WRTM and Connected Vehicles

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Program Vision

To research and facilitate a national, multimodal surface transportation system that features a connected transportation environment around vehicles of all types, the infrastructure, and portable devices to serve the public good by leveraging technology to maximize safety, mobility, and environmental performance.
ITS Research Program Components

**Applications**
- Safety
  - V2V
  - V2I
  - Safety Pilot
- Mobility
  - Real Time Data Capture & Management
  - Dynamic Mobility Applications
- Environment
  - AERIS
  - Road Weather Applications

**Technology**
- Harmonization of International Standards & Architecture
- Human Factors
- Systems Engineering
- Certification
- Test Environments

**Policy**
- Deployment Scenarios
- Financing & Investment Models
- Operations & Governance
- Institutional Issues
ITS Mobility Program Linkages

Real-time Data Capture and Management

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

Dynamic Mobility Applications

- Reduce Speed 35 MPH
- Weather Application
- Transit Signal Priority
- Real-Time Travel Info
- Fleet Management/Dynamic Route Guidance
- Signal Phase & Timing Adjusts Real-Time Conditions
- Safety Alerts and Warnings
Connected Vehicles & RdWx – Vision

- Obtain a thorough picture of current weather and road conditions by including mobile sources
  - Higher resolution observations that spatially augment fixed sensors
  - Take advantage of existing standards and on-board sensors

- Improve weather-related decision support tools to mitigate safety and mobility impacts of weather
  - Based on ability to better detect and forecast road weather and pavement conditions
Weather & Road Condition Observations

- Barometric Pressure
- Windshield Wiper Setting
- Headlights Status
- Ambient Air Temperature
- Speed and Heading
- Adaptive Cruise Control (ACC)
- Location and Elevation
- Hours of Operation

- Anti-lock Braking System (ABS)
- Brake Status
- Stability Control
- Traction Control
- Yaw/Pitch/Roll
- Accelerometer
- Steering Angle
- Differential Wheel Speed
Road Weather CV Applications

- Enhanced Maintenance Decision Support
- Information for Maintenance and Fleet Management Systems
- Weather-Responsive Traffic Management
  - Variable Speed Limits
  - Signal Timing Optimization
  - Motorist Advisories and Warnings
- Information for Freight Carriers
- Information and Routing Support for Emergency Responders
Connected Vehicles & Road Weather: Illustrative Concept

**Doppler Radar (remote)**

**Weather Satellite (remote)**

**Data Processing Center**

**Vehicle Data**
- temperature
- pressure
- velocity
- brake status
- steering
- traction control
- wiper status
- headlights status

**ESS (local)**

**Warnings sent to approaching vehicles**

**CONNECTED VEHICLES:**
the Vehicle Data Translator

Road Weather Connected Vehicle Applications
Integrated Mobile Observations (IMO) Project

- Develop and test CV applications
- Use Vehicle Data Translator (VDT) to support applications
- Ingest vehicular data from State DOTs
  - Minnesota, Michigan, Nevada
- Demonstrate usefulness of mobile data in road weather applications
- Advance understanding of applications benefits
Weather Data Environment (WxDE)

• Develop a database environment that:
  - Manages and archives real-time weather data from both static and mobile sources
  - Incorporates VDT functionality
  - Supports the development of connected vehicle applications
  - Integrates with other Real-Time Data Capture and Management Program environments