![mn Department of Transportation logo] **DEPARTMENT OF TRANSPORTATION**

Distance Based User Fee Pilot Study
## Proof of Concept Test Procedures

BACKGROUND

The Minnesota Department of Transportation (MnDOT) is partnering with shared mobility and automotive technology partners to support the research, demonstration, and examination of the necessary policy and technical considerations needed for developing distance-based user fees (DBUF), where users would pay certain road use fees on a per-mile usage basis. This project will have two phases: a proof of concept, to be conducted in 2018, and a larger-scale demonstration, expected sometime in 2019 - 2020. The document below provides the procedures and expected performance metrics associated with the proof of concept.

PROOF OF CONCEPT OVERVIEW

The MnDOT team will develop, deploy, and demonstrate the proof of concept described below. The proof of concept will test the connectivity to transfer anonymized per-trip data from a shared mobility partner and a connected vehicle to a data repository. The respository would retain the trip data which would be then transferred to a research and analysis entity who will use the data to calculate a series of revenue reports and a per-mile fee. A conceptual diagram for the proof of concept is provided below.
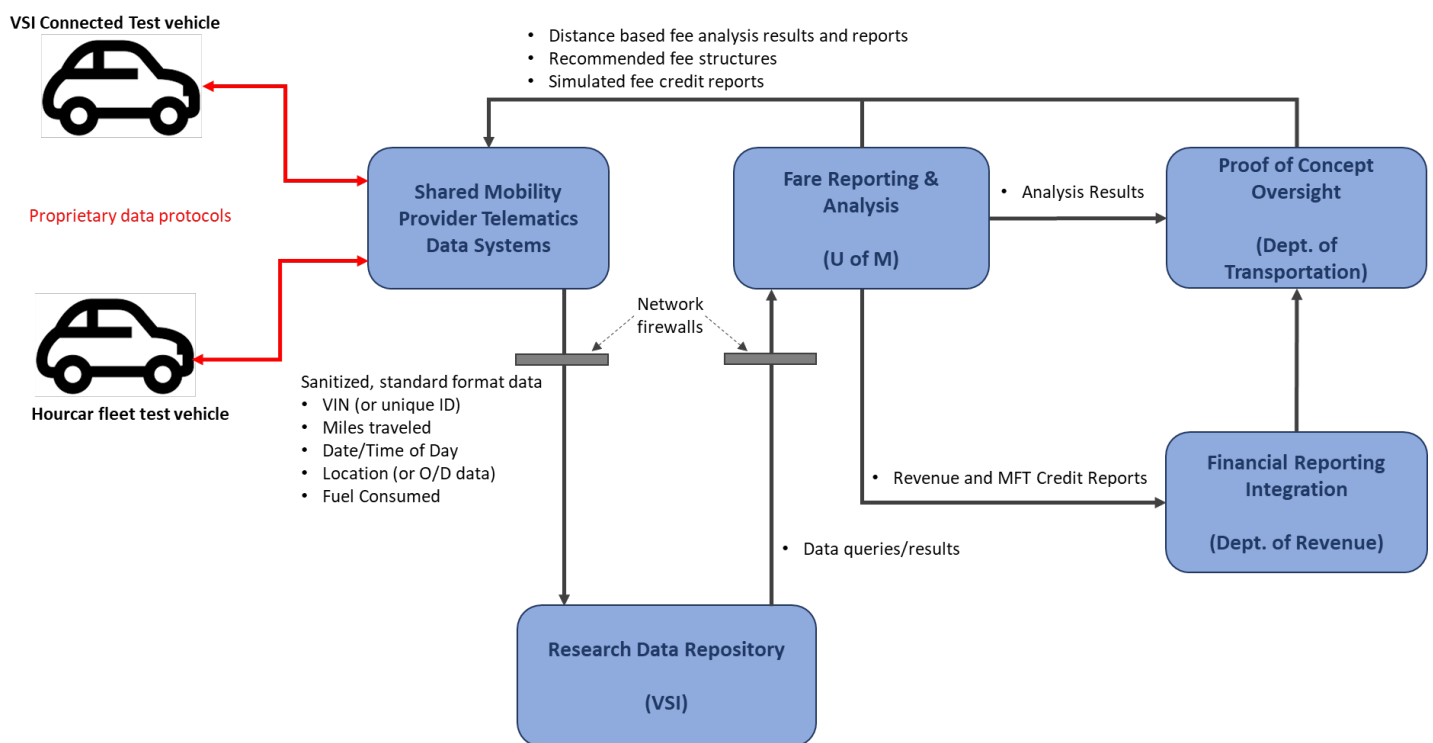
ENTITIES AND RESPONSIBILITIES

There are several entities involved in the proof of concept. Their roles and responsibilities are:

- **MnDOT** – Proof of Concept oversight and approval of results

- **Minnesota Department of Revenue (Revenue)** – Review of the financial reports and integration of the report information into existing Revenue data analysis systems

- **University of Minnesota (U of M)** – Data analysis and generation of the financial reports

- **Hourcar** – Shared Mobility partner providing carshare test data for the proof of concept
- **Vision Systems Intelligence (VSI)** – Establishing the data repository and provider of connected vehicle test data

ASSUMPTIONS

There are several key assumptions used for the proof of concept, described below:

- All data used in the proof of concept will be sanitized, removing any personally identifiable information.
- The shared mobility partners will be responsible for ensuring that all data provided to the research data respository is sanitized.
- The proof of concept will last for not less than two weeks.
- A minimum of 500-vehicle miles from each set of vehicles (carshare and connected vehicle).
- No customization of existing systems will be used for the proof of concept.
- Customer off the Shelf (COTS) hardware and systems shall be used to the fullest extent possible.
- Firewalls and other network protection systems shall be incorporated to ensure that all proof of concept data is safeguarded against unauthorized dissemination.
- All data provided for the proof of concept shall be in Comma Separated Values (CSV) or Excel Spreadsheet (XLS) format.
- All revenue reports provided by U of M shall be in CSV or XLS format.
- All data used for the proof of concept shall be considered research data and shall be destroyed within 30-days of the completion of the proof of concept.

PROOF OF CONCEPT PROCEDURES AND RESULTS SHEETS

This section provides the procedures, responsible entities, and anticipated success results for the proof of concept (POC). These procedures address the proof of concept setup, execution, and closeout. During the POC, the results of each step will be conducted with the results annotated by each involved entity. At the end of each section, a signature from each entity's authorized representative will be required to ensure the results provided are in-line with the expectations for the POC.

PROOF OF CONCEPT ENVIRONMENT SETUP

Step	Procedure	Entities	Performance Measure	Result
S.1	Identify carshare vehicles for proof of concept. Ensure all data points needed for POC can be captured using existing systems.	Hourcar/VSI	Accurate data provided from test vehicles with no data inaccuracies or reporting errors	
S.2	Establish networked data repository capable of collecting at least 2 Terabytes (TB) of data	VSI	Provision of data repository	
S.3	Provide data repository weblink or IP address to all entities	VSI	Weblink or IP address provided	
S.4	Ensure network firewalls are in place between systems	All	Identification of network protection	

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MnDOT Representative   **U of M Representative**   **Hourcar Representative**   **VSI Representative**

PROOF OF CONCEPT EXECUTION

HOURCAR

Step	Procedure	Entities	Performance Measure	Result
E.HC.1	Conduct normal carshare reservation and usage operations	Hourcar	---	
E.HC.2	Collect two weeks and at least 500-miles of carshare data	Hourcar	---	
E.HC.3	Determine the following data points are captured from vehicles on a per-subscription basis: • VIN or unique identifier • Trip mileage • Date/Time of Day of carshare subscription start • Date/Time of Day of carshare subscription end	Hourcar	Accurate categorization of data across the identified points	

E.HC.4	Refuel any test vehicles and record the number of gallons purchased at each refuel	Hourcar	Fuel card statements and data relative to the number of gallons purchased	
E.HC.5	Aggregate the data over the entire POC period. Remove all Personally Identifiable Information (PII) from data.	Hourcar	Inspection of start and end dates in data file equals the POC 2-week period. Inspection of data to ensure no PII exists.	
E.HC.6	Ensure data is in a CSV or XLS format	Hourcar	Identification of filename and extension	
E.HC.7	Upload aggregated data file to research data repository using the weblink or IP address provided in step S3	Hourcar	Screenshot showing successful file upload	
E.VSI.8	Send proof of successful data upload message to U of M and MnDOT	Hourcar	Email or message sent	

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MnDOT Representative   **Hourcar Representative**

VSI

Step	Procedure	Entities	Performance Measure	Result
E.VSI.1	Deploy Connected Test Vehicle	VSI	---	
E.VSI.2	Collect two weeks and at least 500-miles of carshare data	VSI	---	
E.VSI.3	Determine the following data points are captured from vehicles on a per-trip basis: - VIN or unique identifier - Trip mileage - Date/Time of Day of each trip - Location (provided in no less than 15 second intervals) - Fuel consumed in gallons	VSI	Accurate categorization of data across the identified points	
E.VSI.4	Aggregate the data over each 24-hour period during the POC. A day is defined as 00:00:01 to 23:59:59 Central Daylight Time (CDT)	VSI	Inspection of start and end times in data file equals a 24-hour period.	
E.VSI.5	Ensure data is in a CSV or XLS format	VSI	Identification of filename and extension	

Step	Procedure		Performance Measure	
E.VSI.6	Upload aggregated data file to research data repository using the weblink or IP address provided in step S3 at the end of each day during the POC	VSI	Screenshot showing successful file upload	
E.VSI.7	Send proof of successful data upload message to U of M and MnDOT	VSI	Email or message sent	

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MnDOT Representative   **VSI Representative**

U OF M

Step	Procedure	Entities	Performance Measure	Result
E.UM.1	Upon receipt of a successful file upload message, download the data from the research data respository	U of M	Successful download of POC data	
E.UM.2	Inspect uploaded data to ensure no Personally Identifiable Information (PII) exists	U of M	No PII exists on data	
E.UM.3	Create financial revenue report showing gross and net revenues calculated over the duration of the POC. The following calculation should be used in the report: Gross revenue = [(# aggregate miles) x (per-mile rate)] Net reveue = [Gross Revenue] – [(# gallons of fuel consumed/purchased) x ($0.286)] The report shall show both the calculation of gross and net revenues on a per-vehicle basis as well as an aggregate of all vehicles over the POC period	U of M	Objective evaluation of calculations and inspection of reports	
E.VSI.4	Ensure data is in a CSV or XLS format	U of M	Identification of filename and extension	
E.UM.5	Send the POC financial report to both MnDOT and Revenue using email or state-approved ftp website	U of M	Successful transfer of report to MnDOT and Revenue	

MnDOT Representative   **U of M Representative**

MINNESOTA DEPARTMENT OF REVENUE (OPTIONAL)

Step	Procedure	Entities	Performance Measure	Result
E.REV.1	Inspect the provided revenue report for accuracy and auditability.	Revenue	Successfully inspection of revenue report.	
E.UM.2	Identify ways the revenue report could be safely imported into GenTax system. Attempt an integration if it is safe to conduct.	Revenue	Identified ways revenue reports could be integrated into GenTax.	

MnDOT Representative   **Revenue Representative**

PROOF OF CONCEPT DISCREPANCIES AND CONCLUSIONS

This section provides a way for all POC entities to capture any identified discrepancies, the type of rework needed to resolve the discrepancy, and any conclusions noted during the POC that should be applied to the overall demonstration.

Issue	Description	Entities	Impact	Mitigation	Conclusion/Resolution

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MnDOT Representative

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U of M Representative

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Hourcar Representative

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VSI Representative