Research Data Exchange

Real-Time Data Capture and Management Program
Connected Vehicle Environment

**Vehicle Data**
- latitude, longitude, time,
- heading angle, speed, lateral acceleration, longitudinal acceleration, yaw rate,
- throttle position, brake status, steering angle,
- headlight status, wiper status, external temperature, turn signal status, vehicle length,
- vehicle width, vehicle mass, bumper height

**Infrastructure Messages**
- Signal Phase and Timing
- Fog Ahead
- Train Coming
- Drive 35 mph
- 50 Parking Spaces Available
DCM provides data for CV applications

Real-time Data Capture and Management

- Mobile Devices
- Vehicle Status Data
- Infrastructure Status Data
- Weather Data
- Truck Data
- Transit Data
- Location Data

Connected Vehicle Applications

- Weather Application
- Fleet Management/Dynamic Route Guidance
- Safety Alerts and Warnings
- Signal Phase & Timing Adjusts Real-Time Conditions
- Transit Signal Priority
- Real-Time Travel Info

*Reduce Speed 35 MPH*
Data Environments

Data environment:
- well-organized collection of data of specific type and quality
- captured and stored at regular intervals from one or more sources
- systematically shared in support of one or more applications
Research Data Exchange (RDE)

- The Research Data Exchange (RDE) is the connected system of data environments supporting application research and development for connected vehicle applications.
- Currently all data is archived at USDOT within the RDE; in the future other data will be archived outside of USDOT and federated with the RDE.
- The RDE is located at [www.its-rde.net/](http://www.its-rde.net/).
- Registered users may download data files.
Welcome to the Research Data Exchange

The Research Data Exchange (RDE) is developed as a transportation data sharing system that promotes sharing of both RDE Website

The data sent from the integrated Mobile Observation (IMO) system from theRDE can be used by researches to test new applications and

RDE Website

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The primary purpose of the DCM (Data Capture and Management) Research Data Exchange is to provide a variety development, testing, and demonstration of multi-modal transportation mobility applications being pursued under the (CMMA) Program and other connected vehicle research activities. Data accessible through the Research Data Exchange will be used by the public. The vision of the DCM Program is to enhance current operational practices and transform future transportation system acquisition and systematic provision of integrated data from infrastructure, vehicles, and travelers. This data is available others.

Data Environments

<table>
<thead>
<tr>
<th>Title</th>
<th>Start Date</th>
<th>End Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLDOT Orlando ITS Vehicle Counts</td>
<td>2010-09-01</td>
<td>2010-10-22</td>
<td>The Florida Department of Transportation (FLDOT) data environment contains data recorded by Vehicle Awareness Devices (VADs) on Lynx transit buses in Orlando, FL. The VADs started operation in September 2011 and continued operation during the ITS World Congress in October 2011. The contents of the recorded data include the required components of the 20735 Basic Safety Message (BSM). The data in this data environment were produced by the Vehicle Awareness Devices (VADs) installed on one test vehicle over a two-month period. Activities included numerous repetitive trips in and around the city of Orlando, FL. The data in this environment consist of RDE and ODE data for the six days with the most good data.</td>
</tr>
<tr>
<td>Leesburg VA Vehicle Awareness Devices</td>
<td>2012-10-18</td>
<td>2012-12-19</td>
<td>The data sent from the integrated Mobile Observation (IMO) system from the RDE can be used by researches to test new applications and</td>
</tr>
<tr>
<td>NCAR 2009</td>
<td>2005-04-06</td>
<td>2006-04-24</td>
<td>See the Vehicle Infrastructure Initiative Pre-Concept data environment for a description of the Michigan Test Bed and the data collected there in 2008. In April 2009 a second set of trials was conducted at the Michigan Test Bed, directed by the National Center for Atmospheric Research (NCAR). These trials used a smaller set of vehicles, and concentrated on collecting data during periods of rain or snowy weather. RDE data for the NCAT 2009 tests were available for five days in April 2009. The data in this data environment consists of RDE and ODE data for the six days with the most good data.</td>
</tr>
<tr>
<td>NCAR 2010</td>
<td>2010-01-26</td>
<td>2010-03-29</td>
<td>See the Vehicle Infrastructure Initiative Pre-Concept data environment for a description of the Michigan Test Bed and the data collected there in 2008. In late January through early April 2010 a third set of trials was conducted at the Michigan Test Bed, again directed by the National Center for Atmospheric Research (NCAR). These trials used a small set of vehicles, similar to the trials in 2009, and concentrated on collecting atmospheric data from vehicle-mounted sensors to data from a nearby fixed weather observing station. The 2013 data selected for inclusion in this data environment consists of RDE and ODE data for the six days with the most good data.</td>
</tr>
<tr>
<td>Pasadena</td>
<td>2011-09-01</td>
<td>2011-10-31</td>
<td>The Pasadena data environment covers the diverse roadway network in and around the City of Pasadena, California. The data was collected in 2011 during the months of September and October. The data environment includes a variety of data types including network data (highway network file), demand data (trip tables), network performance data (link volumes, turn volumes, speeds and capacities), work zone data, weather data, Closed Circuit Television (CCTV) camera data, and Changeable Message Signs (CMS) data. Data from simulations are included where there are no sensors, and to provide forecasts.</td>
</tr>
</tbody>
</table>
What is included in the RDE

- Real-time and Archived Data
- Probe Data from Field Tests
- Data from Research Projects including simulations
- Advanced Search Capabilities
- Multiple File Download Capability
- FAQs
- External Links
- Contact Information
- Standard Metadata documentation
Available Connected Vehicle Data

- **Probe Message Data.** Actual and simulated vehicle trajectories and probe snapshot messages in SAE J2735 format from tests conducted at the Connected Vehicle Test Bed in Novi, MI in 2008, 2009, and 2010.

- **Vehicle and Roadside Device Data.** Integrated multimodal data from vehicles and roadside sensors from four sites (Seattle, Portland, Pasadena, and San Diego). Data includes light and transit vehicles, incidents, weather, freeway and arterial travel times, and traffic signal data.

- **Connected Maintenance Vehicles.** Real-time and archived data from wirelessly-connected snowplows and maintenance trucks operated by Minnesota DOT.

- **Basic Safety Messages (BSM) - Orlando.** BSM data collected every 0.1 second from transit vehicles at the 2011 World Congress Demonstration in Orlando FL.

- **BSM Data - Leesburg.** BSM data collected every 0.1 second from a device in a vehicle in the vicinity of Leesburg, VA.

- **Connected Vehicles and Roadside Device Data.** One day of connected vehicle, Roadside Equipment, and contextual weather data from the Safety Pilot Model Deployment in Ann Arbor, MI.
New Data on the RDE for Release 2.0

Integrated Mobile Observation (IMO) Data

- Real-time and archived data from Minnesota DOT maintenance vehicles
- Contains location data, road weather observations from vehicle-mounted sensors, and engine data directly from the vehicles’ Controller Area Network (CAN) bus.
  - In archive mode, users may download files containing all records collected within a certain time interval.
  - In real-time mode, an application may be downloaded from the RDE that enables the user to receive the data records in real-time directly from the RDE.
Safety Pilot Model Deployment Data

Connected Vehicle Data (One-Day Sample) from Ann Arbor, MI

- Data from vehicles with vehicle awareness devices, aftermarket safety devices, retrofit safety devices, and integrated safety devices
- Messages sent and received by Roadside Equipment (RSEs)
- Basic Safety Messages (BSM) defined in the SAE J2735 standard.
- The primary contents of BSM files include:
  - Position (latitude, longitude, elevation)
  - Transmission status
  - Speed and heading
  - Lateral, longitudinal, and vertical acceleration
  - Brake system status, ABS status, traction control status
New Features of the RDE for Release 2.0

- The user interface has been upgraded.
- The RDE now features a “shopping cart” model to download of multiple files as a zip file.
- The download confirmation text now provides an estimate of the download file size.

- Updated “Frequently Asked Questions” (FAQs).
- Users can now subscribe to receive emailed news of RDE-related updates and feedback opportunities.
- Data environments may be viewed and accessed via a map-based interface.
Potential uses of RDE data

- What are the key differences between probe data and BSM connected vehicle data?
- How can probe data be used in conjunction with other forms of data to enable new transformative applications?
- Can multi-modal data be fused and used for traveler information and systems management?
- How can “big data” analytic techniques be applied to transportation data to improve transportation planning and management?
Future Additions

- Additional data collected and provided in real-time.
- Additional data from the Safety Pilot Model Deployment
- Additional data in Federated data environments residing on computer systems managed by other entities
- A Portal to facilitate discovery and access to data in Federated data environments
For more information ...

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