5.9 GHz DSRC Vehicle-based Road and Weather Condition Application
CTS PFS is a group of ten state and local transportation agencies and FHWA.

- Focused on research and application development to prepare agencies for the deployment of connected vehicle (CV) technology.

- CTS PFS has contracted with Synesis Partners and its team members Parsons Brinckerhoff and NCAR to demonstrate a 5.9 GHz DSRC vehicle-based road and weather condition application.
Project Objectives

- Develop and test acquisition of weather and road condition data from 5.9 GHz DSRC-equipped agency vehicles
  - From the vehicle’s data bus
  - From supplemental devices like plows and spreaders
- Transmit the data to DSRC roadside equipment
- Send the data to an aggregation server
- Enable storing/processing the data in WxDE/VDT
Major Project Elements

- **Task 1: Messaging Requirements Development**
  - Based on road weather and 5.9 GHz DSRC standards

- **Task 2: Concept of Operations**
  - Consistent with Connected Vehicle Road Weather application concepts

- **Task 3: Applications Development**
  - Primarily software for the DSRC on-board unit (OBU)

- **Task 4: Application Installation**
  - Operating along NYSDOT’s Long Island Expressway
Gathering road and weather data from vehicles is driven by what data vehicles can provide.

Relevant standards include:
- DSRC radios
- Communications over DSRC
- Data bus standards for light and heavy vehicles
- Messages sent over DSRC
  - Basic Safety Message
  - Probe Vehicle Data Message
CV Weather Data Elements

- Exterior lights
- Wiper status front
- Wiper rate (front)
- Wiper status rear
- Wiper rate (rear)
- Sun data
- Rain data
- Air temperature
- Air pressure
- Is raining
- Rain rate
- Precipitation situation
- Solar radiation
- Mobile Friction
System Data Flows

- **Vehicle Data Translator**
  - **Weather Data Environment**
  - **System Monitor**
  - **Sensor**

- **Weather Data Aggregator**
  - **Roadside Unit**
  - **On-Board Unit**

- **NYS INFORM**
- **NYS CV APPLICATIONS**

**Communications Flow**:
- Sensor to Vehicle Data Logger: electric signal
- System Monitor to Roadside Unit: heartbeat
- Weather Data Environment to Weather Data Aggregator: weather observations

**Parameter Flows**:
- J1939/J1979 parameter from On-Board Unit
- J2735 snapshot from On-Board Unit
Logical Deployment

- Similar to other IMO deployments
- Uses DSRC instead of cellular from vehicles to roadside
Physical Deployment

New York State Thruway
Spring Valley CVII Test Bed
Installed: 2009-2010
RSEs: 11
Backhaul: Fiber and Cellular
Head End: Region 10 TMC
(via VPN connection at NYSTA)

Long Island Expressway
Test Bed
Installed: 2008
RSEs: 22
Backhaul: Fiber and Cellular
Head End: Region 10 TMC

Maintenance Facility/
NYS DOT Office
Challenges

- Standardizing the DSRC implementation
  - Messaging for probe data
  - Network configurations
  - On-board unit configurations
- Deployment and operations
  - Siting to reduce data latency
Opportunities

- Developing a prototype DSRC-based application supporting DOT road weather operations
- Replacing two NYSDOT first-generation DSRC RSEs with new generation RSE 3.0 devices
- Demonstrating operations that gather probe data from DOT vehicles over DSRC
- Implementing DSRC-based IMO in other agencies
- Providing a new data feed for the WxDE
Status and Schedule

- Completed Messaging Requirements and Concept of Operations
- Currently procuring DSRC equipment and starting application development
- Deployment in 2013Q4
- Operations through 2014Q1
- Report March 2014
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