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# Technology Test Drive Interface Control Document

January 2020



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## Definitions & Abbreviations

TERM/ABBREVIATION	DEFINITION/DESCRIPTION	REMARKS
AES	Advanced Encryption Standard	
<b>Component</b>	A subsystem component is a modular part of the subsystem that serves specific activities or tasks	
<b>ConOps</b>	Concept of Operations	
<b>Datawarehouse</b>	The database developed for the Part 1 Demonstration but also used for Part 2 to store Participant travel data used to generate Road Usage Reports.	
<b>Demonstration Project</b>	The terms refer to the HiRUC Demonstration, including both parts 1 and 2	
DC	Data Collection	
DIT	Honolulu City & County Department of Information Technology	
ECU	Engine Control Unit	
EPA	Environmental Protection Agency	
FIPS	Federal Information Processing Standard, which includes two-digit numerical codes for each U.S. state/territory.	
FCC	Federal Communications Commission	
<b>Function</b>	Specific tasks accomplished by a system component	
<b>Functional group</b>	Functional groups are high-level objectives of the subsystem component	
GIS/MAP	Geographic Information System	
GPS	Global Positioning Systems	
HDOT	Hawaii Department of Transportation	
<b>HiRUC Administration</b>	Name given to the administrative entity tasked with recruiting Demonstration Participants, verifying the correct computation of road usage charges, and performing any compliance activities recommended by HDOT.	
<b>HiRUC System</b>	The system established for the Part 1 demonstration to generate Road Usage Reports (RURs), comprising a Datawarehouse and a RUR Generator. It will also be used in Part 2.	
HTTP	HyperText Transfer Protocol	
ICD	Interface Control Document	
IP	Internet Protocol	
IT	Information Technology	
JSON	JavaScript Object Notation	



TERM/ABBREVIATION	DEFINITION/DESCRIPTION	REMARKS
<b>LTE</b>	Long-Term Evolution	
<b>Mileage Message</b>	A mileage message is the formatted transaction data, containing mileage, fuel usage and health data, that is exchanged between Service Provider subsystems.	
<b>Mileage Meter</b>	A Mileage Meter is a device or inbuilt system that collects road usage charge information for the vehicle in which it is installed	
<b>Mileage Reporting Technology</b>	The actual technology underlying a Mileage Reporting Method, either a plug-in device, odometer image capture system (an app with front and back ends), or Native Automaker Telematics	
<b>MRD</b>	Mileage Reporting Devices	
<b>MRM</b>	Mileage Reporting Method, a means of recording and reporting miles travelled, either a plug-in device (OBDII), odometer image capture system, or Native Automaker Telematics.	
<b>MTBF</b>	Meantime Between Failures	
<b>MVerity</b>	Vehcon's patented system for odometer image capture and validation, which the Service Provider will use for odometer image capture.	
<b>Native Automaker Telematics</b>	A telematics system installed by the carmaker at the time of manufacturing, providing a secure data interface to the vehicle electronics, including odometer, used here as a Mileage Reporting Method.	Abbreviated NAT
<b>OBDII</b>	On Board Diagnostics II, the CARB/EPA standard for vehicle data interfaces included in all US vehicles built after 1996.	
<b>Odometer Charge</b>	Reporting odometer images periodically as a Mileage Reporting Method, also called Odometer-based Reporting.	Abbreviated OdoPhoto
<b>Odometer Message</b>	An odometer message is the formatted transaction data, containing odometer data that is exchanged between subsystems	
<b>Odometer-based reporting</b>	Reporting odometer images periodically as a Mileage Reporting Method, also called Odometer Charge.	Abbreviated OdoPhoto
<b>Part 1</b>	The Manual Demonstration, in which Hawaii residents receive a Driving Report based on their odometer readings collected during safety inspections. Not included in this specification.	
<b>Part 2</b>	The Automated Demonstration, in which ~2,000 Participants receive Road Usage Reports over the 9-month Demonstration based on a variety of Mileage Reporting Methods. Included in this specification	
<b>Participant</b>	A volunteer who has enrolled in the Part 2 (Automated) Demonstration	
<b>PID</b>	Plug-in Device, an OBDII device with or without location, a Mileage Reporting Method.	Abbreviated PID (either with or without



TERM/ABBREVIATION	DEFINITION/DESCRIPTION	REMARKS
		location information), OBDLoc (includes location information) or OBDNoLoc (no location information)
<b>PII</b>	Personally Identifiable Information	Defined in business rules
<b>PMVI</b>	Periodic Motor Vehicle Inspection	
<b>REST</b>	Representational State Transfer	
<b>RPAM</b>	Demonstration Participant Account Management	
<b>RUC</b>	Road Usage Charge	
<b>Rule ID</b>	RuleID is the code for the location (area) where the mileage is driven. All RuleID's refer to entire states, provinces, counties, or other jurisdictions, except 00, which refers to mileage driven for which there is no location data (state cannot be determined).	
<b>RUR</b>	Road Usage Report, a periodic statement of driving data in PDF format sent to Participants by the Service Provider.	
<b>RURG</b>	Road Usage Report Generator, the component of the HiRUC system (developed for the Part 1 Demonstration but also used in the Part 2 Demonstration) that creates Road Usage Reports based on travel data stored in the Datawarehouse.	
<b>SP</b>	Service Provider, the firm that provides mileage collection and account management services for the Part 2 Demonstration, reports data to the HiRUC Administration and HiRUC system, and has a direct interface with the Participants.	
<b>SRS</b>	System Requirement Specification	
<b>SubRule ID</b>	SubRule ID distinguishes between chargeable (public on-road) and non-chargeable miles driven within a given Rule ID.	
<b>TCP</b>	Transmission Control Protocol	
<b>TP</b>	Transaction Processor	
<b>UBI</b>	Usage-based Insurance	
<b>undifferentiated</b>	Miles for which location data is not available, recorded in RuleID 0, considered to be chargeable miles.	
<b>VIN</b>	Vehicle Identification Number, a unique serial number for each vehicle, standardized as a 17-digit alphanumeric code since 1981.	
<b>VMT</b>	Vehicle Miles Travelled	

## 1. Preface

### 1.1. Purpose

The Interface Control Document (ICD) is a systems engineering document provided to HDOT, the HiRUC system owner, in support of the development of the HiRUC system.

The purpose of this document is to describe the technical specifications of interfaces between existing HiRUC subsystems and HiRUC subsystems supported by the Service Provider, which are specified in the System Requirement Specification (SRS) for purposes of the HiRUC demonstration (a real, revenue-collecting system would require additional interfaces to legacy systems). Four categories of interfaces are identified in this document:

- ▶ Interfaces between the Mileage Reporting subsystem and the Account Management subsystem.
- ▶ Interfaces between the Account Management subsystem and the Datawarehouse subsystem
- ▶ Interfaces between the Account Management subsystem and the Road Usage Report Generator (RURG) subsystem

### 1.2. Other Systems Engineering Documents

The functional and technical aspects of the project work are documented primarily in the following documents (business, administrative, and programmatic aspects of the work are documented in separate documents):

- ▶ A **Concept of Operations** that describes the functions and processes of the system at a high level.
- ▶ A **System Requirements Specification** (SRS) that provides the functional technical requirements for the component subsystems.
- ▶ **MVerity Specification** that provide specifications to integrate the Service Provider smartphone application with the MVerity odometer-image capture, processing and reporting system.

### 1.3. Document Contents

The remainder of this document is organized as follows:

**Section 2** Open Systems Objective cover the standardization objectives of the HiRUC subsystem, and standards and preferences that apply to the HiRUC system interfaces.

**Section 3** The System Interface Overview section presents a brief overview of the subsystems involved and interfaces to which this Interface Control Document (ICD) applies.

**Section 4** The Interface between Mileage Reporting subsystem and the Account Management subsystem section presents how road usage data is exchanged between components of both subsystems for the mileage reporting methods supported.



**Section 5** The Interface between the Account Management subsystem and the Datawarehouse section presents the reports exchanged between the Account Management component and the Masterdatabase component of the Datawarehouse subsystem.

**Section 6** The Interface between the Account Management subsystem and the RURG section presents the reports exchanged between the Account Management component and the Masterdatabase component of the Datawarehouse subsystem.

**Section 7** The Reports sent from the Account Management subsystem to the HiRUC Administration for RUC system oversight purposes.



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## 2. Open Systems Objective

HDOT desires this system to be fully open. Firms will always be eligible to provide hardware or services, and no hardware or service that is certified shall contain proprietary content that would limit the use of other hardware or services in the system at any time. HDOT may accept any technology complying with the specifications, and any service-providing firm complying with the specifications to be a Service Provider. Conformance to the interface specified in this document is mandatory for any technology and any Service Provider. The intent is that vendors can use proprietary components to meet the requirements of the subsystems (as defined in the SRS) but they must stay open at the system level by using the defined interfaces in the ICD, which defines the connections between the subsystems.

### 2.1. Interface Control Standardization

Having a standardized interface is vital to operating open systems. It will allow mileage reporting methods from various technology providers to operate with various Service Providers and multiple Service Providers to work with the agency.

This interface control document embraces a cloud-based approach to communications from the Mileage Reporting subsystem. This cloud-based approach may employ any communications medium permitting an Internet connection. This ICD provides a robust communications standard.

Within Internet communications, this interface control document employs JSON messages because they are an industry standard for human readable, yet relatively low overhead communications.

### 2.2. Applicable Standards and Preferences

- ▶ Web-services protocol: REST (REpresentational State Transfer)
- ▶ Message definition: JSON (JavaScript Object Notation)
- ▶ Application Layer: HTTP over TLS/SSL
- ▶ Transportation Layer: TCP (Transmission Control Protocol)
- ▶ Internet Layer: IP (Internet Protocol)

There is no standard/preference for over-the-air communication. Any communications method that can employ the protocols specified above is appropriate. For example, Wi-Fi, 3G, 4G, and fixed-line Internet are all appropriate communication methods.

## 3. System Overview

### 3.1. Identification of Subsystems

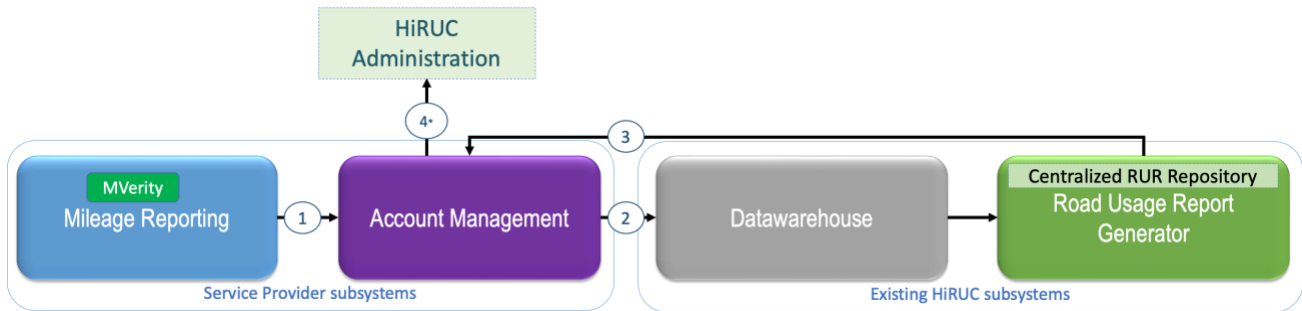
The HiRUC system comprises four subsystems:

- ▶ A **Mileage Reporting subsystem** that includes two components – a Mileage Meter and a Data Collection component that collects the road usage charge information and transmits it to the Account Management Subsystem. The components of the Mileage Reporting subsystem must integrate with the MVerity system (provided by Vehcon, not part of the procurement) which will support the odometer-photo capture, processing, and validation functions.
- ▶ An **Account Management subsystem** that manages Participant accounts, reports Account, VIN and data required to generate Road Usage Reports (RURs) to the Datawarehouse subsystem, retrieves RURs periodically generated by the Road Usage Report Generation subsystem and distributes them to Participant accounts. The Account Management system also produces data reports for the HiRUC Administration. The subsystem comprises three components – a Transaction Processing component, a Participant Account Management component, and a Reporting component.
- ▶ A **Datawarehouse subsystem (existing HiRUC system, not included in procurement)** that includes a Master Database component which imports and stores Account, VIN, and RUR data from the Account Management subsystem. The Master Database then stores and transmits RUR data to the Road Usage Report Generation subsystem periodically.
- ▶ A **Road Usage Report Generator (RURG) subsystem (existing HiRUC system, not included in procurement)** that receives and uses RUR data from the Datawarehouse subsystem to build RURs, which are then posted to a centralized RUR repository that can be accessed by the Account Management subsystem. The RURG subsystem reports the RUR status to the Datawarehouse subsystem, which in turn reports the RUR status to the Account Management subsystem.

### 3.2. Interfaces between Subsystems

Figure 1 below shows four categories of interfaces between Service Provider subsystems and other HiRUC subsystems.

**Figure 1: Overview of Interfaces Between Subsystems**



These interfaces are shown in greater detail in Figure 2.

► Interface 1

> Interface between Mileage Reporting subsystem (Data Collection component) and the Account Management subsystem (Transaction Processing component) to exchange road usage data measured or reported through mileage reporting methods supported. This interface is entirely internal to the Service Provider subsystem. The type of information exchanged depends on the mileage reporting method used:

- The Mileage Message, for the plug-in device Mileage Reporting Methods, and possibly the Native Automaker Telematics Mileage Reporting Methods (if it easily and cheaply allows data to be collected by day) explained in section 4.3, and
- The Odometer message, for the Odometer Charge mileage reporting method, and possibly the Native Automaker Telematics<sup>1</sup> Mileage Reporting Method (if it does not include data by day), explained in section 4.4.

► Interface 2

> Interface between the Account Management subsystem (Account Management component) and the Datawarehouse subsystem (Masterdatabase component) to:

- send participant account creation data and subsequent data updates relating to VIN, mobile phone number or email address—this must be done in near-real time, immediately when each Participant registers for the Part 2 Demonstration or updates account information, as explained in further detail in section 5.3.1.
- send data to generate Road Usage Reports (RURs) for Participants—this must be done for all participants on a periodic basis or on an on-demand basis for a small subset of participants (to manage exceptional cases), as specified in the Business Rules

<sup>1</sup>Note that if Native Automaker Telematics determines location information, it shall detect and record/store miles traveled and (if available) fuel usage by Rule ID/SubRule ID either in the Mileage Message or the Odometer Message.

Document, currently monthly for automated methods and quarterly for the Odometer Charge method, as explained further in section 5.3.3, and

- receive status reports on RURs issued—the Datawarehouse component of the current HiRUC System generates the RURs, and the transmits a message back to the Service Provider indicating which RURs have been creating, which the Service Provider then uses as a basis for transmitting the RURs to Participants. This is explained further in section 5.3.5.

► Interface 3

> Interface between the Account Management subsystem (Account Management component) and the RURG subsystem to retrieve RURs for Participants. This interface is included in section 6. This interface has two elements:

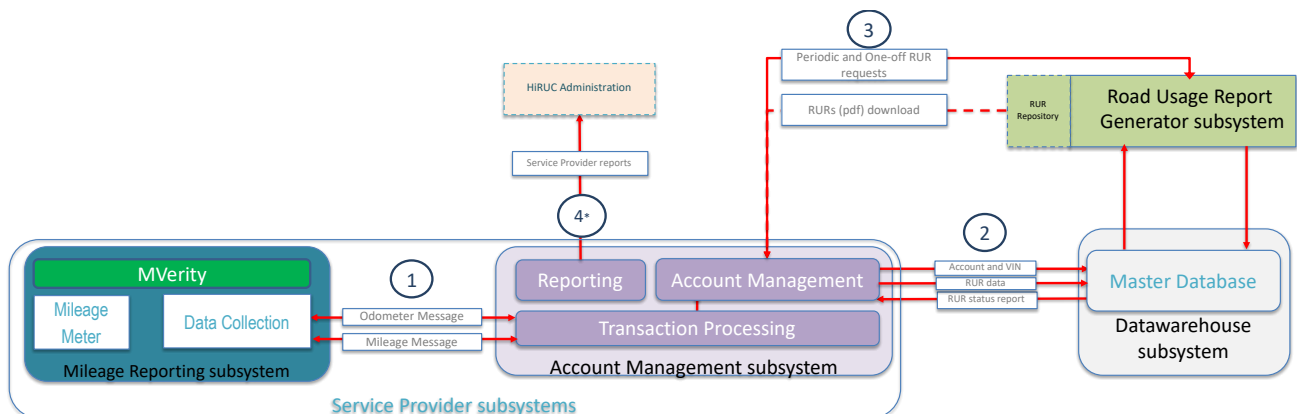
- The RUR Request, in which the Service Provider Requests RURs to be generated and download, specified in section 6.3.1, and
- The RUR Data response, in which the RUR Generator sends download links (URLs) with the RURs to the Service Provider, specified in section 6.3.3.

► Interface 4

> The Road Usage Charge Demonstration Administration uses reports sent by the Accounting Management subsystem to manage the overall RUC system, and in particular, audit, edit and verify the completeness and correctness of the mileage and revenue data calculated by the Service Provider. Interface 4 consists of reports sent in Excel format. Precise details of this interface are not included in this document—simply a starting list of data to include. An example spreadsheet is also attached. The precise data and form of the spreadsheet will be determined by the D’Artagnan and the Service Provider together, at the Workshop. The data lists for this interface are included in section 7.

Figure 2 illustrates the type of messages exchanged between the Service Provider subsystems and other HiRUC subsystems.

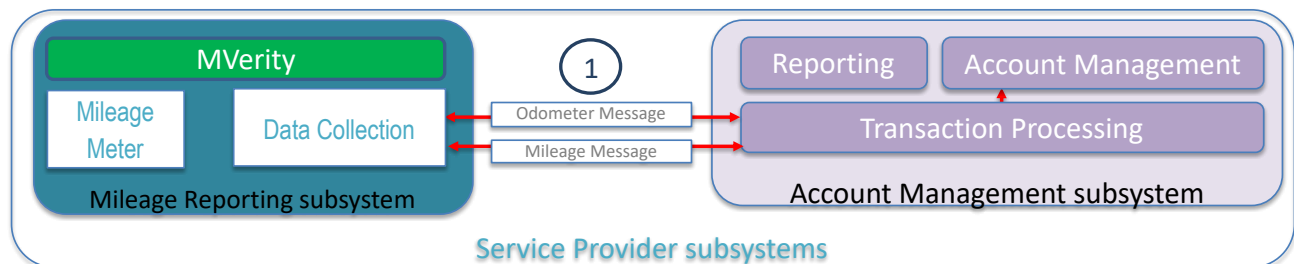
**Figure 2: Interfaces between Service Provider Subsystems and Other Subsystems**



### 3.3. Mileage Reporting Methods and Message Types

Messages exchanged between the Mileage Reporting subsystem (Data Collection component) and the Account Management subsystem (Transaction Processing component) will depend on the type of mileage meter, which determines the type of data collected – either mileage measured or odometer reading reported, and location data and fuel consumption data when and where available (see Figure 3).

**Figure 3: Interface Between Mileage Reporting Subsystem and Account Management Subsystem**



Interfaces for the following types of mileage reporting will be implemented in the HiRUC project.

- ▶ **Odometer-based reporting Mileage Meters (Odometer Charge)**, which are applications or web browsers used on smartphones or camera-equipped mobile phones through which odometer images are reported. These odometer images are captured, processed and verified by Vehcon’s MVerity system with which the Service Provider smartphone applications must integrate. The MVerity system creates an odometer result for each odometer image captured, processed and verified. The Data Collection component uses the odometer result to create an **odometer message**, which is transmitted to the Account Management Subsystem (Transaction Processor component).
- ▶ **OBDII Mileage Meters (Plug-in Device)**, which are devices that plug into a vehicle’s OBDII port to get vehicular data. Such devices may include devices used to measure vehicle data for Usage-based Insurance (UBI). These Mileage Meters are with or without GPS technology. The mileage meter with GPS collects mileage driven for each travel zone. The Data Collection component collects mileage transactions (and zone mileage) from the mileage meter and creates **mileage messages** that include mileage, fuel and health data. Data Collection transmits mileage messages to the Account Management Subsystem (Transaction Processor component).
- ▶ **Native Automaker Telematics Mileage Meters**, which is software that interfaces with the vehicle telematics systems of connected vehicles to extract data needed for road charging. These vehicles are factory equipped with telematics systems that include a cellular (3G/LTE) interface. These mileage meters do may push messages to the Account Managers, but rather allow Service Providers to pull data from the automaker telematics interface. Depending on implementation, Native Automaker telematics may more closely resemble the Odometer Charge or the OBDII mileage meter, which implies that either odometer messages or mileage messages will be exchanged.

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## 4. Interface between Mileage Reporting subsystem and Account Management Subsystem

### 4.1. Data Transfer using Mileage Messages and Odometer Messages

Data will be transmitted from the Mileage Reporting subsystem to the Account Management Subsystem using mileage message or odometer messages, which are defined using JSON data formats specified in this document. These JSON messages are communicated through the REST protocol. The frequency of message transmission is parameterized in the Mileage Reporting subsystem, and set per the agency requirements.

Messages will be acknowledged by the Account Management subsystem with a standard response from a REST transaction (HTTP 200) if the message can be parsed and synchronous validation is successful. If the message fails parsing or synchronous validation, an HTTP 400 will be sent to the Mileage Reporting subsystem from which it came with a failure message as the JSON payload. The failure messages are specified in this document in the mileage message and odometer message specification sections.

### 4.2. Interface Initiation Rules

Mileage Message or Odometer Message reporting is initiated by the Mileage Meter Reporting subsystem by calling a REST/JSON interface implemented by the Account Management subsystem. The method will be mutually agreed to by the Service Provider and any third-party technology provider. The frequency of transmission is defined in the Business Rules. The following apply to the interface:

- ▶ The interface is a REST API (Application Programming Interface). The REST endpoints are the URLs of the Account Management subsystem server provided by the Service Provider to send REST requests and REST responses.
- ▶ The mileage message and the odometer message are push messages (REST requests) from the Mileage Reporting subsystem to the Account Management subsystem (except for the Native Automaker Telematics methods where the interfaces are pull messages).
- ▶ The Account Management subsystem accepts the message or REST requests at all times, whenever the Mileage Reporting subsystem transmits it.
- ▶ The messages or REST requests are sent by the Mileage Reporting subsystem at an interval programmed into the Mileage Reporting subsystem, as specified in the SRS.
- ▶ Message (or REST request) Contents:
  - > The mileage message and the odometer message contain data for only one vehicle (VIN).
  - > If a mileage meter determines it has been inserted into a new vehicle but still has unsent mileage days in its buffer from previous days, it shall send these in one mileage message

(identified by the old VIN) before it sends new mileage day records (for the new vehicle with the new VIN) in a new mileage message.

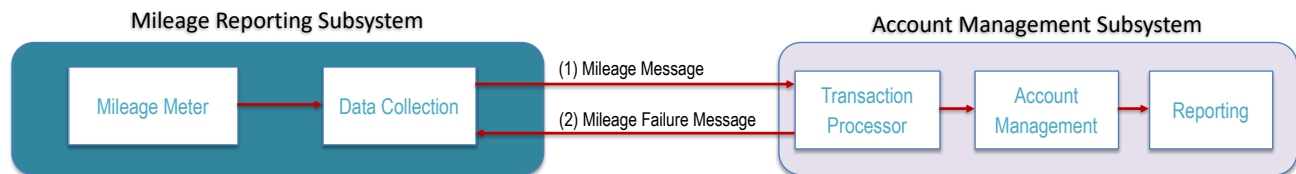
### 4.3. Mileage Message Specifications

The **Mileage Message** is a means of transmitting mileage data from the Mileage Reporting subsystem to the Account Management subsystem. Mileage message transmission is independent of communication channel, and specific hardware or software between Mileage Reporting subsystem to Account Management subsystem.

As illustrated by Figure 4, two types of messages are exchanged between the Mileage Reporting subsystem (Data Collection component) and Account Management subsystem (Transaction Processing component).

- ▶ The Mileage Message (REST request) is sent to the Transaction Processor (section 4.3.1)
- ▶ In case of message validation failure, the Transaction Processor responds by sending a Mileage Failure Message (section 4.3.3).

**Figure 4: Transactions Between Mileage Reporting Subsystem and Account Management Subsystem**



#### 4.3.1. Mileage Message Pseudocode

The following block of code is the mileage day details record. If Day-level detail is available, for each mileage message, include a record for each day not yet transferred to transactions processor. All days shall be included, even if miles driven are 0. If Day-level detail is not available, use the MileageRangeDetails record below.

<i>{MileageMessage</i>	
<b>MRDID</b>	
<b>MRDIssuer</b>	
<b>MRDManufacturer</b>	
	<i>{ MRDConfigVersion</i>
	<b>HWMModel</b>
	<b>HWMainRelease</b>
	<b>HWSUBRelease</b>



<b>SWMainRelease</b>
<b>SWSubRelease</b>
<b>MapMainRelease</b>
<b>MapSubRelease</b>
}
<b>FuelUseMethod</b>
<b>VIN</b>
<b>MsgID</b>
<b>MsgType</b>
<b>TransmittedTimestamp</b>

The following block of code is the mileage day details record. If Day-level detail is available, for each mileage message, include a record for each day not yet transferred to transactions processor. All days shall be included, even if miles driven are 0. If Day-level detail is not available, use the MileageRangeDetails record below.

<i>{MileageDayDetails</i>
<b>ReportDate</b>
<b>TotalMilesOnDate</b>
<b>AccumMilesOnDate</b>
<b>FuelUsageOnDate</b>
<b>FuelAddedOnDate</b>

The following block of code is the mileage range details record. Use this block of code only if day-level detail is not available:

<i>{MileageRangeDetails</i>
<b>ReportStartDate</b>
<b>ReportEndDate</b>
<b>TotalMilesInRange</b>
<b>AccumMilesInRange</b>
<b>FuelUsageInRange</b>
<b>FuelAddedInRange</b>





The following block of code is the mileage rule record. For each day (mileage day record) or range (mileage range record), include one instance of this block for each RuleID and Sub Rule ID in which the vehicle has traveled.

<i>{MileageSubRuleDetails</i>
<b>RuleID</b>
<b>SubRuleID</b>
<b>MsgMileageInSubRuleID</b>
<b>MsgFuelUsagInSubRuleID</b>
<b>MsgFuelAddedInSubRuleID</b>
}

The following block of code is the mileage meter Health error code for each error that occurs during a mileage day record.

<i>{MRDHealthDetails</i>
<b>MRDHealth</b>
<b>MRDHealthTimestamp</b>
}
}
}

#### 4.3.2. Mileage Message Definitions

Note that optional fields may be omitted from the message; if the value fields indicate NULL not OK, then the field must be populated with a non-NULL value; if the value field indicates NULL OK, then the value may be populated with a NULL value, which should be either NULL or "NULL". No empty strings shall be used anywhere.

Data Element	Meaning
<b>MRDID</b>	<p>Required</p> <p>Description: Unique identifier for mileage meter (such as serial number)</p> <p>Data Type: String</p> <p>Format: VARCHAR(64)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>MRDIssuer</b>	<p>Optional</p> <p>Description: Name of entity issuing mileage meter</p> <p>Data Type: String</p> <p>Format: VARCHAR(50)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: N/A</p>
<b>MRDManufacturer</b>	<p>Optional</p> <p>Description: Name of mileage meter Manufacturer</p> <p>Data Type: String</p> <p>Format: VARCHAR(50)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>HWMModel</b>	Optional Description: HW Model number Data Type: String Format: VARCHAR(15) Calculation: N/A Values: NULL OK Special Rules: N/A
<b>HWMMainRelease</b>	Optional Description: HW primary release number Data Type: String Format: VARCHAR(15) Calculation: N/A Values: NULL OK Special Rules: N/A
<b>HWSUBRelease</b>	Optional Description: HW secondary release number Data Type: String Format: VARCHAR(15) Calculation: N/A Values: NULL OK Special Rules: N/A

Data Element	Meaning
<b>SWMainRelease</b>	<p>Optional</p> <p>Description: SW primary release number</p> <p>Data Type: String</p> <p>Format: VARCHAR(10)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: N/A</p>
<b>SWSubRelease</b>	<p>Optional</p> <p>Description: SW secondary release number</p> <p>Data Type: String</p> <p>Format: VARCHAR(10)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: N/A</p>
<b>MapMainRelease</b>	<p>Optional</p> <p>Description: Map primary release number</p> <p>Data Type: String</p> <p>Format: VARCHAR(3)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>MapSubRelease</b>	<p>Optional</p> <p>Description: Map secondary release number</p> <p>Data Type: String</p> <p>Format: VARCHAR(3)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: N/A</p>
<b>FuelUseMethod</b>	<p>Required</p> <p>Description: A value indicating which fuel consumption method is used to calculate fuel usage (for the most recent measurement)</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values:</p> <p>1 = Fuel use not calculated</p> <p>2 = Fuel calculated from actual fuel use from the vehicle</p> <p>3 = Fuel Use calculated using approved EPA methods (see Business Rules Document)</p> <p>4 = Vehicle does not use taxable fuel</p> <p>NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>VIN</b>	<p>Required</p> <p>Description: The VIN of the vehicle in which the mileage meter is installed</p> <p>Data Type: String</p> <p>Format: VARCHAR (20)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>MsgID</b>	<p>Required</p> <p>Description: Message identification number for sequencing of mileage messages</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: a unique, increasing, number only for messages that are accepted by the SP (i.e. http 200 response). The same MsgID <i>may</i> be used again to recover from a message send failure (a http 400 response).</p>

Data Element	Meaning
<b>MsgType</b>	<p>Required</p> <p>Description: A value to indicate the type of message from the mileage meter</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values:</p> <ul style="list-style-type: none"> <li>1 = Normal message</li> <li>2 = First Message from vehicle (only when installed into a completely new vehicle, not a reinstall)</li> <li>3 = Last Message from vehicle</li> </ul> <p>NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>TransmittedTimestamp</b>	<p>Required</p> <p>Description: Timestamp provided by transmitting entity when message sent (in UTC)</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form "YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK, Special Rules: UTC</p>



Data Element	Meaning
<b>ReportDate</b>	<p>Required</p> <p>Description: The date of Mileage Day Record (using the day delineation definition / in local Pacific time)</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form "YYYY-MM-DD" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>TotalMilesOnDate</b>	<p>Required</p> <p>Description: Total Miles Reported for the VIN/mileage meter for a given day</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>AccumMilesOnDate</b>	<p>Required</p> <p>Description: Cumulative miles of the mileage meter since installed in the VIN (all miles of given VIN/MRD combination), including TotalMilesOnDate</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: If no miles accumulated, set this field value to 0</p>
<b>FuelUsageOnDate</b>	<p>Required</p> <p>Description: Accumulated fuel usage on reporting date for the VIN/mileage meter</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "MsgFuelUsageInSubRuleID" for all Sub Rule IDs in reporting period</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>FuelAddedOnDate</b>	<p>Optional (should only be included where supported by the data source)</p> <p>Description: The amount of fuel added on a given day for the VIN/mileage meter</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "MsgFuelAddedinSubRuleID" for all Sub Rule IDs in reporting period</p> <p>Values: NULL OK</p> <p>Special Rules: Calculating fuel added to vehicle is not a required functionality at this time – if no data for this field, set field value to NULL</p>

Data Element	Meaning
<b>ReportStartDate</b>	<p>Required</p> <p>Description: The start date of Mileage Range Record (only used if mileage range details are provided in the message)</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form</p> <p>" YYYY-MM-DD" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>ReportEndDate</b>	<p>Required</p> <p>Description: The end date of Mileage Range Record (only used if mileage range details are provided in the message)</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form "YYYY-MM-DD" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>TotalMilesInRange</b>	<p>Required</p> <p>Description: Total Miles Reported for the VIN/mileage meter for a given date range (only used if mileage range details are provided in the message)</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>AccumMilesInRange</b>	<p>Required</p> <p>Description: Cumulative miles of the mileage meter since installed in the VIN (all miles of given VIN/MRD combination), including TotalMilesInRange (only used if mileage range details are provided in the message)</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: If no miles accumulated, set this field value to 0</p>
<b>FuelUsageInRange</b>	<p>Required</p> <p>Description: Fuel usage in reporting date range for the VIN/mileage meter (only used if mileage range details are provided in the message)</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "MsgFuelUsageInSubRuleID" for all Sub Rule IDs in reporting period</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>RuleID</b>	<p>Required</p> <p>Description: An identifier associated with a geographic area, or zone, in which a specific rate per mile will be assessed for miles traveled. FIPS codes are used to identify states and counties.</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: FIPS codes for States plus four Hawaii counties, see SRS; NULL not OK</p> <p>Special Rules: N/A</p>
<b>SubRuleID</b>	<p>Required</p> <p>Description: Sub Rule ID, numerical index for region of travel within given Rule ID</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <ul style="list-style-type: none"> <li>▶ 1=all public on-road (chargeable) miles in given RuleID</li> <li>▶ 2=all non-chargeable miles in given RuleID</li> </ul> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>MsgMileageInSubRuleID</b>	<p>Required</p> <p>Description: Miles Traveled in VIN/mileage meter Sub Rule ID on given date</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>MsgFuelUsageInSubRuleID</b>	<p>Required</p> <p>Description: Amount of fuel consumed based on Fuel Use Method in given VIN/mileage meter Sub Rule ID on given day</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>



Data Element	Meaning
<b>MsgFuelAddedInSubRuleID</b>	<p>Optional</p> <p>Description: The amount of fuel added in given VIN/mileage meter Sub Rule ID on a given day.</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Special Rules: Calculating fuel added to vehicle is not a required functionality at this time – if no data for this field, set field value to NULL. NULL OK.</p> <p>Calculation: N/A</p> <p>Values: N/A</p>
<b>MRDHealth</b>	<p>Required (if mileage meter error or event occurs during reporting period)</p> <p>Description: Coding of each error and event that occurred for the given mileage meter on the given date, when the error was detected by the mileage meter</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values:</p> <p>All the following values listed in the SRS requirement MM.RSP.1-1-18 are supported but optional, except values 4, 5, and 13, which are supported and mandatory for OBDII device mileage meters (only). Vendors should support as many of the values as possible. NULL OK – NULL means no health issues.</p> <p>Special Rules: When a device is removed and returned to the same vehicle, a pair of events – event 4 and event 6 should occur. If it is connected to a vehicle event 4 and event 5 should occur. These events should always occur in pairs (4/5 and 4/6).</p>

Data Element	Meaning
<b>MRDHealthTimestamp</b>	<p>Required (if mileage meter error or event occurs during reporting period)</p> <p>Description: Date and time stamp that a- mileage meter error or event occurs (in UTC)</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form "YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: UTC</p>

### 4.3.3. Mileage Message Failure Pseudocode

Note that the Failure Message shall only be transmitted by the Account Management subsystem if the mileage message fails data validation checks.

<i>{MileageMessageResults</i>
<b>FailureTimestamp</b>
<b>MsgID</b>
<b>FailedDate</b>
<b>MsgFailedCode</b>
}

#### 4.3.4. Mileage Message Failure Definitions

Data Element	Meaning
<b>FailureTimestamp</b>	<p>Required (if failed message occurs)</p> <p>Description: Timestamp provided by transmitting entity when message sent (in UTC)</p> <p>Data Type: String</p> <p>Format: The date/time is specified in the following form "YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>MsgID</b>	<p>Required (if failed message occurs)</p> <p>Description: Message identification number for sequencing of mileage messages</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>FailedDate</b>	<p>Required (if failed message occurs)</p> <p>Description: The ReportDate. Used to match message to error</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form "YYYY-MM-DD" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>MsgFailedCode</b>	<p>Required (if failed message occurs)</p> <p>Description: A value indicating the reason that the message was not processed.</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values:</p> <ol style="list-style-type: none"> <li>1. Duplicate message (a mileage message with identical MRDID and MsgID has already been received)</li> <li>2. Data Inconsistency (any data consistency check failed—data in message does not make sense)</li> </ol> <p>Special Rules: Numbers beyond #2 will be determined by the Agency. NULL not OK</p> <p>Note: Failed Authentication should result in an HTTP 401 response, thus not covered in this code which accompanies an HTTP 400 response.</p>

#### 4.4. Odometer Message Specifications

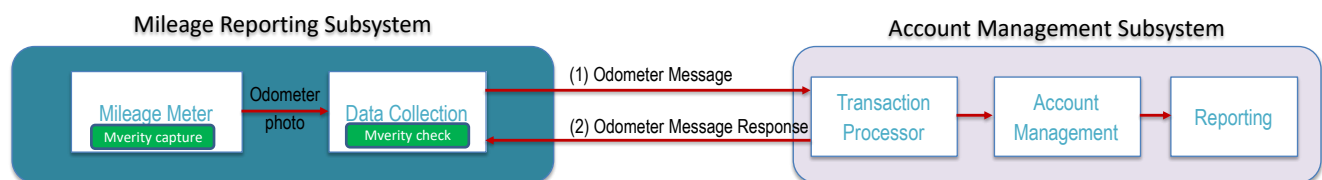
The Odometer Message is a means of transmitting mileage data from the Mileage Reporting subsystem to the Account Management subsystem.

- ▶ An **Odometer Message** is transmitted between Mileage Reporting subsystem to Account Management subsystem. The Odometer Message is built from the odometer photo captured, processed and validated through the MVerity system that is integrated with the Service Provider camera-phone image-based mileage meters.

As illustrated by Figure 5, two types of messages are exchanged between the Mileage Reporting subsystem (Data Collection component) and Account Management subsystem (Transaction Processing component) for odometer-based mileage meters.

- ▶ The Odometer Message (REST request) is sent to the Transaction Processor (section 4.4.1)
- ▶ The Transaction Processor processes the Odometer Message and sends an Odometer Results Message response to the Data Collection component (section 4.4.2).

**Figure 5: Transactions between Mileage Reporting Subsystem and Account Management Subsystem for Odometer-based Mileage Meters**



#### 4.4.1. Odometer Message Pseudocode

{ <i>OdometerMessage</i>
<b>AppUserID</b>
<b>AppIssuer</b>
<b>AppID</b>
<b>VIN</b>
<b>MVerityResult</b>
<b>OdometerReading</b>
<b>OdometerReadingTimestamp</b>
<b>TransmittedTimestamp</b>
<b>MsgIDAlpha</b>

The following block of code is the mileage range details record. **This is applicable ONLY for the “Native Automaker Telematics” mileage meter.** If applicable, the Service Provider may add other fields. Use one block of code for each time interval between successive verified odometer readings:

{ <i>MileageRangeDetails</i>
<b>ReportStartDate</b>
<b>ReportEndDate</b>
<b>TotalMilesInRange</b>



The following block of code is the mileage rule record. For each day (mileage day record) or range (mileage range record), include one instance of this block for each RuleID and Sub Rule ID in which the vehicle has traveled.

```
{MileageSubRuleDetails
RuleID
SubRuleID
MsgMileageInSubRuleID
}
```

```
}
}
```

Data Element	Meaning
AppUserID	Required  Description: Unique identifier for App User (such as account ID, user ID, email address, etc.)  Data Type: String  Format: VARCHAR(64)  Calculation: N/A  Values: NULL not OK  Special Rules: N/A

Data Element	Meaning
<b>AppIssuer</b>	<p>Optional</p> <p>Description: Name of entity issuing App (such as Service Provider name, app vendor, etc.)</p> <p>Data Type: String</p> <p>Format: VARCHAR(50)</p> <p>Calculation: N/A</p> <p>Values: Null OK</p> <p>Special Rules: N/A</p>
<b>AppID</b>	<p>Required</p> <p>Description: Name of App</p> <p>Data Type: String</p> <p>Format: VARCHAR(50)</p> <p>Calculation: N/A</p> <p>Values: N/A</p> <p>“MVOD” = MVerity On-Demand (via browser)</p> <p>“SPAPPNAME” = Service Provider app w/ MVerity integrated</p> <p>NAT = Native Automaker Telematics (if applicable)</p> <p>“PARTICIPANT” = unverified odometer reading, reported numerically by the Participant by email or directly to the Service Provider helpdesk.</p> <p>Special Rules: N/A</p>



Data Element	Meaning
<b>VIN</b>	<p>Required</p> <p>Description: The VIN of the vehicle whose odometer is being reported</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: "Short VINs" with less than 17 characters (permitted for certain pre-1981 vehicles only) must be padded with leading "zeroes" to meet the 17-character length requirement .</p>
<b>MVerityResult</b>	<p>Required</p> <p>Description: Status of odometer reading after MVerity check and validation</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: NULL ok (indicates success)</p> <p style="padding-left: 40px;">NOREAD = Vehicle odometer not in photo</p> <p style="padding-left: 40px;">INVALID = Failed MVerity Validation</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>OdometerReading</b>	<p>Required</p> <p>Description: Value of Odometer Reading</p> <p>Data Type: Number</p> <p>Format: Miles [0 ... 999,999]</p> <p>Calculation: N/A</p> <p>Values: NULL ok</p> <p>Special Rules: N/A</p>
<b>OdometerReadingTimestamp</b>	<p>Required</p> <p>Description: Timestamp of odometer reading (in UTC)</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form</p> <p>"YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: UTC</p>

Data Element	Meaning
<b>TransmittedTimestamp</b>	<p>Required</p> <p>Description: Timestamp provided by transmitting entity when message sent (in UTC)</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form</p> <p>"YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: UTC</p>

Data Element	Meaning
<b>MsgIDAlpha</b>	<p>Required</p> <p>Description: Unique alphanumeric Message identifier</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>ReportStartDate</b>	<p>Optional (Required for Native Automaker Telematics mileage meter with location)</p> <p>Description: The start date of Mileage Range Record (in UTC)</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form "YYYY-MM-DDT hh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: N/A</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<p><b>ReportEndDate</b></p>	<p>Optional (Required for Native Automaker Telematics mileage meter with location)</p> <p>Description: The end date of Mileage Range Record (in UTC)</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form "YYYY-MM-DDT hh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A, Values: N/A</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>TotalMilesInRange</b>	<p>Optional (Required for Native Automaker Telematics mileage meter with location)</p> <p>Description: Total Miles Reported for the VIN/mileage meter for a given date range</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>RuleID</b>	<p>Optional (Required for Native Automaker Telematics mileage meter with location)</p> <p>Description: An identifier associated with a geographic area, or zone, in which a specific rate per mile will be assessed for miles traveled. FIPS codes are used to identify states and counties.</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: Rule ID codes and definitions are defined in the Agency provided Road Usage Charge Rate Table</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>SubRuleID</b>	<p>Optional (Required for Native Automaker Telematics mileage meter with location)</p> <p>Description: Sub Rule ID, numerical index for region of travel within given Rule ID</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>1=all public on-road (chargeable) miles in given RuleID</p> <p>2=all non-chargeable miles in given RuleID</p> <p>Special Rules: N/A</p>
<b>MileageInSubRuleID</b>	<p>Optional (Required for Native Automaker Telematics mileage meter with location)</p> <p>Description: Miles Traveled in VIN/mileage meter Sub Rule ID for a given date range</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

#### 4.4.2. Odometer Message Response Pseudocode

The Account Management also sends back an acknowledgement in real-time every time it receives an odometer message. This Acknowledgement Message has not been finalized but will look much like the message defined below. The definition will be finalized at the Workshop.

{ <i>AMSAcknowledgementMsg</i>
<b>MessageID</b>
Object that includes all the <b>MsgIDalpha</b> present in the odometer message, plus a system-generated AccountID
<b>TransactionID</b> (assigned by the responding system, for tracking purposes)
}

Note that the Account Management system must have a mechanism to request an OdometerMessage be generated and a reason code for the request.



---

## 5. Interfaces between Account Management and Datawarehouse Subsystem

### 5.1. Data Transfer

Data will be transmitted between the Account Management subsystem and the Datawarehouse subsystem via JSON messages communicated through the REST protocol. The frequency of message transmission is parameterized in the Account Management subsystem and Datawarehouse subsystem, and set per the agency requirements.

Messages will be acknowledged by the Account Management subsystem and Datawarehouse subsystem with a standard response from a REST transaction (HTTP 200) if the message can be parsed and synchronous validation is successful. If the message fails parsing or synchronous validation, an HTTP 400 will be sent to the issuer of the response, i.e. either the Account Management subsystem or Datawarehouse subsystem, with a failure message as the JSON payload.

### 5.2. Interface Initiation Rules

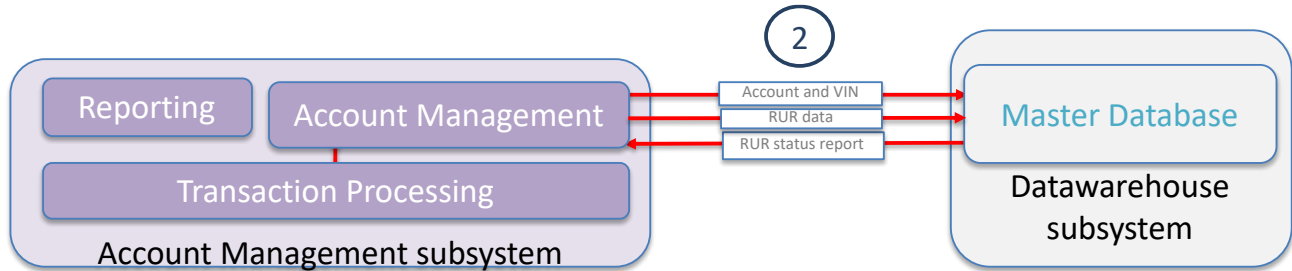
- ▶ Two interfaces, Account and VIN message and RUR reporting, are initiated by the Account Management subsystem by calling a REST/JSON interface implemented by the Datawarehouse subsystem.
- ▶ The RUR status reporting is initiated by the Datawarehouse subsystem by calling a REST/JSON interface implemented by the Account Management subsystem
- ▶ The methods will be mutually agreed to by Service Provider and the vendor supporting the Datawarehouse subsystem. The frequency of transmission for each report is defined in the Business Rules.

### 5.3. Reports Specifications

As illustrated by Figure 6, three types of reports are exchanged between the Account Management subsystem (Account Management component) and the Datawarehouse subsystem (Master Database component).

- ▶ The **Account and VIN Update message** is sent from the Account Management component to the Master Database component in real-time, i.e. each time a Participant account is fully created (section 5.3.1).
- ▶ The **RUR data report** is sent from the Account Management component to the Master Database component on a periodic basis as defined in the Business Rules or on a one-off basis to manage exceptional RUR generation (section 5.3.3)
- ▶ The **RUR status report** is sent from Master Database component to the Account Management component on a periodic basis as defined in the Business Rules (section 5.3.5).

**Figure 6: Reports Exchanged Between the Account Management Subsystem and the Datawarehouse Subsystem**



### 5.3.1. Account and VIN Update Message Pseudocode

The Account and VIN Update message exchanges the appropriate account attributes and participation status of the accounts and VINs in the Road Usage Charge Demonstration in real-time or near real-time for each Participant account created (status = enrolled). In this case include only one account per message—the new account just created.

The following block of code is Account and VIN Update message.

```
{ AccountAndVINUpdateMessage
```

<b>AMID</b>
<b>TransmittedTimestamp</b>
<b>MessageID</b>

```
{ AVMDetails
```

The following block of code is the Account record. Include one for each Account (that is, each unique AMCustomerNumber) where data is changing. For all data elements included in a message, the values will be updated. NOTE: If the AMCustomerNumber is not currently known by the Datawarehouse or the RPMAccountID is not provided, a new Account record will be created and all of the Required data must be provided. Similarly, if the VIN is not currently known by the Datawarehouse or the RPMVehicleEnrollmentID is not provided, a new Vehicle Enrollment record will be created then all of the Required data must be provided.

{ <i>AVMAccountDetails</i>
<b>RPMAccountId</b>
<b>AMCustomerNumber</b>
<b>AccountStatus</b>
<b>AccountStatusDate</b>
<b>AccountFirstName</b>
<b>AccountMiddleName</b>
<b>AccountLastName</b>
<b>CompanyName</b>
<b>AccountEmail</b>
<b>AccountPhone</b>
<b>MaxVehicles</b>
<b>AccountType</b>
}

The following block of code is the VIN record. Include one for each VIN registered with the account.

{ <i>AVMVINDetails</i>
<b>RPMVehicleEnrollmentId</b>
<b>VIN</b>
<b>VehicleEnrollmentStatus</b>
<b>VehicleEnrollmentStatusDate</b>
<b>RegistrationAddressLine1</b>
<b>RegistrationAddressCity</b>
<b>RegistrationAddressState</b>
<b>RegistrationAddressPostalCode</b>
<b>RegistrationAddressCounty</b>
<b>RegistrationAddressCountry</b>
<b>NotificationEmailAddress</b>
<b>NotificationTextNumber</b>
<b>VehicleEPARating</b>
<b>VehicleMake</b>

<b>VehicleModel</b>
<b>VehicleYear</b>
<b>LicensePlateNumber</b>
<b>LicensePlateState</b>
<b>MileageReportingMethod</b>
}

*} // AVMDetails*

*} // AccountAndVINUpdateMessage*

### 5.3.2. Account and VIN Update Data Report Definitions

Data Element	Meaning
<b>AMID</b>	<p>Required</p> <p>Description: The SP identifier number which is provided by the agency</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: "Service Provider name"</p> <p>NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<p><b>TransmittedTimestamp</b></p>	<p>Required</p> <p>Description: Timestamp provided by transmitting entity when message sent (in UTC)</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form</p> <p>"YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: UTC</p>

Data Element	Meaning
<b>MessageID</b>	<p>Required</p> <p>Description: Unique alphanumeric message identifier</p> <p>Data Type: String</p> <p>Format: VARCHAR(40)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: N/A</p>
<b>RPMAccountID</b>	<p>Required (unless brand new Account)</p> <p>Description: Unique identifier (GUID) for the user account; assigned by the Datawarehouse</p> <p>Data Type: String</p> <p>Format: VARCHAR(100)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: If this is null, a new account (with a new RPMAccountID) will be created.</p>
<b>AMCustomerNumber</b>	<p>Required</p> <p>Description: Account Manager unique reference number to the customer</p> <p>Data Type: String</p> <p>Format: VARCHAR(100)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>AccountStatus</b>	<p>Required</p> <p>Description: An integer value indicating the compliance status of the account for the reporting period.</p> <p>Data Type: String</p> <p>Format: VARCHAR (10)</p> <p>Calculation: N/A</p> <p>Values:</p> <p>New = Account is being created by this AVU message.</p> <p>Existing = Existing account</p> <p>Suspended = Account is temporarily suspended; no vehicle data is expected from any enrolled vehicles.</p> <p>Ending = Participant has indicated they wish to close their account; account will remain open until any required closeout activities are completed.</p> <p>Closed = Account closed. Reason for account closure should be recorded in the AM subsystem.</p> <p>NULL not OK</p> <p>Special Rules: AccountStatus should be “New” only on initial creation. After an account is “Closed”, if the account holder wants to open up a new account, it must be re-created as a “New” account with a new RPMAccountID and a new AMCustomerNumber.</p>

Data Element	Meaning
<b>AccountStatusDate</b>	<p>Required</p> <p>Description: Timestamp when the Account Status took effect</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form</p> <p>"YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules:</p>



Data Element	Meaning
<b>AccountFirstName</b>	Required Description: The first name of the account holder Data Type: String Format: VARCHAR(20) Calculation: N/A Values: NULL not OK Special Rules: N/A
<b>AccountMiddleName</b>	Required Description: The middle name of the account holder Data Type: String Format: VARCHAR(20) Calculation: N/A Values: Null OK Special Rules: N/A
<b>AccountLastName</b>	Required Description: The last name of the account holder Data Type: String Format: VARCHAR(36) Calculation: N/A Values: NULL not OK Special Rules: N/A

Data Element	Meaning
<b>CompanyName</b>	<p>Required</p> <p>Description: The company name if it is the registered owner of the vehicle</p> <p>Data Type: String</p> <p>Format: VARCHAR(50)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: If no Company Name available, set this field value to NULL</p>
<b>AccountEmail</b>	<p>Required</p> <p>Description: The e-mail address of the account holder</p> <p>Data Type: String</p> <p>Format: VARCHAR(100)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>AccountPhone</b>	<p>Required</p> <p>Description: The phone number of the account holder. Mobile phone number strongly preferred.</p> <p>Data Type: String</p> <p>Format: VARCHAR(10)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>MaxVehicles</b>	<p>Required</p> <p>Description: The maximum number of vehicles that can be enrolled under this Account.</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: Vehicles with “Closed” or “Ending” status are not counted toward the MaxVehicles count.</p>
<b>AccountType</b>	<p>Required</p> <p>Description: The type of account – private or commercial.</p> <p>Data Type: String</p> <p>Format: “PRIVATE” or “COMMERCIAL”</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: Can only have the values “PRIVATE” or “COMMERCIAL”.</p>

Data Element	Meaning
<b>RPMVehicleEnrollmentID</b>	<p>Required (unless brand new VehicleEnrollment)</p> <p>Description: Unique identifier (GUID) for the enrollment; assigned by the Datawarehouse</p> <p>Data Type: String</p> <p>Format: VARCHAR(100)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: If this is null, a new enrollment (with a new RPMVehicleEnrollmentID) will be created.</p>
<b>VIN</b>	<p>Required</p> <p>Description: The VIN of the vehicle in which the mileage meter is installed</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>VehicleEnrollmentStatus</b>	<p>Required</p> <p>Description: Status of a given Vehicle Enrollment</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Pending = The vehicle has been enrolled, but has not yet reported mileage data.</p> <p>Active = The vehicle is active and operating "as normal" in the RUC program.</p> <p>Suspended = Vehicle is temporarily suspended; no vehicle data is expected.</p> <p>Noncompliant = Vehicle is active, but is noncompliant as determined by RUC Business Rules.</p> <p>EndingVINChange = The vehicle is being replaced by one with a different VIN.</p> <p>EndingVINExit = The vehicle is being removed from the RUC program, will not be replaced.</p> <p>Closed = The vehicle has been un-enrolled from this Account Manager.</p> <p>Special Rules:</p>

Data Element	Meaning
<b>VehicleEnrollmentStatusDate</b>	<p>Required</p> <p>Description: Timestamp when the Vehicle Enrollment Status took effect</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form</p> <p>"YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules:</p>

Data Element	Meaning
<b>RegistrationAddressLine1</b>	<p>Required</p> <p>Description: The first line of the street the vehicle is registered to</p> <p>Data Type: String</p> <p>Format: VARCHAR(36)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>RegistrationAddressLine2</b>	<p>Required</p> <p>Description: The second line of the street of the address the vehicle is registered to, if any</p> <p>Data Type: String</p> <p>Format: VARCHAR(36)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: N/A</p>
<b>RegistrationAddressCity</b>	<p>Required</p> <p>Description: The city of the address the vehicle is registered to</p> <p>Data Type: String</p> <p>Format: VARCHAR(30)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>RegistrationAddressState</b>	<p>Required</p> <p>Description: The U.S. state or Canadian Province of the address the vehicle is registered to</p> <p>Data Type: String</p> <p>Format: VARCHAR(2)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>RegistrationAddressPostalCode</b>	<p>Required</p> <p>Description: The U.S. or Canadian postal code of the address the vehicle is registered to</p> <p>Data Type: String</p> <p>Format: VARCHAR(10)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: 5 characters required, additional 4 characters optional</p>
<b>RegistrationAddressCounty</b>	<p>Required</p> <p>Description: The county of the address the vehicle is registered to</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: Service Provider required to capture or derive county from address.</p>



Data Element	Meaning
<b>RegistrationAddressCountry</b>	<p>Optional</p> <p>Description: The country of the address the vehicle is registered to</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: Must be USA</p> <p>Special Rules: N/A</p>
<b>NotificationEmail Address</b>	<p>Required</p> <p>Description: The e-mail address to use when sending notifications specific to this vehicle (e.g. odometer reminders)</p> <p>Data Type: String</p> <p>Format: VARCHAR(100)</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Recommended to be the email address of the person who most often drives this vehicle. Can default to AccountEmail if appropriate.</p> <p>Special Rules: For odometer-based MRMs, this should be populated. If Participant specifically opts out from having email notifications sent, set the value=null. NOTE: Participants on odometer-based MRMs can NOT opt-out of both NotificationEmail and NotificationSMS.</p>

Data Element	Meaning
<b>NotificationTextNumber</b>	<p>Required</p> <p>Description: The mobile number to use when sending SMS notifications specific to this vehicle (e.g. odometer reminders)</p> <p>Data Type: String</p> <p>Format: String</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Recommended to be the mobile phone of the person who most often drives this vehicle. Can default to AccountPhone if appropriate.</p> <p>Special Rules: For odometer-based MRMs, this should be populated. If Participant specifically opts out from having SMS notifications sent, set the value=null. NOTE: Participants on odometer-based MRMs can NOT have “null” for both NotificationEmailAddress and NotificationTextNumber.</p>
<b>VehicleEPARating</b>	<p>Required</p> <p>Description: MPG rating for the vehicle</p> <p>Data Type: Number</p> <p>Format: One decimal place - Number in tenth of miles [0,1.1,2.1...999.9]</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: Use EPA combined city-highway MPG rating for vehicle. Else use EPA highway MPG for vehicle. Else use any other EPA rating available for the vehicle.</p>

Data Element	Meaning
<b>VehicleMake</b>	<p>Required</p> <p>Description: The Make of the vehicle associated with the VIN</p> <p>Data Type: String</p> <p>Format: VARCHAR(15)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>VehicleModel</b>	<p>Required</p> <p>Description: The Model of the vehicle associated with the VIN</p> <p>Data Type: String</p> <p>Format: VARCHAR(15)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>VehicleYear</b>	<p>Required</p> <p>Description: The Model Year of the vehicle associated with the VIN</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>LicensePlateNumber</b>	Required Description: License plate number of this vehicle Data Type: String Format: VARCHAR(9) Calculation: N/A Values: NULL not OK Special Rules: N/A
<b>LicensePlateState</b>	Required Description: State where the license plate for this vehicle was issued Data Type: String Format: VARCHAR(9) Calculation: N/A Values: NULL not OK Special Rules: N/A
<b>MileageReportingMethod</b>	Required Description: Mileage reporting method for this vehicle enrollment Data Type: String Format: VARCHAR(16) Calculation: N/A Values: OdoCharge, OBDDoc, OBDDoc, NAT NULL not OK Special Rules: N/A

### *AccountAndVINUpdateMessage Response*

The HiRUC system (established for the Part 1 Demonstration, but used also for the Part 2 Demonstration) will respond in this manner. Precise details of the response message will be formalized later, likely at the Workshop.

<i>{AccountAndVINUpdateMessage Response</i>
<b>MessageID (same MessageID the was in the request)</b>
Object that includes all the account-related data elements present in the request, plus a system-generated AccountID
Object that includes all the vehicle-related data elements present in the request, plus a system-generated VehicleEnrollmentID.
<b>TransactionID</b> (assigned by the responding system, for tracking purposes)
}

### **5.3.3. RUR Data Report Pseudocode**

The RUR Data Report shall contain a record of the start and end times of the period, a list of all Rule IDs in which travel was recorded and a list of Road Usage Charge and estimated gas tax consumed for that mileage traveled. This Report includes data to generate RURs for all mileage reporting methods. See above section 3.2 for an illustration and more full discussion of this message.

*{ RURDataReport*

<b>AMID</b>
<b>MessageID</b>
<b>TransmittedTimestamp</b>

Repeat the following block for each enrolled VIN reported. In the case of HiRUC, there will be only one VIN per RUR.

<i>{ RURData</i>
<b>RURNumber</b>
<b>RURRevision</b>
<b>RURSegment</b>
<b>RURReportPeriod</b>
<b>RURPeriodStart</b>

<b>RURPeriodEnd</b>
<b>RPMAccountID</b>
<b>RPMVehicleEnrollmentID</b>

Only one of the following two subsections should be included—either the first one, if the vehicle uses an odometer-based Mileage Reporting Method like Odometer Image reporting, or the second, if the vehicle uses an automated method like PID.

<i>{OdometerBasedMethod</i>
<b>RURStartingOdo</b>
<b>RUREndingOdo</b>
<b>RURStartingOdoDate</b>
<b>RUREndingOdoDate</b>
}

The following are the totals to include only for automated methods (ie, not odometer-based methods) – tables per Rule ID. NOTE: For HiRUC, the RuleID and SubRuleID data is not displayed in the printed RUR. Non-location-based automated methods, such as the plug-in device without location, should only include one RuleID, 0, for undifferentiated mileage.

<i>{ MRMRuleDetails</i>
<b>RuleID</b>
<b>TotalMileageInRuleID</b>
<b>TotalChargeableMileageInRuleID</b>
<b>TotalNonChargeableMileageInRuleID</b>
<b>TotalRUCInRuleID</b>
<b>TotalFuelUsagelnRuleID</b>
<b>TotalEstimatedFuelPaidInRuleID</b>
<b>TotalNonTaxableFuelUsagelnRuleID</b>
<b>TotalTaxableFuelUsagelnRuleID</b>

The following is the SubRule ID totals. Include one for each SubRule ID for the VIN in the report. All totals are for the period defined by RURPeriodStart and RURPeriodEnd.

<i>{ MRRMSubRuleDetails</i>
<b>SubRuleID</b>

<b>RUCRateInSubRuleID</b>
<b>FuelRateInSubRuleID</b>
<b>TotalMileageInSubRuleID</b>
<b>TotalFuelUsageInSubRuleID</b>
<b>TotalEstimatedFuelTaxPaidInSubRuleID</b>
} // SubRule ID

} // Rule ID
--------------

The following section provides the totals for the RUR Data Report for this vehicle. All "Total" values are for the period defined in the header.

<b>RURTotalRecordedMileage</b>
<b>RURTotalChargeableMileage</b>
<b>RURTotalNonChargeableMileage</b>
<b>RURCalcRUCTotal</b>
<b>RUREstimatedFuelUsageTotal</b>
<b>RUREstimatedFuelTaxTotal</b>

The following is additional data provided for tracking purposes.

<b>VehicleComplianceStatus</b>
} //RURData
} //RUR Data Report

### 5.3.4. RUR Data Report Definitions

Data Element	Meaning
<b>AMID</b>	<p>Required</p> <p>Description: The SP identifier number which is provided by the agency</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: "Service Provider name" NULL not OK</p> <p>Special Rules: N/A</p>
<b>MessageID</b>	<p>Optional</p> <p>Description: Unique alphanumeric message identifier assigned by the SP to identify this request.</p> <p>Data Type: String</p> <p>Format: VARCHAR(40)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>



Data Element	Meaning
<b>TransmittedTimestamp</b>	<p>Required</p> <p>Description: Timestamp provided by transmitting entity when message sent (in UTC)</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form "YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: UTC</p>

Data Element	Meaning
<b>RURNumber</b>	<p>Required</p> <p>Description: The unique RUR identifier number which is provided by the Service Provider to be displayed on the RUR issued for the Vehicle Enrollment. This does NOT change with each reporting period.</p> <p>Data Type: Alphanumeric characters</p> <p>Format: String (6 characters)</p> <p>Calculation: N/A</p> <p>Values: Generated by Service Provider according to business rules. It should be unique for each Vehicle Enrollment.</p> <p>Special Rules: N/A</p>
<b>RURRevision</b>	<p>Description: The RUR revision level, an increasing number to indicate the sequence of RUR re-issues for a given RURReportPeriod. The original RURIncrement is numbered 0, and each time it is re-issued, its RURIncrement increases by 1.</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: 0, 1, 2, 3, ...n ; NULL not OK</p> <p>Special Rules: an increasing number to indicate the sequence of RUR re-issues. The original RUR is numbered 0, and subsequent re-issued 1 to n</p>

Data Element	Meaning
RURSegment	<p>Required</p> <p>Description: The Segment number which is provided by the Service Provider—standard, fleet, or EV</p> <p>Data Type: String</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values:</p> <p>1 = ICE or “non-EV” (not an EV or plug-in hybrid)</p> <p>2 = EV</p> <p>3 = Fleet vehicle</p> <p>NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
RURReportPeriod	<p>Required</p> <p>Description: The period for which the RUR is issued (usually a specific month or calendar quarter, e.g. “the April report” or “the first quarter report”). This is distinct from the specific dates for which data was collected (see also “RURPeriodStart” and “RURPeriodEnd”).</p> <p>Data Type: String</p> <p>Format: Alphanumeric characters, specified in the following form</p> <p>“YYYY-MM” where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the reporting month</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: For quarterly reports, the RURReportPeriod reflects the last month of the quarter being reported.</p>

Data Element	Meaning
<b>RURPeriodStartDate</b>	<p>Required</p> <p>Description: The start date of the reporting period in which the mileage information was received by the Account Manager (not necessarily the period in which it was collected by the MRD) – in UTC</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form "YYYY-MM-DD" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>RURPeriodEndDate</b>	<p>Required</p> <p>Description: The Reporting period end date – in UTC</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form "YYYY-MM-DD" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>RPMAccountID</b>	<p>Required</p> <p>Description: The unique reference number for the participant account assigned by the HiRUC system</p> <p>Data Type: String</p> <p>Format: VARCHAR(100)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>RPMVehicleEnrollmentID</b>	<p>Required</p> <p>Description: System-generated unique vehicle enrollment identifier assigned by the HiRUC system</p> <p>Data Type: String</p> <p>Format: VARCHAR(40)</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>RURStartingOdo</b>	<p>Optional (required for Odometer Charge and Native Automaker Telematics)</p> <p>Description: The value of the first odometer reading of the first reporting period or value of the last odometer reading that was provided for the vehicle in the previous reporting period.</p> <p>Type: Number</p> <p>Format: Six-digit odometer reading "XXXXXX"</p> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: N/A</p>
<b>RUREndingOdo</b>	<p>Optional (required for Odometer Charge and Native Automaker Telematics)</p> <p>Description: The value of the most recent odometer reading that was provided for the vehicle in the reporting period.</p> <p>Type: String</p> <p>Format: Six-digit odometer reading "XXXXXX" or "None Reported"</p> <p>Calculation: Null Not OK</p> <p>Values: No valid image received = "None Reported"</p>

Data Element	Meaning
<b>RURStartingOdoDate</b>	<p>Optional (required for Odometer Charge and Native Automaker Telematics)</p> <p>Description: The date of report of the last odometer reading</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form "YYYY-MM-DD" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> </ul> <p>Calculation: N/A</p> <p>Values: Null OK</p> <p>Special Rules: N/A</p>



Data Element	Meaning
<b>RUREndingOdoDate</b>	<p>Optional (required for Odometer Charge and Native Automaker Telematics)</p> <p>Description: The date of report of the last odometer reading</p> <p>Data Type: String</p> <p>Format: The date is specified in the following form "YYYY-MM-DD" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> </ul> <p>Calculation: N/A</p> <p>Values: Null OK</p> <p>Special Rules: N/A</p>
<b>RuleID</b>	<p>Required</p> <p>Description: Rule Identification. An identifier associated with a geographic area, or zone, in which a specific rate per mile will be assessed for miles traveled. FIPS codes are used to identify states and counties</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Values: Rule ID codes and definitions are defined in the Agency provided Road Usage Charge Rate Table; NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>TotalMileageInRuleID</b>	<p>Required</p> <p>Description: Total Miles traveled in given Rule ID for given period</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "TotalMileageInSubRuleID" for all Sub Rule IDs in Rule ID</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>TotalNonChargeableMileageInRuleID</b>	<p>Required</p> <p>Description: Total miles traveled for all non-taxable Sub Rule IDs in given Rule ID for given period, per Agency provided Road Usage Charge Rate Table at the time the mileage occurred</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "TotalMileageInSubRuleID" for all non-taxable Sub Rule IDs in given Rule ID, per Agency provided Road Usage Charge Rate Table</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>TotalChargeableMileageInRuleID</b>	<p>Required</p> <p>Description: Total miles traveled for all taxable Sub Rule IDs in given Rule ID for given period, per Agency provided Road Usage Charge Rate Table at the time the mileage occurred</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "TotalMileageInSubRuleID" for all chargeable Sub Rule IDs in given Rule ID, per Agency provided Road Usage Charge Rate Table</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>TotalRUCInRuleID</b>	<p>Required</p> <p>Description: Total RUC for this Rule IDs for given period</p> <p>Data Type: Number</p> <p>Format: Two decimal places - Dollars and cents: [0.01, 0.02 ... 99,999,999.99]</p> <p>Calculation: Must reconcile with the following: "TotalChargeableMileageinRuleID" multiplied by the applicable RUC rate for the Rule ID.</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>TotalFuelUsageInRuleID</b>	<p>Required</p> <p>Description: Total fuel usage for all Rule IDs for given period</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "TotalFuelUsageInRuleID" for all Rule IDs</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>TotalNonTaxableFuelUsageInRuleID</b>	<p>Required</p> <p>Description: Total non-taxable fuel usage in given Rule ID for given period</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "TotalFuelUsageInSubRuleID" for all non-taxable Sub Rule IDs in Rule ID</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>TotalTaxableFuelUsageInRuleID</b>	<p>Required</p> <p>Description: Total taxable fuel usage in given Rule ID for given period</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "TotalFuelUsageInSubRuleID" for all taxable Sub Rule IDs in Rule ID</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>TotalEstimatedFuelTaxPaidInRuleID</b>	<p>Required</p> <p>Description: Total Estimated Fuel Tax for this Rule ID for given period</p> <p>Data Type: Number</p> <p>Format: Two decimal places - Dollars and cents: [0.01, 0.02 ... 99,999,999.99]</p> <p>Calculation: Must reconcile with the following: SUM of "TotalFuelTaxCreditInRuleID" for all Rule IDs</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>SubRuleID</b>	<p>Required</p> <p>Description: Sub Rule ID, numerical index for region of travel within given Rule ID</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>1=all public on-road (chargeable) miles in given RuleID</p> <p>2=all non-chargeable miles in given RuleID</p> <p>Special Rules: N/A</p>
<b>RUCRateInSubRuleID</b>	<p>Required</p> <p>Description: Mileage rate used in State provided by Agency in Road Usage Charge Rate Table as of the PeriodEndDate</p> <p>Data Type: Number</p> <p>Format: Three decimal places – Dollars and cents + tenth of a cent [0.015, 0.020, ... , 9,999.999]</p> <p>Calculation: N/A</p> <p>Values: Assigned by Agency as necessary, provided in Road Usage Charge Rate Table, NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>FuelRateInSubRuleID</b>	<p>Required</p> <p>Description: Fuel Tax rate in dollars per gallon in given Sub Rule ID for given period as of the PeriodEndDate</p> <p>Data Type: Number</p> <p>Format: Two decimal places - Dollars and cents [0.01,0.02, ... , 2.55]</p> <p>Calculation: N/A</p> <p>Values: Assigned by Agency as necessary, provided in Road Usage Charge Rate Table, NULL not OK</p> <p>Special Rules: N/A</p>
<b>TotalMileageInSubRuleID</b>	<p>Required</p> <p>Description: Total Miles traveled in given Sub Rule ID for all VIN/MRDs given period</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of "MRDMileageInSubRuleID" for all VIN/MRDs in reporting period for given Sub Rule ID</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>

Data Element	Meaning
<b>TotalFuelUsageInSubRuleID</b>	<p>Required</p> <p>Description: Total fuel usage in given Sub Rule ID for this VIN in a given period</p> <p>Data Type: Number</p> <p>Format: Refer to rounding rules in SRS</p> <p>Calculation: Must reconcile with the following: SUM of “MRDFuelUsageInSubRuleID” for this vehicle in reporting period for given Sub Rule ID</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>
<b>TotalEstimatedFuelTaxPaidInSubRuleID</b>	<p>Required</p> <p>Description: Total Estimated Fuel Tax Paid in given Sub Rule ID for this vehicle in a given period</p> <p>Data Type: Number</p> <p>Format: Two decimal places - Dollars and cents: [0.01, 0.02, ... , 99,999,999.99]</p> <p>Calculation: Must reconcile with the following: SUM of “<b>TotalEstimatedFuelTaxPaidInSubRuleID</b>” for all VIN/MRDs in reporting period for given Sub Rule ID</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>



Data Element	Meaning
<b>RURTotalRecordedMileage</b>	<p>Required</p> <p>Description: Total Miles traveled for all Rule IDs for given period (chargeable and non-chargeable)</p> <p>Data Type: String</p> <p>Format: Decimal. Up to five figures (leading zeros not needed), dot, then two decimals. "XXXXXX.XX" Refer to rounding rules in SRS.</p> <p>Calculation: Must reconcile with the following:</p> <p>SUM of "TotalMileageInRuleID" for all Rule IDs for automated methods</p> <p>SUM of LastOdometer – first Odometer for all odometer-based methods</p> <p>Values: NULL not OK</p> <p>Special Rules: If no mileage reported at all (device unplugged whole period or no odometer image received) should have value "-"</p>

Data Element	Meaning
<b>RURTotalChargeableMileage</b>	<p>Required</p> <p>Description: Total chargeable Miles traveled for all Rule IDs for given period</p> <p>Data Type: String</p> <p>Format: Decimal. Up to five figures (leading zeros not needed), dot, then two decimals. "XXXXXX.XX" Refer to rounding rules in SRS.</p> <p>Calculation: Must reconcile with the following: SUM of "TotalChargeableMileageInRuleID" for all Rule IDs+SUM of LastOdometer – first Odometer for all odometer-based methods</p> <p>Values: NULL not OK</p> <p>Special Rules: If no mileage reported at all (device unplugged whole period or no odometer image received) should have value "-"</p>

Data Element	Meaning
<b>RURTotalNonChargeableMileage</b>	<p>Required</p> <p>Description: Total non-chargeable Miles traveled for all Rule IDs for given period</p> <p>Data Type: String</p> <p>Format: Decimal. Up to five figures (leading zeros not needed), dot, then two decimals. "XXXXXX.XX" Refer to rounding rules in SRS.</p> <p>Calculation: Must reconcile with the following: SUM of "TotalNonChargeableMileageInRuleID" for all Rule IDs</p> <p>Values: NULL not OK</p> <p>Special Rules: If no mileage reported at all (device unplugged whole period or no odometer image received) should have value "-"</p>
<b>RURCalcRUCTotal</b>	<p>Required</p> <p>Description: Total RUC for all Rule IDs for this vehicle in given period</p> <p>Data Type: String</p> <p>Format: Decimal. Up to five figures (leading zeros not needed), dot, then two decimals. "XXXXXX.XX" Refer to rounding rules in SRS.</p> <p>Calculation: Must reconcile with the following: SUM of "TotalRUCInRuleID" for all Rule IDs</p> <p>Values: NULL not OK</p> <p>Special Rules: If no mileage reported at all (device unplugged whole period or no odometer image received) should have value "-"</p>
<b>RURCalcRUCAnnual</b>	(DELETED – removed from RUR)

Data Element	Meaning
<b>RUREstimatedFuelUsageTotal</b>	<p>Required</p> <p>Description: Total estimated fuel usage for all Rule IDs for given period</p> <p>Data Type: String</p> <p>Format: Decimal. Up to five figures (leading zeros not needed), dot, then two decimals. "XXXXXX.XX" Refer to rounding rules in SRS.</p> <p>Calculation: Must reconcile with the following: SUM of "TotalFuelUsageInRuleID" for all Rule IDs</p> <p>Values: NULL not OK</p> <p>Special Rules: If no mileage reported at all (device unplugged whole period or no odometer image received) should have value "-"</p>
<b>RUREstimatedFuelTaxTotal</b>	<p>Required</p> <p>Description: Total Estimated Fuel Tax Paid for all Rule IDs for given period</p> <p>Data Type: String</p> <p>Format: Decimal. Up to five figures (leading zeros not needed), dot, then two decimals. "XXXXXX.XX" Refer to rounding rules in SRS.</p> <p>Calculation: Must reconcile with the following: SUM of "TotalEstimatedFuelTaxPaid" for all Rule IDs</p> <p>Values: NULL not OK</p> <p>Special Rules: If no mileage reported at all (device unplugged whole period or no odometer image received) should have value "-"</p>
<b>RUREstimatedFuelUsageAnnual</b>	(DELETED – removed from RUR)
<b>RUREstimatedFuelTaxAnnual</b>	(DELETED – removed from RUR)

Data Element	Meaning
RURVehicleComplianceStatus	<p>Required</p> <p>Description: The compliance status of the vehicle for this RURReportPeriod.</p> <p>Data Type: String</p> <p>Format: Alphanumeric</p> <p>Calculation: See Business Rules</p> <p>Values:</p> <p>COMPLIANT = Vehicle is compliant for this RURReportPeriod</p> <p>NON-COMPLIANT = Vehicle is NOT compliant for this RURReportPeriod</p> <p style="text-align: center;">Special Rules: N/A</p>

If the Request is accepted by the Datawarehouse, a response is sent to the Account Management subsystem with a TransactionID. If the request is not accepted, an error message is sent back. Accepted means that the request contained all of the necessary data elements to generated the RUR. Precise details of the Data report response will be finalized later, likely at the Workshop

*RUR Data Report Response*

{ <i>RUR Data Report Response</i>
<b>MessageID (Same as in the request)</b>
<b>Object that includes all data elements present in the request</b>
<b>Transaction ID</b> (assigned by the responding system, for tracking purposes)
}

---

## 6. Interfaces between Account Management and RURG Subsystem

### 6.1. Data Transfer

Data will be transmitted between the Account Management subsystem and the RURG subsystem via JSON messages communicated through the REST protocol. The frequency of message transmission is parameterized in the Account Management subsystem and RURG subsystem, and set per the agency requirements.

Messages will be acknowledged by the Account Management subsystem and RURG subsystem with a standard response from a REST transaction (HTTP 200) if the message can be parsed and synchronous validation is successful. If the message fails parsing or synchronous validation, an HTTP 400 will be sent to the issuer of the response, i.e. either the Account Management subsystem or RURG subsystem, with a failure message as the JSON payload.

### 6.2. Interface Initiation Rules

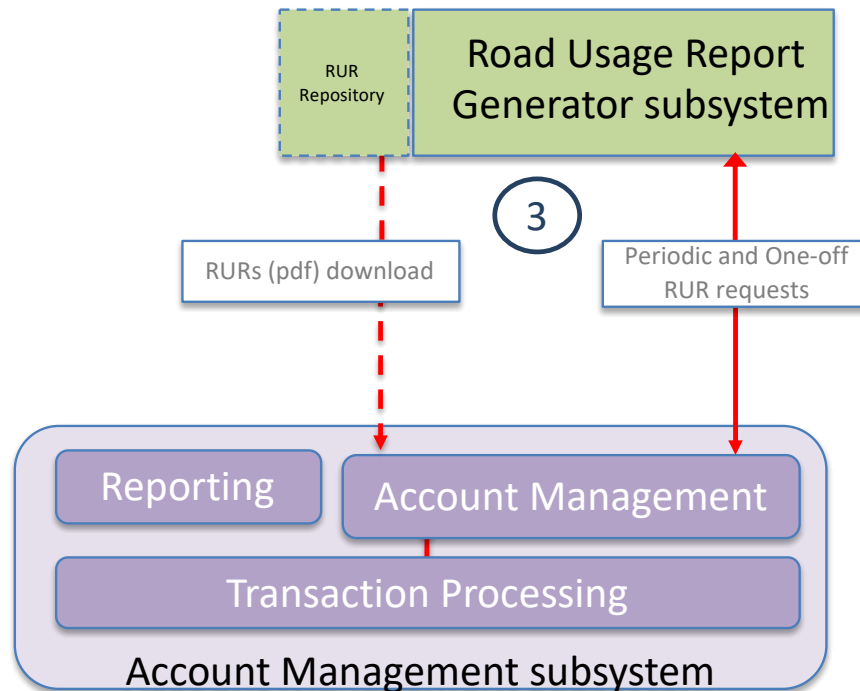
- ▶ The one-off and periodic RUR Requests are initiated by the Account Management subsystem by calling a REST/JSON interface implemented by the RURG subsystem.
- ▶ The RUR Download response is initiated by the RURG subsystem by calling a REST/JSON interface implemented by the Account Management subsystem
- ▶ The methods will be mutually agreed to by Service Provider and the vendor supporting the RURG subsystem. The frequency of transmission for each report is defined in the Business Rules.

### 6.3. Reports Specifications

As illustrated by Figure 7, two types of reports are exchanged between the Account Management subsystem (Account Management component) and the RURG subsystem.

- ▶ The RUR Request is sent from the Account Management component to the RURG subsystem (section 6.3.1).
- ▶ The RUR Download response is sent from the RURG subsystem to the Account Management component in response to the RUR request.

**Figure 7: Reports Exchanged Between the Account Management Subsystem and the Datawarehouse Subsystem**



### 6.3.1. RUR Request Pseudocode

The RUR Request is sent to request for download of all RURs generated or a specific subset of RURs generated for a specific period.

The following block of code is RUR Request.

<i>{ RURRequest</i>
<b>AMID</b>
<b>RURRequestID</b>
<b>RequestTimestamp</b>
<b>RURPeriodStartDateFilter</b>
<b>RURPeriodEndDateFilter</b>
<b>NewestOnlyFilter</b>
<b>RURNumberFilter</b>
<b>RURIncrementFilter</b>
<i>}</i>

### 6.3.2. RUR Request Definitions

Data Element	Meaning
<b>AMID</b>	<p>Required</p> <p>Description: The SP identifier number which is provided by the agency</p> <p>Data Type: String</p> <p>Format: VARCHAR(20)</p> <p>Calculation: N/A</p> <p>Values: "Service Provider name" NULL not OK</p> <p>Special Rules: N/A</p>
<b>RURRequestID</b>	<p>Required</p> <p>Description: Unique ID number of report request</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: N/A</p>



Data Element	Meaning
RequestTimestamp	<p>Required</p> <p>Description: Timestamp provided by transmitting entity when message sent (in UTC)</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form "YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: UTC</p>

Data Element	Meaning
<b>RURPeriodStartDateFilter</b>	<p>Required</p> <p>Description: Earliest RURReportPeriod to be returned by this request</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form "YYYY-MM" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: If null, reports will be returned without regard to an earliest date.</p>
<b>RURPeriodEndDateFilter</b>	<p>Required</p> <p>Description: Latest RURReportPeriod to be returned by this request</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form "YYYY-MM" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL OK</p> <p>Special Rules: If null, reports will be returned without regard to a latest date.</p>

Data Element	Meaning
<b>NewestOnlyFilter</b>	<p>Required</p> <p>Description: Filters the results to return only the newest version(s) of the specified report(s).</p> <p>Data Type: Boolean</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: TRUE (only newest returned), FALSE (all versions (RURIncrement) returned); NULL not OK</p> <p>Special Rules: N/A</p>
<b>RURNumberFilter</b>	<p>Required</p> <p>Description: Filters the results to return only reports with this specific RUR Number.</p> <p>Data Type: Alphanumerical character</p> <p>Format: String</p> <p>Calculation: N/A</p> <p>Values: generated by Service Provider according to business rules; NULL OK</p> <p>Special Rules: If NULL, the request will return all RUR Reports subject to other parameters. If populated with a valid RUR Number, will return reports for only that RUR Number provided there are no conflicts with other filter parameters.</p>

Data Element	Meaning
RURIncrementFilter	<p>Required</p> <p>Description: Filters the results to return only reports with a specific RUR Increment.</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: 0, 1, 2, 3, ...n</p> <p>Special Rules: The original RUR for a given RURReportPeriod is numbered 0, and subsequent updates are numbered with RURIncrement 1 to n. NULL OK.</p> <p>If populated with a value, the NewestOnly filter will be ignored.</p> <p>If NULL, the request will return the reports for RUR Increments based on the NewestOnly filter.</p>

### 6.3.3. RUR Download (Response to RUR Request) Pseudocode

The RUR download response is sent with information to download all periodic RUR generated or a specific RUR.

The following block of code is the RUR Download response.

<i>{ RURRequest</i>
<b>RURRequestID</b>
<b>ResultCount</b>
<b>TransmittedTimestamp</b>
<b>RURPeriodStartDateFilter</b>
<b>RURPeriodEndDateFilter</b>
<b>NewestOnlyFilter</b>
<b>RURNumberFilter</b>
<b>RURIncrementFilter</b>
<b>INCLUDE ONE OF THESE BLOCKS FOR EACH RUR RETURNED</b>

{
<b>RURNumber</b>
<b>RURIncrement</b>
<b>RURStatus</b>
<b>DownloadURL</b>
}

#### 6.3.4. RUR Download Definitions

Data Element	Meaning
<b>RURRequestID</b>	Required Description: Unique ID number from the RUR Request Data Type: Number Format: Integer Calculation: N/A Values: NULL not OK Special Rules: N/A
<b>ResultCount</b>	Required Description: Number of RUR report URLs being returned Data Type: Number Format: Integer Calculation: N/A Values: NULL not OK Special Rules: N/A

Data Element	Meaning
<b>TransmittedTimestamp</b>	<p>Required</p> <p>Description: Timestamp when the response is being sent (in UTC)</p> <p>Data Type: String</p> <p>Format: The date / time is specified in the following form "YYYY-MM-DDThh:mm:ss" where:</p> <ul style="list-style-type: none"> <li>○ YYYY indicates the year</li> <li>○ MM indicates the month</li> <li>○ DD indicates the day</li> <li>○ T indicates the start of the required time section</li> <li>○ hh indicates the hour</li> <li>○ mm indicates the minute</li> <li>○ ss indicates the second</li> </ul> <p>Calculation: N/A</p> <p>Values: NULL not OK</p> <p>Special Rules: UTC</p>
<b>RURPeriodStartDateFilter</b> <b>RURPeriodEndDateFilter</b> <b>NewestOnlyFilter</b> <b>RURNumberFilter</b> <b>RURIncrementFilter</b>	<p>Required</p> <p>Description: Parameters echoed back from the RUR Request. See "RUR Request" for details.</p>

Data Element	Meaning
<b>RURNumber</b>	<p>Required</p> <p>Description: The unique RUR identifier number provided by the Service Provider for the Vehicle Enrollment; displayed in the RUR</p> <p>Data Type: Alphanumerical character</p> <p>Format: String</p> <p>Calculation: N/A</p> <p>Values: generated by Service Provider according to business rules, NULL not OK</p> <p>Special Rules: N/A</p>
<b>RURIncrement</b>	<p>Description: The RUR generation increment, an increasing number to indicate the sequence of RUR re-issues. The original RUR is numbered 0, and subsequent re-issued 1 to n</p> <p>Data Type: Number</p> <p>Format: Integer</p> <p>Calculation: N/A</p> <p>Values: 0, 1, 2, 3, ...n , NULL not OK</p> <p>Special Rules: an increasing number to indicate the sequence of RUR re-issues. The original RUR is numbered 0, and subsequent re-issued 1 to n</p>

Data Element	Meaning
<b>RURStatus</b>	<p>Required</p> <p>Description: The status of the RUR generation for the VIN</p> <p>Data Type: String</p> <p>Format: VARCHAR(10)</p> <p>Calculation: N/A</p> <p>Values: Pending, Generated, Review, Rejected, Approved</p> <p>Special Rules: N/A</p>
<b>DownloadURL</b>	<p>Required</p> <p>Description: URL of RUR PDF document</p> <p>Data Type: URL</p> <p>Format: String</p> <p>Calculation: N/A</p> <p>Values: NULL OK (may be null if RURStatus is Pending)</p> <p>Special Rules: Access to the URL will usually require special security credentials provided by the RURG provider.</p>



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## 7. Interface Between Account Management and HiRUC Administration

### 7.1. Data Transfer

Data will be transmitted between the Account Management subsystem and the HiRUC Administration using Excel workbooks. Sample periodic reports included in Excel Spreadsheet. The SP will work with the HiRUC team to finalize the periodic reporting spreadsheet at the pre-implementation Workshop. The SP should plan to include the raw time-series data for the values in addition to the formatted values included in the spreadsheet.

### 7.2. Reporting Frequency

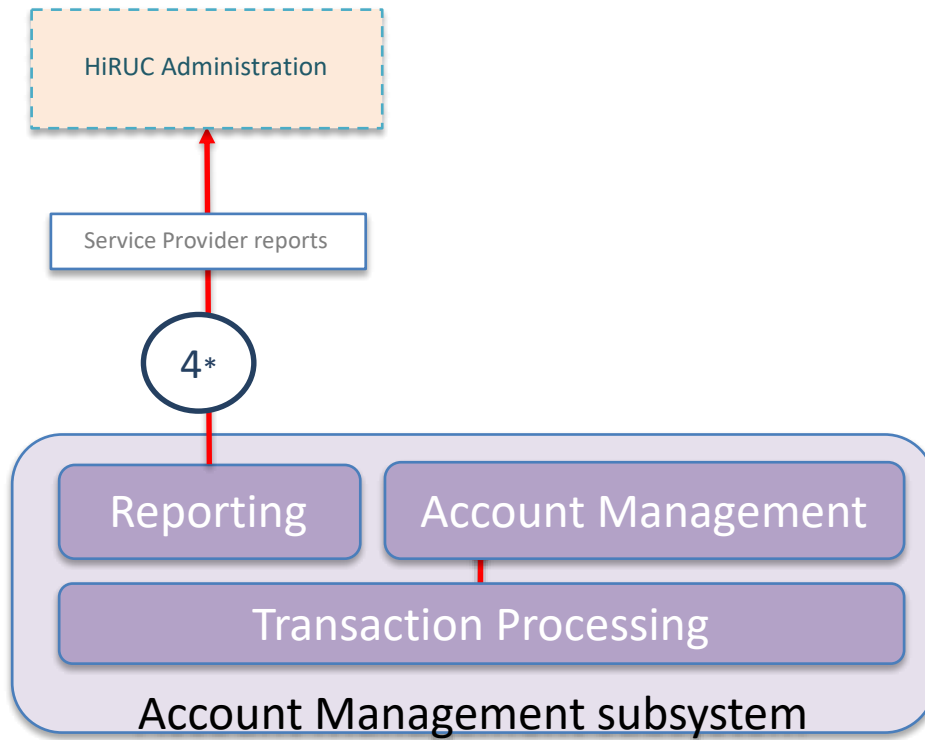
The methods of report transmission will be mutually agreed to by Service Provider and the HiRUC Administration. The frequency of transmission for each report is defined in the Business Rules.

### 7.3. Tables Specifications

The Service Provider sends the following reports to the HiRUC Administration:

1. **Enrollment Overview.** Summary of VINs enrolled, corresponding enrollment status and compliance status, mileage reporting method switches, account closures (forced and requested) by the Service Provider to the HiRUC Administration on a periodic (monthly) basis or an on-demand, possibly daily basis (during the first 4-8 weeks of Demonstration Part 2 to monitor enrollment).
2. **Vehicle Overview.** Summary of all VINs and characteristics (make, model, year, EPA or observed MPG, propulsion type) and enrollment status by the Service Provider to the HiRUC Administration on a periodic basis or an on-demand basis (e.g. during the first weeks of Demonstration Part 2 to monitor enrollment)
3. **Participant Overview.** Summary of Participant account details, Participant account status, and VINs enrolled for the Participant report to HiRUC Administration on a periodic basis or on-demand basis (e.g. during the first weeks of Demonstration Part 2 to monitor enrollment)
4. **Mileage and Revenue.** Summary of Mileage and Road Usage Charge Revenue report to HiRUC Administration on a periodic basis.
5. **RURs Distributed.** Summary of RURs distributed report to HiRUC Administration on a periodic basis.
6. **Errors and Events.** Summary of Errors and Events for each VIN to the HiRUC Administration on a periodic basis

**Figure 8: Reports Exchanged Between the Account Management Subsystem and RUC Demonstration Administration**



Note that Customer service reports are specified in the Business Rules document.