

# **THE MINNESOTA ROAD FEE TEST (MRFT)**

**BEN PIERCE, BATTELLE**

# Enabling Legislation

2007 Legislature

Mn/DOT  
Appropriations Bill

“\$5,000,000 is for a pilot project to demonstrate technologies that will allow for the future replacement of the gas tax with a fuel-neutral mileage charge.”

# Battelle's Role

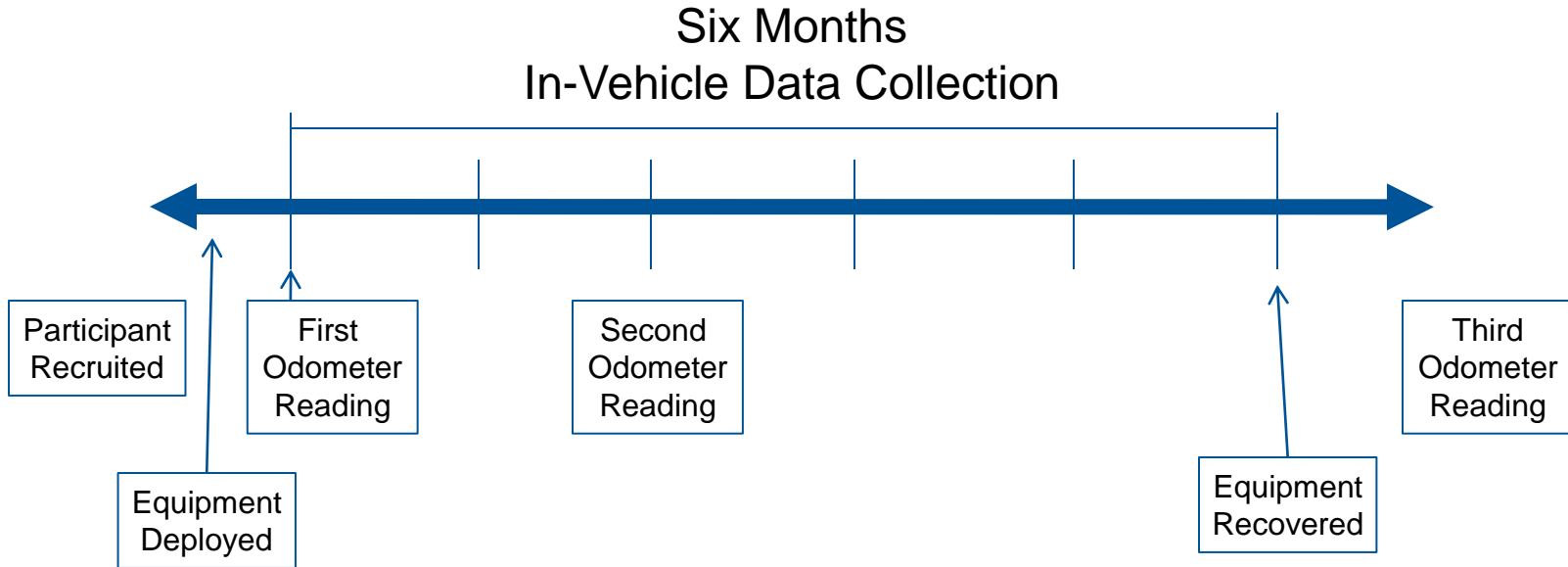
- Develop software and hardware systems to conduct a demonstration of mileage-based user fees (MBUF)
- Demonstration will:
  - Utilize Commercial Off-The-Shelf (COTS) hardware
  - Include 500 in-vehicle devices & back office processing system
  - Be deployed for a 1-year duration (split into 3 deployment waves)
  - Require extensive software development
  - Permit a comparison of technology vs. odometer readings

# Mileage-Based User Fee Operational Concept

- Discounting System

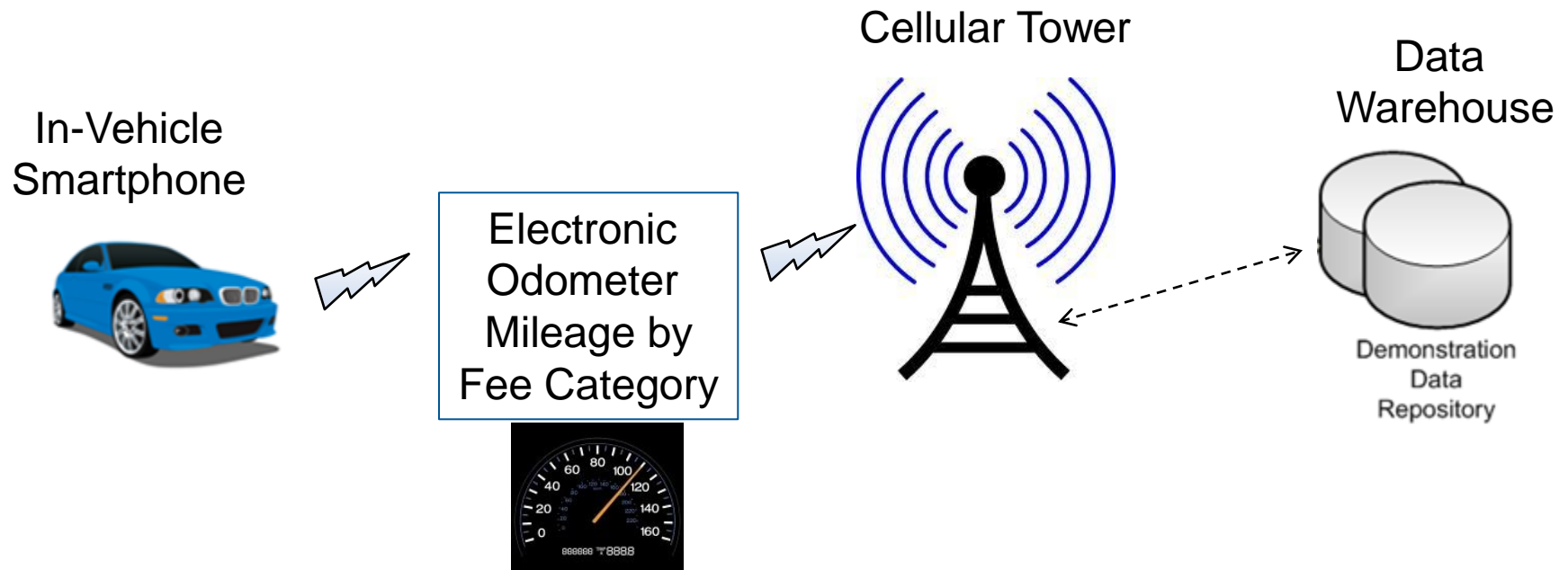
- Everyone has to pay a flat fee per mile driven based upon odometer readings (annual or at sale of vehicle)
- Technology used to discount from a flat fee per mile according for a fee system based upon:
  - Country (inside vs. outside the United States)
  - State (inside vs. outside Minnesota)
  - Large geo-zones (inside vs. outside a metropolitan area)
  - Roadway classification (Interstate vs. Non-Interstate)
  - Time of day
  - Day of week
  - Vehicle heading
  - Type of vehicle

# Study Design Overview



- Participation is voluntary and can be changed on a trip-by-trip basis
- Will have before/after odometer readings to compare to GPS readings
- Will have information on the number of times user opted out

# System Concept



GPS Position is NOT being transmitted for the Fee Assessment

# MBUF Fee Assessment

- “Real” money will change hands
  - Demonstration includes invoicing and payment by participants through PayPal
- Each participant will be provided with an up-front incentive to participate
  - Incentive will be sufficient to “cover” approximately four months of travel
- No MBUF fees assessed until the third month of participation
  - Participant pays MBUF fees for months 3-6
  - Will never have to pay more than the initial incentive

# **MBUF – How it works**

- Designed as a “thick client”
- MBUF application accumulates mileage driven by fee category (roadway type, geography, etc.)
- Every 24 hours accumulative mileage by fee category transmitted via cellular to data warehouse
- Invoice generated monthly based upon aggregate miles in fee categories



# In-Vehicle Design Overview

## Samsung Galaxy S

In-Vehicle  
Computational  
Device and  
Display Unit



## OBD-II Diagnostic Tool

ELM327  
With Bluetooth  
Data Connection



## Mounting Hardware and Cables



# Installation Pictures



# Minnesota Road Fee Test Main



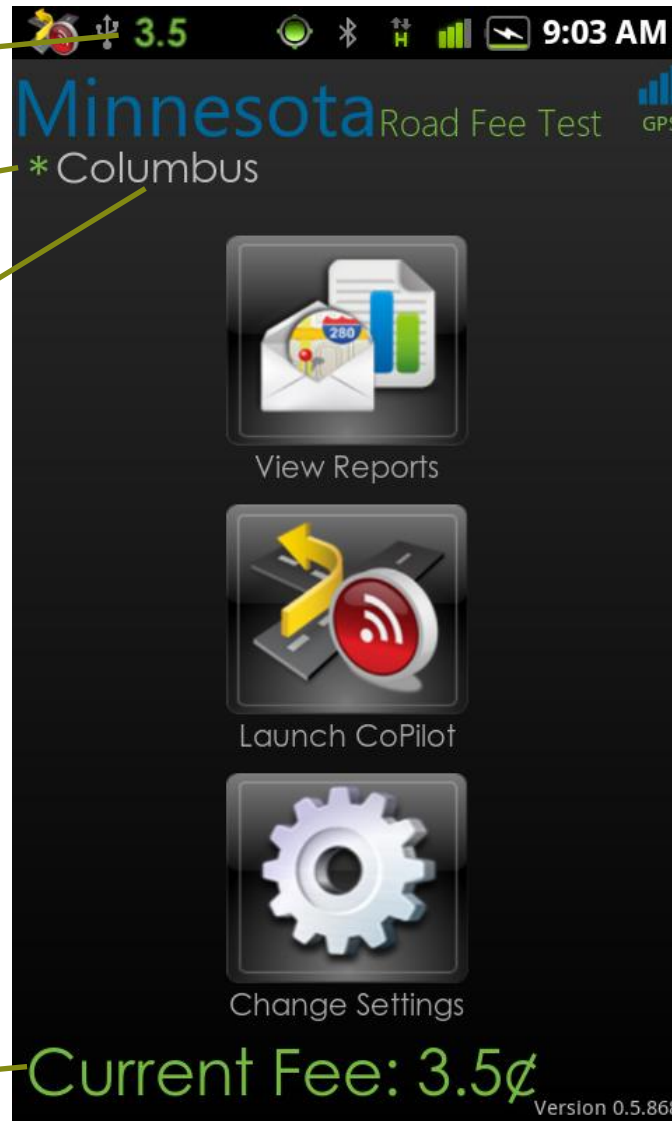
# Minnesota Road Fee Test - Running

MBUF Rate

Interstate Notification

MBUF Geography

GPS Status



MBUF Rate

Version

# MBUF In-Vehicle Trip Report



# Participants Have Web-Access

Welcome burmsm! [ Log Off ]

**Minnesota**  
Road Fee Test

participant portal

## Navigation Menu

- Home
- Account Information
- View Invoices
- View Trips
- Schedule Odometer Reading
- Request Assistance
- FAQ
- Guides / Videos



## Invoices

| Invoice Number | Invoice Date | Due Date  | Invoice Amount | Amount Paid | Remaining Balance | Status           | Action   |
|----------------|--------------|-----------|----------------|-------------|-------------------|------------------|--|
| 2              | 4/22/2011    | 5/5/2011  | \$0.13         | \$0.13      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 3              | 4/25/2011    | 5/8/2011  | \$0.24         | \$0.24      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 16             | 4/29/2011    | 5/12/2011 | \$0.59         | \$0.59      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 23             | 5/1/2011     | 5/14/2011 | \$0.32         | \$0.32      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 25             | 5/2/2011     | 5/15/2011 | \$0.21         | \$0.21      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 482            | 5/4/2011     | 5/17/2011 | \$0.73         | \$0.73      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 590            | 5/5/2011     | 5/18/2011 | \$0.47         | \$0.47      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 611            | 5/6/2011     | 5/19/2011 | \$0.23         | \$0.23      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 632            | 5/7/2011     | 5/20/2011 | \$0.00         | \$0.00      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 653            | 5/8/2011     | 5/21/2011 | \$0.00         | \$0.00      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 694            | 5/9/2011     | 5/22/2011 | \$0.54         | \$0.54      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 979            | 5/17/2011    | 5/30/2011 | \$0.00         | \$0.00      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 1017           | 5/18/2011    | 5/31/2011 | \$0.22         | \$0.22      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 1055           | 5/19/2011    | 6/1/2011  | \$0.47         | \$0.47      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 1196           | 5/20/2011    | 6/2/2011  | \$0.71         | \$0.71      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 1578           | 5/26/2011    | 6/8/2011  | \$0.18         | \$0.18      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 1615           | 5/27/2011    | 6/9/2011  | \$0.39         | \$0.00      | \$0.39            | Canceled         | <a href="#">View PDF</a> <a href="#">Pay Invoice</a> |
| 1690           | 5/29/2011    | 6/11/2011 | \$0.00         | (\$0.26)    | \$0.26            | Overdue          | <a href="#">View PDF</a> <a href="#">Pay Invoice</a> |
| 1764           | 5/31/2011    | 6/13/2011 | \$0.00         | \$0.00      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |
| 1838           | 6/2/2011     | 6/15/2011 | \$0.10         | \$0.00      | \$0.10            | Canceled         | <a href="#">View PDF</a> <a href="#">Pay Invoice</a> |
| 1875           | 6/3/2011     | 6/16/2011 | \$0.49         | \$0.00      | \$0.49            | Payment Due      | <a href="#">View PDF</a> <a href="#">Pay Invoice</a> |
| 1912           | 6/4/2011     | 6/17/2011 | \$0.37         | \$0.00      | \$0.37            | Payment Due      | <a href="#">View PDF</a> <a href="#">Pay Invoice</a> |
| 1986           | 6/6/2011     | 6/19/2011 | \$0.14         | \$0.00      | \$0.14            | Payment Due      | <a href="#">View PDF</a> <a href="#">Pay Invoice</a> |
| 2023           | 6/7/2011     | 6/20/2011 | \$0.43         | \$0.00      | \$0.43            | Payment Due      | <a href="#">View PDF</a> <a href="#">Pay Invoice</a> |
| 2099           | 6/9/2011     | 6/22/2011 | \$0.46         | \$0.00      | \$0.46            | Payment Due      | <a href="#">View PDF</a> <a href="#">Pay Invoice</a> |
| 2175           | 6/11/2011    | 6/24/2011 | \$0.28         | \$0.00      | \$0.28            | Payment Due      | <a href="#">View PDF</a> <a href="#">Pay Invoice</a> |
| 2251           | 6/13/2011    | 6/26/2011 | \$0.00         | \$0.00      | \$0.00            | Payment Complete | <a href="#">View PDF</a>                             |

# Electronic and Paper Invoices

## Minnesota Road Fee Test

### Monthly Invoice

**Matthew G Burns**  
505 King Ave  
Columbus, OH 43201

Invoice #: 2099  
2002 VW Passat

Invoice Date: 6/9/2011

Due Date: 6/22/2011

Total Amount Due: \$0.46

#### Mileage Detail

| Criteria                                       | Mileage | Rate (\$) | Rate Effectivity Date | Total Charge |
|--|---------|-----------|-----------------------|--------------|
| Columbus-NonInterstate-OFF-WEEKDAY             | 20.23   | 0.010     | 6/8/2011              | \$0.20       |
| Columbus-NonInterstate-AM-WEEKDAY              | 6.95    | 0.020     | 6/8/2011              | \$0.14       |
| Ohio-NonInterstate-OFF-WEEKDAY                 | 5.46    | 0.010     | 4/20/2011             | \$0.05       |
| Ohio-NonInterstate-AM-WEEKDAY                  | 3.70    | 0.010     | 4/22/2011             | \$0.04       |
| Bartholomew North-NonInterstate-AM-WEEKDAY     | 0.19    | 0.080     | 6/5/2011              | \$0.02       |
| Bartholomew South-NonInterstate-OFF-WEEKDAY    | 0.20    | 0.070     | 6/5/2011              | \$0.01       |
| Columbus-Interstate-AM-WEEKDAY                 | 0.04    | 0.035     | 4/22/2011             | \$0.00       |
| Columbus-Interstate-OFF-WEEKDAY                | 0.03    | 0.035     | 4/22/2011             | \$0.00       |
| Columbus-NonInterstate-PM-WEEKDAY              | 0.01    | 0.020     | 6/8/2011              | \$0.00       |
| Battelle Parking Lot-NonInterstate-AM-WEEKDAY  | 0.03    | 0.050     | 5/9/2011              | \$0.00       |
| Battelle Parking Lot-NonInterstate-OFF-WEEKDAY | 0.09    | 0.050     | 5/9/2011              | \$0.00       |

#### Payment Detail

Last Payment Amount: \$0.47  
Last Payment Date: 5/24/2011

To make a payment using PayPal, logon to <https://www.mnroadfeetest.com>.

Payments also may be made by appointment by calling (612) 708-7288.

For questions about this invoice, call (612) 708-7288 or email [billing@mnroadfeetest.com](mailto:billing@mnroadfeetest.com)

# Cloud-Based Data Warehouse

Welcome burnsm1 [ Log Off ]

**Minnesota**  
Road Fee Test

administrator portal

- Home
- Reports ▾
- Participant ▾
- System Administration ▾
- Invoice Management ▾
- Management ▾

## Participant

Yogi Bear  
123 Jellystone Dr  
Jellystone, MT 87652  
**Email:** bear.yogi@mnroadfeetest.com  
**Home:** (757) 321-4567

**User Name:** beary  
**Work:** None

**Received Startup Funds:** False  
**Cell:** None

**Preferred:** Home

- [Edit](#)
- [Manage Portal Access](#)
- [Vehicle and Device](#)
- [View Trip Data](#)

## Odometer Readings

**Vehicle:** 2010 Toyota Sienna      **Devices:** 353650049047348

| Odometer Reading | Status        | Detail | Action                   |
|------------------|---------------|--------|--------------------------|
| First Reading    | Not Scheduled |        | <a href="#">Schedule</a> |
| Second Reading   | Not Scheduled |        | <a href="#">Schedule</a> |
| Third Reading    | Not Scheduled |        | <a href="#">Schedule</a> |

## Send Administrative Message to this Participant

 [Send](#)



# Current Status and Schedule

- Current Status
  - Final System Testing and Validation

