"$ref":
"#/definitions/intersectionSignalInventoryUpdateMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "eSSObservationMetadataMsg": {"$ref": "#/definitions/eSSObservationMetadataMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "responsePlanStatusSubscriptionMsg": {"$ref":
"#/definitions/responsePlanStatusSubscriptionMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "centerActiveVerificationUpdateMsg": {"$ref":
"#/definitions/centerActiveVerificationUpdateMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "intersectionSignalPriorityQueueMsg": {"$ref":
"#/definitions/intersectionSignalPriorityQueueMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "gateControlScheduleUpdateMsg": {"$ref":
```

```

"#/definitions/gateControlScheduleUpdateMsg"
  }
},
{
  "type": "object",
  "properties": {
    "eSSInventoryUpdateMsg": {"$ref": "#/definitions/eSSInventoryUpdateMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "eSSStatusUpdateMsg": {"$ref": "#/definitions/eSSStatusUpdateMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "cCTVInventoryUpdateMsg": {"$ref": "#/definitions/cCTVInventoryUpdateMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "sectionControlScheduleUpdateMsg": {"$ref":
"#/definitions/sectionControlScheduleUpdateMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "activeSubscriptionStatusSubscriptionMsg": {"$ref":
"#/definitions/activeSubscriptionStatusSubscriptionMsg"}
  }
},
{
  "type": "object",
  "properties": {
    "videoSwitchInventoryUpdateMsg": {"$ref":
"#/definitions/videoSwitchInventoryUpdateMsg"}
  }
},
{
  "type": "object",

```

```

    "properties": {
      "organizationInformationSubscriptionMsg": {"$ref":
"#/definitions/organizationInformationSubscriptionMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "responsePlanApprovalUpdateMsg": {"$ref":
"#/definitions/responsePlanApprovalUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "videoSwitchStatusUpdateMsg": {"$ref": "#/definitions/videoSwitchStatusUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "intersectionSignalTimingPatternInventoryUpdateMsg": {"$ref":
"#/definitions/intersectionSignalTimingPatternInventoryUpdateMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "hARStatusRequestMsg": {"$ref": "#/definitions/DeviceInformationRequest"}
    }
  },
  {
    "type": "object",
    "properties": {
      "sectionControlScheduleMsg": {"$ref": "#/definitions/SectionControlScheduleMsg"}
    }
  },
  {
    "type": "object",
    "properties": {
      "cCTVInventoryMsg": {"$ref": "#/definitions/CCTVInventoryMsg"}
    }
  },
  {
    {

```



```

        "type": "object",
        "properties": {
            "rampMeterControlScheduleMsg": {"$ref":
"#/definitions/RampMeterControlScheduleMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "deviceInformationRequestMsg": {"$ref": "#/definitions/DeviceInformationRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "fEUMsg": {"$ref": "#/definitions/FEUMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "responsePlanLogRequestMsg": {"$ref": "#/definitions/ResponsePlanLogRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "gateStatusMsg": {"$ref": "#/definitions/GateStatusMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "hARControlRequestMsg": {"$ref": "#/definitions/HARControlRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "availableDialogsResponseMsg": {"$ref": "#/definitions/AvailableDialogsResponse"}
        }
    },
    {
        "type": "object",

```

```

        "properties": {
            "eSSObservationReportRequestMsg": {"$ref":
"#/definitions/DeviceInformationRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "detectorMaintenanceHistoryRequestMsg": {"$ref":
"#/definitions/DetectorMaintenanceHistoryRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "eSSInventoryMsg": {"$ref": "#/definitions/ESSInventoryMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "rampMeterStatusMsg": {"$ref": "#/definitions/RampMeterStatusMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "sectionStatusMsg": {"$ref": "#/definitions/SectionStatusMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "sectionSignalTimingPatternInventoryMsg": {"$ref":
"#/definitions/SectionSignalTimingPatternInventoryMsg"}
        }
    },
    {
        "type": "object",
        "properties": {
            "responsePlanStatusRequestMsg": {"$ref": "#/definitions/ResponsePlanStatusRequest"}
        }
    },
    {

```

```

        "type": "object",
        "properties": {
            "organizationInformationRequestMsg": {"$ref":
"#/definitions/OrganizationInformationRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "gateStatusRequestMsg": {"$ref": "#/definitions/DeviceInformationRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "availableDialogsRequestMsg": {"$ref": "#/definitions/AvailableDialogsRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "rampMeterControlRequestMsg": {"$ref": "#/definitions/RampMeterControlRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "archivedDataProcessingDocumentationMetadataRequestMsg": {"$ref":
"#/definitions/ArchivedDataProcessingDocumentationMetadataRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "dMSMessageAppearanceRequestMsg": {"$ref":
"#/definitions/DMSMessageAppearanceRequest"}
        }
    },
    {
        "type": "object",
        "properties": {
            "responsePlanTerminationRequestMsg": {"$ref":
"#/definitions/ResponsePlanTerminationRequest"}
        }
    }

```

```

    },
    {
      "type": "object",
      "properties": {
        "rampMeterPriorityQueueRequestMsg": {"$ref":
"#/definitions/DevicePriorityQueueRequest"}
      }
    },
    {
      "type": "object",
      "properties": {
        "dMSStatusMsg": {"$ref": "#/definitions/DMSStatusMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "routeInventoryMsg": {"$ref": "#/definitions/RouteInventoryMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "gateControlScheduleMsg": {"$ref": "#/definitions/GateControlScheduleMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "deviceInformationSubscriptionMsg": {"$ref":
"#/definitions/DeviceInformationSubscription"}
      }
    },
    {
      "type": "object",
      "properties": {
        "hARStatusMsg": {"$ref": "#/definitions/HARStatusMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "nodeStatusRequestMsg": {"$ref": "#/definitions/TrafficNetworkInformationRequest"}
      }
    }

```

```

    },
    {
      "type": "object",
      "properties": {
        "cCTVStatusMsg": {"$ref": "#/definitions/CCTVStatusMsg"}
      }
    },
    {
      "type": "object",
      "properties": {
        "hARInventoryRequestMsg": {"$ref": "#/definitions/DeviceInformationRequest"}
      }
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