RUC West Pilot Project

Concept of Common Operations

Final v.1: **February 23, 2018**

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1 INTRODUCTION

1.1 SCOPE OF DOCUMENT

This document presents the preliminary Concept of Common Operations (CCO) for the proposed, multi-state Road User Charge (RUC) program, being deployed by RUC West. The concepts presented in this document represent the user-focused, administrative, and operational concepts to be used by each of the RUC West participating states: Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, Oklahoma, Oregon, Utah, and Washington, to continue exploring RUC feasibility or even deploy their own RUC programs throughout the western United States. Additionally, the concepts in this CCO could eventually be used by the remaining non-participating states: New Mexico, North Dakota, and Texas when the timing is right for researching and deploying RUC pilots and programs.

1.2 DOCUMENT OVERVIEW

The goal of the Concept of Operations, or for this project, the CCO, is to describe all facets of system functionality. The CCO is often the first engineering document produced in the systems development process. It is identified within the Systems Engineering "V-Diagram" shown in Figure 1. The CCO should be used to support discussions among stakeholders that should lead to agreement on major design decisions before technical requirements are developed or implementation details are determined. The CCO does not describe specific technologies or technical details, many of which will be investigated as the parties move forward with the deployment phase.

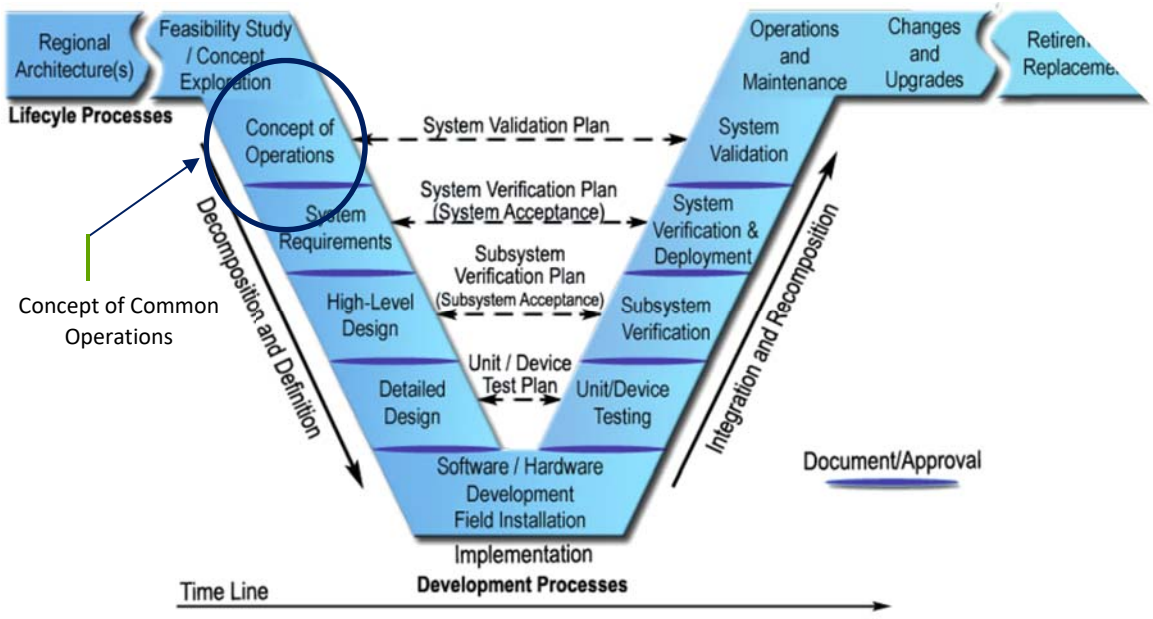

Figure 1: Systems Engineering V-Diagram

1.3 Document Format

The CCO is designed to discuss how the RUC West Regional RUC Program should function. It does, however, become the basis for developing the technical requirements and documents for the system. The CCO is developed to explain the system in a way that all stakeholders, regardless of technical expertise, can understand. Finally, the CCO is a "living document" that is designed to evolve over time to incorporate new system elements as well as lessons learned.

The CCO incorporates:

- Introduction
- Referenced Documents
- Background
- Institutional Setting
- Overall Needs and Goals
    - Mission Statement
    - State Needs and Goals
    - Service Provider Needs and Goals
    - End Users Needs and Goals
    - System Overview
- High Level Architecture
- Operational Scenarios
- Administration
    - Governance
    - Enforcement
    - Customer Relations
    - Providers
    - End Users
    - Federal Coordination
- Failure Scenarios

1.4 Definitions and Abbreviations

The following abbreviations are used throughout the document.

AAMVA	American Association of Motor Vehicle Administrators
AASHTO	American Association of State Highway Transportation Officers
BRD	Business Rules Document
CalSTA	California State Transportation Administration
Caltrans	California Department of Transportation
CAM	Commercial Account Manager
C/AV	Connected and Automated Vehicle
CCO	Concept of Common Operations

CDOT	Colorado Department of Transportation
CRM	Customer Relationship Management
DMV	Department of Motor Vehicles
DOR	Department of Revenue
DPS	Department of Public Safety
EBT	Electronic Bank Transfer
EPA	Environmental Protection Agency
EV	Electric Vehicle
FHWA	Federal Highway Administration
GAAP	Generally Acceptable Accounting Principles
GPS	Global Positioning System
HB	House Bill
HDOT	Hawaii Department of Transportation
IBTTA	International Bridge, Tunnel, and Turnpike Association
ICD	Interface Control Document
IFTA	International Fuel Tax Agreement
ISO	International Standards Organization
MaaS	Mobility as a Service
MbUF	Mileage-based User Fee
MBUFA	Mileage-based User Fee Alliance
MPG	Miles Per Gallon
MRD	Mileage Reporting Device
MRO	Mileage Reporting Options
OAM	Oregon Account Manager
ODOT	Oregon Department of Transportation
ORS	Oregon Revised Statute
OReGO	Oregon Road Usage Charge Program
PII	Personally Identifiable Information
PMO	Project Management Office
RC	Road Charge
RCPP	Road Charge Pilot Program
RUC	Road Usage Charge
RUCAS	Road Usage Charge Administration System
RUCPP	Road Usage Charge Pilot Program
RUFTF	Road User Fee Task Force
SB	Senate Bill
SLA	Service Level Agreement
SRS	System Requirement Specifications
STSFA	Surface Transportation System Funding Alternatives
TAC	Technical Advisory Committee
TNC	Transportation Network Companies

VAS	Value Added Service
VIN	Vehicle Identification Number
VMT	Vehicle Miles Traveled
WSDOT	Washington Department of Transportation
WSTC	Washington State Transportation Commission

2 REFERENCED DOCUMENTS

- *Colorado Mileage-Based User Fee Study*. Colorado Department of Transportation. 2013. https://www.codot.gov/programs/research/pdfs/2013/mbuf.pdf.
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- *Washington State Road Usage Charge Assessment: Concept of Operations*. Washington State Transportation Commission. 2014.
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3 BACKGROUND

3.1 THE NEED FOR RUC

While miles driven continue to increase in the United States, revenue from fuel taxes is decreasing due to improving fuel efficiency. This trend will continue; particularly as alternative fuel vehicles, such as Electric Vehicles (EVs), continue to be a larger part of the overall fleet, as shown in Figure 2. This downward revenue trend is exacerbated by the fact that in many states, fuel taxes have not been linked to the cost of providing new roadways and maintaining existing facilities. On the federal level, the $0.184 per gallon fuel tax has not been raised since 1993. Many states have also not raised their state fuel taxes in many years; however, that trend is changing as some states, such as California and Oregon, have recently implemented fuel tax increases as stop-gap measures to help combat the ever-decreasing state highway trust funds.

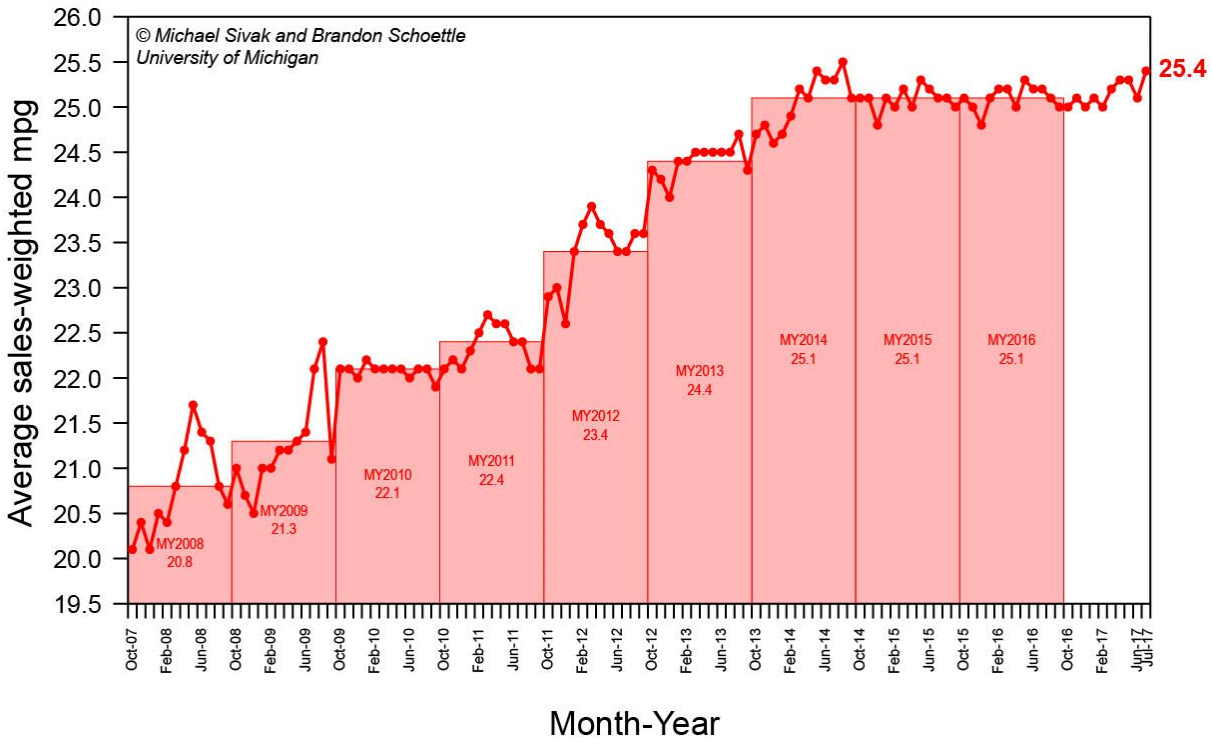

Figure 2: Average Vehicle Fuel Economy (2008 – 2016)

These factors, along with recent technological evolutions, have led to an increased interest for states and the federal government to explore ways to revise the transportation funding model to a system in which motorists pay for their road use through miles driven rather than fuel consumed.

This emergence in RUC initiatives, many of which are discussed in Section 3.2, prompted the federal government, in 2016, to launch the Surface Transportation System Funding Alternatives (STSFA) grant

program. This program authorizes up to $95M in federal grant dollars over a five-year period for states or groups of states (like RUC West) to further explore usage-based funding programs, such as RUC. RUC West was awarded a grant in 2016 to conduct the design and planning of a regional RUC program. This effort was primarily led by California and Oregon and will culminate in a pilot demonstration to show interoperability between neighboring states (initially slated to be California and Oregon).

3.2 History of Western State RUC Initiatives

Several of the RUC West member states have been at the forefront of investigating and demonstrating road usage charges as an alternative to fuel taxes for providing a sustainable funding source for transportation. This section provides a brief overview of RUC pilots conducted or planned in RUC West states, provides the background on the formation of RUC West and the projects RUC West has completed as a group to date. The section concludes with a discussion of the key findings and common themes from these various RUC initiatives. The technologies and approaches used in each pilot – for recording mileage and collecting other data necessary for RUC – are discussed in Section 5.4.

3.2.1 Oregon

Oregon started looking at potential alternatives to the fuel taxes in 2001 when the state Legislature created the Road User Fee Task Force (RUFTF) with the mandate to "develop a design for revenue collection for Oregon's roads and highways that will replace the current system for revenue collection." In 2003, after considering 28 different funding ideas, the RUFTF recommended a road revenue program that included a studded tire tax, tolling new highway capacity, congestion pricing, and a mileage-based user fee. The RUFTF also recommended that ODOT conduct a pilot program to study the feasibility of replacing the fuel taxes with a mileage-based fee. It continues to provide guidance.

3.2.1.1 Oregon Mileage Fee Concept Pilot

The 2006-2007 Oregon Mileage Fee Concept Pilot used a pay-at-the-pump model wherein both mileage data and mileage charge collection occurred at the fuel pump. The concept system, which included 299 volunteer motorists (and 285 vehicles) in the Portland area, involved the use of an on-vehicle receiver that used GPS-based location technology to delineate predefined zones and to determine and record mileage. The system used a "pay-at-the-pump" model to mimic the fuel tax system as closely as possible such that when participating vehicles refueled at participating service stations, mileage and zone information was transmitted via wireless signal to specially installed equipment at the fuel pumps. This data was sent to a central processing center where the per-mile rates were applied and the RUC calculated. The fueling station then billed the motorist for the mileage charges while also deducting the fuel taxes (along with payment for the fuel purchased). Motorists paid only for mileage driven within a jurisdictional boundary. It manually processed these transactions when volunteers fueled at non-participating stations.

ODOT considered this initial pilot a success and concluded that the road usage charge concept was indeed viable. ODOT believed that the way the system was structured allowed for protection of driver privacy, as location data was only used to determine which zone (in Portland) the vehicle was in, and data uploads only occurred when the vehicle was being refueled. Study participants stated that they

became more comfortable with the system the longer they used it and agreed that the "user pays" concept was fair and the fee itself was sufficiently transparent. Overall, participants had generally positive perceptions of the system. ODOT also concluded that by tying fee payment into fuel purchases, the system would be easier for travelers and would result in a built-in enforcement mechanism. Furthermore, the ODOT system accurately calculated fees, completed financial transactions, and had minimal technical issues.[1]

Even with many positive attributes of the Oregon pay-at-the pump pilot, national scrutiny of the program revealed design flaws, the most notable being:

- Dependence upon a closed system for mileage data collection and payment. The pay-at-the-pump model only had one way to develop data, one way for data to flow, and only a government agency could manage the accounts.
- Public reaction to the concept and approach. One concern was privacy: that the use of geo-location technology would enable the government to track where motorists had driven. Another issue was the perception that the system would require a large, costly bureaucracy to implement and operate.

3.2.1.2 Oregon Road Usage Charge Pilot Program (2013)

Given the successes, as well as the concerns, resulting from the 2006-2007 pilot, the Oregon Legislature enacted legislation in 2011 that reinforced the RUFTF to guide and direct ODOT to further develop a system to support the enactment of a road usage charge. That bill—House Bill (HB) 2138—also directed the RUFTF to develop recommendations on the design of pilot programs to test alternative approaches for a road usage charge. The legislation led to the development of the Oregon Road Usage Charge Pilot Program (RUCPP).

The primary goal of the RUCPP was a "feasibility validation" – to demonstrate to the RUFTF, legislators, and other stakeholders that the RUC system goals and objectives could be achieved, the system concepts and features are viable and valid, and the vendor community has the ability to provide and implement the system components required to operate an effective, efficient and open RUC.

The RUCPP, which incorporated technology and services from three private vendors, successfully measured mileage and distributed invoices to 88 participants (people who volunteered to pay the RUC) from three states (Oregon, Washington, and Nevada) over a 4-month period from October 2012 to February 2013. The RUCPP offered participants several choices for measuring mileage and paying the road usage charge. The mileage reporting technologies and account management functions were provided by multiple vendors from the private sector. ODOT also provided account management services for selected participants.

Another significant attribute that made the RUCPP unique and the first of its kind was that the Oregon participants actually paid the 1.56 cents per mile road usage charge as opposed to using simulated

[1] Oregon Department of Transportation (ODOT) (2005). Oregon's Mileage Fee Concept and Road User Fee Program. Report to the 73rd Oregon Legislative Assembly. Salem, OR.

payments. In order to generate stronger support for future road usage charging efforts, ODOT included state legislators, Oregon State Transportation Commission, Governor's office, and ODOT executives and staff, and members of the press in the RUCPP. Fuel taxes paid during the course of the pilot were treated as credits against the assessed fee. Participants from Washington and Nevada were also assessed their RUC, but their payments and associated fuel tax credits were simulated. Those participants who chose a location-based approach were not "charged" for any mileage driven out of state or on private roads.

The RUCPP was deemed a success – it achieved the primary goals and objectives including demonstrating ease of use, motorist choice, accuracy, and an open, interoperable system with significant involvement by the private sector. Participants logged over 121,371 miles during the four-month pilot, and invoices for all 88 participants were properly calculated and distributed. The evaluation team estimated that the $0.0156 per mile charge generated 28% more in revenue than the state fuel tax for participating vehicles. All of the participants who started the pilot completed it and 92% stated in surveys that the system was either "easy" or "very easy" to use, and 58% indicated that their views of the system were either "more positive" or "much more positive" after having participated. The devices deployed were viewed as being easy to install, did not pose safety issues, and there were no attempts to tamper with the devices. Furthermore, participants stated that the system protected privacy either as well or better than common systems used for credit cards and mobile phones. [2]

3.2.1.3 Oregon "OReGO" Program

Based on the success of its previous two pilots, the Oregon Legislature passed Senate Bill (SB) 810 in mid-2013, authorizing a volunteer road usage charge program for light-duty vehicles (i.e., those with a gross vehicle weight rating of less than 10,000 pounds). The "OReGO" RUC program started operation on July 1, 2015. The "OReGO" program is limited (by statute) to 5,000 vehicles, with further limits based on fuel efficiency – no more than 1,500 vehicles with a fuel efficiency of less than 17 mpg and no more than 1,500 vehicles with a fuel efficiency between 17 mpg and 22 mpg may participate. Participants in the OReGO program are assessed a rate of 1.5 cents per mile and credited any state fuel taxes paid. (A new tax rate is now applicable with the passage of House Bill 2017, which raised the fuel tax to 34 cents/gallon and the RUC rate to 1.7 cents/miles.) Those participants with a location-based approach are not charged for out-of-state mileage or miles driven on private roads within Oregon. As with the previous pilots, participants pay the RUC.

The system was activated in July of 2015 and is still running. Those wishing to participate can identify an account manager with which to sign-up online (at http://www.myorego.org). Once they select an account manager, they provide their vehicle identification number, odometer reading and license plate number to create an online account. Vehicle eligibility is confirmed through DMV before an account is activated. Account managers are responsible for providing a mileage reporting device, assessing

[2] Oregon Department of Transportation. *Road Usage Charge Pilot Program 2013 & Per Mile Charge Policy in Oregon.* http://www.myorego.org/wp-content/uploads/2017/07/RUCPP-Final-Report.pdf

mileage, and collecting payment. OReGO offers both private and government account managers with options for participants. The Commercial Account Managers (CAMs) offer both a GPS enabled plug-in device that allows for the crediting of out-of-state miles and a "basic" non-GPS enabled plug-in device for participants that do not want their location collected. The Oregon Account Manager (OAM) offers a plug-in device without GPS capability. This option is for participants who prefer their RUC accounts be administered by the state government as opposed to a commercial company.

The OReGO CAMs also offer a menu of value-added services including:

- visual trip logs
- "achievements" for good driving behavior
- safe zones that notify when the vehicle has crossed a user defined zone
- engine health, diagnostic and other telematics based reports
- advanced navigation
- car finding service for use by smartphone
- remote vehicle use monitoring

As of December 31, 2016, the OReGO program has served 1,111 total volunteers and 1,307 vehicles. The 1200+ vehicles enrolled in OReGO during its first year of operation constituted a wide array of fleet characteristics, including:

- 40 vehicle makes
- More than 300 vehicle models
- Model years 1996 – 2017
- More than 100 hybrid vehicles
- 15 electric / plug-in hybrid vehicles (on a trial basis)
- An average EPA rating of 23.4 MPG

Based on feedback from a 2016 volunteer satisfaction survey[3], the *"OReGO program works well. ODOT's OReGO program has been running successfully since July 2015. Volunteers believe OReGO is effective and are generally satisfied with the program. OReGO volunteers support the concept of RUC. Almost half are more supportive of a RUC after participating in OReGO. Volunteers report OReGO is going well for them including signing up for the program, getting answers to the questions, using the website, and installing and activating mileage reporting devices (MRDs). Volunteers are satisfied with their experience, and satisfied with their interactions with OReGO and account management staff."*

[3] From Appendix B – Volunteer Satisfaction and Program Improvement Report – of the OReGO Final Report; April 2017

ODOT was awarded $2.1 million in the 2016 Federal Surface Transportation System Funding Alternative (STSFA) grant program[4] to expand technology options, enhance the RUC market, research manual reporting and data sharing, expand public outreach, research compliance, and explore interoperability.

3.2.2 California Road Charge Pilot Program

In 2014, the California Legislature enacted SB 1077, requiring the Chair of the California Transportation Commission to create a Road Charge (RC) Technical Advisory Committee (TAC) in consultation with the Secretary of the California State Transportation Agency (CalSTA). The TAC was charged to "study road usage charge alternatives to the gas tax, gather public comment, and make recommendations" to the California State Transportation Agency (CalSTA) regarding a road charge pilot program.[5] The TAC developed several recommendations on the design and evaluation criteria, including the following: [6]

5,000 participating vehicles statewide—Include a broad cross-section of individuals, households, businesses, and at least one government agency.

Diversity in vehicle types—Include vehicles that reflect the fleet currently using California's road network.

Multiple mileage reporting methods—Offer drivers a choice in either manual or automated mileage recording methods, including one that does not require any mileage reporting. Also offer drivers a choice in account managers testing various road charging mileage reporting methods to compare how their performance measured against established set goals and criteria as developed by the TAC.

Protection of privacy and data security—Develop a pilot that features specific governance, accountability, and legal protection approaches for protecting privacy and the security of collected data.

Based on the TAC recommendations, CalSTA and the California Department of Transportation (Caltrans) developed the system and procured private sector account managers for the pilot and officially launched the statewide California RCPP on July 1, 2016. The RCPP was a 9-month field trial with more than 5,100 vehicles statewide including 55 heavy vehicles. Volunteers were assessed a 1.8 cents per mile charge with a credit for state fuel taxes paid. This value was based on a TAC recommendation to keep the rate revenue neutral, and was determined by calculating a charge that would result in the average

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[4] STSFA was established under the "Fixing America's Surface Transportation" (FAST) Act to provide grants to States or groups of States to demonstrate user-based alternative revenue mechanisms that utilize a user fee structure to maintain the long-term solvency of the Highway Trust Fund.

[5] California Transportation Commission. "Road Charge Technical Advisory Committee." http://www.catc.ca.gov/meetings/Committees/Road_Charge/Road_Charge.html, Accessed on 22 November 2017.

[6] California Transportation Commission, California Road Charge Technical Advisory Committee. Road Charge Pilot Design Recommendations. December 2015.

California driver – driving a vehicle getting the state average of approximately 20 MPG – paying the same in road charge as fuel taxes for the same number of miles driven. Additionally, private account managers offered different value-added services in addition to a variety of mileage reporting methods[7].

A total of 5,129 vehicles participated in the California Road Charge Pilot through March of 2017, of which nearly 4,000 provided data. Of these, most (87%) were privately owned vehicles registered in the state of California. About 5% of participating vehicles where light commercial vehicles and 1% were heavy commercial vehicles. The remaining 7% were agency vehicles and out-of-state vehicles. About 79% of California's participants chose an automated mileage reporting option, and about 62% used location-based mileage reporting options. Participants did not incur any out of pocket expenses as the pilot did not collect any money from participants.

The California RCPP was evaluated against eight categories of criteria encompassing 36 goals as developed by the TAC. These goals were as follows:

Revenue—Ability of road charge to serve as a suitable replacement revenue source for fuel taxes.

Cost—Costs associated with administering and collecting road usage charges, both from a user perspective and from an agency perspective.

Operations—How well road charge collections operate, both from customer and agency perspectives.

User Experience—How users interface with the road charge system.

Privacy—Privacy protection measures built into the RCPP.

Data Security—Security of participant data collected, transmitted, stored, and used in the RCPP.

Equity—Equity, perceived and real, along several dimensions.

Communications—Communications with the RCPP participants and the public.

At the time of this report, California is compiling its portion of the pilot legislative report, which will provide key findings and lessons learned from the program. Nevertheless, it can be stated that nearly all goals for the California RCPP were completely satisfied. Nothing in the evaluation indicated any sort of fatal flaw in the feasibility of a road charge in California, such that all users of the roadway pay their fair share based on their use of the transportation network. Another aspect of the RCPP is that it made significant contributions to the road charge knowledge base and moved the state-of-the-practice of an alternative transportation funding method forward. Several RCPP attributes and approaches were "firsts" in the area of road charge (at least in North America):

The RCPP is the largest road charge pilot to date in the United States, encompassing 5,129 vehicles, of which nearly 4,000 provided mileage data.

[7] Refer to Section 5.2.13

The RCPP provided more mileage reporting methods and account managers from which participants could choose than any previous mileage-based collection pilot to date. Several reporting methods—and the associated technologies for measuring mileage—had never been tested in previous road charge pilots.

RCPP included fleets of heavy vehicles, along with additional services of interest to heavy truck fleet managers.

- With respect to the last point – a potentially important consideration for a regional pilot – interstate interoperability was simulated using location-based mileage reporting by one of the CAMs, starting on January 1, 2017 and running through the end of the pilot. Simulated charges of 1.5 cents per mile for mileage driven in Oregon was shown as a separate charge and invoice line item (in addition to miles driven in California). Oregon fuel taxes credits were issued at 30 cents per gallon for miles driven in Oregon. This simulation does indicate that interstate interoperability is feasible, provided participants have a location-based mileage reporting approach, and that the mapping used by the account managers is accurate with respect to state boundaries.

The RCPP did not address every possible issue as it was a proof-of-concept pilot and many issues still need to be addressed in terms of a potential future road charge program. These include administrative costs of a statewide-mandated system, the impact of changing technology, and compliance and enforcement approaches. California's recent federal grant under the STSFA program will investigate several of these issues, namely exploring ways to make RUC payments easier for the user by establishing a Pay-at-the-Pump and Charging Station mileage reporting and payment system and exploring ways to reduce administrative costs.

3.2.3 Colorado Road Usage Charge Pilot Program Research Study

The Colorado Department of Transportation (CDOT) conducted the Colorado Road Usage Charge Pilot Program Research Study in early 2017 to evaluate a pay-by-mile system as a potential alternative to the current fuel taxes. CDOT established a diverse Technical Advisory Committee and Executive Steering Committee consisting of key transportation leaders throughout Colorado as part of this effort.

The statewide pilot launched in December 2016 and continued through April 2017 with nearly 150 participants from 27 different counties across Colorado. Participants were assessed a revenue-neutral rate of 1.2 cents per mile charge with a credit for fuel taxes paid. The rate was calculated specifically for the pilot and was illustrative only; no money was exchanged as part of the Colorado RUCPP. It successfully tested RUC technology on vehicles with various fuel efficiencies and fuel types – gas, hybrid, and electric. One account manager provided users a choice of three mileage reporting options including one manual odometer reading option and two technology options – a GPS-enabled mileage reporting

device and a non-GPS enabled mileage reporting device. During the pilot, feedback and ideas were gathered from the general public and participants through a series of surveys.

The pilot demonstrated RUC is technically feasible as an alternative transportation funding mechanism. Technology-based systems were highly accurate and most convenient for users, the manual option experienced very low compliance over the course of the pilot. Participants who chose technology options had higher levels of satisfaction (93%) than those that chose the manual option (55%). The pilot used a number of media outlets including a project website, newsletters, general media (such as press releases) and social media to educate participants as well as the general public on the current transportation funding model and the RUC concept.

At the time of this report, Colorado is compiling its final research report that will provide key findings and lessons learned from the program. CDOT received 2017 STSFA grant funds that will allow it to continue to study RUC and research issues identified during the 2016/2017 pilot. Colorado intends to further explore the impacts of RUC on rural areas as well as explore ways to reduce overall administrative and collection costs.

3.2.4 Washington State Road Usage Charge Pilot Program

In 2012 the state Legislature directed the Washington State Transportation Commission (WSTC) to assess the feasibility of transitioning from the fuel tax to road usage charges for funding transportation investments. The WSTC subsequently established a 20-member steering committee to conduct research and make recommendations back to the WSTC and the state Legislature. Through these initial deliberations, the steering committee concluded that the concept is indeed viable and developed a work plan to further refine the concept for Washington. As previously discussed, Washington also participated in the Oregon RUCPP in 2012-2013 with 21 participants.

In 2013, following the steering committee's initial report, the state Legislature allocated additional funding in order to develop the business case and operational concept for a road usage charge. At the conclusion of these efforts, the steering committee presented a policy framework for several operational concepts. Additional funds were provided in 2014 to examine issues related to impacts on bonding, equity issues, transition issues and interstate issues. In 2016 the Washington Department of Transportation was awarded $3.847 million in STSFA funding to test "critical elements of interoperable, multi-jurisdictional alternative user based revenue collection systems." The Washington pilot should deploy in 2018 and include 2,000 participants statewide for a 12-month period. Four mileage reporting options will be offered, including both manual and technology options. The pilot will utilize a 2.4 cents per mile mock charge, which is equivalent to what the average car (20.5 mpg) in Washington currently pays under the 49.4 cent per gallon fuel taxes. No real payments will be made in the pilot. Washington will also explore interstate interoperability by including RUC participants from other states (Oregon and Idaho), as well as explore international interoperability with Canada.

3.2.5 Hawaii Road Usage Charge Demonstration

In 2015, the Hawaii Department of Transportation (HDOT) initiated a feasibility study to explore RUC as an alternative to the state fuel taxes, which identified key issues to be explored in a demonstration project. In 2016, HDOT was awarded almost $4 million in funding under the Federal STSFA grant program to conduct a 3-year demonstration project that will test a RUC system statewide. The RUC pilot will address both a manual approach and automated methods.

The manual reporting of mileage (and subsequent invoicing) will take advantage of HDOT's existing annual safety inspection process, which includes odometer readings of all vehicles. Full-scale operation of the manual reporting will be launched via an initial mailing to all the approximately 1.1 million vehicle owners. This communication will include explanation of what RUC is, general project information, historic odometer readings, prototypical billings, comparison of RUC with estimated fuel taxes costs, and contact information for further questions. Subsequent manual reporting will include odometer reporting by approximately 20,000 vehicles per week on average – over a period of 18 months – making the Hawaii RUC pilot the largest system (in terms of number of vehicles) to date.

A subsequent phase of the pilot will demonstrate and test different automated methods. The automated reporting per-mile charge test will include at least 2,000 participants, allocated such that each county and island is represented in such a way as to provide statistically valid results for designated evaluation category.

The program is scheduled to begin in the first half of 2018. HDOT will embark upon a significant public outreach and education effort targeted directly at the state's motorists throughout the course of the study. Some of the key attributes of the proposed Hawaii pilot include the following:

- Test a wide range of payment methods and frequencies for RUC both alone and in combination with other user-based fees such as federal fuel taxes and state registration fees.
- Test whether a RUC affects purchasing decisions regarding clean vehicles and whether providing driving cost information (i.e., RUC statement) results in any reduction of miles driven among all drivers regardless of vehicle type.
- Test per-mile rates that vary by county to determine to what extent differences in the rate influence driving behavior and choices.
- Analyze and address how to ensure visitors contribute their fair share for use of Hawaii's roadway system under a RUC as compared to current fuel taxes. (Note – The vehicle miles traveled (VMT) by visitors in Hawaii as a proportion of the total VMT is among the highest in the nation, but almost entirely in rental cars.)

3.2.6 RUC West Formation

Formed in 2013, the Western Road Usage Charge Consortium – subsequently renamed RUC West – is a voluntary coalition of 14 western state departments of transportation that are committed to collaborative

research and development of a new method for funding transportation infrastructure based on drivers' actual road usage. The goal has been to build public sector organizational capacity for, and expertise in, RUC systems and the associated policy, administrative, and technology issues. RUC West provides a collaborative forum to share information and best practices, discuss issues, observe and learn from other public agencies who are at different stages of testing and implementation, and facilitate joint research, thereby achieving economies of scale. RUC West member states are organized into three tiers based on their current level of involvement in advancing RUC in their jurisdiction (see Figure 3).

Figure 3: RUC West Member States by Tier

3.2.6.1 RUC West Projects

RUC West allows state departments of transportation to pool their resources to study outcomes and share best practices. Since 2013, RUC West has tackled many of the policy, organizational, technological, and operational challenges for finding a new way to generate and collect revenue to fund transportation infrastructure. RUC West has brought 14 states under one umbrella and invested over $800,000 to lay the groundwork for per-mile road usage charging (RUC), and addressed such issues as interoperability, privacy, public education, and rural/urban equity.

Since its inception in 2013, RUC West has used its pooled funding for several projects related to feasibility and implementation of RUC, with more under way. These projects are summarized in Table 1.

Table 1: RUC West Projects

#	Project Title	Brief Description	Date Begun	Fully Funded
1	Critical examination of the Oregon RUC program	Peer review of the Oregon RUC and forward compatibility with other western states		✓
2, 3	Addressing out-of-state drivers in a RUC system (Phase I and II)	Analysis and development of options for collecting a RUC from out-of-state drivers; identification of possible approaches, as well as the costs and revenues associated with alternatives, including international concepts		✓
4	Impacts of a changing vehicle fleet fuel economy on state transportation funding	Developed a framework for forecasting the fiscal impact of alternative fuel and highway miles per gallon on state funding.		✓
5	Web-based cost of transportation calculator	An online calculator lets drivers compare impacts of RUC vs fuel taxes.		✓
6	Effects of RUC on rural residents	Examines the effects of RUC on rural residents, comparing urban with rural fiscal impact issues.		✓
7	RUC Communications Task Force	Established a communications task force and a phased communications program that included creation of a RUC West website and development of a communications "tool kit" on RUC		✓
8	Road map for state consideration of a RUC system	Compiling best practices for RUC policy development and creating a roadmap for state consideration of RUC, including common issues raised and FAQ		✓
9	Protection of privacy in a RUC system	Established foundation and future policy considerations for protecting driver privacy throughout western region; identified standards and comparing those against current best practices (Uber, tolling, account managers currently using)		✓
10	RUC vendor certification (Phases I and II)	Establishing the approach, objectives, and plans for deploying a standard multi-state RUC vendor certification program for a RUC system across multiple states, including processes and mechanisms for certifying account managers at the regional level		✓
11	Parameters for a RUC rate	Examination of congestion pricing and the parameters for the basis of a RUC		✓
12	Public understanding of a RUC system	Research to better understand public knowledge or RUC		

While RUC West has used its pooled funds to support various policy and planning studies related to the implementation of multi-state RUC systems, the group was awarded 2016 STSFA funding in the amount of $1,500,000 to develop a multi-state RUC pilot for the western US (this current regional pilot project). These funds will support a two-phase effort involving system definition of a multi-state pilot (Phase 1A) and the development of essential regional pilot project plans (Phase 1B). As shown in Table 2, 11 RUC West states are participating in one or both of these phases, which will help ensure that most concerns and interests will be addressed. After these initial system definition and pilot planning activities, the coalition will conduct a multi-state pilot (Phase 2) using 2017 STSFA grant funding they were awarded in fall 2017. A critical component of the current effort is the development of this document, the Concept of Common Operations (CCO), which outlines how the system will operate and be administered. The current effort will also produce a marketing and outreach plan with associated communications tools that can be used by RUC West member states in discussing the RUC concept with elected officials, stakeholders and the general public. The effort is anticipated to conclude in the summer of 2018.

Table 2: Member State Involvement in Regional Pilot Project Phases

Participating States	Phase 1 Pre-Development Work		Phase 2 Pilot Demonstration [a]
	Phase 1A System Definition	Phase 1B Project Planning	
Arizona	✓		
California	✓	✓	✓
Colorado	✓	✓	
Hawaii	✓		
Idaho	✓		
Montana	✓		
Nevada	✓		
Oklahoma	✓		
Oregon	✓	✓	✓
Utah	✓		
Washington	✓	✓	

[a] *California and Oregon are pursuing state policy approval during Phase 1 that would allow for participation in the Phase 2 regional pilot demonstration to begin in FY 2018. Other states may use the Phase 1 activities to educate legislators; building the necessary policy and legislative backing for participation in the regional pilot demonstration.*
New Mexico, North Dakota, and Texas are not currently designated as having roles in any of the phases; however, their input may still be sought as part of capturing requirements in Phase 1A activities

3.3 Common Themes and Issues from RUC West State Pilots and Initiatives

The earlier RUC pilots established that the RUC concept is feasible, but still needs further exploration and refinement for implementation. The subsequent pilots built upon this initial feasibility work by exploring different account management and mileage reporting options to improve public acceptance and lower administrative costs to the state. However, there is still much to learn. National experience has found that public acceptance and associated political resistance are likely to be the most significant challenges facing the implementation of road usage charges. RUC experiences to date have illustrated five primary areas of public concern, many of which are interrelated in some manner:

Privacy – One of the biggest challenges facing RUC implementation will be convincing the public that any data collected on road usage will be protected and that drivers are not being actively monitored or tracked by the government when they travel. The aforementioned RUC West project on privacy protection identified several privacy-related issues and considerations that the various RUC pilots have addressed in some manner. These key issues and considerations include:

- Providing motorists choices for mileage reporting, including at least one approach that does not involve any sort of mileage reporting (such as a time-based system)
- Not requiring a location-based approach, including specific origins or destinations or travel patterns
- How long the collected data are retained by the account management entity and / or government
- Protecting "personally identifiable information" (PII) and identifying the scenarios under which it may be disclosed
- The extent to which private-sector providers and account managers are allowed to share (i.e., "sell") collected data to other entities
- The extent to which data should be anonymized (i.e., removing personally identifiable information) and / or aggregated before providing the information to others
- The ability of drivers to opt-in or opt-out of approaches that involve data sharing with other entities and / or long-term retention of the data, particularly when these individuals are using other services offered by a private sector provider
- Allow individuals access to all personal data collected on them – to review it for accuracy, and to ensure only data required for proper accounting and payment of road usage charges (and other services if selected) is being collected.
- Protections and notifications should a government entity request detailed data (e.g., routes by time of day) from private sector RUC providers on one or more individuals.

Cost of implementation, operations and administration – Fuel taxes are a relatively low cost and efficient tax to collect as they are generally assessed and collected from licensed fuel distributors, which are those companies receiving fuel from a manufacturer, and then distributing it to local fueling stations where drivers pay the tax. This means that there are a relatively small number of collection points and generally high compliance. Road usage charges would need to be collected for each vehicle, potentially increasing the cost of collection due to the exponential increase in collection points. Because RUC often relies on in-vehicle and aftermarket mileage reporting technologies, there are additional costs such as hardware, wireless communications and data processing costs. As such, there is an increasing focus on finding ways to utilize the private sector for RUC system administration and operations. For example, using a relatively limited number of account managers and / or a regional clearinghouse – mimicking the current fuel distribution system – might help reduce the number of said collection points. Moreover, based on recent discussions with account managers, there are potential economies of scales with a large (i.e., regional) RUC system. Their respective business models appear to be based on "millions of vehicles" included in a road charge system, with the road charge component becoming a "value-added" to the other services they provide to customers.

Enforcement and Compliance – In addition to being low cost, fuel taxes are also relatively easy to enforce because they are generally paid by distributors, so any vehicle requiring fuel is simply reimbursing the station owner by paying the tax at the pump. However, enforcement of road usage charging is more complex, and the public is not likely to support a funding system with perceived weak enforcement where individuals can easily avoid paying RUC. Different RUC approaches and supporting technologies will likely have different compliance rates and enforcement costs, with automated methods (such as in-vehicle telematics and plug-in mileage reporting devices) having the highest compliance and relative ease of enforcement as compared to methods that require drivers to voluntarily report mileage (e.g., taking a picture of the vehicle's odometer on a recurring basis). Agencies may also address enforcement issues by increasing the role of the private sector for administration and operation of mileage reporting options and linking road usage charges to value-added services.

Equity – In spite of recent RUC pilot success, issues of equity are likely to persist with the concept. RUC systems are likely to increase the cost of driving for the owners of electric vehicles and hybrid electric vehicles, which may be viewed as unfair to those who have made conscious decisions to reduce fuel consumption and emissions. Furthermore, RUC systems represent a highly visible new charge from the perspective of the user, particularly because fuel taxes are embedded in the retail price of motor fuel and effectively hidden from the driver. Because RUC systems are based on actual use, they are perceived as being unfair to drivers who travel further on a trip-by-trip basis and are therefore charged more per-trip. As such, regardless of how technically and administratively feasible RUC is in one state, equity concerns will nonetheless have to be evaluated and addressed in each state. Oregon and RUC West have explored the rural and urban impacts of RUC. The conclusions to date are that while rural drivers tend to drive slightly more miles per day than urban residents, they are generally driving older and less fuel-efficient vehicles than their urban counterparts. Assuming that a RUC program will credit any paid fuel taxes back to the motorist, most rural drivers may see a positive impact from participating in a RUC program.

In fact, the aforementioned RUC West project and final report on this issue[8] indicates that across the eight states analyzed, urban areas are likely to pay between three tenths of a percent and 1.4 percent more under a RUC than the current fuel taxes. Payments for rural residents are reduced between 1.9 percent and 6.3 percent, varying by state. Using different rates based on income, average MPG of the vehicle, and/or classification of the driver's residence (e.g., urban, rural, mixed, commercial) may be a future consideration. Oregon's study yielded similar results.

Also, as RUC expands, international drivers may also be encountered. One example of this is drivers in Canada who travel along US roadways. Further studies and demonstrations encompassing national borders, such as Canada and Mexico should be considered to capture equity along states with international borders.

Evolving Technology and Services – Several of the technologies used in RUC pilot systems to date – such as the mileage reporting devices that plug into the OBD-II port – have proven to be very accurate with

[8] "Financial Impacts of Road User Charges on Urban and Rural Households;" 2017

high compliance rates (albeit with volunteers) and supportive of any future enforcement efforts (e.g., account managers know when a device has been removed, as well as receiving a variety of error codes). However, to paraphrase a statement frequently made by Jim Madaffer, Commissioner of the California Transportation Commission and the TAC: *"road charging will not be ready for prime time until it becomes as easy as saying $5 on Pump Number 3."* In other words, a long-term goal for RUC may be that the driver will not be required to do much of anything, be it plugging in a device, taking a picture of the odometer, etc. As previously noted, the California RCPP included approximately 60 vehicles where in-vehicle telematics was used to collect RUC information. Another consideration is the various additional driver services and amenities offered in recent RUC pilots. Currently, there are challenges with in-vehicle telematics data as automobile OEMs are considering that data proprietary and have not been willing to share that data for RUC collection. However; as the public becomes more comfortable with—and often demanding of—enhanced technology on their persons and in their vehicles, it may be that in the future, vehicle owners and lessees will not choose a "RUC technology," per se, but rather they will choose from alternative amenity packages incorporating a variety of services they desire, with RUC being offered as a value-added option to these other driver services. This may support better collaboration with the OEMs and the public sector for the sharing of in-vehicle telematics data to support RUC programs. Another technology area to be addressed is the potential role of Connected and Automated Vehicles in RUC. As research is being conducted on these technologies, specifically the types of data that can be collected and disseminated, the use of that data for processing RUC should also be considered.

3.4 Institutional Setting and Governance

This section outlines the participating agencies and organizations within each RUC West state and their institutional approach to RUC to date. Some of the RUC West members have been very active in RUC, including implementing pilots as previously summarized in Section 3.2. Others have joined RUC West to see where this concept goes, supporting and providing findings for many of the RUC West studies on the various RUC issues.

3.5 State Jurisdictions and Associated Agencies

3.5.1 Arizona

Arizona is currently researching RUC through its involvement and membership with RUC West. Arizona joined RUC West in February 2014.

3.5.2 California

California joined RUC West in November 2013 and has been an active member contributing to many of the studies completed to date. In addition to its research efforts with RUC West, California has continued to study RUC within its own state. In 2014, the California State Legislature passed (and Governor Brown signed) SB-1077, creating a 15-member Technical Advisory Committee to study mileage-based user fees and design a program for testing.

The TAC is made up of members that represent the telecommunications industry, highway user groups, data security and private industry, privacy rights, advocacy organizations, the equity community,

regional transportation agencies, national research and policymaking bodies, including members of the Legislature and other relevant stakeholders. The TAC conducted 12 public meetings throughout the state and solicited input and feedback from over 400 stakeholder groups and every elected official representing California.

Based on the TAC recommendations, CalSTA and Caltrans developed the system and officially launched the statewide California RCPP on July 1, 2016. CalSTA will submit the final report to the Legislature that includes the findings and summarizes the pilot volunteers' experiences and the stakeholder input received throughout all phases of the process. The California Transportation Commission (CTC) will then provide its recommendations to the Legislature. The Legislature will make the final decision on whether and how to enact a full-scale permanent road charge program.

During the pilot program, Caltrans formed an Interagency Working Group (IAWG). The IAWG consists of other California governmental organizations that either already perform functions pertaining to the current fuel taxes or may take on larger roles for administering, enforcing, and supporting a large-scale statewide road charge program. The IAWG collaborated with Caltrans to define the various roles and responsibilities and identify needed resources and infrastructure for any potential future road charge program. The IAWG comprised several agencies including:

- Bureau of Automotive Repair
- California Air Resources Board
- California Department of Insurance
- California Department of Motor Vehicles
- California Highway Patrol
- California State Board of Equalization
- California Transportation Commission
- State Controller's Office

California was awarded a STSFA grant in 2016 to investigate several issues, including the organizational structure for administering, governing, and evaluating a statewide road charge program; criteria and policy considerations for enforcing road charge and promoting motorist compliance; cash flows for road charge to maximize revenues and mitigate concerns from city and county agencies; and considerations for a pay-at-the-pump and an electric charging station program, including how Connected and Automated Vehicle (C/AV) technology may be incorporated into RUC. Caltrans received additional STSFA funds in 2017 to explore mechanisms to collect revenue at pay-at-the-pump and EV charging stations.

3.5.3 Colorado

Colorado joined RUC West in February 2014, and has contributed to many of the studies RUC West has completed to date. CDOT staff is also the current Chair of the RUC West Steering Committee.

In addition to its research efforts with RUC West, CDOT has explored RUC in Colorado through research programs. In 2008, a state task force recommended that the Colorado Department of Transportation (CDOT) consider a mileage-fee pilot program. The task force made its recommendation after finding that the state's gap in transportation funding was expected to grow to $51 billion by 2030. In 2013, CDOT

published a feasibility study that examined mileage fees in addition to a number of additional transportation financing options. In 2016 and 2017 CDOT launched the statewide Road Usage Charge Pilot Research Study. Funds from CDOT's State Planning and Research (SPR) program were used for the 2016/2017 pilot. SPR funding is from federal sources and is dedicated to planning and research related activities. As such, no state funding and no funding that would otherwise be used to develop, maintain or preserve Colorado's roadways was used for the pilot.

Oversight of the 2016/2017 pilot research study was provided by CDOT executive leadership, a technical advisory committee, as well as a steering committee composed of elected officials and transportation stakeholders. CDOT received 2017 STSFA grant funds that will allow them to continue to study RUC and research issues identified during the 2016/2017 pilot.

3.5.4 Hawaii

Hawaii joined RUC West in March 2014, and has contributed to many of the studies RUC West has completed to date. In addition, HDOT initiated a feasibility study in 2015 to explore RUC as an alternative to the state fuel taxes, which identified key issues to be explored in a demonstration project. In 2016, HDOT was awarded almost $4 million in funding under the Federal STSFA grant program to conduct a 3-year demonstration project that will test a RUC system statewide. Hawaii has support of key state legislators and will use the results from their demonstration project to provide actionable information to legislators to consider.

3.5.5 Idaho

Idaho is currently researching RUC through its involvement and membership with RUC West. Idaho joined RUC West in July 2014. Idaho will be participating in the Washington State RUC Pilot in 2018 with about 50 participants and hopes to continue to move RUC forward in Idaho after that pilot.

3.5.6 Montana

Montana is currently researching RUC through its involvement and membership with RUC West. Montana joined RUC West in March 2014.

3.5.7 Nevada

Nevada is currently researching RUC through its involvement and membership with RUC West. Nevada joined RUC West in November 2013. It is also noted that Nevada DOT participated in the 2012-2013 Oregon RUCPP, with 23 participants.

3.5.8 Oklahoma

Oklahoma is currently researching RUC through its involvement and membership with RUC West. Oklahoma joined RUC West in October 2015.

3.5.9 Oregon

The Oregon legislature formed a RUFTF in 2001 to explore various funding alternatives for replacing Oregon's fuel taxes as the primary source of revenues for repairing, maintaining and improving the state's transportation system.

ODOT conducted a series of pilots between 2006 and 2013 testing various aspects of a road usage charge system including various equipment and technologies, mileage reporting options, and engagement of the private sector. In 2013, the Oregon Legislature passed (and Governor John Kitzhaber signed) Senate Bill 810 establishing the nation's first mileage-based revenue program for light vehicles.

To administer this program, ODOT created the Road Usage Charge Administration System (RUCAS) in 2014. This is the back-end system that receives data from the account managers as well as the fuel taxes system, transcribing it into reports necessary for program administration. This system includes:

- Volunteer management
- Account manager management
- Tax reconciliation
- Program monitoring and reporting
- Issue resolution

Project oversight focused on governance of the OReGO program to ensure the program aligned with overall strategic objectives and legislative mandates. This included reporting to the Oregon RUC Executive Board, meeting with the Oregon RUC Steering Committee, and reporting to external entities such as the quality assurance contractor, Legislative Fiscal Office (LFO) and Department of Administrative Services (DAS), as described below.

RUC Executive Board - includes members of different divisions within ODOT and the director who provided executive management an overview of the program's quality management plan, gave necessary resources to accomplish the project, and oversaw the project's scope, schedule, and budget.

RUCAS Project Steering Committee – consisted of ODOT representatives from Fuel taxes Group, Motor Carrier Division, Driver and Motor Vehicles Division, Transportation Application Development, Enterprise Technology Operations, and Financial Services. This group obtained resources for the project, and oversaw the project's scope, schedule, and budget, as well as gave subject matter expert advice on project decisions.

External Quality Assurance – per DAS guidelines, the project had to procure an external quality assurance firm who was responsible for analyzing the project through key personnel interviews and document reviews.

DAS Office of the State Chief Information Officer and Legislative Finance Office – ODOT worked closely with these agencies to ensure that the project was consistent with Senate Bill 810, was correctly moving through the Stage Gate process, and utilized the program management plan as a basis for ongoing accountability, transparency, and appropriate program controls.

On July 1, 2015, ODOT launched OReGO, seeking up to 5,000 volunteers for the nation's first statewide RUC program. Participants are charged 1.5 cents for each mile they drive and receive a credit on fuel taxes paid at the pump as they use taxed fuel to drive taxed miles. ODOT's Office of Innovation has a number of staff dedicated to the OReGO program.

Oregon received STSFA funds in both 2016 and 2017 to initiate improvements to its existing program.

Oregon joined RUC West in August 2013 as one of the founding members.

3.5.10 Utah

To date, Utah has only studied RUC through its involvement and membership with RUC West, which it joined in December 2013.

In 2015, the Utah Legislature passed (and Governor Gary Herbert signed) HB 362, Transportation Infrastructure Funding. This was the first law in 18 years to modify the state fuel tax by reforming it to keep pace with inflation and providing local communities with tools to help address their transportation needs. It requires, as a provision, UDOT to study the implementation of a road usage charge based on miles driven, including a potential demonstration program. It also requires UDOT to make recommendations on the potential use of such a system in Utah.

In September 2017, UDOT testified to the new Transportation Governance and Funding Task Force that it would like to conduct a small research RUC pilot as soon as 2018, which members of the task force supported.

3.5.11 Washington

In 2012, the Washington State Legislature authorized the state transportation commission to form a stakeholder steering committee tasked with evaluating the feasibility of a road user charge and recommending potential options for a pilot test. This 27-member steering committee includes representatives from:

- Washington State House of Representatives
- Washington State Senate
- Puget Sound Regional Council
- Washington State Department of Transportation
- Washington State Department of Licensing
- The Office of State Treasurer
- Counties and cities
- Motoring public
- Auto industry
- Business
- Ports
- Public transportation
- Environmental interests
- Trucking Industry
- Consumer groups

In 2013, the Legislature asked the commission to evaluate the business case for road usage charging and a policy framework was developed. In August of this same year, Washington joined RUC West as one of the founding members. It is also noted that Washington participated in the 2012-2013 Oregon RUCPP, with 21 participants.

In 2014, the Legislature directed the commission to develop a work plan, and the commission issued a final report to the governor and legislature in December 2014. This report focused on the development of a concept of operations, the first step in putting together a systems engineering process that describes the full functionality of such a system.

In 2016, the Washington Legislature passed HB 2524, authorizing the Washington State Transportation Commission (WSTC) to continue evaluating RUC as an alternative to the motor vehicle fuel tax to fund future investments in transportation, including a RUC pilot project.

Since 2012, the WSTC and the stakeholder committee have been researching, assessing, and analyzing this potential replacement for the fuel taxes in close partnership with the Washington State Department of Transportation (WSDOT) and the Department of Licensing. In 2017, WSDOT was awarded $4.6 million in funding under the Federal STSFA grant program to conduct public outreach with users regarding a method for assessing and collecting fees.

4 SYSTEM STAKEHOLDERS

The RUC West Regional Program (also referred to as the "Regional Program") will support multiple system stakeholders. Each of the stakeholders and a brief description of their involvement in the RUC West Regional Program are described below.

4.1 PRIMARY STAKEHOLDERS

Primary stakeholders are those who are directly involved in the Regional RUC program. Their roles vary between systems access and usage, data review, RUC payment collection and depositing, program administration, discussing status, and developing the overall vision for RUC in the western region.

4.1.1 RUC West

As previously mentioned, RUC West is the governing entity for expanding research of RUC in the western states. RUC West, through its Board of Directors, Executive Committee, and Steering Committee will review the status of the Regional RUC program, provide guidance and policies for managing and expanding the program, and coordinate with other stakeholders on the program's intent and purpose. As the primary system sponsor, RUC West will also be ultimately responsible for the program's performance, working directly with each of the program entities and other stakeholders to ensure the Regional RUC program meets the established goals and objectives.

4.1.2 States

The fourteen (14) states that encompass RUC West will be stakeholders in the Regional RUC program. Whether initially through the pilot demonstration or in the future as their own states explore RUC, the Regional RUC program will be a tool to show their legislators, transportation and financing officials, and the public how a RUC program could be used to transform their current transportation funding model. The types of states involved in the Regional RUC program are categorized into two major categories.

Please note that the delineation between states referenced in this section and the remainder of this document, relate to those that will actually be participating in the program or monitoring the status of the program, and may not reflect actual states that are currently participating in RUC West.

4.1.2.1 Participating States

Participating states are those actively involved in the Regional RUC program. They will be the frontline entities working directly with system users from each of their respective states. They will work directly with the business partners, the regional clearinghouse, agencies within their states, and with other participating states to:

- Review RUC-related data and financial records,
- Provide customer support and communications to system users,
- Monitor project performance, and
- Develop policies within their own states to continue exploring alternative finance models like RUC.

Participating states may also conduct their own enforcement and compliance investigations with agencies to collect missing RUC and to enforce appropriate penalties on system users or business partners where appropriate. They may also, in collaboration with RUC West, conduct system audits with business partners and the regional clearinghouse. Participating states may be involved in working groups, conducting specific activities relative to the evolution of the Regional RUC program through developing policies, conducting research, communications, and evaluating the overall performance of the program. Finally, participating states may be tasked with reporting to their respective legislators and policymakers on the status of the Regional RUC program, crafting messages about the program, and even providing walkthroughs of the RUC system for those who wish to learn more about the program.

4.1.2.2 Monitoring States

Monitoring states are ones without volunteers involved in the Regional RUC program. They will still be involved in the development of RUC West policies and may use the Regional RUC program as a demonstration and education tool for their respective state legislators. They may also review aggregated RUC data to support continued education. They may participate in working groups to conduct studies and develop policies, but their role should be only observational as they will not have as much direct experience in the Regional RUC program as their participating state counterparts.

4.1.3 Drivers/Users

Drivers, or users, are stakeholders who will participate in the Regional RUC program. They will reside in a participating state and drive miles for which they are assessed RUC. They will participate in enrollment, selecting a business partner, selecting mileage reporting options, and establishing accounts. They will also review invoices for accuracy, initiate customer service requests, and provide feedback to the business partners and their participating states on how the program is performing.

Users will review the invoices provided by their business partners, and remit payments to their business partners in accordance with the specifications provided at account enrollment. Users are also responsible for using the Regional RUC system and its provided hardware and systems in accordance with the specifications provided by their business partner.

4.1.4 Business Partners

Business partners are those stakeholders, procured by RUC West, who will provide hardware, systems, and services to system users. They will be the primary interface with the users, providing hardware, establishing and maintaining RUC accounts, communicating status, submitting invoices, collecting RUC, and initiating collection and enforcement activities where appropriate. The business partners will also be responsible for the maintenance (collection, aggregation, sanitization, retention, etc.) of driver data, and the dissemination of that data, and the collected RUC to the regional clearinghouse. They may also be tasked with supporting audits and providing information to participating states.

4.1.5 Regional Clearinghouse

The regional clearinghouse, as currently defined in the systems architecture, is the single entity responsible for the collection and aggregation of data and finances from each business partner, depositing funds into each participating state's designated accounts, and providing data and reports to each participating state, and potentially RUC West. They will interface primarily between each business partner and each participating state to review, aggregate, and disseminate data, as well as to deposit funds.

As the Regional RUC program evolves, the regional clearinghouse may change or expand to include certification, contracting, and other services necessary to support the long-term viability of the program. As other states continue exploring RUC, the need for the private sector to collect RUC and provide services to participants may diminish, and state entities may be those that directly interface with the regional clearinghouse. Also, the evolution of certain technologies, like blockchain, may provide ways to revolutionize the financial administration, reporting, and funds appropriation needs of RUC systems, and possibly remove the need for a regional clearinghouse.

4.2 Secondary Stakeholders

Secondary stakeholders are those who will be impacted by the Regional RUC program, but will not be involved in the daily operations. They may use the outputs of the Regional RUC program to support their current roles, but will have little to no impact to the daily program operations.

4.2.1 Legislators/Policymakers

The legislators and policymakers from each RUC West state are perhaps the most important secondary stakeholder. While not directly involved in the daily operations of the Regional RUC program, their input will be used to shape the future of RUC programs throughout each of the RUC West states. As such, they may request information and data from each participating state or RUC West to use in evaluating the feasibility of RUC, identifying potential needs and uses for RUC in their state, and drafting legislation that continues the evolution and acceptance of RUC.

4.2.2 Federal Agencies

As the Regional RUC program, at least in the early stages, is partially funded by federal grant dollars, federal agencies play an active role in the evaluation of the performance of the program. As such, they may request information from RUC West and the participating states to better understand the performance of the program, the impacts that the program is having on state revenues, and may at some point, wish to actually participate in the program to evaluate the feasibility of implementing a federal RUC in lieu of the federal fuel taxes. They may also choose to explore the outputs of the program to support future programs and use the Regional RUC program as a model for other states or regions to use when conducting their own research on alternative funding options. Some of the federal agencies that may be involved in the Regional RUC program include: Federal Highway Administration (FHWA), National Highway Transportation Safety Administration (NHTSA), Department of Commerce (DOC), Internal Revenue Service (IRS), National Institute of Standards and Technology (NIST) or other agencies focused on exploring ways technology and innovation can be used to improve the current transportation funding model.

4.2.3 General Public

The general public includes residents within a state that may benefit from the proceeds of the Regional RUC program, through improved roads, mitigated congestion, etc., but are not participants in the Regional RUC program. Should the Regional RUC program become a true replacement for a state's fuel taxes, then the general public will become drivers/ users. Until then, the general public may pose questions to their participating states about the Regional RUC program's concepts, constraints, performance, and other considerations. As such, the participating states should capture this information, provide guidance and clarification to the general public through messaging and bring any special considerations from the general public to RUC West for inclusion in their overall messaging.

4.2.4 Professional Organizations

Professional organizations may also benefit from the outputs of the Regional RUC program to support their primary missions. Several organizations, such as the American Association of State Highway Transportation Officials (AASHTO), American Association of Motor Vehicle Administrators (AAMVA), Transportation Research Board (TRB), International Bridge, Tunnel, and Turnpike Association (IBTTA), and the Mileage-Based User Fee Alliance (MBUFA) have all taken a vested interest in the development of RUC programs. As such, they may request information from RUC West and the participating states on the status of the Regional RUC program to aid in the development of their own platforms geared at continued exploration and research of usage-based funding programs. Additionally, entities such as the American Automobile Association (AAA) and the American Trucking Association (ATA) may be directly impacted by RUC and as such, may request information on the Regional RUC program for dissemination to their members.

5 OVERALL NEEDS AND GOALS

The overall goal of the RUC West CCO is to provide operational guidance to its various state members for deploying RUC programs, which can be linked together into a regional system. Additionally, as part of RUC West's STSFA grant application, several key goals and objectives were identified, all of which will be addressed through the Regional RUC program:

- Design and deploy RUC systems that:
  - Are open to foster market competition
  - Allow for motorist choice
  - Are compatible with readily available and affordable consumer products and technologies
  - Are designed to achieve the primary purpose of collecting taxes to fund roadway maintenance and improvements.

- Also further RUC West's goals to:
  - Explore the technical and operational feasibility of a multi-jurisdictional road usage charge system
  - Investigate public and key decision-maker criteria for acceptance
  - Share experience and lessons learned
  - Develop standards and protocols for how RUC could best be collected and remitted among the various jurisdictions
  - Develop preliminary operational concepts for how a multi-jurisdictional RUC system would be administered
  - Develop a model for regional cooperation and interoperability
  - Engage the automotive manufacturing and technology sector to encourage RUC with other products and services
  - Share knowledge to maximize the preparedness for and efficiency of policy and program development for RUC

To accomplish this, a structure sufficient to allow independent operation of multiple state programs while providing the foundational elements needed to collect and transfer RUC revenues and data across multiple state jurisdictions needs to be developed. The need to provide flexibility and some level of independence to each participating state is paramount in ensuring that individual state needs are met. A regional governance structure to provide the requisite policies, implement administrative controls, and evaluate cost impacts will also be necessary to ensure that any collected RUC revenues are accurately and efficiently transferred to each participating state. Therefore, there will be elements that each state should be required to have in its RUC system, elements that a state may have in its RUC system, and elements that might be detrimental to the overall operation of RUC systems in the RUC West states. This CCO provides concepts addressing each of these categories.

5.1 Mission Statement

The mission of RUC West is to collaborate and coordinate between various member states and their elected, public, and private stakeholders to develop a regionally coordinated RUC system. RUC West will enable interoperability of RUC systems between its member states by setting the basic standards and practices for RUC implementation without dictating specific mechanisms to individual states for meeting those standards and practices.

5.2 State Needs

The overarching need for each state is a reliable system that accurately determines the mileage fees due to it at a reasonable cost. As incorporated into the RUC West coalition, this includes effectively interacting with other states to equitably calculate and distribute revenues between the various states.

As part of the development of this CCO, each of the eleven participating states were interviewed to gather their input and distinct needs and drivers for the Regional RUC Program. These interviews resulted in several system considerations such as:

- Interoperability between participating states
- System and network reliability
- Accuracy in the collection, processing, and transfer of RUC data and funds and the credit of any assessed fuel taxes
- Auditable
- Safeguards against unauthorized data dissemination
- Cost effective to administer and manage
- Ability to allow states to choose those options best suited for their state motorists
- Direct input and collaboration with the private sector business partners
- Maintain the highest practical levels of compliance
- Interfaces to state and local enforcement agencies, such as Departments of Motor Vehicles, State Patrol, and local police
- Performance monitoring and measuring capabilities using real-time or near real-time data
- Centralized technical and business process certification
- Value-added services to motorists

At the discretion of the states, data collection, fee calculation, and fee collection can be performed by the state through a specified state agency, by private providers, or both. In all cases, the entities providing these services must be able to interact, as needed, with other entities. This includes interaction within the state, as well as interaction with other states.

5.2.1 Interoperable between participating states

One of the key objectives of the Regional RUC program is to support interoperability, simply defined as "*ability of a system or a product to work with other systems or products without special effort on the part of the customer."* This means that the systems and data provided by each business partner must be able to seamlessly transfer data and RUC revenues from their systems to participating states and their

respective financial institutions (the "customer"). Additional communications with each RUC West participating state further defined the interoperability of the Regional RUC program to include:

- **User oriented** – Users should not have different devices, accounts, reporting or billing systems when traveling across state borders. Driving miles across multiple states should be seamless to the user.
- **Feasible** – System complexities are minimized and practical to administer.
- **Transparent** – Users should clearly understand what RUCs are being assessed and paid. Furthermore, states should be able to easily verify and audit both assessed and paid revenues without the need for administrative complexities.
- **Consistent** – Systems, messages, and themes should be consistent across platforms to alleviate confusion from the users.
- **Equitable** – The Regional RUC program should perform at the same level for each participating state regardless of the contractual arrangements between one state and the business partners.

The key to meeting interoperability will be to establish a series of mutually agreeable (between each participating state and each business partner) functional, technical, and business requirements. This includes establishing common data interface and financial transaction protocols that will ensure the accurate transfer of data and RUC revenues between each participating state. To further support interoperability, the Regional RUC program will consider implementing a regional clearinghouse to collect and disseminate RUC-related data and revenues between states. Details around this regional clearinghouse are covered in Section 7 of this CCO.

5.2.2 Reliable System and Network

This need revolves around the need to maintain a network that supports the accurate collection and reporting of mileage and associated RUC. This means that the business partner's account management systems and hardware must remain available to support daily operations, including mileage reporting and account management operations, at least a certain percentage of a 24-hour per day, 365-day per year period. Generally, a common network uptime for these types of systems is 99.9% (meaning that the system should remain operable at least 59.94 minutes every hour of a year). This does not include system outages for regularly scheduled maintenance or situations that are out of the business partner's control (i.e., inadequate cellular communications coverage for plug-in devices). Maintenance outages should be scheduled for times when the system is least likely to impact data collection and retention.

5.2.3 Accurate in the collection, processing, and transfer of RUC data and funds and the credit of any assessed fuel taxes

The accuracy of collection, processing, and transfer of RUC data and funds between the business partners and each participating state, as well as the accurate crediting of any assessed fuel taxes is a key objective for the success of the regional program. The ability to accurately capture a vehicle's mileage, correctly process the associated RUC (at each state's respective per-mile rate, including the credit of relative fuel taxes), and transfer the data and revenues to each participating state based on the miles traveled across each state is paramount. Additionally, the ability to accurately credit any fuel taxes based on fuel consumed whether it be based on the miles that fuel is consumed, the average EPA

mileage rating, or simply based on all miles traveled relative to the fuel tax rate for a driver's registered state is a key objective for the RUC system performance.

5.2.4 Auditable

The ability of a business partner's financial systems to be easily and successfully audited and maintaining compliance with state and federal standards is another key objective. This includes compliance of the business partner with Generally Acceptable Accounting Principles (GAAP) recommendations, policies and recommendations established by each participating state and account oversight agencies (such as the Public Company Accounting Oversight Board (PCAOB)), compliance with Statement on Standards for Attestation Engagements (SSAE) 18, and any policies required by financial institutions with whom the business partner may transfer funds, such as Payment Card Industry Data Security Standards. Generally, audit records will be required prior to entering into a contract and each business partner will also be required to provide historical audit records and any remediation actions from at least the previous two years.

5.2.5 Safeguarded against unauthorized data dissemination

Given the public concerns over privacy protection, coupled with recent well-known instances of data network breaches (i.e. Equifax), the need to safeguard data and the hardware and networks that collect and transfer data from hacking and unauthorized dissemination of data will be a key objective. This includes compliance with industry standards for data storage and network security, such as the International Standards Organization (ISO) standard 27001 Information Security Management. Compliance with these standards (or their equivalents), coupled with any penalties for the unauthorized dissemination of data must be paramount in protecting driver and financial information, thus implementing a level of comfort from the public as to the systems that will house their driving and financial information. These standards should apply both to the RUC business partners as well as any participating state that will either access driver specific data, or have access to business partner systems.

5.2.6 Cost Effective to Administer and Manage

The increased complexity of a RUC system relative to the fuel tax model, leads to a concern over increased expenses needed to administer and manage the system. The current fuel tax model costs between 1% and 5% of collected revenues to administer[9]. Previous pilot projects have conducted analyses that have estimated the cost to administer a RUC program to be between 12% and 25% of collected revenues. Also, previously conducted RUC pilots and programs have operated at a loss, where the RUC revenues collected are far less than the costs needed to administer the programs. Consider though, that these pilot demonstrations have been relatively small in nature (between 100 and 5,000 vehicles) and economies of scale for administrative cost reductions may lower these initial values. Regardless, the need to maintain cost effectiveness for administering the Regional RUC program, for both the business partners and the participating states, must be a key objective for the overall project success. To support this, RUC West should establish a series of cost metrics that the Regional RUC

[9] Dispelling the Myths: Toll and Fuel Tax Collection Costs in the 21st Century, Daryl S. Fleming, PhD, PE, 2012

program can be compared against to determine if the program is cost effective relative to some series of quantifiable metrics.

5.2.7 Ability to allow states to choose those options best suited for each of their state motorists

System flexibility supporting state and motorist choice is another key objective of the Regional RUC program. As each state has unique differences and their respective motorists have unique needs, it is imperative that the RUC program support flexibility in allowing states to select mileage reporting options and business partners that are best suited for their state. To help support this objective, it is recommended that a set of mutually agreeable technical, functional, and business requirements be established amongst all participating states. It is recommended that subsequently there is established a multiple award contracting mechanism where states can choose business partners who both meet the general requirements and support the unique needs of each state. This may require each participating state to explore their existing contracting laws to determine what statutory amendments would be required to establish a multi-state contracting mechanism for RUC.

The specific contracting mechanisms and the contracting authority of these contracts has yet to be determined; however, having a mutually agreeable set of requirements and contracting terms and conditions will be key to promoting choice. The requirements established for the Regional RUC program should encompass a wide array of reporting, account management, and payment options (including technology and manual, plug-in and smartphone, location and non-location based, prepayment and post-payment, etc.), all the while maintaining the core requirements of reporting mileage, assessing the respective RUC rate(s), crediting any fuel taxes, and providing clear and accurate data reporting and transfer between states.

5.2.8 Direct input and collaboration with the private sector business partners

Over the course of the state interviews, most states expressed the need for direct input and collaboration with the business partners contracted for the Regional RUC program. While the conditions of contracting remain undetermined, the ability for states to have direct input and collaboration with their contracted business partners regarding system and program status, cost negotiations, and addressing questions and concerns from their stakeholders is a key objective when establishing the overall program construct.

5.2.9 Maintain the highest practical levels of compliance

Another concern stemming from previously conducted RUC pilot demonstrations is the need to maintain a high level of motorist compliance. Previous RUC programs, except for the current OReGO program, have only used simulated RUC funds and revenues. As more states explore the collection and transference of actual monies, the concern over motorist compliance and timely remittance of assessed RUC becomes more prevalent. This includes complying with terms and conditions established between each participating state and their motorists, the motorists and the business partners, and the participating states and the business partners on items such as: timely remittance of RUC payments, addressing how to handle accounts when vehicles change owners, anti-tampering, anti-fraud, protection

of Personally Identifiable Information (PII), and the care of any business partner hardware (i.e. plug-in devices). For the Regional RUC Program to maintain high levels of compliance, a series of stringent terms and conditions encompassing motorists, business partners, and participating states must be created, vetted amongst all states, and ultimately enforced using practical staff levels and appropriate penalties.

5.2.10 Interfaces to state enforcement agencies

While interoperability between each participating state is a key objective, having the ability for the Regional RUC program to interface with multiple state agencies within a particular state is another key objective. As RUC programs in states expand, the need to incorporate other state agencies, such as Departments of Motor Vehicles (DMVs), Departments of Revenue (DORs), Departments of Public Safety (DPSs), and other agencies who will conduct enforcement of RUC payments and analyze RUC data will become more and more critical. To ensure this interoperability between state agencies, the data interfaces between business partners and each participating state will need to be in a format that is acceptable for existing state systems. Additionally, RUC West and the participating states may need to establish some sort of interstate reciprocity agreements to aid in interstate enforcement activities. It is recommended that each participating state look to their respective DMVs to identify potential reciprocity agreements that could be leveraged for enforcing RUC.

5.2.11 Performance monitoring and measuring capabilities using real-time or near real-time data

To promote public acceptance of RUC, maintain cost effectiveness, and measure overall system reliability and performance, the Regional RUC system must be capable of providing real-time or near real-time monitoring capabilities. This includes the ability for drivers to see their individual trip information, including their assessed RUC, within a reasonable timeframe of when the trips were completed. Also, included should be the real-time, or near real-time notification of any technology issues, including missed mileage or issues that directly impact the ability to accurately capture the information needed to assess RUC in a timely fashion.

5.2.12 Centralized technical and business process certification

Another key consideration from the state interviews was the need to provide a centralized technical and business certification capability. This capability would certify each contracted business partner relative to the technical and business requirements established for the Regional RUC program. They would conduct the requisite testing and certify that the business partner has met the criteria necessary to successfully collect, administer, and transfer RUC data and revenues.

The requirements and criteria necessary to certify these business partners should be created by each participating state. Thus, once the requirements are created and mutually agreeable by each participating state, a certification entity, governed by RUC West, with input from each participating state, should be established or procured to handle the certification activities. In the alternative, states could streamline certification through the use of reciprocity agreements with states that are engaged in certification activities.

An alternative would be to establish reciprocity protocols between states. This would allow contracted business partners that are certified in one jurisdiction to be able to conduct business in another jurisdiction based on the initial certification.

5.2.13 Provide value-added services for motorists

In addition to the objective for choice in mileage reporting options and business partners, the need for value-added services is also a key consideration for the Regional RUC program. As seen in other state RUC pilots, value-added services have been seen as a key mechanism for promoting driver acceptance. The value-added services seen in previous pilots have included: vehicle diagnostic indications, vehicle battery levels, driving scores, and the ability to geofence particular locations for younger drivers. Other services being considered include: integration with vehicle emissions testing, integration with pay- as-you-drive insurance, roadside assistance, driver concierge, and e-coupon services to local restaurants and service stations. The inclusion of value-added services has been critical in encouraging drivers to participate in previous RUC programs and should be a key consideration for the RUC West Regional program.

5.3 Driver Needs

The success of a RUC program is highly dependent upon the acceptance of the program by the end user. As RUC remains a new concept to most drivers and it is a significant change from fuel tax, acceptance is far from guaranteed. To enhance acceptance, there are five major things that a RUC system must provide. From the user's perspective, the RUC system must be:

- Understandable
- Reliable
- Accurate
- Easy to use
- Include a choice of data collection and payment mechanisms
- Transparent

5.3.1 Understandable

While the pay-per-mile aspect of a RUC system is likely to be intuitively understood by the public, how the system actually operates and how mileage is reported may not be. Further, there may not be a clear understanding of the fee and how it is calculated, or how drivers enroll and maintain their RUC account.

Prior to discussing how a RUC program operates, drivers need to first understand how transportation is currently funded and then the disparity between revenues collected and the costs to maintain and expand the transportation network. Once that disparity is explained, the driver can then better understand the viability of RUC.

To assist in driver acceptance of a RUC fee, therefore, it is necessary to be able to describe how the mileage is captured under various types of RUC systems, how the fee is then calculated from that information, and how and when a user is expected to pay the fee. If credit is being given for fuel taxes paid at the pump, how these credits are determined and applied must also be made clear.

Participation in pilot demonstrations, in which there is transparency and clear direction and instruction to the driver, is key in promoting easy of understanding for RUC programs. During the pilot demonstrations and at the end of the RUC pilots, having clearly defined instructions, transparent rate calculations, fees, credits, and a means for drivers to ask questions, such as a customer support helpdesk, can greatly increase understanding and overall public acceptance.

5.3.2 Reliable

For drivers to accept a RUC system, it must be reliable. This means that downtime of the system should be minimal, users should be able to access their RUC portals at any time they choose, and the treatment of any mileage driven during a system outage is clearly understood by the driver. There should also be a robust mechanism to report system outages.

5.3.3 Accurate

While reliability and accuracy are related, "accurate" refers to the system's ability to correctly determine mileage driven and apply the proper fee. If users consistently see significant, unexplainable variations in fees charged, system acceptance will suffer. For the driver, common trips, such as the home-to-work commute should have only small, if any, variations from day-to-day. Reporting options that use location-based technologies (such as GPS) should clearly delineate between in-state versus out-of-state miles. Having a system that can accurately capture and report traveled mileage and provide accurate representation of fees will help promote driver confidence, assuage any concerns, and ultimately lead to system acceptance.

5.3.4 Easy to use

One of the most attractive benefits to the current fuel tax funding model is its ease of use. Currently, for motorists to contribute to the maintenance and operations of their roads, all they need to do is put fuel in their vehicles. RUC presents a new concept that, when compared to the current fuel tax model, presents a new level of complexity. Under a RUC program, drivers need to sign up for an account, choose a mileage reporting option and business partner, install a device (if chosen), and monitor and pay for their road use. While significant efforts have been taken over the course of previous pilot projects to reduce the complexity, RUC is still not as easy to use as filling up a vehicle at a fuel station.

For a RUC program to be successful and accepted by the public it is imperative that the system be easy to use. This includes reducing the amount of time and complexity needed for sign-up, the use of plug and play technologies (where applicable), and simple and convenient ways to pay RUC. Specifically, the considerations for ease of use to the drivers include:

- Type of technology used to gather mileage data
- Program enrollment
- Review account statements
- Easily pay RUC invoices
- Change mileage reporting options
- Add, remove, or change vehicles associated with an account
- Report equipment issues

- Dispute charges
- Contact customer service

5.3.5 Includes a choice of mileage payment mechanisms

The element of choice will be a significant part of the acceptability of RUC systems. Having choices of mileage reporting options, business partners, payment methods, and the ability to easily change those options will help promote a sense of "ownership" with the RUC system as well as alleviate concerns over complexity and privacy. For example, drivers who have concerns over privacy may choose a mileage reporting option that does not require technology. Conversely, drivers that are comfortable with technology and less concerned over privacy may gravitate toward some type of technology-based solution, especially if their business partner provides a bevy of value-added services.

Specifically, the choices captured during the development of this CCO include:

- Mileage reporting options including technology options.
- Payment types including: credit/debit card, cash, Electronic Funds Transfer (EFT), potential integration with other bills, and allow both prepayment and payment in arrears.
- Business partners who compete in an open market for drivers based on options and value-added services.
- Flexibility for drivers to change mileage reporting options, business partners, and payment options

Please note that the options included in this report are focused on volunteer type programs. Should a state implement a mandatory RUC program, then these options may need to be adjusted based on policies, state legislation, and potentially socioeconomic impacts to state motorists.

5.3.6 Transparent

Having RUC systems that are transparent to users will be another key consideration. Systems that are transparent will clearly show reported mileage, delineation of those miles, assessed RUC in and/or between states where the user has traveled, accurate fuel tax credits, and any other key information that will provide the user confidence in how their charges are calculated and collected. Any administrative fees levied on the user should be clearly identified and have been previously accepted at RUC signup. When a user transfers vehicle(s), changes their registration, or moves to another state, any unpaid RUC should be traceable to the user with payment required at some milestone.

5.4 Overarching System Goals

Based on the previous discussions with RUC West participating states, and the results of the state interviews, the overarching system goals for the RUC West Regional Program have been identified. These overarching system goals include:

- Accurate Collection of Data
- Use of an Open Architecture
- Standards-based using readily available technologies

- Accurate determination of miles driven
- Accurate delineation of miles driven between states (for mileage reporting options that use location-based technologies)
- Calculation of RUC based on miles driven
- Credit of fuel taxes
- Timely remittance of invoices
- Timely collection of unpaid RUC
- Expedient reconciliation of accounts and the ability to support account audits
- Detect, report and take appropriate action relating to fraudulent activity
- Educate users to encourage appropriate use of the system
- Interoperable between both participating states and agencies within each state
- Equitable
- Able to Protect Driver Privacy
- Market Driven to Promote Driver Choice
- Cost Effective to Administer
- Flexible to support evolving trends in technology and vehicle ownership

5.4.1 Accurate Collection of Data

The accurate collection of data in a RUC system is basic in nature, although potentially complex to collect in actual practice. This includes the collection of the data necessary to accurately determine the RUC due and any credits due for fuel taxes. Furthermore, for a truly regional program, encompassing states with varying per-mile RUC rates and state fuel taxes, the ability to accurately delineate between state borders is also a key consideration.

In general, RUC systems must be able to capture data related to:

- The identity of the vehicle being used, such as the Vehicle Identification Number (VIN) [10]
- The number of miles traveled
- The per mile rate(s) to be applied
- The amount of fuel used / purchased (for the purpose of providing a credit for the amount of fuel taxes paid).
- The per-gallon fuel tax rate(s) to credit (where applicable).
- The accurate delineation between miles traveled between states (Note, this is ONLY required for Regional RUC programs that do not have a single per-mile rate and fuel tax rate).

As RUC programs evolve, additional data needs may be levied to include:

- The location of the miles driven.
- Time of day the miles were driven

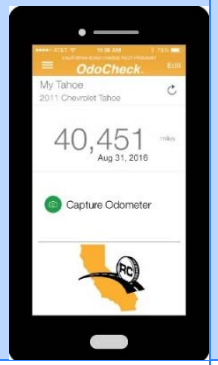
[10] The VIN is a unique serial number used by the automotive industry to identify individual motor vehicles.

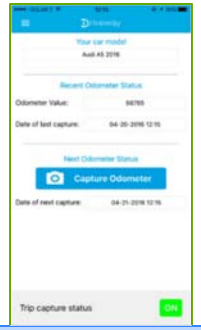
- Specific driving incidents, such as lengthy idle times, hard braking incidents, and other congestion related measures.
- Ways to incorporate multiple, variable RUC rates and the considerations on how those rates should be calculated and assessed between multiple states

There are several ways to collect this data, commonly referred to as Mileage Reporting Options (MROs). Many of these MROs have been evaluated as part of previously conducted state RUC pilot projects. Table 3 below provides a comparison of the mileage reporting options used in previous pilot demonstrations, and the types of data that can be collected.

Table 3: Comparison of available Mileage Reporting Options and the Types of Data Available for Collection

	Approach	Technology	Fuel Usage (for providing credits)	Privacy Concerns	Previous / (Planned) Pilots	Other Considerations and Issues
Manual	**Flat Rate ("Time Permit")** Participants purchase unlimited road use for a specific time period. Time Permit = Specified number of annual miles * per-mile user fee	None – paper driven approach 	Unknown; and possibly not provided. No actual mileage data collected so individualized fuel usage cannot be estimated.	None No additional information is collected from driver	Oregon - 2013 California –2017	Difficult to determine and justify the "time permit" costs given the individual mileage is unknown. However, offering this "paper only" option with no mileage reporting may be necessary to alleviate privacy concerns for some drivers. Oregon used a value of 35,000 miles per year to discourage the selection of this option (except for high-mileage vehicles). CA used 25,100 miles per year. Poses challenges with equitability and are not a true usage-based funding mechanism.
Manual	**Odometer Reading** Usage fee is based on actual mileage collected from odometer readings. Payments can be made before mileage is incurred through a "block" of mileage aka "Mileage Permit" (e.g., 1,000 or 5,000 miles) or through recurring payments (more common).	Mileage can be checked as part of annual inspections IF odometer reading is required for all vehicles **and** if there is an annual inspection required. A smartphone app also exists for taking a picture of the odometer (see next approach). 	Estimated Usage estimated based on odometer reading and EPA values of MPG for specific make, model, and year of vehicle.	Minimal Given no location information is collected (only mileage and vehicle type data are collected), privacy concerns are lower.	California - 2017 Colorado - 2017 (Hawaii)	The burden of the odometer based approach will likely fall to the state to manage; although an account manager may administer this approach for the pilot. Even with the odometer picture app, a manual read is still required at the start of the program and when the vehicle leaves the program for verification. This would also include the purchase of a new vehicle or a change in ownership. Note: Hawaii's STSFA grant project will test the feasibility of using its annual inspection process to gather

	Approach	Technology	Fuel Usage (for providing credits)	Privacy Concerns	Previous / (Planned) Pilots	Other Considerations and Issues
						mileage data. The "pilot" will include 1.1 million vehicles.
Semi-Automated	**Smartphone (No Location)** Usage fee based on estimated mileage using a smartphone app that measures vehicle movement. The mileage is regularly verified by taking a picture of the odometer – also included in the app. The app also transmits the information to an account manager.	Smartphone app identifies trip dates and times, and estimates mileage, based on vehicle movement and acceleration. The app also includes taking pictures of the odometer (for verification), transmitting the data to an account manager. 	Estimated. Usage estimated based on odometer reading and EPA values of MPG for specific make, model, and year of vehicle.	Minimal Given no location information is collected (only mileage, vehicle type and basic trip data are collected), privacy concerns are lower.	California - 2017	May still require a "true – up" of actual odometer reading (e.g., at beginning, some recurring time period) because there are no guarantees that the driver has their smartphone when driving, or that the app is turned on. Compliance may be a major concern if there is no annual inspection or registration that is required of all vehicles, which involves an odometer reading. Several participants in previous pilots failed to take pictures of their odometers.
Semi-Automated	**Smartphone (With Location)** Usage fee based on actual miles collected using smartphone app	Location info on the smartphone app expands data collected and accuracy.	Estimated Usage estimated based on odometer reading	High Location and route data collected and	California - 2017	Similar challenges with the non-location Smartphone approach: no guarantees the phone will be in the vehicle or turned on.

	Approach	Technology	Fuel Usage (for providing credits)	Privacy Concerns	Previous / (Planned) Pilots	Other Considerations and Issues
	that measures vehicle movement coupled with smartphone's GPS technology. Requires recurring photos of odometer (using the app) for verification.	Information – including odometer pictures – transmitted to account manager via the app. 	and EPA values of MPG for specific make, model, and year of vehicle.	shared with account manager.		May still require a "true – up" of actual odometer reading (e.g., at beginning, some recurring time period) Compliance may be a major issue. Some CA participants complained about battery drain with the location-enabled app and the GPS constantly on.
Automated	**Smartphone with Beacon / Dongle** Connects to smartphone app (e.g., Bluetooth) to detect vehicle usage.	Provides more reliable and accurate vehicle identification and trip detection. Associates vehicle trip with driver, and excludes trips made in other vehicles.  A Bluetooth OBD-II device provides VIN and vehicle diagnostic information. May include an accelerometer for event detection.	Usage estimated based on measured mileage and EPA values of MPG for specific make, model, and year of vehicle.	High Location and route data collected (via GPS) and shared with account manager.	Oregon – 2012 (Note – This used a device that plugged into the OBD-II port and paired with the smartphone via Bluetooth – different from the approach currently offered by vendors)	Appears to be an improvement over the "smartphone only" approach. Has not been deployed in a MBUF pilot system to date but will be evaluated by Oregon as part of its 2016 FAST Act grant work. May still require an occasional "true – up" of actual odometer reading. Some location-based services provided (e.g., trip logs) as well as driver behavioral analysis.
Automated	**Plug-in Device (No location)** Usage fee based on actual miles collected using a Mileage Reporting Device (MRD)	Mileage Reporting Device (MRD) plugs into the vehicle's onboard diagnostic system (OBD-II) data port, and automatically measures the number 	Calculated. Automatically calculated from vehicle data (actual fuel use not collected by OBD-II).	Minimal Given no location information is collected (only mileage, vehicle type and basic trip data are collected), privacy concerns are lower.	Oregon – 2012 Oregon - 2015 California - 2017 Colorado – 2017 (Washington) (Hawaii)	Latest versions can automatically determine (within 24-hours) if the device has been removed or otherwise disabled. Value-added amenities are available with the non-location devices including: Trip logs (e.g., duration, fuel cost, carbon footprint)

	Approach	Technology	Fuel Usage (for providing credits)	Privacy Concerns	Previous / (Planned) Pilots	Other Considerations and Issues
		of miles driven and amount of fuel used (as well as VIN).	For some hybrids, these calculations may not be possible, so fuel usage will be estimated based on mileage and EPA value for MPG.			Vehicle health (e.g., battery voltage) Driver behavior analysis (e.g., heavy braking) User based insurance Emissions testing (in development) Older vehicles (2000 or older) may not be compatible with MRO. Latest versions can detect if the device has been taken out or disabled.
Automated	**Plug-in Device (with location)** Usage fee based on actual miles collected using a Mileage Reporting Device (MRD)	In addition to features listed above, gathers vehicle location data to differentiate mileage by location (typically using a GPS chip). 	Calculated Automatically calculated from vehicle data (actual fuel use not collected by OBD-II). For some hybrids, these calculations may not be possible, so fuel usage will be estimated based on mileage and EPA value for MPG.	High Location and route data collected and shared with account manager. Note: Only total miles (differentiated by state) is sent to the state. No routing information is provided.	Oregon – 2012 Oregon - 2015 California - 2017 Colorado – 2017 (Washington) (Hawaii)	Additional value-added amenities are offered with a location-based device, including: Trip routing information as part of the trip logs Decoding engine diagnostic codes Reporting vehicle battery health Find my car (parking lots) Safe Zone (geofencing) Older vehicles (2000 or older) may not be compatible with MRD. Latest versions can automatically determine (within 24-hours) if the device has been taken out or otherwise disabled. Lesson learned: the MRD with GPS location has been one of the most widely chosen options in pilots.

	Approach	Technology	Fuel Usage (for providing credits)	Privacy Concerns	Previous / (Planned) Pilots	Other Considerations and Issues
Automated	**In-vehicle telematics** Account manager interfaces directly with the in-vehicle computer and communications technology	Technology already built into the cars. No external plug-in devices or smartphones are required. 	Automatically applied.	Maximum concern. Location and route info is sent to account manager. Only total miles (differentiated by state) is sent to the state.	California - 2017	Telematics data is currently considered proprietary and not easily transferred from the automobile manufacturers to any other entity, except the user. Participants may have to pay extra for it to be enabled on their vehicles.

5.4.2 Open Architecture

Open architecture allows access to underlying code and other system elements, both hardware and software, needed to allow multiple vendors or agencies to integrate with an existing system including the potential to upgrade the system or add value-added applications. This is like the multitude of "apps" developed for smart phones. Interestingly, some toll collection agencies in the United States already use a smart phone app for various functions. The goal of open architecture is to allow significant system flexibility, which open architecture enables.

From the standpoint of the states, open architecture allows multiple vendors to provide the services necessary for a successful RUC program. In turn, this allows states to choose what type of RUC system it would like to offer to its citizens, and what type of value-added services it will allow providers to offer. Open architecture also allows the state to develop its own system.

The true definition of an "open architecture" is somewhat subjective as the methods and types of collection, analysis, and ability to resell data used in the Regional RUC program may have direct implications on the willingness of the private sector to participate in the program. As RUC West negotiates with the private sector vendors, special consideration should be given to data collection and the ability for the private sector to reuse, analyze, and possible resell data captured during RUC operations.

5.4.3 Standards-based Using Readily Available Technologies

If an open architecture system is to be used, standards for operations must be developed to ensure that the products of various vendors are compatible with the overall system. While there may be differences in driver interfaces, the format of the data being delivered to the mileage processing system must be capable of interacting with all elements of the RUC system that it impacts. Additionally, existing standards related to information security (ISO 27001), financial data security (PCI 3.0), and auditability should also be used as reference requirements.

5.4.4 Accurate determination of miles driven

The accurate determination of miles is one of the most important goals for the Regional RUC system. The accurate capture of miles, coupled with the accurate calculation of RUC and any associated fuel tax credits, will provide the participating states the ability to accurately evaluate the potential revenues associated with transitioning to a RUC. For most mileage reporting options, the accurate determination of miles driven is captured either through periodic updates of distances traveled, provided by plug-in devices, or through periodic updates to odometer readings. The accuracy of miles driven could decrease significantly for the time-based reporting options. That said, should RUC West pursue time-based options for the Regional RUC program, it should carefully evaluate the overall vehicle miles traveled (VMT) for a driver over the prescribed time period. Too many miles assumed could lead to potential overcharges and potential reimbursement scenarios, should that be allowed. Too few miles assumed could lead to lost revenues relative to other MROs.

5.4.5 Accurate delineation of miles driven between states

The accurate delineation of miles driven between states is another key consideration and system goal for the Regional RUC system. The accurate delineation between state borders will be key in determining

overall RUC revenues and fuel tax credits for each participating state. This becomes especially important for drivers who live in one state but commute regularly to a neighboring state (such as with Vancouver, WA residents who commute to Portland, OR). Furthering the need for this accurate delineation is the current disparity between fuel tax rates across states. Until states close the disparity between fuel taxes, drivers who purchase fuel in one state with a lower tax rate and then travel the majority of their miles in a state with the higher tax rate, will not be supporting their use of the roads. Currently, the only way to accurately delineate miles driven across state borders is through using MROs that have location-enabled technologies (GPS-enabled plug in, In-vehicle telematics, Smartphone apps). Business partners create a geofence in their transaction processing systems that determines what miles are driven in each geofenced state. Miles driven in one state are "flagged" for being driven in one state and miles in another state are given a different flag. This allows the business partner to assess per-mile rates for each state the miles are traveled. Being able to accurately geofence these areas, as well as ensuring the location-based MROs accurately capture miles driven in each state, will allow for a better understanding of how travel occurs across state borders. This also potentially improves the equitable share of transportation revenues for each state.

An important consideration is whether data collection and analyses – and the associated costs – are necessary to estimate out-of-state travel, beyond what location-based approaches can provide. Per 2011 census data, and shown below in Table 4, the amount of work-related cross-state travel is relatively small for the western states. The possible exceptions might be travel between the Portland, Oregon and Vancouver, Washington metro areas, and between Southern California and Las Vegas, Nevada. In these circumstances, origin-destination studies might be useful to allocate mileage between states for vehicles that don't have location technology.

Table 4: RUC West States Work-Related Cross State Travel

State	Workers Living in State; Working in Another State	Workers Working in State; Living in Another State
Idaho	6.1 %	2.7 %
Wyoming	2.8 %	5.2 %
Washington	3.6 %	2.0 %
Oregon	2.4 %	5.2 %
New Mexico	3.0 %	2.7 %
Nevada	2.2 %	2.7 %
Colorado	1.5 %	1.5 %
California	0.5 %	0.5 %

Another area where measuring interstate mileage and charging RUC rates based on which state travel occurred in is long-haul trucking. However, there is already a system in place for managing interstate fuel taxes – namely the International Fuel Tax Agreement (IFTA). As part of IFTA, long-haul commercial vehicles – typically heavy trucks – report miles by state on a regular basis (four times each year). IFTA is an agreement among states in the U.S. and provinces in Canada to report fuel taxes by interstate motor carriers. Commercial trucking companies can register if they have an established place of business in the

state from which motor carrier operations are performed, if they accrue mileage in that state, and if they operate in at least one other IFTA jurisdiction. IFTA offers several advantages to interstate motor carriers, including a single fuel tax license authorizing their vehicles to travel in all member jurisdictions, plus a single tax return filed each quarter with the jurisdiction where they are licensed, containing mileage and fuel use information for all member jurisdictions. IFTA then uses these data to ensure that each state or province receives their correct amount of fuel tax receipts. IFTA could likely be readily modified to handle multi-state RUC, however it should be noted that the trucking industry is closely regulated, while interstate passenger vehicle travel is not.

Other considerations for data interoperability lie with the tolling industry. While still in the development phases, entities such as IBTTA and EZ-Pass (through the I-95 Corridor Coalition), have developed standards and policies for regional interoperability of data and funds. Moving forward, RUC West should engage these entities, as well as IFTA, to gather best practices and considerations for RUC interoperability.

Finally, considerations may need to be given for users who live on tribal lands. Tribal nations are considered "sovereign" and are often not subjected to state taxes, including fuel taxes for fuel purchased on tribal lands. Should the regional program evolve to further delineate between borders within a particular state, provisions for tribal lands may need to also be considered.

5.4.6 Calculation of RUC based on miles driven

The calculation of RUC based on miles driven is the fundamental goal of any RUC system. Under this goal, the business partner's systems capture the miles driven and assess a per-mile RUC rate relative to either a) the vehicle's state of registration, or b) the actual miles driven in each state. Note the latter calculation can only be conducted with those MROs that use location-based technologies. For the Regional RUC system, a rate table should be established, with a series of per-mile rates for each participating state that may vary based on a series of business rules or policy decisions (time of day, location, etc.). For the initial demonstration, it is recommended that a single per-mile rate for each state be utilized; however, the overarching RUC system should be able to accommodate variable rates once those policy decisions and business rules are established. Oregon, through their 2017 STSFA grant, will explore the feasibility and policy considerations of a carriable rate approach for the OReGO system. The results of this study should be shared with RUC West when completed in 2020.

5.4.7 Credit of fuel taxes

While states continue exploring RUC, it is expected that the state fuel taxes will remain intact. Thus, for states that do not wish to "double tax" their drivers, crediting fuel taxes paid by the motorist becomes a system goal. Under previous RUC programs, a gross RUC total was determined by multiplying the miles driven times the per-mile rate. Any fuel taxes paid were credited back on the driver's RUC invoice based on the gallons consumed, either captured through technology or through using the Environmental Protection Agency (EPA) fuel economy estimate. Note that the fuel tax credits are based on the gallons of fuel consumed during a time period that corresponds to the time period during which RUC is being calculated, not the fuel purchased. The fuel tax credit is then applied to the gross RUC total to provide a net RUC total to be paid by the motorist.

For the Regional RUC system, this goal is further complicated by introducing multiple states, and possibly multiple cities within those states to the program, each with different state fuel tax rates, often with varying tax rates for different fuel types. As mentioned before, the delineation of miles driven in each participating state will have a direct impact on the fuel taxes credited, unless a fuel tax credit rate is solely based on the motorist's state of registration. Either way, the amount of fuel tax credits applied to drivers should then be evaluated by each participating state to determine if any tax credits need to be reallocated to neighboring states.

Note that the proposed RUC West system currently will calculate and credit state fuel taxes. However, the system is also designed to support other types of credits, including the calculation, analysis, and potential credit of the 18.4 cent federal gasoline tax as part of future evolutions.

5.4.8 Timely remittance of invoices

The timely remittance of RUC invoices is a system goal that is directly tied to the timely recognition of RUC revenues from the participating states. Business partners will be ultimately responsible for the transmittal of invoices; however, a time period for their release must be determined by RUC West and each participating state. It is recommended that no less than monthly invoices be released, and potentially quarterly invoices should also be considered. One alternative would be for motorists to choose how often they receive their invoices, with potential discounts provided for drivers who pay their invoices more frequently. Note that this only applies to those MROs that provide periodic updates to distance traveled, such as plug-in devices, smartphone apps, and odometer reading options. Mileage-block and time-block options will also need prescribed time periods for updates; however, as their charges will be prepaid, there is no need for an invoice.

5.4.9 Timely collection of unpaid RUC

The timely collection of unpaid RUC is also a key consideration, again directly tied to potential lost revenues. One elegance of the existing fuel tax funding model is that a driver's contribution to transportation funding is directly tied to a commodity, if fuel (and its associated tax) is not purchased then vehicles cannot travel on roadways. RUC presents a new challenge in that drivers will have to consciously pay for their road use separately from fuel purchase. While some states are exploring ways to directly tie RUC to fuel purchases, there will still be a need for enforcement and collection of unpaid RUC. Many states are expecting to levy unpaid RUC to their Departments of Motor Vehicles, who would then levy any unpaid RUC, and presumably any collection fees, to a driver's registration. If charges are still not paid, then other enforcement mechanisms such as liens could be placed on vehicles. Ultimately, some law enforcement may be used to enforce unpaid RUC. Collaboration with state agencies (such as Departments of Revenue) and professional organizations, such as AAMVA, should be continued to explore ways to efficiently and effectively collect any unpaid RUC.

As part of policy discussions, RUC West and the participating states will need to determine appropriate timeframes, penalties, and escalation procedures for enforcing unpaid RUC. One way to potentially reduce the amount of unpaid RUC is to require business partners to pay RUC revenues based on miles traveled, not on funds collected. This would place the onus of collection primarily on the business partners; who could then enlist support from the state when their collection efforts are not successful.

Another possibility to at least alleviate some enforcement issues, would be to require prepayment of RUC through a prepaid "wallet" that automatically deducts RUC periodically and replenishes the wallet when a certain threshold is reached. Regardless, the issue of enforcement and collection and the challenges it presents will require careful consideration from RUC West and each participating state.

Another key consideration facing participating states relates to how and when funds are collected and deposited to the designated state accounts by the business partners and the regional clearinghouse. This is directly related to the relationship between the business partners, the RUC payers, the regional clearinghouse, and each participating state. If the business partner or the clearinghouse serves as an agent of the state, such as the Oregon Account Manager for the OReGO program, then they are required to collect and immediately deposit RUC funds, either through a direct deposit or into a trust fund established by the state. If the business partner acts as an agent of the RUC Payer, such as the OReGO Commercial Account Managers, then there is no requirement on when to deposit funds. This may force the participating states to require prepayment of RUC revenues based on miles traveled and then force the business partners to engage in their own collections (as they would be collecting monies owed them by RUC payers, but previously paid to the state). As the Regional RUC program continues through the development phases, the relationship between the business partners, the RUC payers, and the participating states, relative to when funds should be deposited is a key consideration.

5.4.10 Expedient reconciliation of accounts and the ability to support account audits

Unfailingly, the need to reconcile driver and/or business partner accounts will happen. This reconciliation can occur through many different triggers, including: protests of reported miles, questions about assessed fees, potential fraud scenarios, deposit errors or omissions from business partners, or the unauthorized dissemination of data. When the need for an account investigation and audit occurs, the business partner's system must be able to support an independent audit, either through the participating state(s) or even a third party. The business partner's financial records and systems must be easy to interpret, show full traceability through the miles driven, any RUC assessed, any fuel tax credits given, the transfer of RUC revenues, and the reports provided to each participating state. Furthermore, the business partner's processes and controls should also be subject to audit to ensure compliance with Information Security standards. The auditability and reconciliation requirements for each business partner should apply to both the business partner and any subcontracted collection or accounting services they enlist.

Also, the timely reconciliation of accounts is directly tied to revenue recognition. Accounts that are under reconciliation investigation will presumably be placed on an administrative hold until the investigation is complete, which could lead to potentially recognizing RUC revenues at a later time than anticipated. While this may be acceptable for a small number of accounts, if a large number of accounts becomes subject to investigation the participating state may experience considerable lags in the recognition of revenues.

As part of the overall business rules development, careful consideration should be given to the auditability of accounts and the timeframe for account reconciliation. Furthermore, potential penalties

for not meeting these requirements should also be considered and established as part of the contracting terms.

5.4.11 Detect, report and take appropriate action relating to fraudulent activity

Fraud detection and action is another key consideration for the Regional RUC system. Increased fraud can lead to potentially lost revenues and deter driver confidence in the RUC concept. Fraud encompasses both driver fraud, where drivers attempt to misreport their driven miles and assessed RUC, as well as business partner fraud, where business partners fraudulently report RUC revenue collections and associated revenue transfers to participating states.

Combating driver fraud can be accomplished through technology and reporting. For example, plug-in devices could provide anti-tamper casing and/or provide notification to the business partner when tampering with a device is detected. Independent audits of odometer readings could also be used to deter fraudulent odometer reporting for those types of MROs. Combating business partner fraud is more complex, as each participating state will need to monitor their data reports from each business partner, identify any potential triggers to reduced RUC revenues, and then conduct audits on the questionable business partner systems and accounts.

As RUC West and the participating states develop the technical and business requirements, the contracting terms, and any state policies related to participation in a RUC program, careful consideration should be given to how fraudulent activity will be addressed and any penalties associated with these activities. Some potential reference sources would be to evaluate the penalties associated with odometer fraud or tolling/High Occupancy Vehicle fraud.

5.4.12 Educate users to encourage appropriate use of the system

To help reduce fraudulent activity and encourage the timely payment of RUC, system users will need to be educated on proper system use and the penalties associated with misuse. This should be a multi-tiered campaign including program websites, business partner websites, participant agreements, and even periodic communications to system users. This effort must include both the business partners, as well as the participating states, to ensure the message is clearly conveyed to the system users both before they sign up for the RUC program and throughout their participation in the program.

5.4.13 Interoperable between both participating states and agencies within each state

As previously discussed, interoperability will be a key goal of the Regional RUC system. This includes interoperability both between each participating state and between agencies within each state. The data, reports, and platforms for transferring revenues must be on a common platform, with a common set of requirements and criteria for the business partners to operate within. Data will need to be formatted in a common, preferably standards-based format. Additionally, proprietary interfaces should not be allowed, as this could pose interpretation issues and potential cost impacts to other business partners. Also, a common set of business rules and conditions, fully vetted and mutually agreed upon by all participating states, needs to be established to ensure a common operating platform for the business partners, thus reducing the risk of funds misappropriations or fraudulent activity.

The participating states who have conducted RUC demonstrations have already begun establishing common data and platform requirements, through the Interface Control Document (ICD), the System Requirement Specifications (SRS), the Business Rules Document (BRD), and the Service Level Agreement (SLA). These previously developed documents should be used as the platform for the Regional RUC system; modified to support multi-state interoperability. Existing data and financial clearinghouse models already exist, such as those used by the International Fuel Tax Agreement (IFTA), the International Registration Plan (IRP). Evolving systems such as blockchain and their capabilities, processes, and systems should be evaluated as options or considerations for the Regional RUC system.

The interoperability of system data also impacts the agencies within a participating state. As states integrate other agencies into RUC programs, such as DMVs, highway patrols, and other agencies, the need for a common data and revenue platform will also need to take their legacy systems into consideration. This further supports the recommendation to use non-proprietary, standards-based platforms for information.

5.4.14 Equitable

The basic element of equity in a RUC system is accurate development of the fees due from any given driver. This includes a reasonable relationship between fees charged and mileage driven regardless of which assessment mechanism has been chosen. Equity, however, extends beyond these basics. Tax equity generally is considered to have two components: horizontal equity, which means those who are similarly situated pay the same amount, and vertical equity, which means that those with more income pay more because of their ability to pay more. Generally, RUC has focused on horizontal equity.

In order to address vertical equity, consideration for the economically disadvantaged and transportation challenged requires that several conditions be met. Perhaps most important, there should not be significant barriers to entry for any of the RUC systems contemplated. This includes barriers due to high cost of equipment needed for a particular RUC methodology and/or fees that cannot reasonably be paid by the economically disadvantaged. For these reasons, programs to supplement payment of RUC by the economically disadvantaged should be considered. If, for instance, a driver is eligible for some type of social support, that driver could be automatically enrolled in a program that supports all, or a portion of, that driver's RUC fees. Additionally, some program features, mileage reporting options, and payment methods or payment terms may not be available to economically disadvantaged participants.

Technology that may be available to the average RUC user may not be available to the economically disadvantaged. In the worst case, an older vehicle may not be equipped with an OBD II port so that several of the RUC options would not be available. A reasonable mechanism to alleviate this condition might be to provide alternative solutions, such as smartphones or other smart device to those drivers so that a VMT option may be made available to them. Another possibility may be to offer income tax credits for RUC, provide a reduced RUC rate based on income levels, or even offer a set of credited miles from the states for those who could not afford to pay RUC.

If RUC fees are going to replace fuel taxes, particularly those at the federal level, a reasonable distribution between roadway and transit for those fees should be developed as it is now with federal fuel taxes. Without this, transition to a RUC system could disproportionately impact the transportation

disadvantaged and could be addressed through various means. Additionally, federal revenues provided to states that are disproportionate to their federal fuel taxes collected should also be considered should RUC be used as a replacement to the federal fuel taxes.

5.4.15 Able to Protect Driver Privacy

Privacy protection has been a significant issue for many years, particularly since the development of transponder type systems. The potential use of GPS systems has increased concerns that a driver's trip characteristics could be tracked by a governmental or a private entity. Further, hacking attacks that have struck multiple large transaction databases in the past few years are a significant and realistic concern.

Additionally, lack of understanding about the capabilities of various system types has exacerbated concerns related to privacy protection. While it is incorrect that GPS alone can track a vehicle, it is nonetheless a concern for many members of the traveling public. The fact that a GPS system coupled with cellular communications can be used to report any particular trip, increases this confusion.

To facilitate privacy protection, the following steps should be considered:

- Development and required high standards for online data protection
- Requirement of a two-step process to link any given trip with a driver. This would require information that is transmitted from the vehicle, and potentially between agencies, to be tracked using a unique identifier that can then be reconciled with a particular account based on that unique identifier. The account information and the unique identifier would never be transmitted together in the same message.
- Implementation of at least one RUC process that does not require trip specific information. This could either be from odometer readings or an annual fee payment.
- For VMT systems that are trip specific, a "thick client" system can be developed so that the actual calculation of the fee associated with any given trip is performed in the driver's vehicle. At that point, only the fee assessed is transmitted to the processing organization. Information is retained on the system in the driver's vehicle for a specific period of time for auditing purposes as required.

5.4.16 Market-Driven to Promote Driver Choice

For a RUC program to be successful, the ability to allow users choice on multiple issues is likely to be a key objective. As discussed previously, that can include different RUC programs and various mechanisms to collect the necessary data. In addition, use of the private sector market can bring about value-added services for drivers . Value-added services, provided by business partners, will be key in differentiating themselves from their competitors, thus allowing them to compete for more drivers in an open RUC marketplace.

5.4.17 Cost Effective to Administer

Perhaps the most appealing aspect of the current fuel tax system is its very low cost to administer and relative ease of enforcement. The cost to administer a RUC system climbs with the complexity of the specific mileage reporting means chosen. For example, a flat annual fee collected along with vehicle registration is likely to be, if anything, less expensive than fuel tax administration as it occurs in

conjunction with a governmental activity that must already take place. An annual odometer reading is also likely to be relatively cost effective, particularly in those states that require an annual vehicle inspection.

As the complexity of the system increases, so that some type of onboard device is required that is coupled with communication to a back-office system, the cost to administer the RUC program will climb. It is possible to mitigate this to some extent. For instance, a VMT program that uses a thick client, whereby the actual fee calculation is performed in the vehicle will require significantly less back-office effort. In fact, it may be possible to have an entire months' worth of travel uploaded as a single transaction. If coupled with some form of self-reporting if the device detects possible tampering, the need for account auditing can be reduced which will also reduce costs.

Systems that upload each trip in real-time or near real-time will be required to collect multiple transactions for each reporting period. This will require the system to reconcile multiple transactions with the associated complexity.

By opening the RUC process to private providers, it may be possible to significantly reduce the percentage of RUC fees that must go to program administration. While this seems counterintuitive, if private providers are also adding a value-added service, it may be in their financial best interest to collect RUC at little to no profit, and perhaps even at a loss. The rationale for this would be to increase the percentage of RUC traffic that they administer to maximize the market for value-added services that they may offer.

For this reason, negotiations with private providers will be a key aspect of any RUC program and may require changes to current contracting methods in particular states. It is, however, likely that a RUC program that is successful for both the governmental agency, as well as the private provider, can be developed.

5.4.18 Flexible to Support Evolving Trends in Technologies and Vehicle Ownership

Given the advancements in vehicle data collection and the emergence of new technologies, such as Connected and Automated Vehicles (C/AV) the Regional RUC system should be flexible to support evolving trends in technology and vehicle ownership. One example of this is the consideration of assessing RUC with Mobility as a Service (MaaS) providers including car share and Transportation Network Companies (TNCs) such as Uber and Lyft. As the system is designed, it should maintain flexibility to expand both data collection and payment mechanisms.

6 FUNCTIONAL ARCHITECTURE

The various RUC pilots conducted to date – in Oregon, California, and Colorado – have utilized similar system architectures, as shown in Figure 4. The system functions are described below.

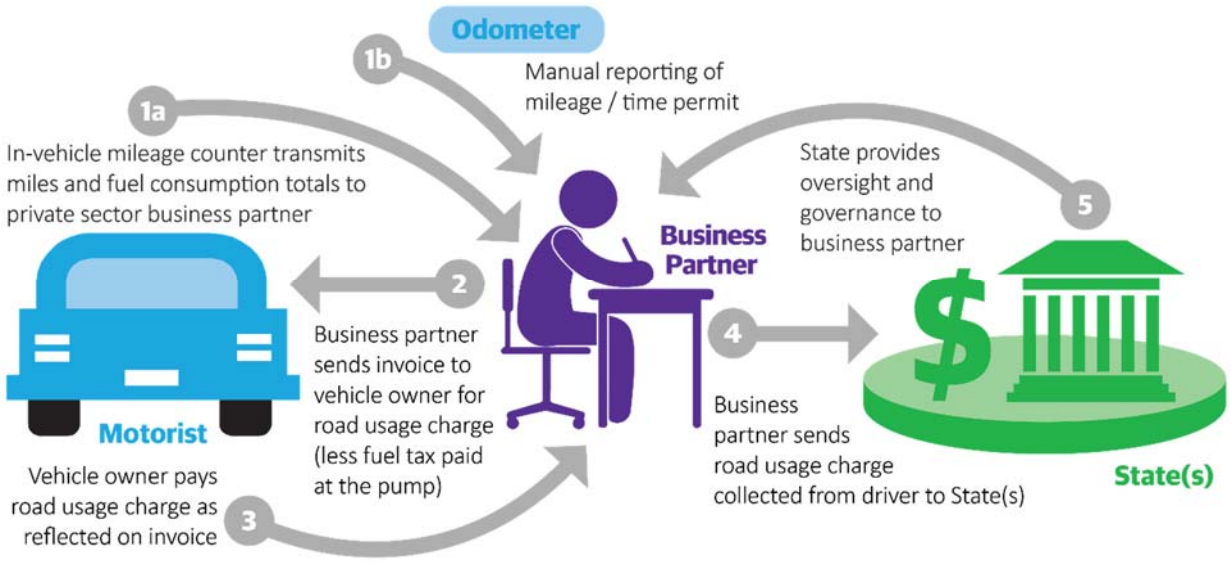


Figure 4: RUC Activities and Functions

6.1 MILEAGE & DATA COLLECTION AND PROCESSING

As previously discussed, several methods—both automated and manual—have been used for collecting and reporting mileage and other data, such as VIN and fuel usage. With automated approaches, this information is transmitted to a business partner via secure wireless communications ("1a" on Figure 4). For some automated methods, location and routing data may also be collected – as selected by the vehicle owner / lessee – to differentiate mileage driven out-of-state or on private roads, and also in support of in-vehicle and driver-oriented services. Manual methods ("1b" on Figure 4) include recurring odometer readings, pre-paying for mileage blocks, and time-based flat-rate fees involving no mileage reporting. These manual methods involve some vehicle information (e.g., VIN, odometer readings) being provided to a business partner, but very little or no personally identifiable information (PII). They can also be offered to those vehicle owners and lessees who did not want to or could not use a technology-based approach.

6.1.1 Transaction Processing

Transaction processing transforms the vehicle data into a road usage charge by applying the appropriate per mile rate – possibly differentiated by location (e.g., state) – and any applicable fuel taxes credits. To date, transaction processing has occurred as part of the account management activities; but with future approaches (e.g., pay-at-the-pump) the transaction processing and calculation of the RUC may be processed in the vehicle, and the charge and record of payment uploaded to the business partner. It is

noted that the latter approach will require that per-mile rates and fuel tax information be regularly downloaded to the vehicle.

6.1.2 Account Management

In addition to transaction activities, account management functions include the following:

- Opening accounts and providing needed in-vehicle equipment / smartphone apps (if any)
- Collecting and processing vehicle data
- Preparing and sending invoices ("2" on Figure 4)
- Collecting and processing payments ("3" on Figure 4)
- Sending collected payments to the state ("4" on Figure 4)
- Handling questions and concerns from drivers and vehicle owners / lessees (e.g., Help Desk operations)
- Maintaining / replacing / updating RUC in-vehicle components as required
- Providing additional services and driver amenities to account holders (if any)
- Monitoring compliance and implementing enforcement procedures for late / non-payers
- Closing accounts and retrieving any in-vehicle equipment
- Ensuring protection of PII and data security
- Supporting audit activities

Payments can be made by several different means. The RUC pilots to date have relied primarily on automated monthly payments linked to credit cards – either real ones (as in Oregon), or faux credit card numbers where simulated payments have been made (e.g., California and Colorado). This information is provided as part of the account set up activities. It is envisioned that a mandated system will need to accommodate payment by check (for those individuals that don't have credit cards), or cash for those that do not have credit cards or bank accounts. These situations will likely be associated with manual approaches.

6.1.3 Administration

Administration involves financial collection and accounting, with the primary goal that all RUC funds – as paid by the vehicle owners / lessees – make their way into state accounts. This function is typically a government activity – or perhaps outsourced to a private entity by the state – that receives account information and funds from the business partners ("4" in Figure 4) and provides oversight of business partners ("5" in Figure 4). These oversight activities may include auditing and reconciliation functions, ensuring that the road charge payments are ultimately provided to the state, and certifying private entity business partners and their RUC hardware and systems. Other accounting functions may include compliance and enforcement activities (e.g., ensuring all mandated vehicles are participating in the system and verifying that vehicles enrolled in the program paid correctly) and evaluating system performance.

6.1.4 Data and Information Transfer

As shown in Figure 4 and described above, the RUC architecture in state pilots conducted to date involves the transmission of data from the vehicle to the business partner (via the "Mileage Message"),

and then from the business partner to the administration accounting entity. The data transferred from a participant's vehicle to the business partner is expected to include (at a minimum):

- VIN (or unique identifier)
- Distance traveled per start and stop point (not necessarily per trip)
- Location of vehicle (if a location-enabled option is used)
- Fuel consumed (for vehicles that support Mass Air Flow (MAF) data)
- MRO device error codes

Business partners may also collect other data points such as, driving behaviors, vehicle diagnostic codes, and emissions data. While this data is not required for RUC processing, it allows business partners to provide value-added services to their participants.

The business partners then collect the data from each participant, calculate the gross and net (minus fuel tax credits) RUC, combine or aggregate the data from all participants, remove any instances of Personally Identifiable Information (PII), and then disseminate the data to the regional clearinghouse and/or each participating state.

These data and information messages were first defined as part of the Oregon RUCPP and documented in an Interface Control Document (ICD) – a systems engineering document that specifies precisely how communications within the RUC system takes place; addressing data elements, standardized messages, protocols, and interfaces. The RUC ICD has subsequently been updated as part of the OReGO effort and the California RCPP based on lessons learned from previous pilots and specific system needs and is being updated further as part of this effort to address some of the regional considerations as discussed in the next section.

6.2 Regional Considerations and Approaches

The RUC architecture has worked very well for the individual state pilots. However, for a regional pilot (or full Regional RUC system in the future) consisting of multiple states, the information required and the number of data flows can be expected to increase. The state-specific RUC pilots have not charged vehicles – those with a location-enabled method for differentiating mileage – for miles driven out-of-state. It is expected that in a regional RUC system, this scenario will change such that when a vehicle is driven in another state (say State A) – as measured by a location-based method – it will be charged for those out-of-state miles at the per-mile rate established by state A. Similarly, the fuel tax credit can be prorated based on each state's fuel tax and the number of miles driven in each state. For example:[11]

- A car registered in Oregon drives 3000 miles in Oregon, and 1000 miles in California. The estimated fuel used for these 4000 miles is 160 gallons (at an average 25 MPG).

[11] As previously discussed, this concept of interoperability was successfully simulated as part of the California RCPP.

- The per-mile rate in Oregon is 1.5 cents; in California, it is 1.8 cents (values used in the most recent pilots in each state)
- The state fuel tax is 30 cents per gallon in Oregon; the state fuel taxes in California is 41.7 cents per gallon[12]
- Where before, the gross RUC charge (without fuel tax credit) would have been 3000 * 1.5 = $45.00 (for the mileage accrued in Oregon only). The new gross RUC charge under this regional scenario is now (3000 * 1.5) + (1000* 1.8) = $63.00. The fuel tax credit is prorated based on the number of miles driven in each state and the corresponding state fuel taxes ($36 in Oregon, and $16.68 in California), resulting in a net RUC of $63.00 - $52.68 = $10.32.

Such a regional scenario makes the transaction processing, account management, and administration activities more complex – the per-mile rate and gas tax amount must be known for each involved state, and all differentiated mileage must be charged the appropriate rate and fuel taxes credit based on the number of miles accrued in each state. The business partner must then transfer the appropriate RUC amounts and the supporting documentation to each participating state – a process that could conceivably increase the costs of business partner's activities in a RUC system (and then be passed on to each state). Assuming each state selected their own set of business partners, the complexity increases almost exponentially as the number of states and business partners increase.

There are several approaches for reducing the complexity of this expanded regional RUC architecture. One is for the participating states to agree to use the same set of business partners across all states, likely through a regional procurement process with one state acting as the lead (much the way RUC West currently works, with ODOT managing all RUC West contracting). This approach is less complex in terms of the number of information flows and transfer of funds; but it does increase the responsibilities of the contracting state in terms of testing and acceptance activities for approving regional business partners. There is also the question of how auditing, reconciliation, and compliance issues would be managed for each state. Moreover, this approach might limit the flexibility of some states regarding the mileage reporting options and methods they would like to use to meet any state-specific needs and circumstances.

Another alternative is to implement a **regional clearinghouse,** which could provide several functions, including:

- Receipt of funds from each business partner, with supporting documentation, including differentiation of miles by state and the associated fuel taxes credits
- Process the received documentation to determine the amount of RUC funds entitled to each state based on number of miles driven within each state less the fuel taxes credit based on each respective state's fuel taxes value
  Transfer the funds to each state. Note: The duration which the regional clearinghouse can hold funds before depositing to the respective state designated accounts is dependent on the

[12] This reflects the increase that became effective on November 1, 2017

relationship between each participating state and the regional clearinghouse, as well as any laws within each participating state related to funds withholding.

- Support reciprocity agreements between each participating state including the collection and transfer of RUC revenues
- Perform auditing functions of the business partners and participate in state audits of the regional clearinghouse
- Support compliance and enforcement efforts across states
- Conduct participant vehicle validation including interfacing with state Departments of Motor Vehicles (DMVs)
- Certify business partners and their methods and technologies for the region

6.2.1 Regional Pilot Operational Approach

Given that only two states (Oregon and California) will be participating in the initial phase of the regional RUC West pilot, the architecture between account managers and the states shown in Figure 5 with a region-wide set of business partners and the regional clearinghouse should work quite well. Moreover, it really doesn't matter if the business partners are selected by each individual state or on a regional basis (i.e., the same set of business partners are used in each state), as the number of business partners with a proven track record of providing automated and semi-automated RUC methods and technologies – including the associated invoicing and support services – is relatively small at this point in time.[13] However, given that the purpose of the STSFA grant is to explore "alternative revenue mechanisms that utilize a user fee structure to maintain the long-term solvency of the Federal Highway Trust Fund", with an interest in potential nationwide application, including a regional clearinghouse – a feature that has not been included in any previous pilots – should be considered for the RUC West regional pilot. As part of continued design and procurement activities, RUC West should undertake a make/buy analysis to determine the cost and operational feasibility of either implementing the regional clearinghouse within a RUC West state, or procuring those services from a third-party vendor.

[13] The total number of different account managers used by OReGO, California, Colorado, and as selected for Washington – providing automated and semi-automated approaches for light duty vehicles – is three. California used an additional and separate account manager for the manual methods and another one for the heavy commercial vehicles.

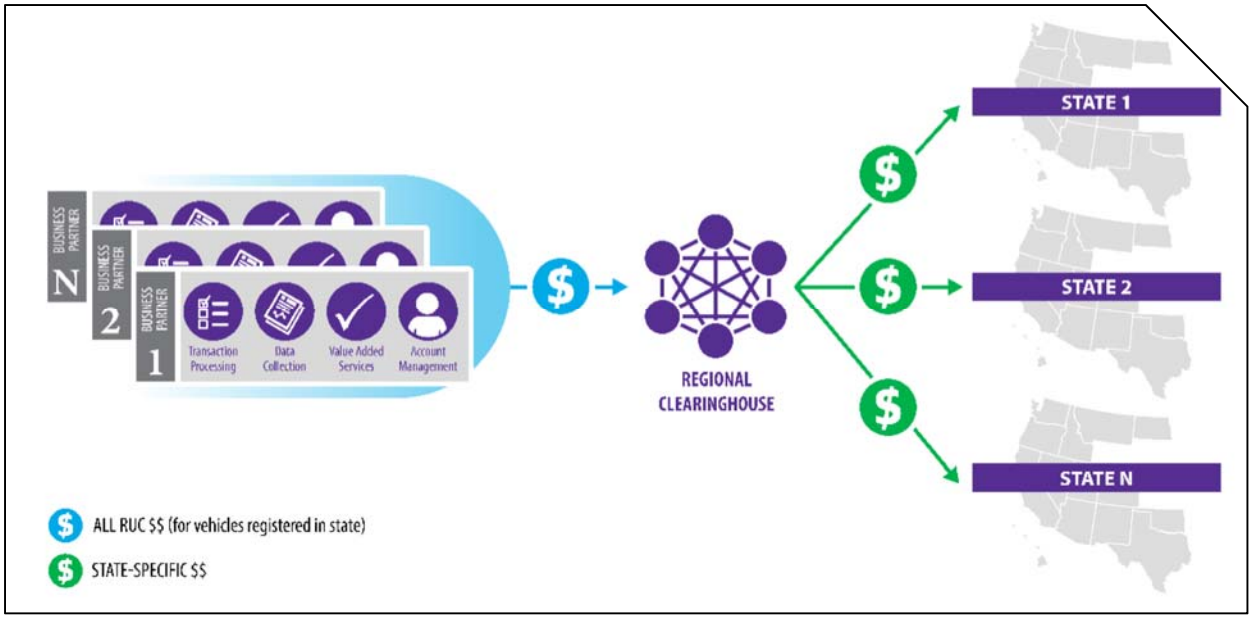


Figure 5: Regional RUC Pilot Architecture with Clearinghouse, With a Single Set of Business Partners for Region

As previously noted, the functionality of the regional clearinghouse could take on several different forms. One approach that has been mentioned during state interviews with RUC West members is for the participating states to procure their own business partners (in accordance with the system requirements and ICD), with the regional clearinghouse providing testing and certification activities of these business partners across states. This architecture is shown in Figure 6 and may be most appropriate for a regional RUC system involving several states.

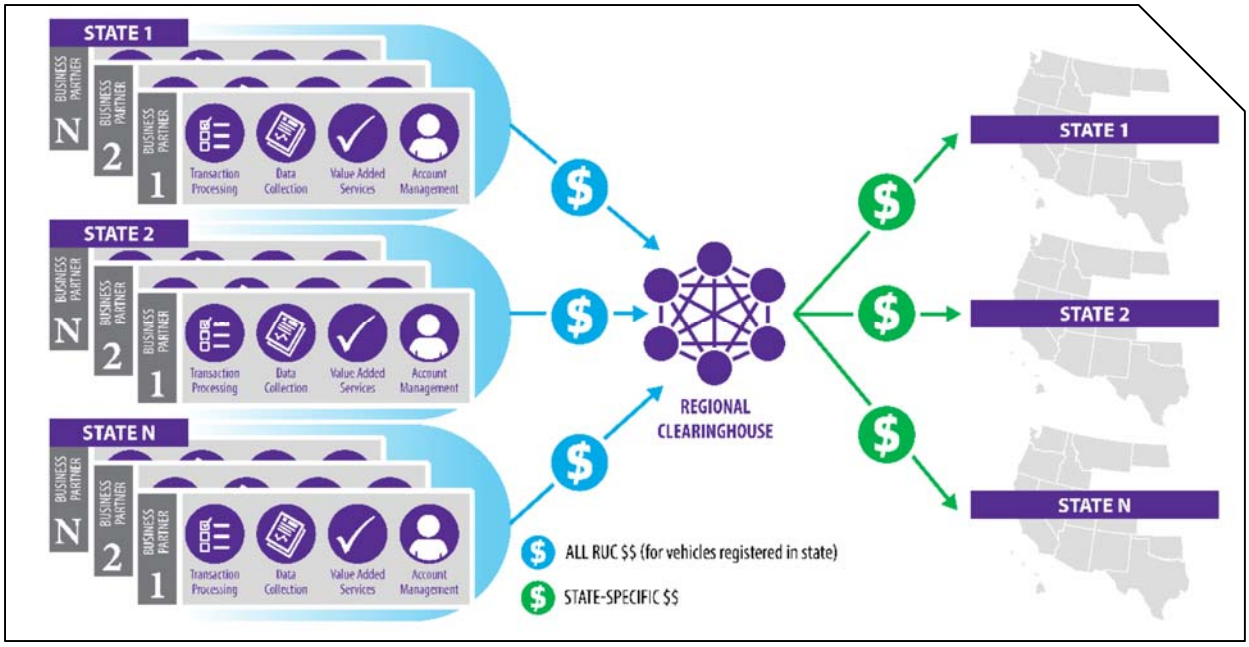


Figure 6: Regional RUC Architecture with Clearinghouse, with a Different Set of Business Partners for Each State

A more detailed diagram of this recommended architecture is provided in Figure 7. It is based on a previous diagram developed for OReGO, and shows the Regional Clearinghouse and the likely functions, along with the information flows and interactions between stakeholders. This approach also requires an update to the system requirements and ICD to address clearinghouse functions and the information flows to and from the regional clearinghouse. This regional clearinghouse report allows the business partners to provide a consistent set of reports to the regional clearinghouse. In turn, the regional clearinghouse manages the data from all the business partners involved in the regional system, providing state-specific data and information to each state, including any special reports that a state may require for managing their RUC system.

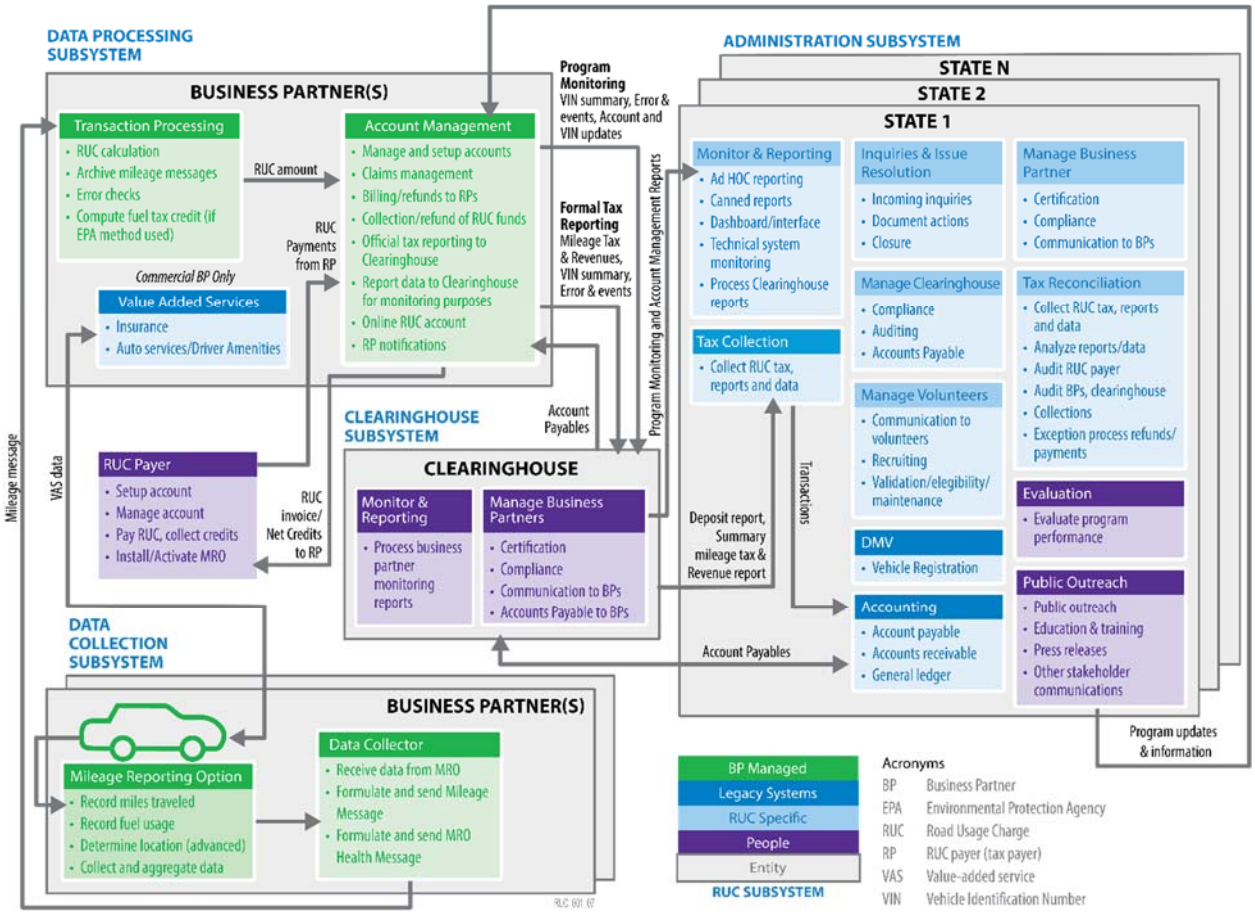


Figure 7: Recommended Systems Architecture and Functional Diagram

The elements of the RUC ICD messages with updates for the clearinghouse functions are summarized in Table 5.

Table 5: Elements of RUC ICD

Mileage Message (from vehicle to account management function) – No Change for Clearinghouse	
Mileage Reporting Option (MRO) ID, manufacturer, issuer, hardware / software release numbers Fuel use calculation method VIN Message number and type Timestamp of message Total miles for VIN on a given reporting period. Cumulative miles since MRO installed Fuel usage date	Fuel usage amount for that date Rule IDs - identifiers 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. Miles Traveled in VIN / Rule ID (state or other zone) on given date Amount of fuel consumed for VIN / Rule ID (state of other zone) on given day MRO health (with multiple codes) and time stamp of health message

Reporting Messages from Business Partners to Regional Clearinghouse [14]
Mileage and RUC Revenue Report: Transfer of Summary Mileage and RUC Revenue by state on a periodic basis. (No location data)
VIN Summary Report: A summary of all VINs and related data managed by the Business Partner on a periodic basis
Errors and Events Report: Provides exception (or health) codes on Mileage Collection/Business Partner hardware or data gathering to monitor performance of the system.
Account and VIN Update: Report of all account attribute changes and status updates regarding status in the program. This flow also returns data to indicate status of the participants. It is emphasized that location information and routing information – as used to differentiate mileage and for additional driver services – is not reported to the Regional Clearinghouse or to individual states.
Message from Regional Clearinghouse to Individual States
• Mileage and RUC Revenue Report: Transfer of mileage and RUC revenue information for all miles driven in the state – regardless of state of vehicle registration – across all participating Business Partners
• VIN Summary Report: A summary of VINs and related data for all vehicles registered in the state
• Errors and Events Report: Provides exception (or health) codes on Mileage Collection/Business Partner hardware or data gathering for all vehicles registered in the state to monitor performance of the system.
• Account and VIN Update: Report of all account attribute changes and status updates regarding status in the program for all vehicles registered in the state. This flow also returns data to indicate status of the participants.

The exact functions and responsibilities of the regional clearinghouse relative to the states' administrative and accounting functions will be clarified during the course of this project and will be reflected in the final CCO.

6.3 System Functions

6.3.1 Mileage Reporting Approaches and Supporting Technologies

Mileage and other data from registered vehicles are collected, including the VIN, the miles traveled by the vehicle, in some instances, an estimate of fuel usage, and other data necessary to calculate the appropriate RUC. As part of an open system, these data are transmitted to the business partner's transaction processing function using a standard messaging format.

6.3.1.1 Automated Approaches

Automated Approaches are technology-based data reporting that are one of two overarching types of mileage collection used in RUC systems. Automated data reporting options center on the use of a technology capable of automatically collecting driving related data, including location information when

[14] These are the same reports as currently provided by Business Partners to the State-based Administration function; but are now sent to the Regional Clearinghouse in a regional RUC system. The information addresses only those vehicles that have an account with the Business Partner

applicable, and then transmitting the resulting data, along with information needed to identify the user and the vehicle driven, to the business partner.

There are several types of technology-based data reporting options that can be used in the regional pilot. These options utilize data provided through a vehicle's OBD-II port and (for some options) an embedded GPS to collect data from the vehicle and transmit that information to the business partner using an embedded cellular or Wi-Fi radio within the unit. These devices are provided primarily for the collection of RUC information; however, value-added services can be provided by the business partner through their RUC account portals.

In each of the instances listed below, the information provided by each mileage reporting option is transmitted to the business partner who conducts all the transaction processing and account management activities. Additionally, the business partner will handle all hardware and services provisioning, as well as provide information to the RUC Clearinghouse.

6.3.1.1.1 Plug in Device with Location Ability

Location ability refers to the ability to differentiate a user's traveled miles based on specific locations. This is an option chosen by the user, not a requirement for all users. The hardware used in location reporting relies on technology such as:

- GPS
- GPS with digital mapping
- Cell phone/broadband triangulation

Previous pilot demonstrations have used location reporting to delineate between state borders; however, additional delineation could be used in future systems (i.e. public/private road delineation, specific corridors, or city and county boundaries). For the purposes of the RUC West Regional Pilot, only state delineation is recommended, however, determination of driving on private land can be added as the system matures.

6.3.1.1.2 Plug in Device without Location Ability

Location ability is an option selected by the user and not a requirement for using automated data reporting. In this case, location-based technologies are not used, and as such, the location of a user's traveled miles cannot be determined. Automated Data Reporting without location ability can be provided for users who have concerns over privacy and do not wish to provide their business partner with location information.

Under previous pilot demonstrations, every mile reported from vehicles without location reporting options were assessed the same RUC rate, regardless of where those miles were traveled. RUC rates, fuel tax credits, and associated revenues for users that choose to not report location are only associated with the user's state of record.

To date, reporting options have been limited to plug-in devices. Some smartphone applications also support a "switchable" mode that allows the user to turn location capabilities on or off. Miles

that are reported while the GPS capability is “on” can be differentiated by location, while all miles reported while the GPS capability is “off” are assessed a RUC rate regardless of vehicle location.

6.3.1.1.3 In-Vehicle and Aftermarket Infotainment

Factory-installed telematics devices use OEM installed onboard equipment with an embedded GPS unit and cellular radio to identify location and collect, process, and transmit vehicle data as part of an infotainment suite of value-added services. Possible examples of factory-installed telematics devices include GM’s OnStar, Ford’s Sync, Mercedes’ Embrace, or Toyota’s Entune.

Aftermarket telematics devices have also been tested. These systems collect RUC information as a subset of a larger, value-added service offering, similar to those provided by the in-vehicle infotainment providers. Mileage and vehicle data is collected and combined with location data to determine chargeable miles traveled. Other potential options include aftermarket OnStar devices, Navigation systems (i.e. Garmin), Progressive Snapshot, and the Verizon Hum.

6.3.1.1.4 Smartphones

Smartphones contain all the necessary abilities to collect and transmit RUC data, albeit not as granularly or accurately as their plug-in device or in-vehicle telematics counterparts. Smartphones have been tested that can collect vehicle information (with or without a connection to the vehicle’s OBD-II port) and transmit that data via a user’s cellular network to the business partner. The advantage of using smart phones as mileage reporting devices is their relatively high market penetration coupled with the fact that no additional devices need to be installed in the vehicle.

Smartphone applications have been tested in several RUC programs under several different applications. The first test using a smartphone was the Minnesota Mileage-based User Fee (MbUF) study in 2011. Under this study, a smartphone was used as a standalone MRD that used the smartphone’s embedded GPS to calculate distance based on location and assess a MbUF/RUC based on the miles traveled. For the Oregon Road Usage Charge Pilot Program, a smartphone was used that tethered via Bluetooth to a plug-in device. Under this program, a user could enable or disable the smartphone’s GPS, thus allowing flexibility in the amount of data provided to the business partner. Smartphones were used in several applications again for the California Road Charge Pilot Program. Pilot participants could choose options that used their smartphones to access their road charge accounts, manage their trips, and even take pictures of their odometer; as part of the odometer read manual option. The Colorado Road Usage Charge Pilot Program used smartphones as a way for participants to access their RUC accounts and take odometer pictures for upload to their business partner.

Given the forecasted increase in market penetration and their previous successes in RUC projects, smartphones could prove a viable mileage reporting option for the Regional RUC program.

6.3.1.1.5 Pay-at-the Pump

Pay-at-the-pump systems allow for immediate payment of RUC when a vehicle visits a fueling station. Under this option, a vehicle could access a fueling station (fuel pump or electric charging station) and a computer system installed on the fueling station can capture the collected RUC

data from the vehicle's telematics, assess the users' RUC as part of their fuel purchase, and then directly tie RUC payments back to a commodity, thus reducing the enforcement actions needed by the state and making RUC less complicated for the user. Previously, pay-at-the-pump systems were tested as part of the original Oregon RUC pilot (2006) with mixed results. California is also evaluating pay-at-the-pump technologies and is expected to deploy a feasibility study in 2018. Note that should this option be further explored, some collaboration with utility providers to account for vehicles that charge at the home should also be considered.

6.3.1.2 Manual-based Approaches

Manual Reporting Options: The manual reporting options used in RUC programs center around options where users can forego the use of technology but still participate in RUC. Manual options available under the CCO are provided below:

6.3.1.2.1 Time Permit/Flat Rate

A Time Permit or Flat Rate system is payment of a single fee for a RUC charge over a specified time period, possibly tied to a vehicle's registration. It has the benefit of great simplicity, however, the relationship between mileage driven and fee paid can only be estimated. Generally, programs that consider a flat rate, tend to tie that rate to a high annual VMT, which results in a high flat rate. While flat rate approaches do not necessarily support the usage-based concept, they are a valid consideration for states that wish to improve their revenue positions without the complex technologies or systems generally associated with RUC programs.

6.3.1.2.2 Odometer Self-Report

Under this approach, users provide an initial odometer reading at account signup and then provide periodic updates to their odometer reading, either through a website, or through a smartphone app that takes pictures of their odometer and transmits the change in odometer reading to the business partner. The business partner then assesses the RUC charge and any associated fuel tax credits.

6.3.1.2.3 Odometer State Report

This approach is similar to the Odometer Self-Report; however, the state (or their designated agency) is responsible for updating business partner records with new odometer readings. A user who chooses this option would schedule a time with their participating state (or their designee) to have their odometer reading reported. At prescribed periods throughout the program, the user would then schedule additional appointments to have their odometer reported. One consideration for this approach would be to have a user's odometer read as part of their registration renewal. Another application for this approach would be to integrate odometer state reporting through vehicle emissions stations, or through service stations who capture odometer readings during vehicle maintenance.

6.3.1.2.4 Mileage Permit

This approach allows users to purchase blocks of mileage from their business partner. Permit "blocks" can be offered in multiple mileage increments (1,000, 5,000, 10,000, etc.). Under this scenario, a user's initial odometer reading is reported by their business partner and a compliance

sticker is provided to place on their windshield. The user monitors their mileage usage and renews their blocks once their mileage is consumed. Simplicity is the major advantage of the system, however periodic reading of the odometer by a state agency, or a certified service provider is still needed to verify that the block of miles has not been exceeded.

7 OPERATIONAL SCENARIOS

This section describes the operational scenarios of the Regional RUC program. It identifies each of the activities associated with enrolling, participating, and operating the Regional RUC program. Multiple perspectives are also provided, encompassing the activities expected to be conducted by users, business partners, the regional clearinghouse, and participating states. There are four overarching activities that encompass the Regional RUC program. Those steps are shown in Figure 8 and a description and details to each activity are provided below.

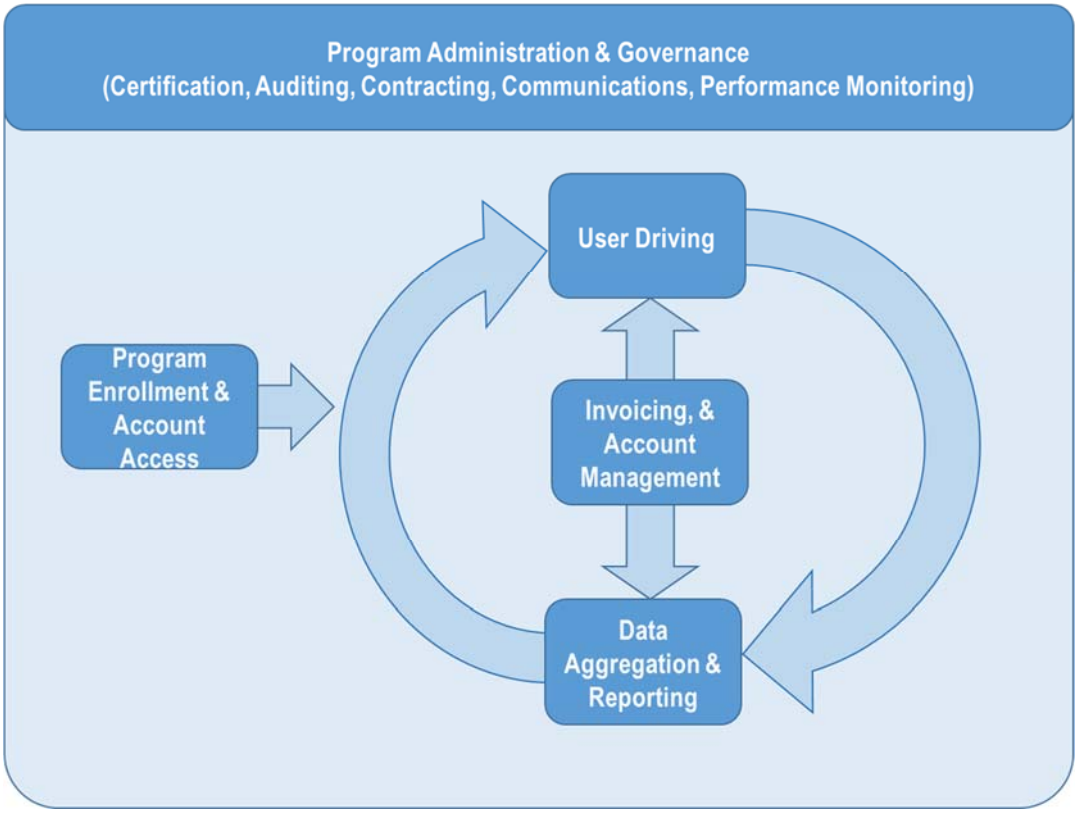


Figure 8: Overarching RUC Activities

7.1 PROGRAM ENROLLMENT AND ACCOUNT ACCESS

Enrollment is the process by which a business partner opens a new RUC account for a user. Enrollment can either be done in person at a business partner's location, or through online or mail registration. Through the state interview process, some states have even recommended that an enrollment service be provided at participating state DOT offices. The enrollment process will include collection of

information to allow the account to be opened; and contact, vehicle, and billing information to be collected by the DOT and submitted to the business partners.

Account access entails any instances where the user changes the status of their account. This involves changing vehicles, reporting stolen or destroyed vehicles, changing reporting options, changing business partners, or leaving the program.

7.1.1 Providing Participant Information and Vehicle Enrollment

7.1.1.1 User Activities

Users will be given access to select a business partner and enroll their vehicle(s). The user will choose a business partner, select a mileage reporting option, and enroll as a user into the Regional RUC system. Previous pilot demonstrations have given users state-provided unique identifier numbers to access business partners, to prevent unauthorized entry from the general public. Once a user selects a business partner, the user will be required to provide information to the business partner including, but not limited to:

- Name
- Address
- Email address (if applicable)
- Login name/Password (for web based portals only)
- Number of vehicles to enroll
- Vehicle Enrollment Information (note for users who enroll more than one vehicle, this information will need to be entered multiple times)
    - Vehicle Year
    - Vehicle Make
    - Vehicle Model
    - Vehicle Identification Number (VIN)
    - License Plate
    - Mileage Reporting Option desired for each vehicle
    - Beginning odometer reading and picture (for some MROs)
- Invoicing Mechanism desired
- Payment Mechanism desired
- Credit/debit card, or EFT information (for prepaid accounts only)
- Agreement to business partner and participant state terms and conditions as defined in the Participant Agreement
- Expressed consent to participate in the Regional RUC program as defined in the Participant Agreement

Provision of any necessary in-vehicle device should be provided during the enrollment process. If the enrollment process is not handled in person, any needed device can be sent via US Mail or other delivery service. Additionally, the driver may choose to subscribe to any value-added services provided by the business partner.

7.1.1.2 Business Partner Activities

The business partner is responsible for verifying the information provided by the user is accurate. This includes VIN verification, email, address, and financial payment information (such as making a $0.01 withdrawal and immediate refund to a user's debit/credit card or bank account). Additionally, the business partner will validate the selected MRO is compatible with the user's vehicle, provide the device to the user (where applicable), support them with any questions related to the installation process, and then verify the installation was successful and data can actually be transferred. For in-vehicle telematics options, the business partner may need to work directly with the user's telematics provider to gain access to a user's data, given their expressed consent. For manual options, the activities vary to include, capturing and processing initial odometer readings, providing any windshield stickers, and capturing information for mileage and time block purchases.

7.1.1.3 Regional Clearinghouse Activities

None, other than reviewing any participant related information provided by each business partner to ensure no duplicity of accounts.

7.1.1.4 Participating State Activities

During the enrollment process, the participating state may engage in several activities including (but not limited to): issuing unique login identifiers for users, supporting enrollment activities, providing enrollment and installation support, and validating user and vehicle information and program eligibility from registration databases. At the end of enrollment, the participating state may request a report from the business partners on the number of enrolled users and may choose to conduct surveys or provide program status information.

7.1.2 Changing Mileage Reporting Option

7.1.2.1 User Activities

Over the course of the program, users may wish to change their mileage reporting option. This may be due to vehicle compatibility, dislike of their current MRO, or simply wanting to try a new method. Whatever the reason, the user will need to contact their business partner, either directly or through a website, and request the change to their MRO.

7.1.2.2 Business Partner Activities

Depending on the type of MRO change, the business partner may require the user to pay any unpaid RUC, remove and return any hardware, check vehicle compatibility of the new MRO selected, and provide reasons for their change. The business partner may provide a self-addressed return envelope or label for the user to mail any hardware.

7.1.2.3 Regional Clearinghouse Activities

None, other than reviewing any participant related information provided by each business partner to ensure no duplicity of accounts.

7.1.2.4 Participating State Activities

The participating state does not need to be involved in this scenario except to review reports from the business partners on any changes to the MRO. The state may also choose to conduct any follow-up surveys with the users on the reason for their change.

7.1.3 Changing Vehicles

7.1.3.1 User Activities

Changing vehicles is another consideration for users in the Regional RUC program. Should a user change vehicles, they must notify their business partner of the change, either directly or through the business partner's website. As part of this, they must identify which vehicle is being changed and provide the new vehicle information (VIN, license plate (where applicable), make/model). Also, depending on the mileage reporting option chosen, the user may have to return any previously installed hardware and install new hardware.

7.1.3.2 Business Partner Activities

The business partner will be responsible for updating any user records and reports with the new vehicle information, validating user information, and providing new hardware, as requested by the user. In some states, this may be accomplished by simply treating the user as a new enrollment.

7.1.3.3 Regional Clearinghouse Activities

None, other than reviewing any participant related information provided by each business partner to ensure no duplicity of accounts or vehicles.

7.1.3.4 Participating State Activities

Depending on the registration policies, the participating state may be required to update their registration databases with the new vehicle information. For example, states where a license plate follows the owner, the participating state will need to update their registration system to reflect the new vehicle under the previous license plate number. For states where a new plate is issued with the vehicle, the registration database will need to be updated to reflect the new license plate number. These activities may only need to validate vehicle information requested by the business partner through existing state vehicle databases. Further discussions with participating state DMVs is required to determine the operational processes related to registration activities.

7.1.4 Declaring a Stolen or Destroyed Vehicle

7.1.4.1 User Activities

Should a user's vehicle become stolen or destroyed, they must also notify their business partner. If the vehicle is declared destroyed, the user should try and recover any hardware, return it to the business partner, and then enroll the replacement vehicle into the Regional RUC program.

7.1.4.2 Business Partner Activities

The business partner should suspend the user's account for that particular vehicle until the vehicle is either found or replaced. If the vehicle is stolen, and depending on the mileage reporting option selected, the business partner may be able to use technology to help find the missing vehicle. If a vehicle

is reported stolen, but the business partner is still receiving RUC data from that vehicle, it should open an investigation into potential fraud or theft, working with the participating state and applicable law enforcement agencies. The business partner should also review their status logs (if technology-based options are selected by the user) to determine that their hardware did not cause damage to the vehicle.

7.1.4.3 Regional Clearinghouse Activities

None, other than reviewing any participant related information provided by each business partner to ensure no duplicity of VINs

7.1.4.4 Participating State Activities

The participating state may be involved in this scenario in the event they support fraudulent or theft investigations, as well as registration updates should a user's license plate be destroyed or lost.

7.1.5 Changing Business Partners

7.1.5.1 User Activities

Users may also choose to change their business partner. For this to occur, the user must notify their existing business partner of their intent to change, settle any unpaid accounts, and return any hardware or information back to the existing business partner.

7.1.5.2 Business Partner Activities

Depending on the business rules levied by RUC West, the current business partner may be required to notify the new business partner of the change and provide any information to ease in the new enrollment process, or the user may be required to provide new information to their newly selected business partner.

7.1.5.3 Regional Clearinghouse Activities

None, other than reviewing any participant related information provided by each business partner to ensure no duplicity of accounts.

7.1.5.4 Participating State Activities

The participating state does not need to be involved in this scenario except to review reports from the business partners on any changes to their enrollment. The state may also choose to conduct any follow-up surveys with the users on the reason for their change.

7.1.6 Leaving the Program

7.1.6.1 User Activities

Depending on the policies established by RUC West and the participating state, users may be allowed to leave the Regional RUC program. Should this occur, the user will notify their business partner who will then notify the participating state. Also, the user may be required to notify the participating state directly, depending on the requirements levied by the state and the business partner. As with changing business partners, the user must settle any unpaid accounts, return any hardware, and provide reasoning for their desire to leave.

7.1.6.2 Business Partner Activities

As with the user activities for this scenario, the business partner should oversee the closeout of a user's account, the return of any hardware, and the settling of any unpaid RUC. The business partner must also notify the participating state of the user's desire to leave the program.

7.1.6.3 Regional Clearinghouse Activities

None, other than reviewing any participant related information provided by each business partner to ensure no duplicity of accounts.

7.1.6.4 Participating State Activities

The participating state will be notified by the business partner of the user leaving the program. This can be through direct contact or through report review. Depending on the laws in the state, the participating state may be required to review subsequent motorist records to ensure that they are paying some sort of road charge, whether through fuel tax, flat rate, or other alternatives. The state may also choose to conduct any follow-up surveys with the users on the reason for their departure.

7.2 User Driving Scenarios

Once the user is enrolled into the Regional RUC program they are responsible for their participation in the program to include timely payment of RUC, care of any provided hardware and software, and proper use of the business partner's systems. The users will then continue driving their vehicles under a series of scenarios described below. Under most conditions, these scenarios will be transparent to the user, but will require different actions on the part of the business partners and the regional clearinghouse to assess the proper fees.

7.2.1 Driving within the state

7.2.1.1 User Activities

Driving within the state that the user has designated as their primary state of travel is the simplest scenario regardless of which type of RUC system has been chosen. Determining the RUC fee to be charged and which state should receive the revenue is straightforward. The driver only needs to travel within their state and review their invoice for accuracy to ensure miles traveled and RUC assessed are for the primary state of travel. For odometer reading and mileage block options, the user will update their periodic odometer readings at the timeframes prescribed by their business partner. For time block options, the user only needs to renew their time block upon notification from their business partner.

7.2.1.2 Business Partner Activities

The business partners are responsible for collecting the RUC specific data for each mile traveled, assessing the respective state's per-mile RUC rate, and providing any fuel tax credits. For odometer reading and mileage block options, the business partner will notify the users to update their odometer reading. These notifications should be provided to users no less than five (5) days prior to the end of the reporting period. For time block options, the business partner will notify the users within 30-days of their time block expiration to renew their time block.

7.2.1.3 Regional Clearinghouse Activities

The collection and transference of RUC revenues to the appropriate state.

7.2.1.4 Participating State Activities

The review of business partner reports and associated revenues.

7.2.2 Driving outside of the state

7.2.2.1 User Activities

As with the previous scenario, the driver only needs to travel. If desired, the driver may keep a separate log of miles traveled within each state to compare against their business partner's invoice. For users who select MROs that have switchable location technology, the user may also activate the location-based technology when traveling across state borders to ensure the accurate delineation of miles, fuel tax credits, and RUC invoice assessment. For odometer reading and mileage block options, the user will update their periodic odometer readings at the timeframes prescribed by their business partner. For time block options, the user only needs to renew their time block upon notification from their business partner.

7.2.2.2 Business Partner Activities

The activities around this scenario vary based on the MRO chosen by the user. For non-location based reporting options, strong consideration should be given to assume that all miles driven should be reported within the state of vehicle registration, which should also be the state that the user has designated as its primary state of travel.

For location-based reporting options, the business partner must delineate the miles traveled between each state, assess the respective state per-mile rates and fuel tax credits, and identify the appropriate revenue deposits to the regional clearinghouse.

For odometer reading and mileage block options, the business partner will notify the users to update their odometer readings. These notifications should be provided to users no less than five (5) days prior to the end of the reporting period. For time block options, the business partner will notify the users within 30-days of their time block expiration to renew their time block.

7.2.2.3 Regional Clearinghouse Activities

The regional clearinghouse should validate the data provided by each business partner to include state specific mileage and RUC revenue delineations and make the appropriate revenue deposits to each participating state's designated state accounts. Additionally, the regional clearinghouse will aggregate and disseminate reports to each participating state, and possibly RUC West.

7.2.2.4 Participating State Activities

Review of business partner reports and associated revenues.

7.2.3 Driving on non-taxable roads

7.2.3.1 User Activities

For this scenario, the user will need to log any miles traveled on non-taxable roads, regardless of the type of MRO selected. Upon receipt of their invoice, they will need to validate the records provided on the invoice against their own records. Also, depending on state process, the user may also be required to submit a formal request to be refunded any RUC assessed during travel on non-taxable roads. Additionally, the user may be required to submit any paperwork (map data, real estate records, etc.) to the participating state and the business partner (if directed) showing the zoning of the roads or land traveled is not maintained by the state and is not subject to RUC.

7.2.3.2 Business Partner Activities

The business partner will need to establish geofencing around a particular area, designating it as a non-taxable area. Any miles captured by the business partner's system that lie within that geofence, depending on state policy, should not be assessed a RUC or a fuel tax credit.

7.2.3.3 Regional Clearinghouse Activities

The regional clearinghouse should validate the data provided by each business partner to include non-taxable mileage and RUC revenue delineations and make the appropriate revenue deposits to each state.

7.2.3.4 Participating State Activities

If a participating state chooses to reimburse RUC for travel on non-taxable roads, then they will be responsible for overseeing their state refund process including auditing requests and records reviews. They may also be responsible for any direct refunds to users who satisfactorily complete the process.

7.3 Invoicing and Account Management Scenarios

At an interval prescribed by RUC West and established in the business rules, the business partner will process trip data, assess aggregated RUC, and submit invoices to each user. These invoices will be used to identify the miles traveled, delineate between miles traveled in each state (depending on the MRO selected), delineate between the RUC assessed for each state where the miles were traveled, provide any fuel tax credits relative to the state the miles were traveled and the fuel consumed, and provide a net RUC amount to the user.

7.3.1 Customer Service Requests

7.3.1.1 User Activities

Over the course of the program, users may wish to initiate customer service requests. These requests may include (but are not limited to): questions about their RUC accounts, installation assistance, account reconciliation requests, or general questions about the program. To access customer service, the user will need to initiate a request using the business partner's available methods (i.e. website, telephone, email, walk-in, etc.). The user should provide any information needed by the business partner's customer service representative and work with them until the issue is resolved. In the event

the issue is not resolved to the satisfaction of the user, they may (depending on the business rules established by the participating state and RUC West) initiate an appellate process, which would escalate the issue from the business partner to the participating state. During this process, the user may be asked to provide any relevant information to the participating state, including any correspondence between them and the business partner.

7.3.1.2 Business Partner Activities

The business partner will be responsible for working with the user to address any customer service requests and resolve any issues to the satisfaction of the user. Generally, customer service is categorized into three tiers, with each tier providing more detailed support. Most customer service requests will be initially addressed by Tier 1 representatives, tasked with providing general information and providing rudimentary customer support (i.e. account login issues, questions about accounts, etc.). Should the Tier 1 representative be unable to satisfactorily resolve the request, they may escalate the request to higher tiers (Tier 2 and then Tier 3) who provide more detailed technical support. As a request is initiated by the user, the business partner's customer service representative is responsible for logging the request into their Customer Relationship Management (CRM) tool. This tool will assign a unique identifier to the issue and provide a means for the representative to log the actions taken to address the issue. All actions needed to address the issue will be assigned to the same unique identifier and then used as part of the customer service report provided by the business partner to the regional clearinghouse and the participating state.

For any customer service requests that require an account reconciliation, the business partner will need to adjust their revenue reports and document the account reconciliation amounts, as part of the revenue reports and statement of deposits (where applicable).

The resolution and escalation parameters for a business partner's customer service entity should be defined in the Service Level Agreement (SLA). This document provides the requirements, escalation parameters and procedures, and report methods for logging and addressing all customer service requests. The SLA will be developed by RUC West and the participating states, reviewed and vetted by the business partner, and then used as a contractual document to monitor the business partner's performance over the course of the program.

7.3.1.3 Regional Clearinghouse Activities

Depending on the nature of the request, and the business rules established, the regional clearinghouse may have varying customer service roles. If requested by RUC West and the participating states, and documented in the business rules, the regional clearinghouse may be tasked with supporting a regional customer service entity, responsible for addressing issues not handled by the business partner. It may also be tasked with supporting any aggregate account investigations and documenting and initiating any revenue transfers related to account reconciliation. As with the business partner, and if tasked by RUC West and the participating states, the regional clearinghouse should implement its own CRM tool and provide customer service reports to the participating states as part of the reporting requirements.

7.3.1.4 Participating State Activities

The participating state is responsible for reviewing the Customer Service Reports, identifying any recurring themes or concerns, and initiating any investigations into resolution of major issues. The participating state may also be responsible for addressing any outstanding customer service issues not resolved by the business partner and (if tasked) the regional clearinghouse. They may also disseminate information to RUC West on customer service issues as well as support any account reconciliations, documenting reconciled revenues, and providing funds transfers where appropriate.

If chosen by the participating state and RUC West, the participating state may also employ customer service staff within their own state. These staff may be provided from existing state customer service entities (such as the DMV) but use the customer service scripts and escalation procedures established by RUC West and the participating state. In this event, the same processes apply as identified for the business partner (addressing the issue, escalating if necessary, logging information into CRM, etc.).

7.3.2 Submitting and Reviewing Invoices

7.3.2.1 User Activities

The user is responsible for reviewing their received invoice, initiating disputes or customer support requests, and, if acceptable to the user, paying their invoice.

7.3.2.2 Business Partner Activities

The business partners will submit the invoices to each user. Generally, invoices are compiled and submitted within five (5) days after the prescribed invoice period. These invoices are submitted either electronically via email or, if chosen by the user, physically mailed to them. Once the invoices are submitted, the business partner should monitor payment activities; annotating any accounts that are not paid within the prescribed timeframe. Also, the business partner will provide customer support to users who question their invoices, provide account reconciliation, and reissuance of updated invoices as necessary.

7.3.2.3 Regional Clearinghouse Activities

None.

7.3.2.4 Participating State Activities

None.

7.3.3 Remitting RUC Payments

7.3.3.1 User Activities

Users are responsible for maintaining their accounts, paying any RUC due in a timely manner and in accordance with the specifications established by the business partner. Each business partner should support payments from a multiple of mediums including: Credit/debit card, Electronic Funds Transfer (EFT), and, if allowed by RUC West, check, money order, and cash.

In addition to the payment media, users should also be given the opportunity to pay their assessed RUC through multiple methods. Some of these methods include: web-based payments, phone payments,

prepayment through an e-wallet, automatic payment, mail-in payment, and, if supported by the business partner, cash collection at a government facility (or designated representative).

The users will pay their assessed RUC using any of these media or methods. The timeframe for RUC payment within receipt of an invoice should be established by the business partner and as part of the business rules established by RUC West.

7.3.3.2 Business Partner Activities

The business partners will be responsible for collecting the monies paid by the users. Also, the business partner will monitor accounts that are not paid within the prescribed timeframes, working with the user to ensure their accounts are paid within the prescribed timeframes. The business partner will also develop the data reports and statement of deposits for each state for submittal to the regional clearinghouse.

State policy may not allow business partners to hold funds received from RUC payments, requiring business partners to transfer funds immediately upon receipt from the user. Should this requirement be levied, the business partner should establish immediate funds transfers to the regional clearinghouse, who will then make an immediate transfer to the respective state's designated account based on the deposit record provided by the business partner.

Also, it is recommended that business rules be levied on each business partner to transfer RUC revenues to the regional clearinghouse based on the total miles reported; not the funds collected from users. This rule would place the onus of collection of unpaid RUC directly on the business partner and the states would receive RUC revenues based on actual road use, not on when (or if) users would pay their RUC.

The business partner will compile all monies collected, generate the necessary revenue and deposit reports, and transfer the monies (calculated as the number of aggregate miles traveled in each state, times the state per-mile rate for each mile traveled in each state, minus the number of gallons consumed in each state, times the fuel tax rate for each state the gallons are consumed). They will also generate a statement of deposits for each state showing the monies that will be deposited to each designated state account, based on the calculations above. These reports and monies will then be transferred to the regional clearinghouse for verification and deposited into the state accounts. Depending on the compensation model chosen by RUC West or even specific to each participating state, the business partner may also deduct any negotiated compensation from the collected revenues prior to transfer to the regional clearinghouse.

7.3.3.3 Regional Clearinghouse Activities

The regional clearinghouse will be ultimately responsible for collecting the RUC revenues from each business partner and depositing those revenues into the participating designated state accounts in accordance with Public Funds laws and other statutory requirements. They will receive the monies from each business partner, along with the revenue reports and statement of deposits. They will review these reports and monies for accuracy, conduct audits and reconciliations as needed, and then transfer the monies to each state's designated account. Should RUC West and the participating states allow the regional clearinghouse to deduct compensation from the collected revenues to cover administrative costs, the regional clearinghouse would make these deductions from the collected monies prior to

deposit into the participating state designated accounts and generate a deposit report showing the deductions and reflecting the net revenue deposits.

7.3.3.4 Participating State Activities

The participating state is responsible for verifying the accurate and timely deposit of RUC revenues into their respective state accounts. The state will review the statement of deposits and the corresponding mileage and revenue reports for accuracy, conduct inquiries, audits, and reconciliations as needed with the regional clearinghouse.

Depending on the compensation model developed by RUC West and the participating states, the participating state may also remit compensation to the business partners and the regional clearinghouse. This payment remittance will either be a direct payment upon receipt of monies with accompanying invoices where appropriate, or simply a deduction of RUC revenues at time of transfer from the business partner to the regional clearinghouse and from the regional clearinghouse to the designated state accounts.

7.3.4 Generating RUC Reports

7.3.4.1 User Activities

None.

7.3.4.2 Business Partner Activities

The business partners will be responsible for generating the reports for the regional clearinghouse and each participating state. These reports will be submitted to the regional clearinghouse and each participating state to inform RUC West states on the overall program performance, identify RUC revenues, identify aggregated VMT, and identify the revenue deposits to each participating state's designated account. Some of the reports identified for the Regional RUC program include:

- **VIN Summary Report** – The VIN Summary Report provides a listing of all vehicles enrolled with the business partner for the Regional RUC program, the miles traveled, fuel consumed, and assessed RUC based on each VIN and MRO selected.
- **Mileage and RUC Revenue Report** – This report provides the aggregated reported mileage from each vehicle, the gross and net (minus fuel tax credits) RUC, and the aggregated revenue. This report may be subjugated between revenues associated with automated reporting options and manual options.
- **Errors and Events Report** – This report provides any technical errors, anomalies, or events encountered by the business partner's data collection, transaction processing, and account management subsystems.
- **Statement of Deposit Report** – This report provides the statement of deposits for each participating state based on the mileage and revenues calculated by the miles traveled and fuel tax credits for each state in which miles were driven. Additionally, any administrative charges levied by the business partner may also be reflected as credits to this report. This report will be used by the regional clearinghouse to deposit RUC revenues into each participating state's accounts.

- **Enforcement Actions Report** – This report will identify the RUC accounts that are past-due and which collection activities have been already initiated by the business partner.
- **Fraudulent Actions Report** – This report will identify any identified fraudulent activities reported by the business partner on users.
- **Customer Service Report** – This report provides the aggregated results of customer service requests, the nature of the request, and the resolution time of any issues.

Additional reports may be developed based on the needs of RUC West and the participating states, as well as the capabilities and limitations of each business partner.

The business partner may also be tasked with providing actual, sanitized data to the regional clearinghouse for research purposes. This data provision will be established as part of the business rules and any memorandums of understanding between the business partners, the regional clearinghouse, RUC West, and the participating states. The types and formats of these data sets are currently undefined but may be established as the program evolves.

7.3.4.3 Regional Clearinghouse Activities

The regional clearinghouse will be responsible for the validation of business partner data and aggregation of each of the aforementioned reports into a series of consolidated reports to be provided to the participating states and possibly RUC West. These reports will mimic the individual business partner reports, but be consolidated to reflect the aggregation of information from each business partner. The individual business partner reports may also be provided as appendices to the clearinghouse report. The regional clearinghouse will validate the information on each business partner report, conduct inquiries and reconciliations as necessary, create a series of consolidated reports, and develop their own statement of deposit report showing successful deposit of revenues (minus any pre-established administrative fees) into each participating state's designated account.

In addition to the reports and finances aggregated and appropriated by the regional clearinghouse, they may also be tasked with providing certain data sets to participating states and RUC West for research purposes.

7.3.4.4 Participating State Activities

The participating state is responsible for reviewing the reports, verifying accurate data reporting, and funds deposits. They will also implement the necessary enforcement and collection actions, defined in legislation, for any unpaid accounts or reported fraudulent activity. Depending on the nature of the enforcement or fraudulent activities, the participating state may engage the state DMV or law enforcement agencies. The participating state may also conduct audits or account investigations based on any concerns over the data provided by the business partners and/or the regional clearinghouse. Finally, the participating state may also support account reconciliation and RUC refunds to participants who request refund for travel on non-taxable roads.

7.3.5 Depositing RUC Revenues

7.3.5.1 User Activities

None.

7.3.5.2 Business Partner Activities
None.

7.3.5.3 Regional Clearinghouse Activities
The regional clearinghouse will be responsible for depositing collected RUC revenues into each participating state account. Once the validation of the business partner reports is satisfactorily completed, and the revenues are received from the business partner, the regional clearinghouse will initiate electronic transference of revenues from their account to the accounts associated designated by each participating state. Depending on the compensation model selected by RUC West, the regional clearinghouse may deduct administrative fees from the deposit.

As previously mentioned, state policy may prevent the holding of revenues. That being the case, the regional clearinghouse may be required to initiate electronic funds transfers as funds are received from each business partner.

At the completion of the deposits, the regional clearinghouse will prepare a series of deposit reports to be provided to each participating state showing the successful transference of funds and traceability between each business partner, through the regional clearinghouse, and ultimately deposited into the respective state accounts.

7.3.5.4 Participating State Activities
The participating state is responsible for reviewing the reports, verifying accurate data reporting, and funds deposits. They will also implement the necessary enforcement and collection actions, defined in legislation, for any unpaid accounts or reported fraudulent activity. Depending on the nature of the enforcement or fraudulent activities, the participating state may engage the state DMV or law enforcement agencies. The participating state may also conduct audits or account investigations based on any concerns over the data provided by the business partners and/or the regional clearinghouse. Finally, the participating state may also support account reconciliation and RUC refunds to participants who request refund for travel on non-taxable roads.

7.3.6 Collections

7.3.6.1 User Activities
All users, as part of their compliance with the Regional RUC program, will be required to pay their unpaid RUC in a timely manner upon receipt of invoices. Should a RUC account be entered into collections, either by the business partner or the participating state, the user should support the collection activities and pay any due RUC. In the event those charges cannot be paid, the user may, depending on statute, work with the business partner and the participating state to setup payment plans or to have the unpaid balances forgiven due to economic hardship, lack of cost effectiveness to collect, or simply good cause. The participating state and the business partner will need to establish any guidelines or policies related to forgiving unpaid RUC balances.

7.3.6.2 Business Partner Activities
The business partner will be the first point of collections of any unpaid RUC balances. They will contact the user to collect monies, establish payment plans as necessary, enforce penalties as necessary, and

forgive any unpaid debt. If the business partner is unsuccessful in collecting these monies, they may choose to hand the unpaid accounts over to collection agencies who will then initiate their own collection activities.

In extreme circumstances, the business partner may report the overdue RUC accounts to the participating state for further enforcement. These accounts, the amounts due, and the timeframe these accounts are overdue (< 30 days, 30-60 days, >60 days, etc.) will be reported on the previously mentioned Enforcement Actions report.

Also, if the business partner is not required to pay on reported miles but rather on collected revenues, any collected or forgiven debts should be accounted for by the business partner and may need to be reported on the revenue reports and any reconciled monies due to the business partner may also need to be reported on the statement of deposits report.

7.3.6.3 Regional Clearinghouse Activities

Depending on the business rules levied on the business partners, the regional clearinghouse may need to initiate account reconciliations between the business partner and the participating states to appropriate and account for any due RUC revenues owed.

Additionally, while not expected, the regional clearinghouse may need to implement collection activities on any business partners who are overdue with their RUC revenue deposits. These collection activities may include working with participating states, collection agencies, legal processes, or leveraging any performance bonds to recoup lost revenues.

7.3.6.4 Participating State Activities

The participating states will be the last resort collections entity. Should collection efforts from the business partner and/or the regional clearinghouse deem unsuccessful, the participating state will undertake their own collection activities. For user accounts, these activities may include conducting their own collection efforts, assessing unpaid RUC fees on vehicle registrations, placing tax liens on vehicles, or engaging law enforcement agencies to conduct collections. For overdue business partner accounts, these collection activities may include liens against performance bonds, lawsuits, and contract termination activities. For accounts that are forgiven, the participating state may be required to account for any forgiven debts and report the deductions in revenue as part of their revenue transaction logs.

7.3.7 Account Reconciliation

7.3.7.1 User Activities

Users may initiate reconciliation requests as part of the customer service interactions. If so, they will provide any relevant information and documentation to the business partner, and if requested, the regional clearinghouse and the participating state.

In the event an account reconciliation results in a refund due to the user, they should monitor their account to ensure the refund was successfully processed and the correct amount was credited. If the reconciliation results in a charge due to the business partner, the user will pay the charges in accordance with the terms and conditions established in the participant agreement.

7.3.7.2 Business Partner Activities

The business partner will be the entity responsible for identifying, documenting, and resolving (to the fullest extent possible) any fee and account reconciliations. They will act as an intermediary between the user, the regional clearinghouse, and the participating states to identify the need for the reconciliation, update records as necessary, provide refunds to users, and collect payments from users.

7.3.7.3 Regional Clearinghouse Activities

The regional clearinghouse will be responsible for working with the business partner and reporting and providing any reconciled funds to either the business partner (for account overpayments) or to the participating state (for account underpayments). They will also provide any reconciliation results as ledger entries in their financial reports, including the statement of deposits to the participating states.

7.3.7.4 Participating State Activities

The participating state is responsible for reviewing account reconciliation records and providing (if necessary) refunds back to the business partner or the user. Conversely, the participating state may also need to support collection activities based on reconciliations that result in fees due the state, in accordance with the collection procedures defined by RUC West and the participating states.

7.4 Data Aggregation and Reporting

Most RUC data is collected on a trip basis, and generally invoicing and payments are made in aggregate, where the RUC for multiple trips in a prescribed time period are aggregated and the overall RUC is invoiced to the user.

Also, data reports provided to each participating state and possibly RUC West from the regional clearinghouse are provided in aggregate form, where specific trip information is combined with other trips for the same vehicle. Under previous RUC programs, each business partner provided aggregated reports for mileage, RUC /revenues, credits, and financial transactions. The exception to this is when an account is audited or placed under inquiry. At that point, individual trip records or daily metered use data may be needed to show traceability and to identify any discrepancies.

Additionally, all data provided by the business partner to the regional clearinghouse and then from the clearinghouse to each participating state is sanitized, whereby all Personally Identifiable Information (PII) is removed. Oregon statute ORS 319.915 (2015) identifies PII as “any information that identifies or describes a person, including, but not limited to, the person’s travel pattern data, per-mile road usage charge account number, address, telephone number, electronic mail address, driver license or identification card number, registration plate number, photograph, recorded images, bank account information and credit card number.”[15] As part of the Regional RUC Program, RUC West and the participating states will need to review the standards for PII, identify which pieces of information

[15] Oregon Revised Statute (ORS) 319.915 Confidentiality of personally identifiable information used for reporting and collecting road usage charge

constitute PII, exceptions for PII disclosure, and identify penalties for business partners who participate in the unauthorized disclosure of PII in accordance with state laws.

For the Regional RUC program, it is still advised that reports be provided to each participating state in aggregate format with the caveat that daily metered use data may be accessed under special circumstances. Should the RUCAS be used for the Regional RUC program, it may need to be modified to access daily metered use information without accessing a user's PII.

7.4.1 User Activities

Monitoring individual RUC accounts to ensure accurate data reporting and payment of RUC.

7.4.2 Business Partner Activities

The business partners, as collectors of the per-trip data, will be the primary entities responsible for data aggregation. As part of the business rules and the service level agreement, RUC West will identify the invoicing and reporting period for the business partners. Aggregation from each business partner will occur in two phases. The first phase will be to aggregate all trip data into a single day. This day is generally from (h:m:s) 00:00:00 to 23:59:59. Time standard reference will be a key consideration for when these trips are aggregated. While many RUC West states operate in Pacific Time, some states operate in other time zones. One way to avoid this issue would be to set the time standard reference to Greenwich Mean Time (GMT) or Coordinated Universal Time (UTC), the world standards for time references.

Depending on the business rules levied on the business partner, the second phase of the data aggregation will be in aggregating each day into a month. The business partner would aggregate each daily trip data into a month for reporting and invoicing purposes. As each month has differing days (some 30, some 31, and February with 28 changing to 29 every four years), the business partner will need to aggregate daily trip data into months with varying days. While back office systems make this aggregation easy, careful attention should be placed in reviewing the data to ensure that daily trip information is properly aggregated into the correct month. This care becomes more prevalent if invoicing is required to be levied on a monthly basis, as the information provided on the reports must match the information provided to users on their monthly invoices.

Additionally, some data requirements may necessitate subsequent aggregation phases from monthly data, into quarterly and/or annual increments.

For each aggregation period, the business rules should dictate how often and when data should be aggregated and reported both to users and to each participating state. These rules could be levied on the business partner, or depending on the architecture configuration, the regional clearinghouse.

7.4.3 Regional Clearinghouse Activities

The regional clearinghouse will also play a role in data aggregation. Depending on the business rules, the clearinghouse may aggregate per-trip data, as previously described for the business partner, or they may aggregate already aggregated data from each business partner. This aggregation may also include delineation of data for each participating state based on the business rules levied by RUC West.

7.4.4 Participating State Activities

The participating states will be responsible for reviewing the data provided in the summary reports provided by the regional clearinghouse. Also, should research data be provided to the participating state, they will be responsible for ensuring the received data is properly aggregated and sanitized against PII unless conditions exist where PII is acceptable (such as expressed user consent).

7.5 Enforcement and Compliance

As RUC is at its core, a tax program, there will be the need to conduct enforcement and compliance actions against users and companies who attempt to obstruct, defraud, or otherwise prevent the remittance of tax revenues to the participating states. This section provides the scenarios and considerations for states to conduct enforcement and compliance for the RUC West Regional Program.

7.5.1.1 Mileage Reporting Enforcement and Compliance

Users that select mileage reporting options that automatically capture miles traveled (i.e. plug-in device, some smartphone applications, In-vehicle telematics) should require little to no enforcement actions by business partners.

For these types of mileage reporting options, the business partner should monitor the daily reports and logs to identify any unusual activity or lack of activity. Should discrepancies be identified, the business partner should notify the user within a specified time frame notifying them of the issue and providing instructions to remedy the discrepancy.

Users that select manual reporting options, mileage blocks, and flat fee/time-based options will require more enforcement and compliance actions from the business partner than the technology-based options. For these options, the business partners should review daily logs to identify when users must update their mileage reports. Reminders to users who have selected these options should be sent prior to the update being due reminding them to update their mileage reports or renew their fee. The reminder should provide instructions to each user, specific to each option, that show them how to proceed. As records are updated, the business partner should review the accuracy of each updated mileage report and option renewal log and identify any discrepancies. This could include mileage that is under their initial reading, or mileage that is significantly higher than expected. Any discrepancies should be annotated and the business partner should notify the user of the issue, identify the cause of the discrepancy, and work with them to remedy any discrepancies.

For all mileage reporting enforcement and compliance issues, the business partner should provide records to the participating states identifying the issues, any corrective actions taken by the business partner, and any outstanding issues or areas of non-compliance that are still open.

7.5.1.2 Payment Enforcement and Compliance

All users who enroll in the RUC West Regional Program, will need to make some form of payment of assessed RUC. The business partners are expected to take the lead role in enforcing RUC payments and notifying participating states of any missing payments past prescribed deadlines.

Each user will receive an invoice that shows any RUC due to the business partner. For business partners that use prepayment, or a credit card link to automatically deduct a user's RUC, there should be little to no need to enforce RUC payments so long as fee payments are made and/or credit card information remains valid.

Users that must take some sort of action to pay their RUC, will need to be monitored by the business partner to determine that payments have been made. The business partner should specify, as part of the invoice, when payments are due after the receipt of the invoice. Determination of payments that are past due may be made by an appropriate algorithm that flags past due accounts. When appropriate, a sampling of payments should be manually reviewed to ensure the proper functioning of the algorithm. The business partner should follow up with users shortly after any payment becomes past due. For significantly past due accounts, appropriate collection activities should take place as discussed in other sections of this document.

As part of the enforcement process, participating states will also have a role in enforcement and compliance for accounts that are significantly past due as established by RUC West or the state's business rules. Actions can include notification of their state's DMV with the user's Vehicle Identification Number (VIN), their license plate number, user name, address, vehicle type, and overdue RUC. Should statutory authority be given, the DMV would then place a notification on the user's account which would require them to pay their overdue RUC (as well as any prescribed late fees, established in accordance with other late fees assessed by the DMV) to renew their license registration or driver's license.

The ultimate fallback for enforcement for all RUC activities should be to tie unpaid RUC into a motorist's registration. This will require each participating state to work between the business partners and the state DMVs to ensure that unpaid RUC can be ultimately captured as part of registration fees.

Once any overdue RUC is collected from the user, the state should notify the business partner and the regional clearinghouse of the paid RUC for account reconciliation purposes. Funds due should be transferred by the state to the business partner through the regional clearinghouse. If the past due account occurs as part of a RUC pilot, these enforcement actions may be simulated.

7.5.1.3 Business Partner Enforcement and Compliance

Each participating state will have a role in maintaining business partner compliance. This includes activities such as initial audits and certification verifications and then ongoing activities to include spot audits and review of financial and technical reports.

7.5.1.4 Pre-Pilot Enforcement and Compliance

Business partners will be required to comply with a series of technical and business requirements. This will include providing financial information and audit records relative to demonstrating that the business partner is capable of securely and accurately collecting funds, is capable of transferring those funds to a state approved banking institution, and has the available capital to collect monies in arrears while making RUC deposits to banking institutions as required in the agreement between the business partner and the state in which it is operating.

The certification and audit responsibility for business partners should take input from each participating state. These states should identify relevant accounting, financial, and IT Security standards with which each business partner will need to comply. Also, each participating state should take part in any compliance reviews of financial information, audit result reviews, and negotiation between RUC West and the business partners on the contractual and financial terms and conditions established by RUC West. Any discrepancies noted by the participating state should be shared with RUC West, who will work with the business partner for resolution.

For issues related to technical nonconformance, the participating state, in collaboration with RUC West, should work with the business partner to develop a corrective action plan with retest parameters for evaluating whether the corrective action meets the technical requirements established in the contract. Should the corrective action not be deemed viable to the participating state, or RUC West, then decisions may be made to remove the non-compliant business partner from the program.

7.5.1.5 Ongoing Enforcement and Compliance

It is anticipated that each participating state will monitor financial reporting and RUC deposits to their respective banking institutions. Additionally, it is recommended that each participating state, in collaboration with RUC West, conduct spot audits on their respective business partner's financial performance. Should these spot audits occur, the participating state will inform RUC West of the audit request and then schedule the audit with the business partner. The participating state representative, with RUC West personnel, will then conduct the audit, review the audit results, and work with the business partner to remediate any deficiencies identified during the audit.

Additionally, each participating state should monitor the business partner provided errors and events reports, as well as the customer service logs to identify any major technical deviations from the technical requirements. This may include a series of inaccurate data, large-scale technical issues with MRDs, increased customer complaints on a specific mileage reporting option, or any situation that poses a risk to the safety or longevity of the user or their vehicle. Should any of these issues arise, the participating state should communicate with RUC West regarding the issue and request an investigation and corrective action with the business partner. For any recurring issues or issues that represent negligence on the part of the business partner, consideration should be given to removing the business partner from the RUC program.

8 ORGANIZATIONAL COMPOSITION

The oversight and management of the RUC West Regional program will encompass a mix of participating states, monitoring states, and the overall RUC West executive management board. As shown in Figure 9, RUC West currently consists of three entities:

- **Board of Directors** – The RUC West Board of Directors is responsible for the overall sponsorship, administration, and oversight of RUC West. They consist of DOT directors and are responsible for establishing the policies, procedures, and governance rules for overseeing the activities and projects within RUC West.

- **Steering Committee** – The Steering Committee is responsible for establishing the direction of RUC West. They establish the annual budget, identify research studies and projects, and develop the overall operating procedures and work products being developed by each participating state.
- **Executive Committee** – The Executive Committee is responsible for the administrative and executive support to the other committee members. They prepare work materials, coordinate meetings, and establish the agendas for RUC West Meetings. They also coordinate activities with the Steering Committee and the Board of Directors regarding voting issues and other program activities.

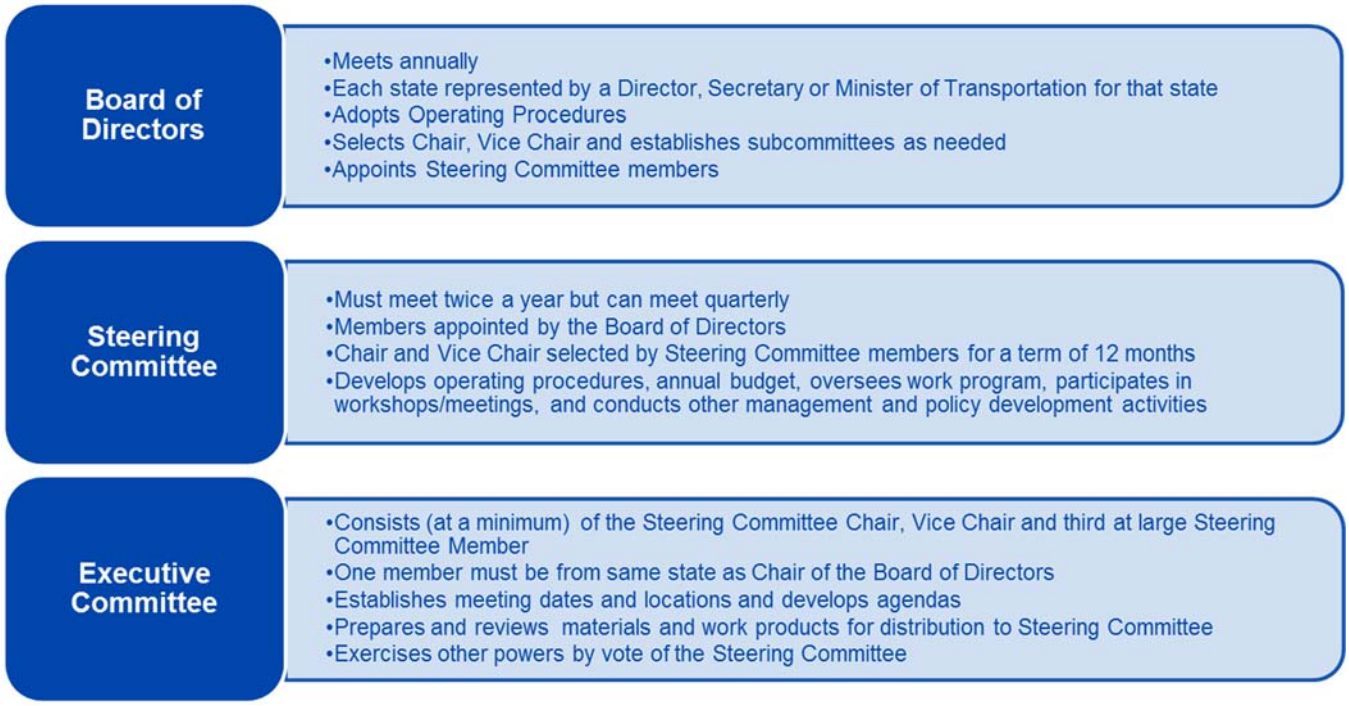


Figure 9: RUC West Organizational Composition

8.1 Proposed Organizational Structure

A proposed organization structure integrating the Regional RUC Program into the existing RUC West organization is provided in Figure 10 below. Under this structure, a Program Management Office (PMO) would be established to oversee the pilot activities, evaluate program risk, and provide governance from the Steering Committee to the contracted business partners, regional clearinghouse, and participating states. Additionally, a series of working groups, consisting of members of each participating state would be established to provide recommendations and policies to the Steering Committee who would then provide guidance to the PMO. As the Regional RUC program evolves, the PMO may transition to a peer level same as the Steering Committee, reporting directly to the Board of Directors.

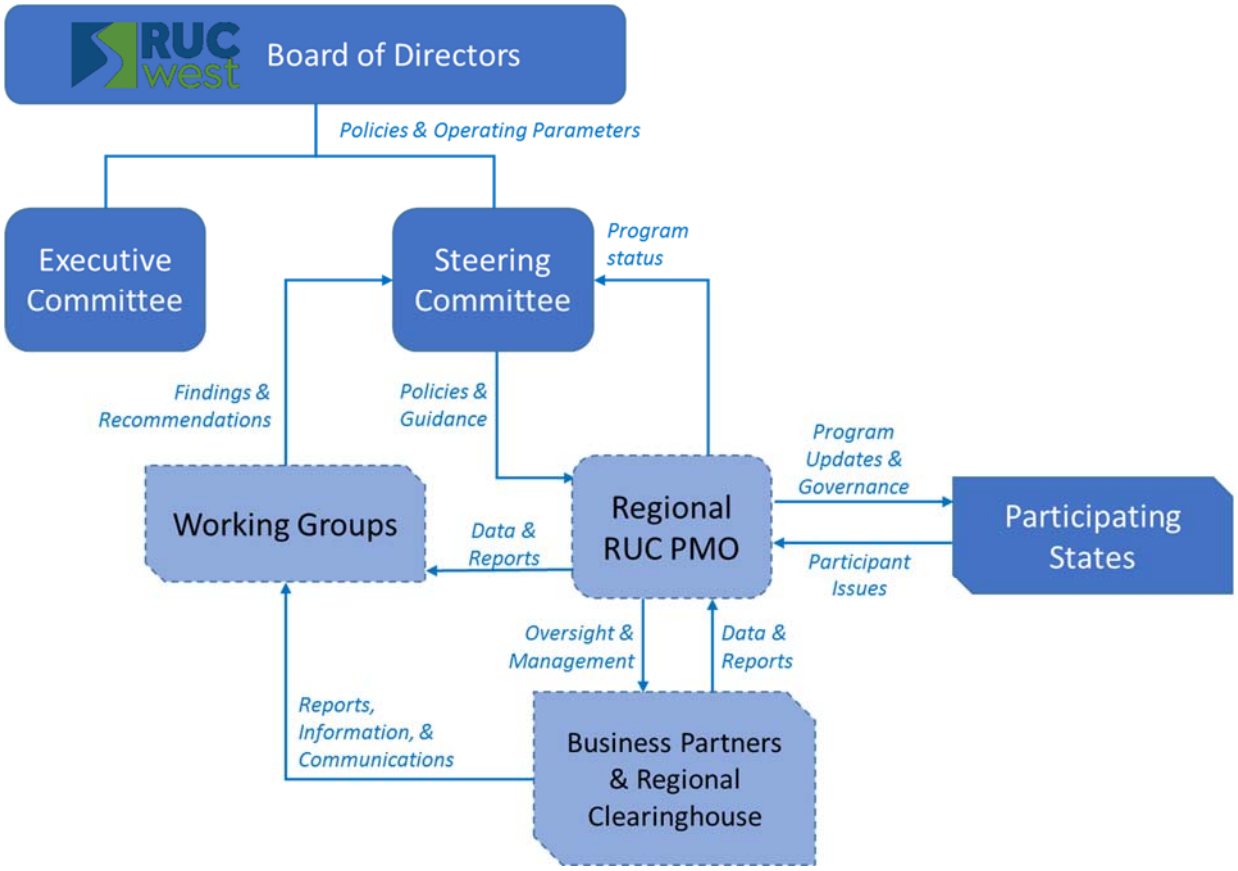


Figure 10: RUC West Regional Program Proposed Organizational Structure

8.1.1 Program Management Office

The Regional RUC Program Management Office (PMO) will be responsible for the management and oversight of the Regional RUC program. Under the supervision of the RUC West Steering Committee and the Board of Directors, the PMO will establish policies and guidance to the participating states and to the contracted business partner(s) and regional clearinghouse. The PMO will establish a series of program policies, requirements, and performance metrics that will then be used to monitor and communicate the overall performance of the Regional RUC program. Additionally, the PMO will be responsible for the identification, monitoring, communication, and (where necessary) mitigation of program risks. The PMO should be comprised of a single Program Manager, appointed by the Board of Directors and Steering Committee, who will be ultimately responsible for the performance of the Regional RUC program. The PMO will also contain the necessary project managers, business analysts, technical analysts, contracting and procurement professionals, and support staff necessary to maintain the daily operations. It is recommended that a similar organizational construct to the existing OReGO program be used to determine overall staffing needs and personnel types to staff the Regional RUC PMO.

In the beginning phases of the Regional RUC program, the PMO should also administer the Road Usage Charge Administration System (RUCAS). This tool, originally developed by ODOT for their OReGO

program, provides data monitoring, performance tracking, participant information, and revenue traceability monitoring for RUC revenues. As part of the PMO development, the RUCAS should be evaluated and modified as necessary to support management functions across each participating state and their respective RUC projects. The RUCAS should be provided to each participating state as part of a "beta" licensing agreement where the states can evaluate the RUCAS, determine the relevance to their unique state needs, and provide recommendations for update or customization to ODOT.

8.1.2 Working Groups

During the interview process, several of the participating states identified the need to establish working groups. These working groups would encompass members from each RUC West state and focus on creating policies, rules, and regulations related to the operation and administration of the Regional RUC Program. Each of these working groups would report directly to the RUC West Steering Committee and oftentimes work collaboratively with other working groups in establishing policies and regulations. Some of the working groups, their function, and potential compositions are listed in the subsequent subsections.

8.1.2.1 Standards and Certification Working Group

The Standards and Certification working group would be responsible for developing guidance on the technical and business certification of business partners and other RUC service providers. The working group would research and develop standards and specifications for RUC Technology components, establish certification processes, identify pass/fail criteria, establish or procure a certification provider, and evaluate the results of the technical and business certifications. This working group would consist of members of each participating state, with emphasis on staff who have technical expertise, or business function and financial certification and auditing capabilities.

8.1.2.2 Enforcement and Collections Working Group

The enforcement and collections working group would focus on formulating standards and guidance on enforcement and collection procedures, coordinate and oversee enforcement activities, and establish policies and penalties related to late payments, fraudulent activity, and business partner financial responsibility. This working group would consist of members of each participating state, preferably those with experience in enforcement and collections, such as DMV and Public Safety.

8.1.2.3 RUC Rate Setting

This working group would focus on evaluating the per-mile rates from each participating state, adopting a standard calculation format for per-mile rates, evaluating the program revenues and costs, and establish the rate schedules for each business partner. As part of this effort, the RUC Rate Setting Working Group would evaluate and formulate the business rules and policies necessary to establish the rates for the program, as well as periodically review the in-place rates and adjust as necessary at the direction of the RUC West Executive Committee. This working group would consist of members of participating states' Departments of Revenue, Departments of Transportation, Transportation Commissions (where appropriate), economists, and state legislators involved in transportation funding.

8.1.2.4 Contracting and Procurement

This working group would be responsible for administering the contracting mechanisms for each procured service (i.e. business partners, financial clearinghouse, consultant support, etc.). They would develop a common set of contracting terms and conditions that would be used by all RUC West participating states to procure those services necessary for participating in the Regional RUC program. This working group would consist of state procurement officials, legal review and analysts, contract law professionals, and program administrators.

8.1.2.5 Communications

This working group would focus on the messaging, information, and themes related to communicating certain aspects of the Regional RUC program to legislators, transportation officials, the public, and media outlets. They would conduct research polling and surveys to capture the key messaging themes and issues, develop methods for disseminating information, creating communications content (i.e. websites, press releases, media kits, etc.), and working with each participating state to deploy consistent messaging related to RUC, the Regional RUC program, and (for those drivers in the program) program updates and participation reminders, as well as centralized information and customer service. This working group would consist of members of each participating state's public information office and possibly legislative affairs. To prevent duplicative work, this group could also be replaced with the existing RUC West Communications Task Force.

8.1.2.6 Financial Analysis and Auditing

This working group would ensure the accurate and timely transfer of RUC revenues to each participating state. They would be the entity responsible for auditing business partners, the regional clearinghouse, and other service providers to ensure their records, processes, and transactions fully comply with established standards and accounting principles. They would also be responsible for evaluating the financial performance of the Regional RUC program, conducting financial analyses, and making recommendations to the RUC West Executive Committee and other working groups on ways to improve the overall efficiency and financial stability of the Regional RUC program. Members of this working group would consist of members from Departments of Revenue or Commerce, business and financial analysts, and economists.

8.1.2.7 Research and Innovation

This working group would focus on researching and evaluating new technologies and methods for capturing data and assessing and collecting RUC. They would evaluate new marketing innovations and identify ways to integrate these new innovations into the Regional RUC program. They would also lead the deployment of any pilot demonstrations related to integrating innovation and work with the other working groups to identify criteria and metrics for evaluating and communicating the results of these pilots. Members of this working group should consist of members of technology departments, departments of innovation, big data/smart cities, and innovative finance methods.

8.1.2.8 Program Performance and Evaluation

This working group would evaluate the overall performance of the Regional RUC program, and provide recommendations to the RUC West Executive Board and other working groups on ways to improve performance. They would evaluate technical and financial reports, review customer service logs,

conduct driver opinion surveys, identify trends, and make recommendations on ways to improve the overall program. To maintain objectivity, representatives of this working group should not have an in-depth understanding of the program, but can analyze program data to identify trends and make recommendations for improvement.

8.1.2.9 Policy Development

This working group would work with the RUC West Executive Board and other participating state executives to create policies related to furthering RUC. They would meet with state legislators (and federal legislators as appropriate) to identify policy needs, draft needed policies, and then work with legislators to sponsor and ratify these draft bills into legislation. They would also work with members of the Communications Working Group to inform legislators and key officials on RUC West activities, status of the Regional RUC program, and address any unique communications needs or concerns from legislators. Members of this working group would primarily consist of members of state legislative affairs departments, as well as state transportation executives.

8.2 PARTICIPATING STATES

Each of the participating states will have a role in the Regional RUC program. Those states who have existing projects (either pilot demonstrations or fully implemented programs) should work directly with the Regional RUC PMO and the RUC West Steering Committee on their respective project status, recommendations, development of policies, and data transfers and reporting. As more RUC West states become involved in RUC programs, the specific roles and responsibilities of each participating state will evolve. At a minimum, each participating state should be communicating and coordinating with RUC West on how the plans, policies, and activities within each of their respective programs may affect the overall Regional RUC program. Initially, some of the anticipated responsibilities of each participating state include:

8.2.1 Discrepancies and Dispute Resolution

Each state deploying a RUC system under the auspices of the RUC West program shall abide by the business rules established for the handling of discrepancies of various types that can arise in the operation of a RUC system. These may include, but are not limited to, discrepancies in the calculation and/or transfer of monies at any level of the program, operational discrepancies within a state, or between multiple states, or discrepancies regarding business partner operations.

If discrepancies cannot be resolved within a reasonable time, states should agree to use the Dispute Resolution Procedures established by RUC West to resolve any differences. This should be included in agreements between RUC West and the various states. However, it will be necessary to ensure that such a requirement is consistent with the laws of the various states and RUC West.

8.2.2 Auditing

Each state deploying a RUC system under the auspices of the RUC West program shall abide by the business rules established for auditing all aspects of its RUC operation. While the emphasis in auditing will be on inter-state transfers, all aspects of a state's RUC system will likely impact auditing and it is necessary for minimal auditing standards to be established for proper business functioning.

8.2.2.1 Certification

Each state deploying a RUC system under the auspices of the RUC West program shall abide by the business rules established for certifying various RUC systems as well as business partners and other service providers.

8.2.3 Adjudication

If adjudication is necessary between the states and/or between states and business partners, and/or between states and customers, each state deploying a RUC system under the auspices of the RUC West program shall abide by the business rules established for adjudication. Prior to any proceedings being brought in a court with jurisdiction, all states agree to participate in mediation as outlined in the RUC West business rules. If litigation becomes necessary, each state agrees to follow rulings made by courts with proper jurisdiction. RUC West and participating states should verify that this type of agreement is allowed by the laws of the various states.

8.3 Other Related Activities

8.3.1 Enforcement and Compliance

Enforcement and compliance must be taken into consideration to explore how each state will enforce RUC payments and compliance from users. There are two overarching subcategories to enforcement and compliance for consideration: user enforcement and business partner enforcement.

Enforcement and compliance entails the efforts taken to ensure the users are accurately reporting mileage and promptly paying any assessed RUC fee. While it is expected that enforcement and compliance will be mainly the responsibility of the business partners, the requirements for user enforcement and compliance will be developed by RUC West and the participating states.

8.3.2 Contract Management

Contract management involves overseeing all procurement and contracting activities related to the RUC West. Currently, Oregon DOT is providing contract management support, including the procurement of consultants and presumably the future initial procurement of business partners and the regional clearinghouse. As the Regional RUC program evolves, RUC West may choose to establish a centralized contracting entity, supported by multiple procurement agents from the participating states. Additionally, the state interviews identified the desire to transfer ultimate contracting responsibilities of the business partners to the regional clearinghouse, who would be responsible for the certification, contracting, and performance management of each of the business partners.

8.3.3 Certification and regulations

It will be necessary to develop standards and requirements for almost all aspects of a RUC system. Standards are necessary so that RUC systems in various states can properly communicate with each other and elements of any given RUC system are compatible operating with other RUC systems. Without standards relating to communications protocols, calculation of RUC fees, the coordination between various states for differing RUC fees, standards for determining location of the vehicle for the calculation of RUC, and standards for the elements of the RUC system that are provided by RUC West, the

participating states, business partners, and users, it will not be possible for RUC West to integrate various RUC systems into the Regional RUC program.

Establishing standards is the first step. As various state systems come online in the Regional RUC system, and additional options are developed in the various RUC systems, it will be necessary to determine if the standards are being appropriately implemented. Certification of the various systems will be necessary to ensure that the various standards are in place so that system compatibility can be maintained. It is likely that RUC West as an organization will need to take the lead in certification processes. Certification can either be performed by agencies within the various states, or by using a private entity.

Standards and certification will be necessary for numerous aspects of the RUC system including:

- **System and Network Integrity and Reliability** – These standards relate to how reliable the business partner and regional clearinghouse systems are and how long they can maintain standard operations without network downtime.
- **Interoperability and Data Formats –** These standards relate to how business partner and regional clearinghouse data is formatted for ingestion and analysis by participating state systems. It also defines the interoperability interfaces between vendor systems, as well as between an individual vendor's subsystems.
- **Data Security and Protection of PII** – These standards relate to how the business partners and the regional clearinghouse should protect their existing networks against unauthorized access and how data is protected, especially around the protection of PII.
- **Enforcement and Collections** – These standards relate to how the business partners should conduct enforcement and collections of RUC revenues. These standards should rely heavily on industry best practices, but also incorporate state policies and statutes where appropriate.
- **Hardware and Software Performance –** These standards relate to how well vendor-provided hardware and software interact with user vehicles and devices. They should focus on operating within the prescribed parameters while not impeding normal operations. Additionally, human factors engineering and possibly Americans with Disabilities Act (ADA) standards should also be considered when evaluating and certifying hardware and software.
- **Service Levels** – These standards focus on maintaining reliable and acceptable levels of customer service. They should address response times, escalation procedures and times, and any metrics for issue resolution.
- **Reporting** – These standards should define how reports will be provided from business partners and the regional clearinghouse. They should identify the required data formats, interoperability, and the ability for financial reports to support audits showing full traceability between the user's individual trip, all the way through funds deposits and reconciliations.
- **Financial Performance and Viability** – These standards relate to a business partner's overall financial health, including their ability to support continuous operations, RUC revenue payments, and liquidated damages as necessary.

8.3.3.1 Initial Certification (Pre-Contracting)

Initial certification includes a full testing and audit of a vendor system against the prescribed requirements and standards prior to entering into a contract for the Regional RUC program. This certification process should entail full testing and compliance with each requirement, business rule, and contracting term provided. Full compliance should be required prior to entering into a contract for the Regional RUC program. Generally, this process involves several phases of audits and testing, with remediation actions and full compliance with those actions being required prior to executing a contract. Some of the potential categories for initial certification include:

- **Unit Testing –** Testing of individual hardware components and subsystems against prescribed requirements and industry standards.
- **Integration Testing –** Testing of vendor subsystems into the overall system, focusing on system-to-system and subsystem interoperability, as well as data formats within the prescribed interfaces.
- **System Acceptance Testing** – Full operational testing of vendor systems, including interfacing with other vendor systems.
- **Financial Auditing and Investigation –** Review of vendor financial records, auditing financial accounts, and reviewing compliance with GAAP recommended standards and results of a SSAE-18 compliance audit.
- **Business Evaluation –** Evaluating a company's overall financial health to ensure longevity and safe and secure handling of RUC fees to include their ability to enter into agreements with participating state treasuries and their associated banking institutions.

8.3.3.2 Recurring Certification (Post-Contracting)

Over the course of the Regional RUC program, the contracting entity or the participating states may require recurring certification of vendors. This may be based on subpar performance by the vendor, the introduction of new hardware, software or systems by the vendor, the introduction of new requirements by RUC West and the participating states, or simply spot audits requested by RUC West to ensure continued compliance with the program requirements and conditions. Recurring certification may involve any or all facets of the initial certification process. The vendor undergoing recurring certification will be required to fully comply with the certification and could face penalties or removal from the program if certification conditions are not met.

9 FAILURE SCENARIOS

The failure scenarios presented in this section represent potential issues associated with the hardware and technology systems used for the Regional RUC program. They represent system or subsystem failure scenarios and the potential impacts of those failures. Process failures are not covered in this section but should be evaluated as administrative processes are developed over the course of the program.

9.1 USER-ORIENTED FAILURE SCENARIOS

User-oriented failure scenarios are likely to be the most common failures in any RUC system. This can range from simple device installation issues, to data communications and accuracy issues from embedded systems.

Mitigation and correction actions for user-oriented scenarios will depend on the type of failure.

For MROs that use wireless communications to transmit data (plug-in devices, embedded telematics, etc.), loss of communication will be a common failure. This will often be a temporary failure that will remedy once the vehicle reaches an area more conducive to cellular communication. The MRO should be equipped with sufficient electronic storage to collect trip data for a reasonable period of time. A minimum of one week of trips is recommended and additional storage for up to a month is highly preferred. If the business partner has not received communication from a particular vehicle for a predetermined period of time, perhaps three days, the business partner should have the ability to "ping" the MRO to verify the system is communicating properly. Should the ping be unsuccessful, the user should be contacted to assist in correcting the issue.

A second source is the loss of communications between the MRO and the vehicle through the data connection buss (either the vehicle's OBD-II port or the embedded Computer Area Network (CAN) buss within the vehicle). Under this circumstance, recovery may be difficult and mileage may need to be estimated.

For manual reporting systems, the number of potential failures is significantly reduced. The most likely are failure to report in a timely manner or failure to accurately report for manual options. The business partner should have the ability within its system to identify potential failures to report so that they can take appropriate corrective actions.

For any type of failure, unless and until the fuel tax is completely replaced by a RUC system, almost all failures can be mitigated to some extent by the payment of the fuel tax, with no credit given for fuel tax payments. For this reason, it is recommended that credit for the fuel tax paid be made when miles are reported, not when fuel is purchased.

9.2 BUSINESS PARTNER FAILURE SCENARIOS

Business partner failure scenarios are likely to be more serious to the integrity of the overall RUC system, but they should be significantly easier to quickly identify that the failure has occurred so that remedial action can be quickly taken.

As with User-oriented failure scenarios, loss of communication is a potential issue. This could be due to the failure of a third-party phone or data communications system used by, but not associated with, the business partner. A second form of failure would be failure within the business partner's system or network. In either case, if the plug-in devices have sufficient storage, as outlined in the section above, recovery from either type of communication failure, provided it is not an unusually extended failure,

should not be an issue. As more and more data-centric networks migrate to cloud computing architectures, the risk of a communications failure impacting daily operations is minimized.

As with any system that stores a significant amount of financial data, the potential for hacking will exist for business partners. For this reason, state-of-the-art safeguards should be in place to prevent unauthorized access to account information. ISO 27001 provides recommended safeguards to maintain data integrity and operations.

Loss of data could be a catastrophic failure. As with data security, state-of-the-art data backup, coupled with a robust Continuity of Operations (COOP) plan must be in place to prevent data loss and support data restoration in the event of a catastrophic failure. Business partners shall be required to provide safeguards from all types of data loss risk.

9.3 REGIONAL CLEARINGHOUSE FAILURE SCENARIOS

Regional clearinghouse failure scenarios are a combination of the failure scenarios that could be associated with the business partners (network outages, system failures, lack of data, etc.). If communications are lost for whatever reason with business partners, the systems employed should have sufficient storage to accommodate large amounts of data. Once communications are restored, data transfer can resume.

Failures can also occur through breakdowns in the clearinghouse hardware and software as well as from failure to follow the RUC West business rules and operating procedures. As with monitoring of administrative systems, regular auditing, with oversight by RUC West should occur.

APPENDIX A: RELEVANT STANDARDS

One of the primary goals of the Regional RUC Program is to create a system architecture based on relevant technical and business standards. Given the previous efforts of RUC West and the participating states who have developed requirements for their pilot demonstrations, several standards have already been identified and included in requirements documentation. Some of the standards identified and previously used include (but are not limited to):

TECHNOLOGY STANDARDS AND REFERENCES

- **Internet Protocol (IP)** – IP is the principal communications protocol within the Internet protocol suite for relaying datagrams across network boundaries.
- **Hypertext Transfer Protocol (HTTP)** – HTTP is an application protocol for distributed, collaborative, and hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web and serves as the application layer for RUC communications.
- **JavaScript Object Notation (JSON)** – JSON is data-interchange format that is easy for humans to read and write and easy for machines to parse and generate. JSON is based on a subset of the JavaScript Programming Language, Standard ECMA-262 3rd Edition - December 1999. JSON is a text format that is completely language independent but uses conventions similar to the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others. Within Internet communications, the OReGO interface control document employs JSON messages because they are an industry standard for human readable, yet relatively low overhead communications.
- **Onboard Diagnostics (OBD II) Standard**s - This standard provides engine control and monitoring for parts of the chassis, body and accessory devices, as well as the diagnostic control network of vehicles. All cars built since January 1, 1996 must be OBD II compliant. There are five basic OBD-II protocols in use. In general, Chrysler products, European and most Asian imports use ISO 9141 circuitry or KWP2000. GM cars and light trucks use SAE J1850 VPW (Variable Pulse Width Modulation). Ford vehicles use SAE J1850 PWM (Pulse Width Modulation) communication patterns. Control Area Network (CAN) is the newest protocol added to the OBD-II specification. CAN is mandated for all 2008 and newer model years.
- **Representational state transfer (REST)** - REST or RESTful web service protocols provide interoperability between computer systems on the Internet. A REST-compliant Web service allows requesting systems to access and manipulate textual representations of Web resources using a uniform and predefined set of stateless operations. Requests made to a resource's URI will elicit a response that may be in XML, HTML, JSON or some other defined format.
- **Transmission Control Protocol (TCP)** – TCP is a main protocol that provides reliable, ordered, and error-checked delivery of a stream of octets between applications running on hosts communicating by an IP network.

- **Transport Layer Security & Secure Sockets Layer (TLS/SSL)** – TLS/SSL are cryptographic protocols that provide communications security over a computer network. There are several variations used in applications such as web browsing, email, Internet faxing, instant messaging, and voice-over-IP (VoIP). Websites use TLS to secure communications between servers and web browsers and provide privacy and data integrity between two communicating computer applications.
- **Wireless Communications Standards** – There are different standards in place for wireless communications and technologies can generally be divided into four categories, two of which are pertinent to RUC systems. A Personal Area Network (PAN) is used for communication among computer devices (including telephones and personal digital assistants) that are close to one person, typically with a reach of a few meters. Bluetooth, (IEEE 802.15.1) is an industrial specification for wireless PANs. A Wireless Local Area Network (WLAN) links two or more computers through spread-spectrum technology based on radio waves to enable wireless communication between devices within a limited area. IEEE 802.11 is the family of WLAN standards and includes six over-the-air modulation techniques, the most popular of which are b, a, and g amendments to the original standard. If a BP intends to remotely access ODOT or Caltrans data then they will be required to identify their use of industry supported access standards within 802.11 (i.e. 802.11a, 802.11b, 802.11e, 802.11g, 802.11i, 802.11n)

Financial Standards and References

- **Generally Acceptable Accounting Principles (GAAP)** – GAAP is a common set of accounting principles, standards and procedures that companies follow when compiling financial statements. It is a combination of authoritative standards (set by policy boards) and the commonly accepted ways of recording and reporting accounting information. GAAP improves the clarity of the communication of financial information and must be employed by RUC business partners.
- **Statement on Standards for Attestation Engagements (SSAE) 18** – This is a new standard promulgated by the American Institute of Certified Public Accountants Auditing Standard Board, replacing SSAE-16 and SAS 70. It is relevant for service organizations, particularly ones that are engaged in the handling of others' moneys. The controls examined in order to issue a service organization control (SOC) report include data security such as physical security at a data center among others. SSAE 18 requires that controls be in place to monitor the effectiveness of internal controls at subservice organizations.
- **Standard document and information formats** include pdf, MS Excel, MS Word and CSV as specified by RUC West.

Information Technology Security Standards and References

- **Advanced Encryption Standard (AES)** – AES is a specification for the encryption of electronic data. It is defined in FIPS PUB 197: Advanced Encryption Standard (AES) and ISO/IEC 18033-3: Information technology – Security techniques – Encryption algorithms – Part 3: Block ciphers.

AES will be used for data encryption within RUC systems and business partners must provide their policy for encryption for each level where state data will reside (file, database, disk, etc.). This policy should include the procedure for preventing unauthorized access. Business partners shall indicate if they use Advanced Encryption Standard (AES) 128-bit or stronger.

- **Payment Card Industry Data Security Standard (PCI DSS)** - PCI is an information security standard for organizations that handle major branded credit cards. It is mandated by the card brands and administered by the Payment Card Industry Security Standards Council. Validation of compliance is performed annually, either by an external Qualified Security Assessor (QSA) or by a firm specific Internal Security Assessor that creates a Report on Compliance for organizations handling large volumes of transactions, or by Self-Assessment Questionnaire (SAQ) for companies handling smaller volumes. Business partners must provide proof of compliance with security standards required for the payment options they provide (for example, PCI 3.0 for transactions).
- **International Standards Organization (ISO) 27001 Information Security** – ISO 27001 is a specification for an information security management system (ISMS). An ISMS is a framework of policies and procedures that includes all legal, physical and technical controls involved in an organization's information risk management processes. This standard defines the physical, virtual, and network related components and processes needed to safeguard information against unauthorized access and data dissemination.

STATE STATUTES

- **Oregon Revised Statute (ORS) 319.915 – Restrictions on Information**
    - If a business partner wants to be able to disclose Personally Identifiable Information (PII), per ORS 319.915(3)(a)(F), to an entity expressly approved to receive the information by the registered owner or lessee of the subject vehicle (i.e. the RUC Payer), the CAM shall obtain this approval through a unique agreement with a separate section of terms and conditions with its own approval step.
    - If the CAM wants to offer the retention of location and daily metered use information by obtaining RUC Payer consent (per ORS 319.915[4][a][B]), the CAM shall obtain this consent to data retention through a unique agreement with its own approval step.
    - Any RUC program Terms and Conditions required by the CAM must be obtained through a unique agreement with separate terms and conditions with its own approval step.

- **California Constitution Article XIX (19) – Motor Vehicle Revenues (condensed)**
    - Sec. 1. -- The Legislature shall not borrow revenue from the Highway Users Tax Account, or its successor, and shall not use these revenues for purposes, or in ways, other than those specifically permitted by this article.
    - Sec. 2. -- Revenues from taxes imposed by the State on motor vehicle fuels for use in motor vehicles upon public streets and highways, over and above the costs of collection and any refunds authorized by law, shall be deposited into the Highway Users Tax Account (Section 2100 of the Streets and Highways Code) or its successor, which is

hereby declared to be a trust fund, and shall be allocated monthly in accordance with Section 4, and shall be used solely for the following purposes:

- Sec. 3. -- Revenues from fees and taxes imposed by the State upon vehicles or their use or operation, over and above the costs of collection and any refunds authorized by law, shall be used for the following purposes:
  - (a) The state administration and enforcement of laws regulating the use, operation, or registration of vehicles used upon the public streets and highways of this State, including the enforcement of traffic and vehicle laws by state agencies and the mitigation of the environmental effects of motor vehicle operation due to air and sound emissions.
  - (b) The purposes specified in Section 2 of this article.
- Sec. 7. -- If the Legislature reduces or repeals the taxes described in Section 2 and adopts an alternative source of revenue to replace the moneys derived from those taxes, the replacement revenue shall be deposited into the Highway Users Tax Account, dedicated to the purposes listed in Section 2, and allocated to cities, counties, and areas of the State pursuant to Section 4. All other provisions of this article shall apply to any revenues adopted by the Legislature to replace the moneys derived from the taxes described in Section 2.

- **California Senate Bill 1077 (2014), California Statute Chapter 835 (2014)**

  This legislation required the Chair of the California Transportation Commission (CTC) to create a Road Charge Technical Advisory Committee (TAC) in consultation with the Secretary of the California State Transportation Agency (CalSTA). The TAC was assigned the task of making recommendations (to CalSTA) on the design of a pilot program to explore the benefits and risks of "road charge" as an alternative to the fuel taxes and to also consider providing recommendations on the criteria to be used to evaluate the pilot program. The bill also required CalSTA, based on the TAC recommendations, to implement a pilot program to identify and evaluate issues related to the potential implementation of a road charge program.

Groups Represented in TAC Membership

- Telecommunications industry
- Highway user groups
- Data security and privacy industry
- Privacy rights advocacy organizations
- Regional transportation agencies
- National research and policymaking bodies (e.g., Transportation Research Board, American Association of State Highway and Transportation Officials)
- Members of the Legislature
- Other relevant stakeholders as determined by the chair

In 2015, the 15-member TAC, representing a broad spectrum of diverse interests, publicly convened monthly throughout the State to discuss various policy and technical issues related to designing and implementing a Road Charge Pilot Program (RCPP). SB 1077 was the guiding framework that provided policy, design criteria, and privacy protections guidance to assist with the TAC's deliberations and recommendations, which included:

- Analyzing alternative means of collecting road usage data, including at least one alternative that does not rely on electronic vehicle location data
- Collecting a minimum amount of personal information, including location tracking information necessary to implement the California Road Charge Program
- Ensuring that processes for collecting, managing, storing, transmitting, and destroying data are in place to protect the data integrity and safeguard driver privacy

In addition, gathering public comment on issues and concerns related to the RCPP was critical to its design. The TAC held 12 public meetings throughout the state, allowing not only California residents to provide direct feedback, but also more than 400 stakeholder groups and elected officials representing California. Furthermore, public surveys and focus groups were conducted to gain a baseline understanding of the public's views and opinions on transportation funding and their reaction to road charge as a replacement for the fuel taxes. Throughout the year-long process, the TAC, CTC, and Caltrans also briefed reporters and newspaper editors to elicit help in providing full transparency to the public.

The TAC developed the following recommendations on the design and evaluation criteria for an RCPP, presenting them to the Secretary of the State Transportation Agency (CalSTA) in December 2015:

- **5,000 participating vehicles statewide**—Include a broad cross-section of individuals, households, businesses, and at least one government agency.
- **Diversity in vehicle types**—Include vehicles that reflect the fleet currently using California's road network.
- **Commercial and state account managers**—Offer drivers a choice in account managers.
- **Multiple mileage reporting methods**—Offer drivers a choice in either manual or automated mileage recording methods, including one that does not require any mileage reporting.
- **Protection of privacy and data security**—Develop a pilot that features specific governance, accountability, and legal protection approaches for protecting privacy and the security of collected data.

- **California Senate Bill 1 (2017), California Statute Chapter 5 (2017)**

The California State Legislature passed SB 1 in early April 2017 to increase transportation funding. The bill creates the Road Maintenance and Rehabilitation Program to address deferred maintenance on the state highway system and the local street and road system. The additional funds are achieved via the following:

- Increase the base excise tax on gasoline by 12 cents per gallon (bringing it to 30 cents), with an inflation adjustment. This takes effect on November 1, 2017.
- Eliminates the annual adjustment required by the "gas tax swap" of 2010 and re-establishes the price-based excise tax at its original rate of 17.3 cents, with an inflation adjustment. This takes effect on July 1, 2019.

- Increase the diesel excise tax to 20 cents per gallon, with an inflation adjustment. This takes effect on November 1, 2017.
- Add new transportation improvement fee (as part of the Vehicle License Fee) with a varying fee between $25 and $175 based on vehicle value, with an inflation adjustment. This takes effect January 1, 2018.
- Add a new $100 annual vehicle registration fee for zero-emission vehicles model year 2020 and later, with an inflation adjustment.