



Appendix B-7: Mock Standards Committee

December 2023

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TABLE OF CONTENTS

1.0	Executive Summary	1
2.0	BACKGROUND AND OBJECTIVES.....	1
2.1	Introduction.....	1
2.2	Previous Efforts	2
2.3	Committee Purpose and Objectives.....	3
2.4	Standards, Certifications, Requirements and Regulations.....	3
2.5	Standards Development Principles	4
2.6	Standardization Process	5
3.0	RUC STANDARDS	7
3.1	Elements of RUC.....	7
3.2	Identification of Possible RUC Standards	11
3.3	Prioritization of Possible RUC Standards.....	11
3.4	Example Standards.....	21
4.0	Jurisdictional Identifier Standard	22
4.1	Standard.....	22
4.2	Supporting Information and Clarifications	22
5.0	Vehicle Classification Standard.....	25
5.1	Standard.....	25
6.0	RUC STANDARDS DEVELOPMENT COMMITTEE	28
6.1	Potential Standards Setting Organizations	28
6.2	Committee Leadership	28
6.3	Committee Membership Expertise	31
6.4	Committee Structure	33
6.5	Committee Charter	33
6.6	Committee Operating Procedures.....	33
7.0	FINDINGS AND LESSONS LEARNED.....	35
7.1	Findings.....	35
7.2	Committee Accomplishments.....	35
7.3	Lessons Learned.....	36
7.4	Next Steps.....	36

FIGURES

Figure 1: The Elements of RUC	7
Figure 2: Illustration of Prioritization of Possible Areas for RUC Standardization	13

TABLES

Table 1: Possible Areas of Standardization Across the Nine RUC Functions.....	13
Table 2: Possible Areas for Best Practices Across the Nine RUC Functions	18
Table 3: JurisID Codes for RUC Jurisdictions	22
Table 4: Vehicle Classification Standard.....	25
Table 5: Opportunities and Challenges of Different Organizational Types	29
Table 6: Necessary Areas of Expertise for Development of Identified Potential Standards.....	32

GLOSSARY

TERM	DEFINITION
AAMVA	American Association of Motor Vehicle Administrators
DOL	State of Washington Department of Licensing
EV	electric vehicle
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
IBTTA	International Bridge Tunnel and Turnpike Association
IFTA	International Fuel Tax Association, Inc.
IRP	International Registration Plan, Inc.
ISO	International Organization for Standardization
MPG	miles per gallon
RUC	road usage charge
U.S.	United States
VIN	vehicle identification number
VMT	vehicle miles traveled
WSDOT	Washington State Department of Transportation
WSTC	Washington State Transportation Commission
WTO	World Trade Organization

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PREFACE

Forward Drive was a research, development, demonstration, and public engagement effort of the Washington State Transportation Commission. The project sought to advance understanding of and implementation pathways for per-mile road usage charging (RUC) as an alternative to motor fuel taxes and alternative fuel vehicle registration surcharges. The project aimed to address several key issues for RUC including principally equity, user experience, and cost of collection. As reported in Volume 1, the project unfolded in several stages. A series of appendices contain more detailed results. These appendices are organized as explained and illustrated below.

Appendix A. Forward Drive began with research spanning several activities including financial analysis, equity outreach and analysis, user experience research, and cost of collection reduction workshops (Appendices A-1 through A-4, respectively). The purpose of the research was to explore the financial, equity, user experience, and cost impacts of RUC under a variety of deployment scenarios. This research informed the design of experience-based simulations and pilots of various elements of a RUC program.

Appendix B. The research stage led directly to the design and development of simulations and pilots of RUC program elements spanning several areas to reflect the multiple objectives and research findings. The centerpiece of the simulation and pilot testing stage was an interactive simulation of RUC enrollment, reporting, and payment. As described in Volume 1, the simulation offered over 1,100 Washingtonians an opportunity to experience RUC in as little as a few minutes, followed by a survey about their preferences and opinions. The detailed results of the simulation survey and the measurements of the simulation itself are presented as separate reports (B-1 and B-2, respectively).

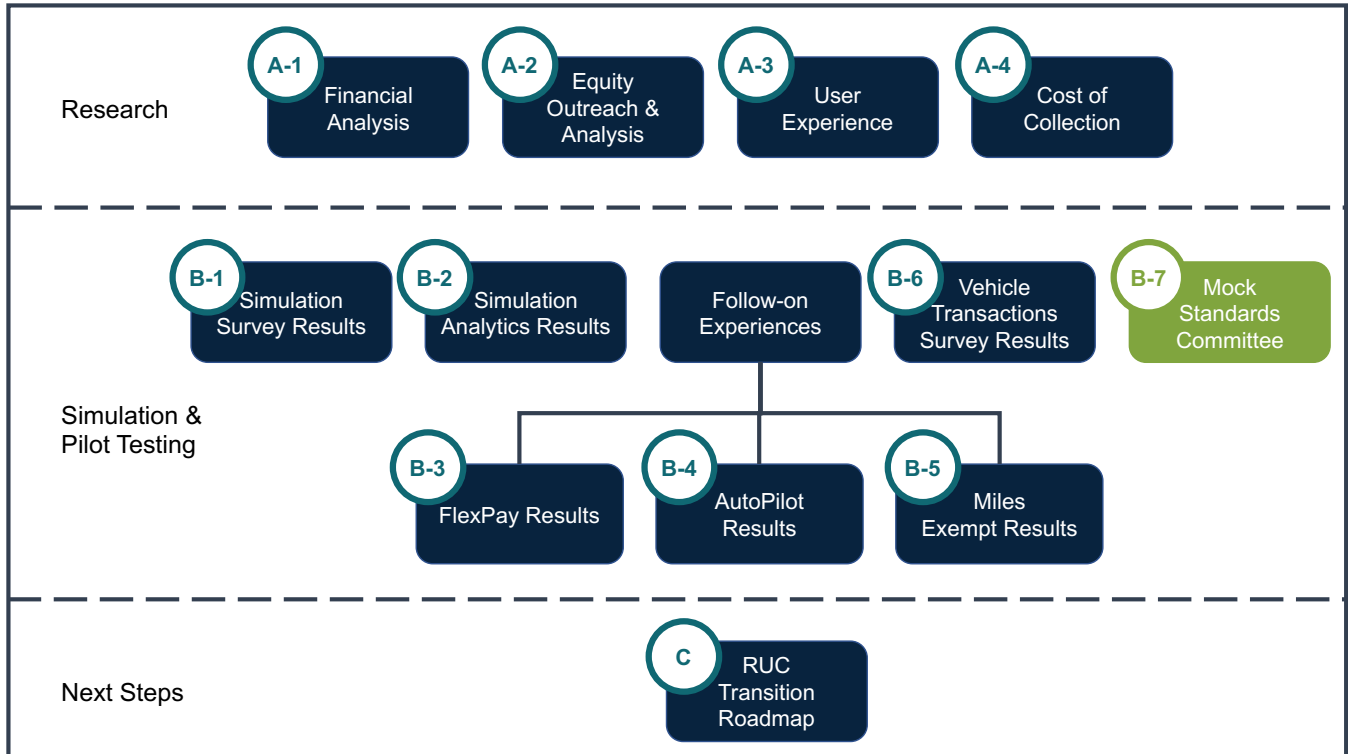
Within the simulation, participants could opt into one of three follow-on experiences, each designed to further test a specific feature of RUC of interest to Washington stakeholders and policymakers:

- FlexPay tested installment payments, allowing participants to pay their RUC over four payments instead of all at once (B-3).
- AutoPilot tested using native automaker telematics to report road usage as an alternative to self-reporting or other technology-based approaches to reporting (B-4).
- MilesExempt tested a self-reporting approach for claiming miles exempt from charges, such as off-road and out-of-state driving (B-5).

The simulation and pilot testing stage also included a statewide survey of Washingtonians' vehicle transactions designed to understand existing transactions and preferences and possibilities for how RUC reporting and payment could potentially be bundled with such transactions (B-6).

Lastly, the simulation and pilot testing stage included a mock standards committee of RUC experts from jurisdictions and industry. The committee simulated the process of creating standards for RUC to support cost reduction, enhanced user experiences, and multi-jurisdictional interoperability (B-7).

Appendix C. Appendix C details a transition roadmap for RUC in Washington drawing on the results of the research and simulation and pilot testing, as well as the updated recommendations regarding RUC implementation from the Commission to the Washington Legislature in 2022.



Appendix B-7 covers detailed results from the Mock Standards Committee, including methodology, standards developed, and paths forward for further development of RUC standards.

1.0 EXECUTIVE SUMMARY

As part Washington’s road usage charge (RUC) *Forward Drive* project, the Washington State Transportation Commission (WSTC) convened a Mock RUC Standards Committee. The idea for a standards committee emerged from a series of multi-jurisdictional workshops conducted in 2021 focused on approaches for reducing costs of RUC collection. Workshop participants identified standards as one way to reduce costs both for vendors servicing multiple jurisdictions in the RUC market and for agencies responsible for implementing and operating RUC systems. This cost reduction stems from the identification of specific requirements necessary to comply with a standard, which provides vendors and agencies a roadmap to completion of the standardized task. The committee’s purpose was to examine the opportunity for developing standards for RUC programs and systems, identify possible areas for standardization, simulate the process of creating a standard for RUC, and create structures and processes for a future RUC standards committee.

The Mock RUC Standards Committee convened three times in hybrid meetings. Committee members included four representatives of jurisdictions engaging in RUC programs or research (Hawaii, Oregon, Utah, Washington), two members with RUC vendor expertise, one representative of the Federal Highway Administration (FHWA), one member from the American Association of Motor Vehicle Administrators (AAMVA), and one member from the Eastern Transportation Coalition. These members provided relevant expertise from diverse perspectives and participated actively in the work of the Committee.

The Committee identified and determined the functions of RUC programs suitable for standardization and others that should be left to jurisdictional or vendor discretion. Jurisdictional and industry standards can lead to more efficient operations but must be considered carefully to ensure they do not unduly stifle innovation or impinge upon legal prerogatives and policy choices that should remain within the powers of each jurisdiction to decide. The Committee weighed these issues when composing an initial list of possible items for standardization. The initial list contained 72 possible areas for standardization, later reduced through combining some areas and recategorizing others as best practices rather than standards.

The Committee completed the process of developing two standards: one for standardizing jurisdictional identification (“JurisID”) that heavily leveraged Oregon’s efforts, and one for standardizing elements of vehicle classification and identification for RUC purposes. The committee demonstrated the typical process for creating a standard, including identifying the need and utility of a specific standard, researching existing rudiments of the standard that could inform the standard’s development, developing detailed features for the standard, and reducing the proposed standard to writing.

The results of this Committee’s efforts offer guidance to a future RUC standards committee and associated subcommittees. The Committee adopted two standards, but because of the “mock” nature of the process it fell short of official or widespread adoption. Instead, the process offers a useful model for future RUC standards committees to follow. In addition, the list of proposed standards and the two specific standards adopted offer a roadmap. Finally, the Committee suggested committee and subcommittee structures aligned with potential standards for future development.

The development of RUC standards can support implementation of RUC systems that are cost-efficient to administer, easy for vendors to support, interoperable across jurisdictions, and simple for participants to interact with. The process demonstrated and guidance offered by this Committee can be built upon in future efforts to realize these benefits.

2.0 BACKGROUND AND OBJECTIVES

2.1 Introduction

In 2013, Oregon became the first state to enact a road usage charge (RUC) program into law. Oregon's program, OReGO, launched in 2015. A central feature of Oregon's enabling legislation was an open market for RUC administration by private sector providers. Between 2013 and 2015, the Oregon Department of Transportation (ODOT) developed and published open standards, including a system requirements specification, interface controls document, and business rules. These documents collectively define the standards for RUC in Oregon, such as the conditions under which mileage data must be collected from vehicles, the formats by which data must be transmitted among system components and to ODOT, and the rules for collecting funds from vehicle owners and remitting them to the state. Any firm wishing to provide the service of collecting RUC from Oregon drivers must adhere to these documents. ODOT has evaluated and certified several firms as qualified to collect RUC from drivers in Oregon. Importantly, under this vendor certification-based approach, vehicle owners are the direct customers to their chosen vendors. ODOT merely qualifies vendors to participate in the market, audits them for compliance, and permits them to keep a portion of the revenue they collect in exchange for their services.

Since 2015, two other states—Utah and Virginia—have enacted RUC programs. Although they borrowed heavily from the Oregon approach, the Utah and Virginia programs are not identical to Oregon's. Importantly, Utah and Virginia chose not to follow an open market approach. Instead, each state conducted a competitive procurement process and selected a single vendor to run their respective programs under exclusive, time-limited contracts.

In parallel, in 2012, Washington's legislature directed the WSTC to lead RUC exploration activities, including research, pilot testing, and policy development. Through this process, among other things, the Department of Licensing (DOL) was identified as the most likely, best-fit operating agency for a RUC program should one be enacted in Washington. The 30-member Washington RUC Steering Committee has also identified an open market approach as desirable for Washington, and cost of collection as a critical issue to address through research.

In 2021, the *Forward Drive* research project conducted a series of workshops with representatives of ODOT, WSTC, and DOL. The purpose of the workshops was to explore how to reduce the cost of administering a RUC program by analyzing some of the specific features of RUC programs that contribute to high costs: provision of customer service, enforcement of RUC reporting and payment, and procurement of RUC functions.

One recommendation resulting from the workshop on procurement was the need to develop and implement a multi-state process for creating and maintaining RUC standards that could, among other things, be used to extend the open market concept across multiple states. The prospective benefits of a multi-state open-market RUC concept include significantly reduced costs to implementing agencies for system design, procurement, and implementation, and significantly reduced costs to market participants for marketing, sales, and system implementation. To carry this recommendation forward, the *Forward Drive* project team established a Mock RUC Standards Committee to demonstrate the steps and features of a venue and process for developing and maintaining RUC standards.

2.2 Previous Efforts

The mock RUC standards committee is neither the first nor only effort of its kind. As described previously, Oregon developed a system definition for its own use that serves as a de facto one-state standard. In 2015, RUC America (then RUC West) undertook a series of research efforts focused on RUC certification including elements to standardize, a process for certifying systems against standards, and the definition of a forum for developing and maintaining multi-state standards-setting and certification processes.

More recently, SAE International began developing a standard for RUC payments from vehicles, J3217/R. The standard, once adopted, will define the concept and functional and performance requirements for reporting and payment of RUC from vehicles. This standard will serve as one of several key building blocks of a broader set of future standards around RUC.

Related transportation user fees have also developed standards to guide and streamline the development of systems and solutions. Examples include heavy vehicle fuel taxes, heavy vehicle registration fees, and tolls. For interstate commercial motor vehicle fuel tax and registration fee administration, the International Fuel Tax Association (IFTA) and the International Registration Plan (IRP) have established standards that govern most facets of their operations. Each jurisdiction must collect a standard set of information from motor carriers and data to IFTA and IRP. Most aspects of the carrier audit process are standardized, although some areas are left to jurisdictional discretion. Data transfer protocols are standardized, as are jurisdictional upload and payment schedules.

Examples of non-standardized areas for IFTA and IRP are:

- Responsible agency. The specific agency for operating IFTA and IRP is left to jurisdictional discretion. Departments of tax, departments of transportation, and secretaries of state are among the agency types that have jurisdictional responsibility for IFTA and IRP functions.
- Enforcement management. Jurisdictions are responsible for developing their own rules for enforcing fuel tax and registration payment
- Customer service protocols. Websites, email and phone support, and in-person support are examples of customer service channels, but jurisdictions hold the responsibility for defining and providing customer support.
- License and registration fee setting (including supplements for IRP). Legislative bodies in each jurisdiction set their own tax and fee rates.
- Reasonable ranges for miles per gallon (for IFTA). Given that IFTA returns must include a fleet MPG as a key parameter for calculating taxes due, jurisdictions may prescribe their own reasonable ranges for MPG assumptions for use by their carriers.

IFTA and IRP have organizational structures based on member engagement and participation. Multiple committees meet regularly to support organizational structures and member needs. Included in these committees are review committees that verify jurisdictional compliance with the Agreement and the Plan and dispute resolution committees to address non-compliant jurisdictions and disputes between member jurisdictions.

2.3 Committee Purpose and Objectives

The purpose of the Mock RUC Standards Committee is to model the process and substantive content for future efforts to standardize elements of RUC that public agencies administering RUC programs should lead. The objectives of the committee were to:

- Develop criteria and procedures for convening a standards committee
- Develop procedures for operating a standards committee
- Develop one or more pathways for operationalizing the committee efforts beyond “mock” status
- Identify elements of RUC that will benefit from standardization, and articulate the benefits

The efforts of the Mock RUC Standards Committee can provide guidance to a future RUC standards committee by providing a structure and specific standards for development. An established structure will enable a future committee to focus on standardization in support of future RUC program interoperability across borders, improve convenience and reduce costs for consumers, and reduce costs of collection for agencies.

The value of standards depends on the level of acceptance among entities to whom the standards apply. To increase the legitimacy of a standards committee development effort, and acceptance of the outputs of the Mock Standards Committee, participants with a wide variety of experiences, perspectives, organizations, geographies, and levels of RUC maturity were consulted. Although only mock in nature, the Mock RUC Standards Committee included representatives from industry, from agencies with varying degrees of experience with RUC, and from non-profit organizations with membership relevant to RUC.

2.4 Standards, Certifications, Requirements and Regulations

2.4.1 Definitions

Standards, certifications, and requirements are components of processes that serve distinct functions within a business system. Each of these elements has a distinct function and attributes.

The International Organization for Standardization (ISO) is a membership organization of national standards bodies formed to develop voluntary, consensus-based, market-relevant international standards. This organization and its members develop standards for publication, approval, and adoption by marketplace practitioners in many fields.

- ISO defines a **standard** as “a document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.”¹ A standard is developed when a need is identified, and expertise is assembled to develop the best solution to address the identified need. Standards are agnostic as to solution-provider, voluntary, and must be adopted to be valid.
- Within a standard, one or more **requirements** must be identified to define compliance with the standard.

¹ [ISO Publication on Good Standardization Practices](#), 2019.

- **Certification** is the process of providing a written attestation to the certainty that specific quality and conformity requirements are fulfilled by a product, service, or system (i.e., that the product, service or system complies with a standard). Certification is generally performed by an independent organization to ensure an unbiased evaluation and affirmation. Certification may be mandatory for some solutions to be adopted, but, in general, certification is a voluntary process.

2.4.2 Business Requirements and System Requirements

Requirements are documented necessary components of a given system or function. Requirements must be clear, verifiable, and include all aspects of the system or function. Business requirements documents define all of the components needed to accomplish the business objectives, but also include descriptions of the business objectives, the scope of the project, regulations and standards that must be accommodated and measures of success. System requirements are documented translations of system user needs into technological specifications required to fulfill those needs. As the name implies, the meeting of requirements is not voluntary. Specific requirements with well-defined outcomes provide structured demands that standardized and certified products, services, and systems must meet, thus supporting innovation in delivering solutions. Within an operational requirement document, any requirement related to a standard would identify the necessity of compliance with that standard.

Regulations are mandated by authority. They are not voluntary. Standards and certifications can support adherence to regulations by providing clear guidelines and verified tools to comply. For this reason, regulations may be inputs into standards, business requirements, and system requirements.

2.4.3 Benefits of Standards Setting

The development of open standards, those that do not favor a particular actor or technology, offer benefits to jurisdictions, vendors, and customers. For jurisdictions, the establishment of RUC standards facilitates the creation of regulations to administer RUC programs. Standards will allow jurisdictions to opt for in-house or third-party solutions for functions within their programs. Additionally, standards will facilitate RUC interoperability by setting baselines that are universally understood and adopted by RUC program actors. The development of open standards can lead to greater participation in the vendor marketplace, increasing competition and cost-effective innovation by establishing consistent protocols for product development. Standards can also benefit end customers by ensuring the safety, quality, and reliability of products and services in RUC programs.

2.5 Standards Development Principles

Many national and international organizations have developed principles for standards development. The World Trade Organization's (WTO's) Technical Barrier to Trade Committee adopted six principles for international standards development²:

- Transparency
- Openness
- Impartiality and Consensus

² [WTO Principles for the Development of International Standards, Guides and Recommendations, 2000.](#)

- Effectiveness and Relevance
- Coherence
- Development Dimension

ISO embraced the WTO's standards development principles and added three more³:

- Stakeholder Engagement
- Due Process
- National Implementation

ISO further developed two principles to address conformity testing within standards, the Neutrality Principle and the Testing Methods Principle.

- The Neutrality Principle specifies that the content of the standard shall not state a preference for a form or one type of conformity assessment over another. In other words, the standard must be written so it can be applied by a manufacturer or supplier (first party), a user or purchaser (second party), or an independent body (third party).
- The Testing Methods Principle specifies that test methods included in a standard must outline the process and thresholds of testing. They must neither include provisions on who should undertake the test, nor establish the conformity assessment structure that might employ such test methods within it.

These eleven principles can guide the establishment and operations of a future RUC Standards Committee. By adhering to these principles, a RUC Standards Committee will be able to develop valuable standards that encourage open competition while providing a stable foundation for development of RUC programs, systems, and technology.

2.6 Standardization Process

Developing a standard follows steps that culminate in widespread approval. The Mock Standards Committee engaged in this process, as far as possible on simulated basis, for two standards. The process of standardization includes seven steps:

1. Identify the need for a standard. The Committee identified multiple elements that could be standardized. These elements are identified in this report to be taken up by later standardization workgroups or committees.
2. Assemble a working group with the expertise needed to develop a solution. The Mock Standards Committee included members with expertise in areas of jurisdictional administration, federal administration, jurisdictional membership organizations, and industry.
3. Develop draft standard language. The Committee drafted language for two potential standards.
4. Discuss and arrive at consensus within the working group on the standard language. Consensus was achieved within the Committee for the language of the two draft standards.
5. Disseminate the draft standard to the wider community who will review the standard for possible revision or adoption. This step was beyond the scope of this committee.

³ [ISO Publication on Good Standardization Practices](#), 2019.

6. Approval by vote of the wider community. This step was beyond the scope of this committee.
7. Publish the approved standard. This step was beyond the scope of this committee.

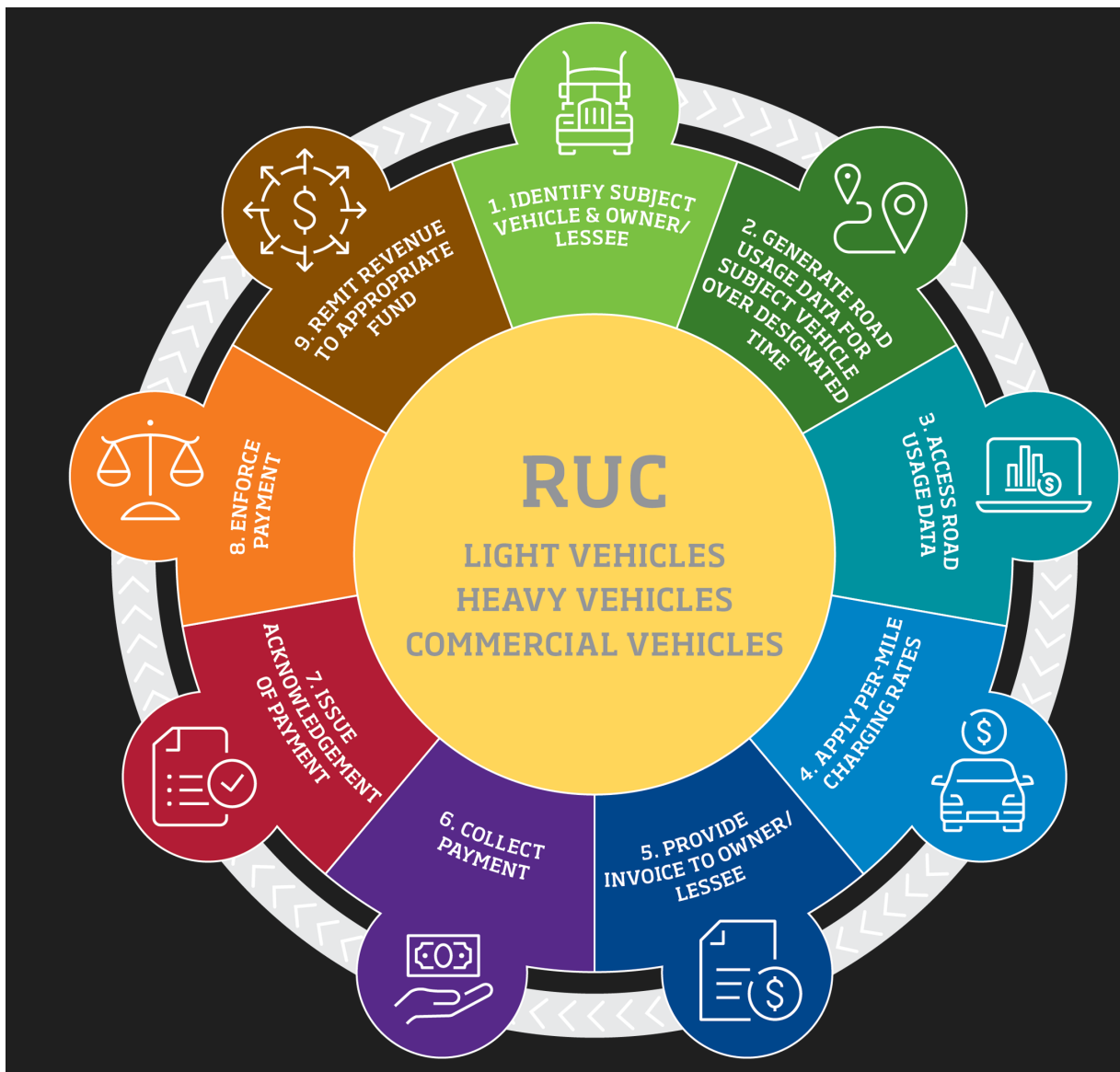
While the final three steps of a standardization process are beyond the scope of the Mock RUC Standards Committee, the two proposed standards could easily be picked up by a future committee to complete the final three steps. Because the RUC community does not have an official voting body, an alternative body may need to take up the standardization process. Alternatively, an entirely new organization could be formed to manage RUC standards.

3.0 RUC STANDARDS

3.1 Elements of RUC

RUC systems can be divided into nine distinct functions, illustrated below. Each jurisdiction may choose to implement each of the nine functions in unique ways. Standards can help improve the likelihood that jurisdictions will approach elements in similar manners. This reduces complexity for potential vendors that may provide services to multiple jurisdictions, which in turn reduces costs for agencies. It also improves the ease with which jurisdictions can work toward interoperable RUC solutions and improves the user experience.

Figure 1: The Elements of RUC



3.1.1 Identify subject vehicle and its owner/lessee and connect with vehicle registry

Legislative bodies in each jurisdiction (states, provinces, etc.) will determine which vehicles are subject to RUC, while motor vehicle agencies manage vehicle registries. These registries may be administered by multiple agencies, depending on the jurisdiction. Elements that could be amenable to standardization include:

- Common classification of vehicles for the purposes of RUC. This allows jurisdictions that adhere to the standard to have common identifiers for vehicle classes.
- Common vehicle identifier between states. A common identification of record is confirmed across jurisdictions, so when receiving an identifier for a vehicle in a jurisdiction, that jurisdiction can efficiently search for its details in its registry.

Some questions to be considered are:

- How can jurisdictions obtain access to each other's motor vehicle registries for the purposes of enforcement and compliance of RUC?
- Should each vehicle owner/lessee have a RUC account in their home state, or may accounts be opened out of state? How is this to be managed if either account measures out of state miles?
- Will RUC-relevant data elements be added to existing accounts?

3.1.2 Generate road usage data for subject vehicle over designated time period and report data

Core to all RUC systems is the measurement of road use and the reporting of that data to the relevant jurisdiction whether directly or via an account manager. This data may be generated by the user directly, or by the user's vehicle, or equipment supplied by a jurisdiction or account manager. Although it is up to jurisdictions to determine the appropriateness of any road usage measurement and reporting methods, some common sets of data may be identified that could be used by jurisdictions. This includes (aside from vehicle identification):

- Defining set intervals for data collection (this can vary by jurisdiction, but is useful to be clear that any data must be time defined)
- Miles traveled
- Location of miles traveled on public roads compared to private roads/private property
- Location of miles traveled by state
- Changes in vehicle configuration (for commercial heavy vehicles only)
- Fuel consumption (which may be associated only with miles traveled on public roads within a specific jurisdiction)
- Rules may be standardized for rounding, for minimum increments liable for a charge (e.g., one mile)

Within this element is the potential for standardization of technical elements of road usage measurement and reporting methods. A discussion point could include developing standard terms and understanding of what those methods are and identifying issues with trip measurement and reporting methods that may be addressed through a standard process.

3.1.3 Access road usage data—receive reporting of road usage data

A variety of technological options is available for measuring road usage by vehicles. These should be explored and documented. Following the data collected from vehicle usage is the transmission or accessing of that data by the relevant entity (whether it is the responsible jurisdiction or an external account manager).

Reporting of that data may be automated, through user intervention (e.g., mobile phone reporting) or through jurisdictional intervention (e.g., vehicle testing). Options available for heavy duty vehicles may be tied to current mileage and fuel reporting or Electronic Logging Devices.

One approach to this function could be to standardize technological communications. Elements that could be standardized include:

- Mobile data communications from telematics systems or devices
- Transmission of imagery of odometers
- Data formats/means of access

3.1.4 Apply charge rates to calculate the road usage charge per vehicle

Once road usage data has been gathered by the jurisdiction or account manager, the charge rates must be applied to the mileage data over the charging interval period to calculate the road usage charge due for that period. This may be the responsibility of the account manager (which will be periodically audited) or the jurisdiction itself.

Applying charge rates may be simple for vehicles traveling within one state, but for vehicles traveling across state boundaries, issues abound in identifying and allocating miles traveled in different jurisdictions if data collected does not automatically determine this through the use of location-identifying technologies.

The parameters of the function should be consistent, regardless of the owner. Some questions to be considered are:

- What is common between how distance charge rates are applied? What could vary?
- How may it be different for light-duty and medium-duty vehicles than for heavy-duty vehicles? (e.g., heavy duty vehicles may have variations in configuration that vary rates)
- What are the possible hand-off points between vendors and jurisdictions? Should jurisdictions expect data collected from vendors to be provided to them? If so, what data should be provided, and how long should it be stored?
- How is interoperability affected? (e.g., how is data collected about out-of-state trips applied to the RUC system in that other state?)
- Should rules be applied to the ways in which refunds of gas tax are applied to RUC?

3.1.5 Provide invoice to owner/lessee—notice of the charge

Once charges have been calculated, the vehicle owner must be made aware of the charge. Investigation of current jurisdictional and vendor systems should provide direction to answer questions such as:

- How soon after a billing period should invoices be sent?

- How will out-of-state road usage data and charge rates be displayed on invoices?
- Should separate standards be developed for invoices for pre-payment and post-payment systems?
- Should billing frequency be standardized?
- Should standards be developed for means of invoice delivery (electronic, post)?
- Should standards be developed for management of invoice queries and complaints?
- How should prepaid accounts or prepaid miles to be managed?
- Are states going to offer installments in payments for low-income vehicle owners who cannot pay the full amount at one time? If so, should standard practices be applied to support interoperability?

3.1.6 Collect payment

Once an invoice has been provided to the customer, payment must be collected. Collection of payments may be through automated or manual processes or may be accomplished prior to road usage (pre-payment). Existing jurisdictional and vendor systems should provide directions to help answer these questions:

- Should availability of payment plans for road usage charges be mandatory?
- Should specific payment options be required in all jurisdictions (e.g., a cash payment option)?
- Should standards be developed for direct debit/automated payments?
- What standards should be developed for inter-jurisdictional payment of RUC?
- For inter-jurisdictional RUC, should standards be developed for periods and processes of jurisdictional reconciliation?
- What may be different depending on whether it is a pre-pay or post-pay system?
- Can the recovery of bank/cc processing fees be standardized?
- Should standards be developed for international payment options for foreign-registered vehicles?

3.1.7 Issue acknowledgement of payment

Jurisdictions and vendors issue receipts to customers for most transactions, to provide clarity about when, how much and for what the payment was received. The answers to the following questions will be determined by jurisdictional choices in establishing a RUC system:

- Should an acknowledgement of payment be required? If so, what entity should be responsible for this?
- Should standards be developed about the acknowledgement of payment or access to records of such acknowledgment?

3.1.8 Enforce payment

Multiple elements exist in the enforcement of payment. Development of standards for enforcement could support interoperability, as well as single jurisdiction operations. Enforcement processes should focus on a detection of and addressing a range of non-compliance, from casual errors through intentional fraud. Elements that could be considered for standardization include:

- Detection of and mitigation of unintentional user errors
- Addressing intentional non-payment or part-payment of invoices
- Enforcement actions toward owners/lessees of vehicles who engage in evasion of RUC (through disabling trip reporting systems, fraudulently interfering with them, or not engaging any such systems)
- Enforcement actions toward owners/lessees of vehicles with false identification (e.g., license plates)
- Interjurisdictional information sharing about road users engaging in misrepresentation and/or fraud

3.1.9 Remit net revenues to road fund. Integrate revenue collection with financial systems

Commercial account managers or jurisdictions will manage the distribution of net revenues to the relevant road fund. Due to jurisdiction-specific processes, it is unlikely that this activity will require the support of any standards.

3.2 Identification of Possible RUC Standards

The Mock RUC Standards Committee was presented with the nine functions of RUC to offer a framework to brainstorm possible RUC areas for standardization. The group started by answering some fundamental questions such as the following:

- Why is a standard needed?
- What is the risk of non-standardization?
- Do standards already exist?
- How broad should the standard be?
- Is the practicing community ready for a standard?

Across the nine functions, the Committee identified an initial list of 74 possible areas of standardization for RUC.

3.3 Prioritization of Possible RUC Standards

After the Committee identified possible areas for RUC standardization, they went through a prioritization process to acknowledge which potential RUC standards may be easier to standardize versus those that may be more difficult, as well as whether a possible RUC standard could be established in the near term versus those that may require more time. A possible standard may have been labeled as “difficult” because of potential for inter-jurisdictional conflict, lack of readiness within the

community to tackle the topic, or other reasons that presented challenges to standardization. A possible standard flagged as “later”, needing more time before standardizing, may be due to lack of readiness of the community and market, or simply because that part of a RUC program is farther off for most jurisdictions at this time (e.g., dispute resolution for jurisdictional interoperability—because no jurisdiction is starting interoperability efforts yet, this standard can wait).

The visual prioritization exercise mapped each possible standard to a dual-axis graph, as depicted in Figure 2. The graphical representation shows that out of 74 possible areas of standardization, 40 belong to the “Easy” and “Now” category (upper right quadrant). As illustrated in Figure 2, many areas identified for possible standardization, both easy and difficult, are ready for further standardization efforts.

The project team analyzed the initial list of 74 areas for standardization and determined possible combinations as well as reclassifications from standards to best practices. “Best practices” refers to the areas in which jurisdictions would benefit from applying a technique, framework, or proven process to achieve its goals, whereas “standards” refers to a set of requirements that must be met to be compliant with the system functionality and state. In short, a best practice constitutes a recommendation, whereas a standard is a voluntary requirement. For example, “order of capturing information during enrollment” is a best practice as a jurisdiction can determine the order in which to gather such information as personal contact information, vehicle information, mileage reporting preference, and payment information, without impacting other jurisdictions’ programs. By contrast, “minimum required vehicle data” is more suitable for standardization, as multiple jurisdictions will benefit from prescribing the same minimum data needs. Table 1 and Table 2 summarize the complete lists of possible standards and best practices, respectively.

Standard	Description	Difficulty	Timing
	include but are not limited to make, model, year, mpg, trim, gvwr rating, fuel type.		
Vehicle Classification	<p>The Vehicle Classification standard includes several elements related to classifying vehicles to provide consistency in RUC program eligibility and enrollment purposes. It provides clarity across jurisdictions, removing varied naming conventions, and helps establish clear delineation of vehicles eligible for a RUC program.</p> <p>Mock standard developed by Mock Standards Committee September 2023 include the following vehicle classification data elements: Vehicle model year, fuel type, gross vehicle weight rating (GVWR), and combined fuel economy rating; as well as the following optional data elements: Number of wheels, top speed, axle count, and jurisdiction(s) of registration.</p>	Difficult	Now
Base state definition	Define base state for RUC reporting. Determine reporting processes associated with vehicles registered in multiple jurisdictions, as well as processes for vehicles registered in one jurisdiction.	Difficult	Now
Mileage data errors & events	Identifying types of errors, events, anomalies, exceptions, or health codes that may be identified on data collection and validation across various RUC systems. Examples may include MRO disconnect events, message failures, data validity checks, missing data, etc.	Easy	Now
Accuracy & precision of mileage data	To a defined percentage margin of acceptability, define minimum accuracy and precision of mileage and related travel data when collected for a RUC program. Accuracy is defined as how close a measurement is to the accepted value. Precision is defined as how close measurements of the same type are to each other.	Easy	Now
Mileage Reporting Option Types	Define mileage reporting method types, including but not limited to: Manual, Automated without location detection, and Automated with location detection.	Easy	Now

Standard	Description	Difficulty	Timing
Minimum mileage data reporting data elements	<p>Define the minimum data elements required by each mileage reporting option (MRO) type to ensure accurate, consistent, and timely reporting of travel data for the purpose of assessing a RUC.</p> <p>MRO types range from manual to automated and include location and non-location-based methods. Each unique MRO type may require different minimum data elements to achieve reporting requirements. Minimum data reporting data elements may include, but are not limited to miles, fuel consumption, location, time, unique trip definition/boundaries, and unique vehicle identifier or association information.</p>	Easy	Now
Eligible miles / distance	<p>Determine the parameters for defining eligible distance traveled for RUC reporting. Considerations may include, but not be limited to public/non-public road, vehicle taxable status, time of travel (if a RUC applies only to a certain timeframe), updating eligibility definitions, and jurisdictional interoperability configuration needs.</p>	Difficult	Now
Towed vehicles	<p>Determine the applicability of road usage charges for towed vehicles. Cases include the vehicle on a trailer, the vehicle towed with four wheels on the road, the vehicle towed with two wheels on the road. Consider electronic and mechanical odometers and different mileage reporting option types.</p>	Difficult	Now
Data sharing & privacy	<p>Determine minimum privacy standards for sharing data among stakeholders, considering privacy laws and agreement, inter and intra jurisdictional laws. Define the types of information that should be private and how that information should be handled when sharing amongst various stakeholders. Consider federal/national standards and NIST Cybersecurity Framework.</p>	Difficult	Now
Minimum Compliance Support Rules	<p>Establish minimum compliance support rules to detect and address user-directed inaccuracies, ranging from unintentional errors through international fraud. This examination should</p>	Difficult	Later

Standard	Description	Difficulty	Timing
	include, but not be limited to program enrollment, mileage reporting, mileage collection technologies, and payment.		
Interface Control Document (ICD)	Standardize the interfaces between various RUC systems/subsystems, including data elements and definitions, data formats, expected values, pseudocode, transmission requirements and frequency, transmission responses and errors, etc.	Easy	Now
Data retention by MRO type	Identify the type of data to be retained, the security parameters for this data storage, the retention period, to whom the data should be made available and the data deletion guidelines for each MRO type.	Easy	Now
RUC Rate Table	Identify and define the parameters of a RUC Rate Table. These parameters may include, but not be limited to fixed jurisdictions, sub-level geographic boundaries, jurisdictional and sub-jurisdictional RUC and fuel tax credit rules and rates, definitions/descriptions of each jurisdictional and sub-level geographic boundary, RUC, and fuel tax credit eligibility (separately), applicable rate dates, and rate priority if sub-levels overlap geographic areas. This standard should also detail RUC Rate Table management information, such as update procedures, expectations, historical rate table management, etc.	Difficult	Now
Exempt and non-public road usage by jurisdiction	Define exempt and non-public roads as defined by jurisdictional statutes and regulations and reflected in the RUC Rates table. These definitions may include, but not be limited to existing road type definitions, jurisdiction road mapsets, determining whether non-public roads apply to those privately owned or those that do not allow public access (example: parking lots are privately owned but allow public access), and best practices around identification of public or non-public roads (e.g., must use authoritative sources, must be to the +/- XX.XX% accuracy of road boundary, road definition and mapping update procedures, etc.).	Difficult	Now

Standard	Description	Difficulty	Timing
Linking usage data to owner	Define the parameters for linking the usage of mileage data to the RUC payer (timing, unique payer, privacy etc.)	Difficult	Now
Transaction type definition	Establish standard nomenclature for transaction types, including mileage reporting, payment received, dispute received, suspended transactions. Transactions may be suspended for a variety of reasons. Define the types of suspended transactions.	Difficult	Later
Road usage charge calculation	Determine parameters for calculating road usage charges by jurisdiction, including use of the RUC Rates table, the decimal points to which the charge should be calculated and rounded and the aggregation of jurisdictional road usage charges for interoperability.	Easy	Now
Minimum invoice data/information	Define the minimum data elements/information on periodic invoices/statements. Possible examples include account identification, vehicle identification, period for which charges apply, road usage charge by jurisdiction, mileage traveled by jurisdiction, fuel tax credited by jurisdiction, penalties, and adjustments applied to their account.	Easy	Now
Payment Card Industry data security standards	Determine whether the Payment Card Industry Security Standards suffice for road usage charge payments and should be adopted, as written.	Easy	Now
Payment frequency	Establish the parameters for flexibility in frequency of payments within each jurisdictional RUC program and the stability of interjurisdictional RUC payments.	Easy	Now
Remittance of funds to owed jurisdictions	Establish a standard for the maximum time between collection of funds from the customer and transmission to the recipient jurisdiction. Examine the issue of transmission of interest and penalties for owed amounts.	Difficult	Now
Report non-payment / write off	Determine the parameters for reporting non-payment of RUC fees to the base and owed jurisdictions. Determine the process for writing off uncollectible accounts.	Difficult	Later

Table 2: Possible Areas for Best Practices Across the Nine RUC Functions

Best Practice	Description	Difficulty	Timing
Order of capturing information	Determine the order in which personal, vehicle, MRO selection, and payment information is recommended to be captured in the RUC program enrollment process for a participant, to ensure elements required for subsequent steps are captured first. Examples include, but are not limited to, acceptance of the program terms and conditions and prerequisite vehicle information for MRO selection.	Easy	Now
Motorized/non-motorized vehicle definitions	“Motorized Vehicle” means a self-propelled land or amphibious regardless of method of surface contact. Examples include passenger car, station wagon, sport-utility vehicle, van, pick-up truck, etc. “Non-motorized” vehicle means a vehicle that is not self-propelled.	Easy	Now
Data Reporting Period definition	Define data reporting period, including customer reporting and inter-jurisdictional data aggregation reporting for different MRO types. Explore the impact of different aggregation intervals on interoperability and compliance.	Easy	Now
Suspended transactions resolution	Establish best practices in the resolution of suspended transactions and the communication of those resolutions to affected parties.	Difficult	Later
Tolling NIOP Do’s and Don’ts	Learning from the tolling industry's nationwide interoperability (NIOP) initiative to standardize the tolling industry standards, business rules, interface specifications, etc. to identify areas that worked well and should be modeled in RUC standardization practices as well as opportunities for improvement based on challenges the tolling NIOP initiative has run into.	Easy	Now
Reporting RUC for Fleets	Establish best practices for fleet mileage reporting of distance.	Difficult	Now
Contact information / customer support	Establish best practices regarding customer support to be provided in RUC programs.	Easy	Now

Best Practice	Description	Difficulty	Timing
RUC Invoices	Establish best practices regarding the timing and method of invoice delivery in RUC programs. Include recommended language for delinquent payers, protest procedures.	Easy	Now
Categorization of funds	Define fund categories. Examples include, but are not limited to road usage charges, penalties, interest, refund, and credit.	Easy	Now
Payment confirmation	Establish best practices for the confirmation of payment from the customer, including who will issue the receipt, the maximum elapsed time for confirmation, information to be included on the confirmation, and different parameters for electronic or manual payments.	Easy	Now
Options for paying	Establish best practices for minimum payment options available to the customer, including, but not limited to the method of payment, the frequency of payment, and the location of payment.	Easy	Now
Interest on RUC payments	Establish best practices for interest charged/received on RUC payments. Consider jurisdictional mandates for this type of fund.	Difficult	Now
Credit card fees	Establish practices regarding credit card fees. Credit card fees depends on negotiable costs through the payment processor, card network, and card issuer. Businesses need to monitor the monthly fees to determine which payment forms are sustainable for them to accept.	Difficult	Now
Payment and Delinquent fee Collection	Establish recommended collection procedures, considering existing jurisdictional and vendor collection procedures.	Difficult	Now
Pre-payment and post -payment	Develop best practices for pre-payment and post-payment systems.	Difficult	Now
Associating RUC with vehicle registration	Establish best practices for associating RUC accounts to vehicle registration processes, considering individual jurisdictional differences.	Easy	Now
Audit	Establish best practices to trace information efficiently and effectively through the entire process of collecting and assessing a RUC to ensure all systems, processes, and entities are following requirements and expectations and are accurately handling information.	Difficult	Now

Best Practice	Description	Difficulty	Timing
SSAE18	<p>Establish SSAE-18 guidelines as best practices. SSAE-18 is a generally accepted auditing standard published by the American Institute of Certified Public Accountants (AICPA) to evaluate service companies, including internal controls over financial reporting and clear insights into financial quality, security, confidentiality, availability, and privacy.</p> <p>SSAE-18 is important for RUC programs utilizing third party companies to assess and collect road usage charges on its behalf.</p> <p>Its international equivalent is ISAE 3042.</p>	Easy	Now
ISAE 3042	<p>Establish ISAE 3042 guidelines as best practices. ISAE 3042 is a standard established by the International Standards for Assurance Engagements (ISAE) for assurance reports on controls at a service organization.</p> <p>ISAE 3042 is important for RUC programs utilizing third party companies to assess and collect road usage charges on its behalf.</p> <p>Its U.S. equivalent is SSAE-18.</p>	Easy	Now
GAAP	<p>Establish GAAP principles as best practices for RUC programs. Generally Accepted Accounting Principles (GAAP) is the accounting standard adopted by the U.S. Security and Exchange Commission and is the default accounting standard used by companies in the U.S. GAAP standardizes accounting principles to ensure financials are accurately recorded and managed.</p> <p>The Governmental Accounting Standards Board (GASB), an independent and private-sector organization recognized by U.S. state and local governments, enforces GAAP.</p>	Easy	Now
Maintaining a record of fund deposits	<p>Fund deposit records allow a RUC program's financial entity to appropriately account for and reconcile actual RUC funds deposited into its financial institution with the expected funds per financial reconciliation and tax reporting.</p>	Easy	Now
Central Remittance System	<p>Establish a centralized repository/clearinghouse system to support interoperability</p>	Difficult	Now
Data Retention	<p>Establish best practices associated with data retention for RUC, considering individual jurisdictional regulations</p>	Difficult	Now

3.4 Example Standards

To demonstrate how to convert the ideas generated for areas for standardization into actual standards, the committee developed draft mock standards for two areas of interest: JurisID and Vehicle Classification.

The JurisID concept has been unofficially used by most, if not all, RUC pilots and programs in the U.S., as a way to identify jurisdictions in a numerical format that is easily understood by various systems for processing RUC information transmissions and reducing potential for distinct spellings or naming conventions.

The Vehicle Classification standard includes several elements related to classifying vehicles to provide consistency of determining RUC program eligibility, enrollment, and application of charges. It provides clarity across jurisdictions, removes varied naming conventions, and helps establish clear delineation of vehicles eligible for a RUC program.

The two mock standards are defined in the next two sections.

4.0 JURISDICTIONAL IDENTIFIER STANDARD

4.1 Standard

To identify a unique road usage charge (RUC) jurisdiction for the purpose of assigning relevant travel data and assessing a RUC, a unique jurisdictional identifier, “JurisID”, shall be utilized.

4.2 Supporting Information and Clarifications

- Definition of JurisID: The unique three-digit number assigned to a RUC jurisdiction.
- Each unique RUC jurisdiction can only be assigned one JurisID.
- A JurisID is only assigned to U.S. States and Territories, Canadian Provinces and Territories, and Mexican States.
- Defined JurisID codes are listed in Table 1 below.
- “RESERVED” State/Location JurisID codes are reserved for addition of a U.S. State, Canadian Province, or Territory, or Mexican State if new jurisdictions are established and identified.

NOTE: The concept of sub-level IDs within a JurisID (e.g., for counties or other geographic boundaries that warrant distinct definitions for assessing sub-level charges) were discussed during Committee meetings, and were determined to be outside the scope of this standard. Further discussion and development of sub-level IDs is warranted if a future RUC standards committee is established.

Table 3: JurisID Codes for RUC Jurisdictions

STATE / LOCATION	JurisID	STATE / LOCATION	JurisID
No State / Undifferentiated	000	North Carolina	037
Alabama	001	North Dakota	038
Alaska	002	Ohio	039
<i>RESERVED</i>	<i>003</i>	Oklahoma	040
Arizona	004	Oregon	041
Arkansas	005	Pennsylvania	042
California	006	<i>RESERVED</i>	<i>043</i>
<i>RESERVED</i>	<i>007</i>	Rhode Island	044
Colorado	008	South Carolina	045
Connecticut	009	South Dakota	046
Delaware	010	Tennessee	047
District of Columbia	011	Texas	048
Florida	012	Utah	049
Georgia	013	Vermont	050
<i>RESERVED</i>	<i>014</i>	Virginia	051
Hawaii	015	<i>RESERVED</i>	<i>052</i>
Idaho	016	Washington	053

STATE / LOCATION	JurisID	STATE / LOCATION	JurisID
Illinois	017	West Virginia	054
Indiana	018	Wisconsin	055
Iowa	019	Wyoming	056
Kansas	020	RESERVED	057
Kentucky	021	RESERVED	058
Louisiana	022	RESERVED	059
Maine	023	RESERVED	060
Maryland	024	RESERVED	061
Massachusetts	025	RESERVED	062
Michigan	026	RESERVED	063
Minnesota	027	RESERVED	064
Mississippi	028	RESERVED	065
Missouri	029	RESERVED	066
Montana	030	RESERVED	067
Nebraska	031	RESERVED	068
Nevada	032	RESERVED	069
New Hampshire	033	RESERVED	070
New Jersey	034	RESERVED	071
New Mexico	035	RESERVED	072
New York	036	RESERVED	073
...
...
RESERVED	259	Canada	300
RESERVED	260	Mexico	301
RESERVED	261	International Miles	302
RESERVED	262	Canada – Alberta	303
RESERVED	263	Canada - British Columbia	304
RESERVED	264	Canada - New Brunswick	305
RESERVED	265	Canada - Newfoundland and Labrador	306
RESERVED	266	Canada - Nova Scotia	307
RESERVED	267	Canada – Manitoba	308
RESERVED	268	Canada – Ontario	309
RESERVED	269	Canada – Quebec	310
RESERVED	270	Canada - Prince Edward Island	311
RESERVED	271	Canada - Saskatchewan	312
RESERVED	272	Canada - Northwest Territories	313
RESERVED	273	Canada – Nunavut	314
RESERVED	274	Canada – Yukon	315
RESERVED	275	RESERVED	316
RESERVED	276	RESERVED	317
RESERVED	277	RESERVED	318

STATE / LOCATION	JurisID	STATE / LOCATION	JurisID
<i>RESERVED</i>	278	<i>RESERVED</i>	319
Mexico - Aguascalientes	320		
Mexico - Baja California	321		
Mexico- Baja California Sur	322		
Mexico – Campeche	323		
Mexico – Chiapas	324		
Mexico – Chihuahua	325		
Mexico – Coahuila	326		
Mexico – Colima	327		
Mexico – Durango	328		
Mexico – Guanajuato	329		
Mexico – Guerrero	330		
Mexico – Hidalgo	331		
Mexico – Jalisco	332		
México – Mexico	333		
Mexico – Michoacán	334		
Mexico – Morelos	335		
Mexico – Nayarit	336		
Mexico - Nuevo León	337		
Mexico – Oaxaca	338		
Mexico – Puebla	339		
Mexico – Queretaro	340		
Mexico - Quintana Roo	341		
Mexico - San Luis Potosí	342		
Mexico – Sinaloa	343		
Mexico – Sonora	344		
Mexico – Tabasco	345		
Mexico – Tamaulipas	346		
Mexico – Tlaxcala	347		
Mexico – Veracruz	348		
Mexico – Yucatán	349		
Mexico – Zacatecas	350		
Mexico - Mexico City	351		
<i>RESERVED</i>	352		
<i>RESERVED</i>	353		
<i>RESERVED</i>	354		
<i>RESERVED</i>	355		

5.0 VEHICLE CLASSIFICATION STANDARD

Motor vehicle registries identify all vehicles in a jurisdiction using a range of descriptive fields. Vehicle Identification Number (VIN) already exists as a standardized 17-digit unique alphanumeric string to identify specific vehicles and some common characteristics such as country of manufacture, maker, and model year. However, RUC policymakers use a range of factors to identify vehicles eligible and/or subject to RUC, including engine or fuel type, age, weight, fuel economy rating, jurisdiction of registration, top speed, number of wheels, and axle count. There are currently no standards for these descriptive vehicle classification elements that are designed with RUC in mind. A RUC standard related to vehicle classification would make it easier for jurisdiction and vendors to identify vehicles subject to RUC, regardless of the policy in any given state.

5.1 Standard

Elements of vehicle classification, including definition of the element term, applicability, valid values, and additional relevant information, is defined for the purpose of determining vehicle eligibility and policy criteria including but not limited to charge rate in a jurisdiction’s road usage charge (RUC) program.

Table 4: Vehicle Classification Standard

Element Name	Definition	Valid Values	Sources / Existing Standards	Additional Information	Need for Standardization <i>(for purposes of Mock Standards Committee)</i>
Vehicle Model Year	A four digit year, which is assigned to a vehicle by the manufacturer, to designate a vehicle model irrespective of the production year	Four digit whole number Format: #### Example: 2023	Existing Standard: AAMVA D20 Traffic Records Systems Data Dictionary (JSON) (aamva.org) Source: Manufacturer	May be required to determine compatibility with mileage reporting options (e.g., on-board diagnostic ports available primarily from 1996 onward)	For vehicle classification and program eligibility purposes
Fuel Type	Source(s) of energy used to propel/move motor vehicle	<i>Primary and secondary values from EPA</i>	Source: US EPA	Combination of primary and secondary fuel types may be required (e.g., Plug-In Hybrid Electric – gasoline and battery electric)	For vehicle classification and program eligibility purposes, possibly in combination with fuel economy (not all vehicles have a single rating, and fuel type impacts determination of mpg rating); for fuel tax credit applicability and calculation

Element Name	Definition	Valid Values	Sources / Existing Standards	Additional Information	Need for Standardization <i>(for purposes of Mock Standards Committee)</i>
Gross Vehicle Weight Rating (GVWR)	Maximum loaded weight vehicle is designed to carry, including trailer weight	Four or more digit whole number, represents pounds (lbs) Format: ##,### Example: 8,400 (lbs)	Source: Federal Motor Vehicle Safety Standards (FMVSS) (49 CFR 571)	Recommendation to use registered weight	For vehicle classification and program eligibility purposes (not for determining RUC rate in this standard)
Combined Fuel Economy Rating	Combined city/highway fuel economy (miles per gallon [MPG]) or equivalent (MPGe)	One or more digit whole number Format: ## Example: 97 (MPGe)	Source: EPA or best available source	MPG vs. MPGe determined by Fuel Type Vehicles between 8,500 – 10,000 lbs GVWR are not required to have an EPA rating	For vehicle classification, program eligibility, and fuel tax credit applicability and calculation purposes
Number of Wheels (optional)	Count of wheels affixed to vehicle for the purpose of propelling vehicle	One or more digit whole number Format: ## Example: 2	NHTSA/Manufacturer Data (not always available) or as reported by owner		To be populated when available, as some states may use for program eligibility
Top Speed (optional)	The maximum rate at which the vehicle is designed to move longitudinally, as defined by manufacturer, indicating miles per hour (MPH)	0 (zero) to <i>N</i> speed, in whole number increments Format: ## Example: 35 (MPH)	Source: Manufacturer		To be populated when available, as some states may use for program eligibility
Axle Count (optional)	Count of axles, the mechanism affixed to wheels to turn vehicle and support vehicle weight	One Two Three Four Five Six Seven or more	Existing Standard / Source: FHWA Vehicle Types		To be populated when available, as some states may use for program eligibility and for determining RUC rate

Element Name	Definition	Valid Values	Sources / Existing Standards	Additional Information	Need for Standardization <i>(for purposes of Mock Standards Committee)</i>
Jurisdiction(s) of Registration (optional)	Geographical jurisdiction vehicle is registered in to legally operate	<i>Recommend leveraging JurisID standard for values; in the cases of the U.S., Canada, and Mexico, value must be a state, province, territory, or federal district.</i>	Source: Jurisdiction	Some vehicles may be dual-registered in two jurisdictions	At minimum, base jurisdiction of registration should be denoted

6.0 RUC STANDARDS DEVELOPMENT COMMITTEE

One goal of the Mock RUC Standards Committee was to determine what a future RUC standards committee structure and organizing principles might look like. To accomplish this goal, this committee investigated the characteristics of types of organizations that could play a role in a future RUC standards committee, the areas of expertise that would be needed to establish each of the identified possible standards, and the structures necessary for forming such a committee.

6.1 Potential Standards Setting Organizations

The Committee examined three types of organizations that could develop RUC standards: jurisdiction membership-led organizations, industry-led organizations, and researcher-led organizations.

The jurisdiction membership-led organization type includes FTA (Federation of Tax Administrators), AAMVA (American Association of Motor Vehicle Administrators), IFTA (International Fuel Tax Association, Inc.), and IRP (International Registration Plan, Inc.). These are membership organizations whose members are U.S. and Canada jurisdictions. Their membership may also include non-voting industry members. Paid staff members coordinate the activities of working groups and committees. These committees or working groups may assume the responsibility of identifying the need for a standard, researching parameters and alternatives, proposing the standard, and seeking membership affirmation. Because expertise and affirmation may be needed from a variety of jurisdictional agencies, such as Departments of Transportation, Motor Vehicles, Labor, Administration or Revenue, it is likely that no existing organization includes membership and offers voting systems for participation by all pertinent agencies across all jurisdictions.

The industry-led organization type includes IBTTA and ITS (Intelligent Transportation Systems) America, which are membership organization(s) whose members include industry-specific entities focused on advancing that industry, including public and private entities. Paid staff members coordinate the activities of committees or working groups. As in jurisdiction-led organizations, committees or working groups may assume the responsibility of identifying the need for a standard, researching parameters and alternatives, proposing the standard. In these types of organizations, membership affirmation may not include affirmation by implementing jurisdictions.

The researcher-led organization type includes SAE (formerly Society of Automotive Engineers) International, and IEEE (Institute of Electronics and Electrical Engineers), which are membership organizations whose members include technical experts and technology professionals. These are standards development organizations that develop and publish technical standards for adoption by other entities. They play no part in the adoption of standards by any jurisdiction but could produce technical standards for non-technical organizations with road usage charge standards committees.

6.2 Committee Leadership

After the Committee examined the three types of potential standards development organization and examples of those types, opportunities and challenges associated with each organization type were identified. The Committee then identified opportunities and challenges associated with each organization type, as detailed in Table 5.

The Committee did not identify an ideal type of organization to develop RUC standards. While all types have distinct advantages, the Committee concluded that a hybrid of the organizational types could provide the opportunities of each type and mitigate the challenges posed by any one organizational type.

Table 5: Opportunities and Challenges of Different Organizational Types

Jurisdiction Membership-Led	
Opportunities	Challenges
<ul style="list-style-type: none"> • Has the implementation/organizational expertise • Encourages buy-in from jurisdictions, who can champion the topic after participation • Provides (some) cover for some/many jurisdictions to participate • For now, RUC is best led from a policy perspective, which jurisdictions are more likely to have than industry or researchers • Given quantity of work left to do for interoperability, jurisdictions are best positioned to facilitate and make decisions around this topic • Encourages better inter-governmental communication between states and between distinct agency types within states 	<ul style="list-style-type: none"> • Requires a lot of time and effort that state agencies may not be able to offer • May lack technical expertise for highly technical standards • Possible for lack of political cover to prevent full membership participation • May be problematic for organizations to participate if their members have positions contrary to RUC implementation
Industry-Led	
Opportunities	Challenges
<ul style="list-style-type: none"> • Quickest access to technical expertise through vendors providing RUC systems • Opportunity for cross-pollination among industry • Less bureaucracy-not as constrained by public sector rules • International perspective • More familiarity with cutting-edge research • More initial motivation to find resources to support RUC • Quicker timeline for developing standard 	<ul style="list-style-type: none"> • Bias toward particular solutions • Less structure may lead to floundering • Voting process might be less representative of jurisdictions • Lack of bureaucracy may lead to inability for states to follow rules • Possibly influenced by bottom line instead of realistic standards (short-term incentives) • Lack of sensitivity to policy development environment • Vendor organization may be more interested in increasing membership • Goals may be misaligned with jurisdictional goals-what does success look like for vendor vs. jurisdictional participants?

	<ul style="list-style-type: none"> • Overemphasis on topics pertinent to vendors • May have less consistency of participation when business needs interfere
Researcher-Led	
Opportunities	Challenges
<ul style="list-style-type: none"> • Unbiased orientation (or perception of lack of bias) • Standards are their line of work • More rigorous structure and product • Possibly some industry led benefit (innovation) combined with the structure of a jurisdiction-led organization may increase credibility and acceptance 	<ul style="list-style-type: none"> • Lack of practical perspective • Could be biased depending on the specific group • Could be held behind closed doors-possible lack of accountability • May require payment to access published standards • Difficult to get jurisdictional resources on an ongoing basis. • May only allow a few jurisdictions to participate • May be a lengthier process • Individual participation (as opposed to agency/organization) may lead to lack of continuity
Joint Leadership	
Opportunities	Challenges
<ul style="list-style-type: none"> • Jurisdictional and industry representation over individual representation • Balance of jurisdictional, industry, and researcher participation • Can balance lack of structure by combining structure from an ANSI-certified group with administration by a jurisdiction-led organization • Possibly easier to fund by garnering support from several sponsors • Has the implementation/organizational expertise • Encourages buy-in from jurisdictions, who can champion the topic after participation • Encourages better inter-governmental communication between states and between distinct agency types within states • Quickest access to technical expertise through vendors providing RUC systems 	<ul style="list-style-type: none"> • No existing overarching organization • Extended timeline for approved standards • Possibly funding difficulties depending on sponsorship of committee • Balancing competing interests • Lack of continuity may slow progress • May have trouble initiating unique committee • Possibly less incentive to participate in a new venture • Establishing clear roles and responsibilities a must

- International perspective
- More rigorous structure and product
- Possibly some industry led benefit (innovation) and the structure of a jurisdiction-led organization may increase credibility and acceptance

6.3 Committee Membership Expertise

For the potential standards identified by the Mock Standard Committee, the project team identified specific areas of expertise desirable for a future Committee or sub-Committee membership. These areas are summarized in Table 6.

Table 6: Necessary Areas of Expertise for Development of Identified Potential Standards

Standards Committee Expertise									
Standard	Juris Admin	Juris Legal	Juris IT	Juris Finance	Vendor IT	Vendor Admin	Vendor Finance	Interoperable Admin	Interoperable IT
Min Required Data	X		X		X				X
VIN Decoding			X		X				
Veh. Classification									
Base State	X							X	
Mileage data errors/events	X		X		X				
Accuracy/precision of mileage data			X		X				
MRO types	X					X			
Minimum mileage reporting data			X		X				
Eligible miles/distance	X	X				X		X	
Towed vehicles	X	X	X		X				
Data sharing/privacy	X	X	X	X	X	X	X	X	X
Minimum Compliance Support	X	X		X	X		X	X	
Interface Control Document	X		X		X	X			
Data Retention by MRO type	X		X		X	X		X	
RUC Rate Table	X		X		X			X	X
Exempt/Non-public road use	X	X				X			
Linking usage to owner			X		X				
Transaction Types	X		X	X	X	X			
RUC calculation			X	X	X				X
Minimum Invoice Information	X	X	X			X			
PCI data security	X			X			X		
Payment frequency	X	X		X			X		
Remittances to owed jurisdictions	X		X	X	X		X		
Non-payment/write-offs reporting	X		X	X	X				
Juris Admin – Operational Expertise within jurisdiction Juris Legal – Legal advisory expertise within jurisdiction Juris IT – Systems and technical expertise within jurisdiction Juris Finance – Accounting expertise within jurisdiction, not necessarily within Operations group					Vendor IT – Vendor systems and technical expertise Vendor Admin – Vendor program expertise Vendor Finance – Vendor accounting expertise Interoperability – Expertise in cross-jurisdiction interactions Interoperability IT – Expertise in cross-jurisdictional technical systems				

6.4 Committee Structure

The Committee discussed two types of committee structure, a centralized steering committee with specialized subcommittees and separate committees for different standard types. The centralized steering committee structure provides a system of coordination between standards under development and more structure to the entire RUC standards environment. Jurisdiction- and industry-led organization types would likely utilize this type of structure to manage the standards development process. The separate committee structure provides the ability to select the most appropriate organization for each standard. This decentralized system may also enable quicker standards development, as different organizations could bring their administrative resources to develop standards concurrently. However, without a centralized organizing body, some standards may not be taken up in a timely manner. The main concern of the Committee was how development of a standard would be “sparked” and development continued without a coordinating force.

6.5 Committee Charter

The Committee discussed relevant items to be included in a charter for a RUC Standards Committee. The following elements were deemed relevant in a charter:

- Establishment date
- Committee purpose
- Scope and expectations
- Membership
- Terms
- Voting
- External communications
- Partner/parent support
- Benefits of participating

6.6 Committee Operating Procedures

The Committee discussed operating procedures and rules that should be in place for a RUC Standards Committee. These procedures include, but are not limited to:

- Committee charter establishment
- Defined standard proposal process
- Defined active membership responsibilities and rights
- Consistency of scheduled meetings
- Attendance method options (virtual/in person)
- Voting/non-voting members
- Voting procedures/comment periods
- Committee reports

- Standards publications
- Liaison assignments

The establishment of committee operating procedures should lead to consistent progress toward presentation of standards for adoption. The method of presentation, voting and adoption will depend on the structure of the committee and organizations engaged with the committee. Ideally, voting and publication would be open to jurisdictions currently and potentially in the RUC community.

7.0 FINDINGS AND LESSONS LEARNED

7.1 Findings

The Committee found that areas ready for RUC standardization can be, and have been, identified by analyzing the elements of RUC programs and the details of those elements. Each RUC program must perform the same nine functions. Because the ways in which those functions are carried out may differ, any standards developed by a future committee should be broad enough to allow jurisdictions the latitude to administer their programs and vendors to develop innovative solutions, yet specific enough to provide guidance to jurisdictions and vendors.

Some elements initially identified by the Committee as appropriate for standardization were deemed by the project team to be more appropriate for development as best practices. By contrast, the elements identified as potential standards demonstrated potential for universal applicability.

The Committee further found that the establishment of one or more standard committees, leveraging the appropriate expertise, would provide the impetus for RUC standards development. While opportunities were identified in each of the organization types, it is possible that a joint committee could better serve the standardization effort.

7.2 Committee Accomplishments

Through the course of this work, the Committee brought together four implementing agencies, two RUC-environment vendor representatives, as well as representatives from two non-profit membership associations and one federal agency. The expertise in the assembled group enabled this Committee to efficiently achieve its objectives. The Committee members unanimously agreed that standards are critical to the success of RUC and expressed support for the continued RUC standardization efforts. Through its work, this committee identified the following six primary benefits of standardization. The establishment of standards:

- reduces the cost of collection by providing a foundation for jurisdictions and vendors to rely upon, instead of having to start from scratch with each new program;
- eases implementation of RUC programs by providing a roadmap for program initiation, setup, and operationalization;
- supports an open market and competition by clearly identifying the requirements for new products and services while leaving some parameters open to innovation and jurisdictional discretion;
- provides support for nationwide consistency of RUC program implementation;
- bolsters the scalability of various technological solutions by identifying areas that must be consistent, allowing vendors and jurisdictions to expand programs based on proven solutions; and
- supports interoperability by providing common language, communications and processes to be shared by all participating jurisdictions.

States will always make distinct policy and programmatic choices. This is inevitable and valuable as each state must respond to its own unique circumstances and needs. Given this inevitability, standards provide a common language and framework to ensure that programs throughout the country have a better chance of cooperating in the long run for the benefit of customers and driving down operating costs.

The Committee developed an initial list of 26 standards that would support the development of RUC within and between jurisdictions. An additional 23 elements were identified that should be addressed through best practices, rather than standards. This distinction was made when facets of these elements were identified that should be left to jurisdictional discretion due to differences in legislation or administrative policies. After identifying the 26 potential standards, the Committee developed the draft JurisID and Vehicle Classification Standards. While no mechanism is currently in place for review, voting and widespread adoption of these draft standards, they are ready to be presented for review.

Finally, the Committee designed a standards committee workplan for future development activities. The workplan provides an organizational roadmap for establishing a national RUC standards committee that could move standardization efforts forward to support all jurisdictions and vendors seeking to implement RUC programs.

7.3 Lessons Learned

The mock standards committee demonstrated a viable approach to developing RUC standards and offers concrete pathways forward for much-needed future efforts. The primary lesson learned is that the RUC community is ready for standardization. Given the large number of standards that will be needed, a future committee should prioritize those that will provide the most current value. To accelerate standards development, “like” standards should be grouped and developed by specialized sub-committees, guided by an organizing committee. Further lessons learned from this Committee’s efforts include:

- Open acceptance of alternative opinions is helpful in encouraging participation and working through differences of opinion. Committee members with expertise in distinct areas are vital to robust discussion.
- Inclusion of members from jurisdictions at different stages of RUC implementation will allow the Committee to consider distinct points of view based on program maturity.
- One-day meeting formats are easier for Committee members to accommodate in their schedules than multi-day meetings. Providing lunch in the conference room allows in-person attendees to maximize their time onsite by continuing discussions through the lunch hour.
- A hybrid format enables a greater level of participation by Committee members. While in-person meetings offer greater opportunities for engagement, it is not always possible for those with the necessary expertise to travel to participate in standardization efforts. It is recommended that a future RUC Standards Committee offer in-person and virtual options for attendance.

Committee members, especially those attending virtually, found breakout sessions useful to engage in discussions and provide feedback about specific topics. Breakout sessions, followed by a committee-level synthesis of ideas enabled all members to be more engaged in and contribute to the discussions.

7.4 Next Steps

The Mock RUC Standards Committee’s work is only a beginning. Washington State has spearheaded the RUC standardization effort through the sponsorship of this first RUC Standards Committee. Washington State can continue to lead this effort to inform the national discussion about RUC standards by assembling the organizational resources and subject matter expertise needed to advance RUC standardization.

To establish RUC standards for adoption by the wider RUC practicing community, a national RUC Standards Committee should be established. To ensure its legitimacy, this future committee must

achieve buy-in from state jurisdictional stakeholders from planning and implementing agencies, as well as vendors serving the RUC community. This future RUC Standards Committee must have financial support for its operations, access to the necessary expertise, a defined membership and procedures for feedback and voting, a charter to guide committee procedures, and a road map for standards development. A steering committee would provide structure and guidance to the establishment of the RUC Standards Committee. Active support from these stakeholders, including all of the previously identified requirements, should be solicited.

The combined efforts of four jurisdictions (Oregon, Hawaii, Utah, Washington) as well as the Eastern Transportation Coalition (representing 18 jurisdictions) represent a strong start for the effort to develop RUC standards. As the convener of the mock RUC standards committee, Washington can continue to advance this important activity as part of a future research effort in collaboration with other states under the federal Strategic Innovations in Revenue Collection program, with the aim of enhancing the familiarity and credibility of the mock standards committee with a wider audience, identifying and executing a process to make its efforts more official (i.e., no longer “mock”), and to continue the work of developing relevant, useful standards that can benefit the small but growing number of states moving forward with RUC programs.