Vehicle Infrastructure Integration Update

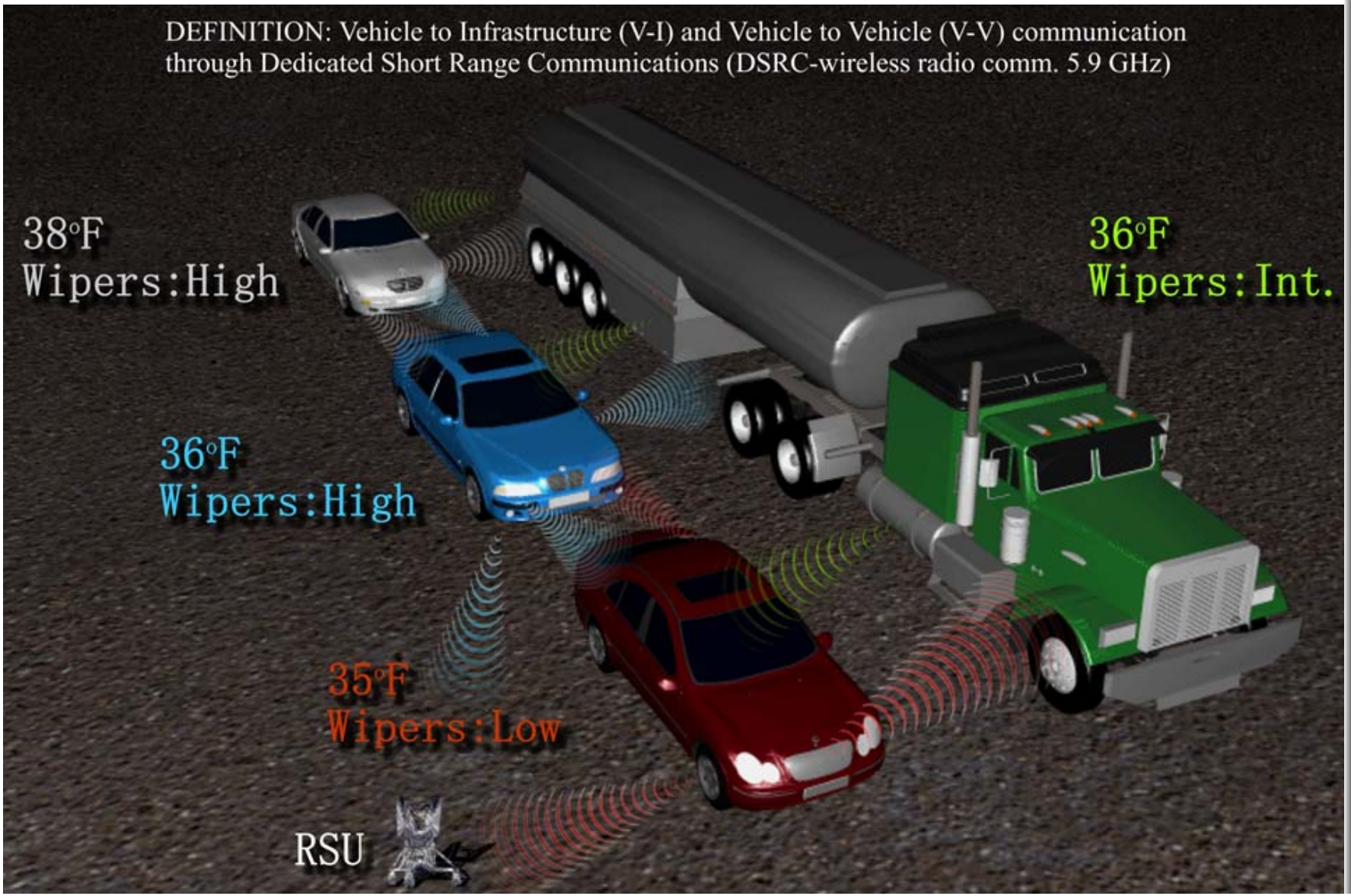
2007 MDSS Annual Meeting
Session 8

Andy Stern
Consulting Meteorologist (Noblis)
FHWA Road Weather Management Team

U.S. Department of Transportation
Federal Highway Administration

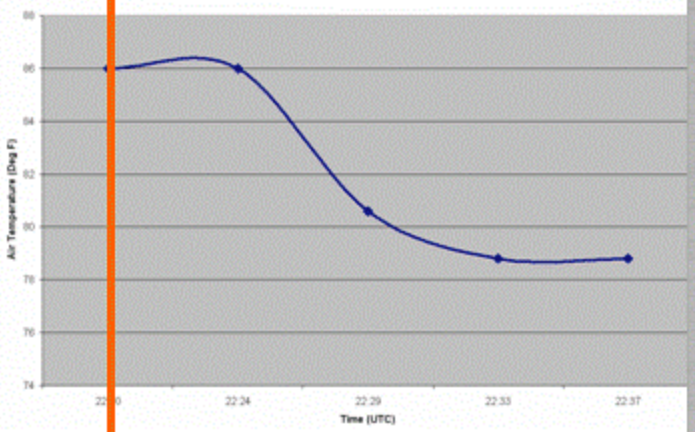
Road Weather Management

Vehicle Infrastructure Integration (VII)

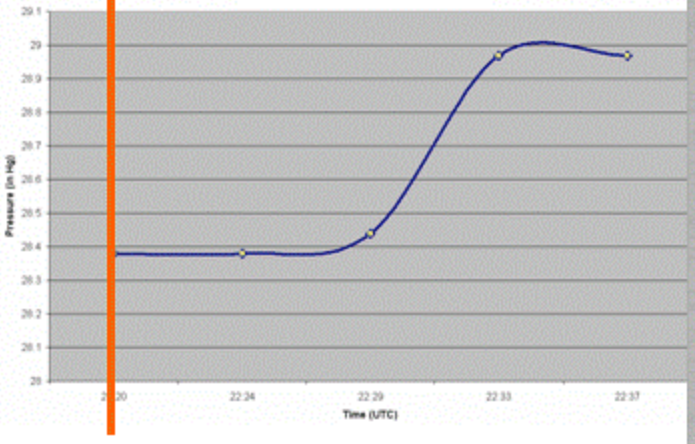


VII Test Bed – Detroit Metro

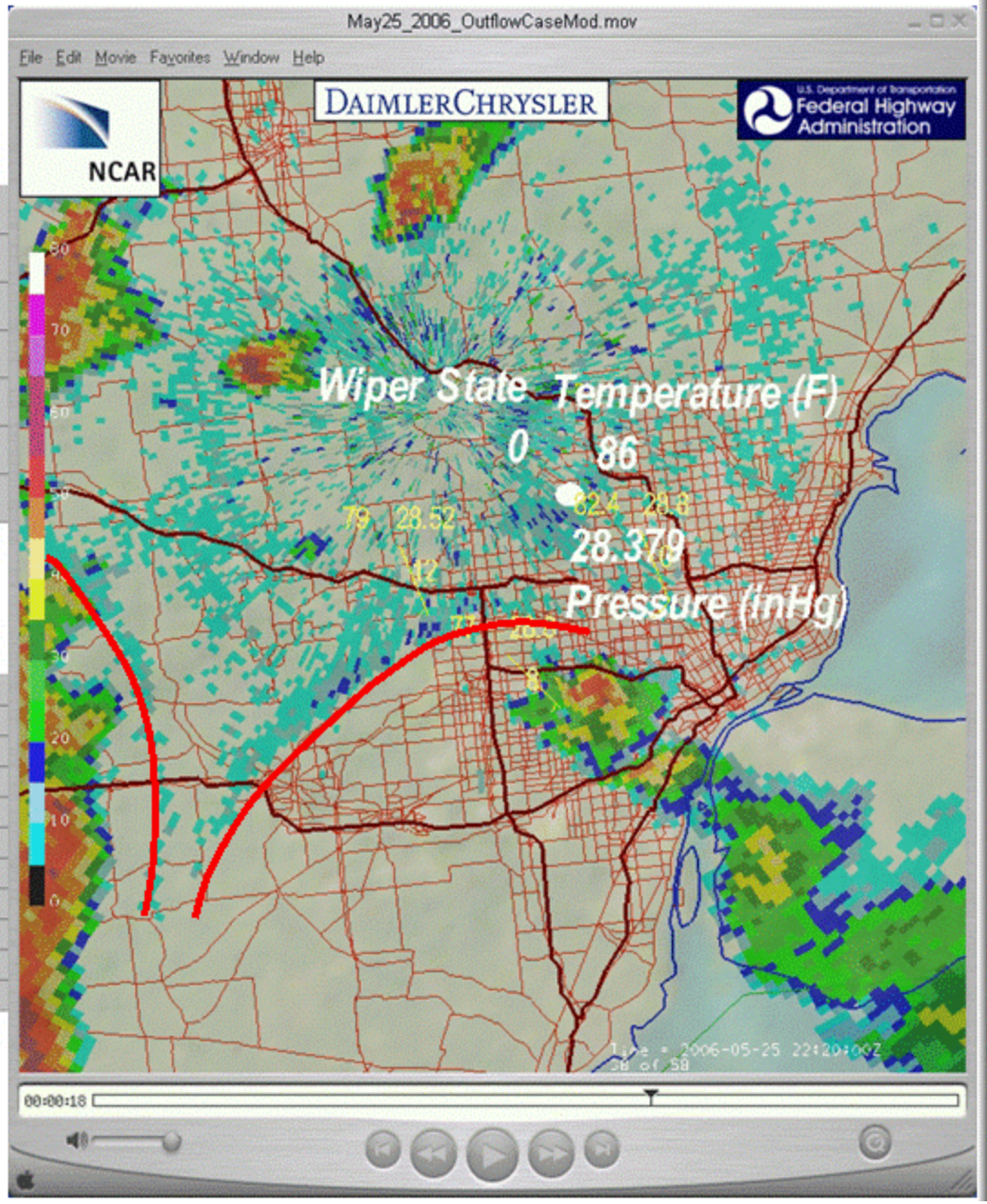
Air Temperature



Pressure

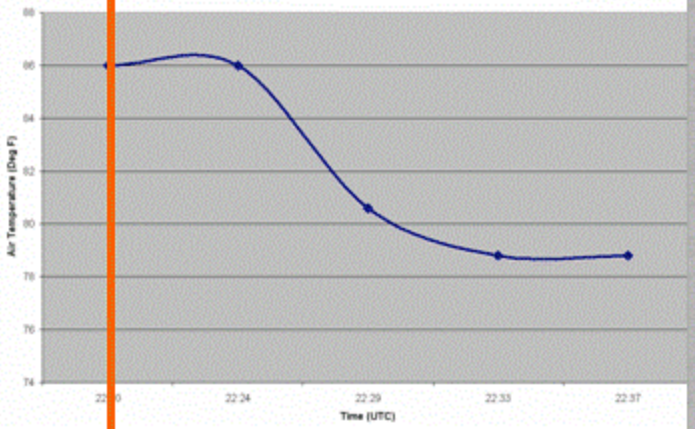


22:20 UTC

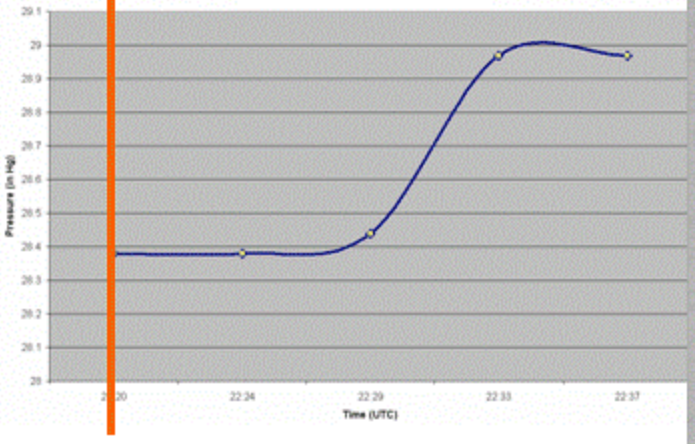


VII Test Bed – Detroit Metro

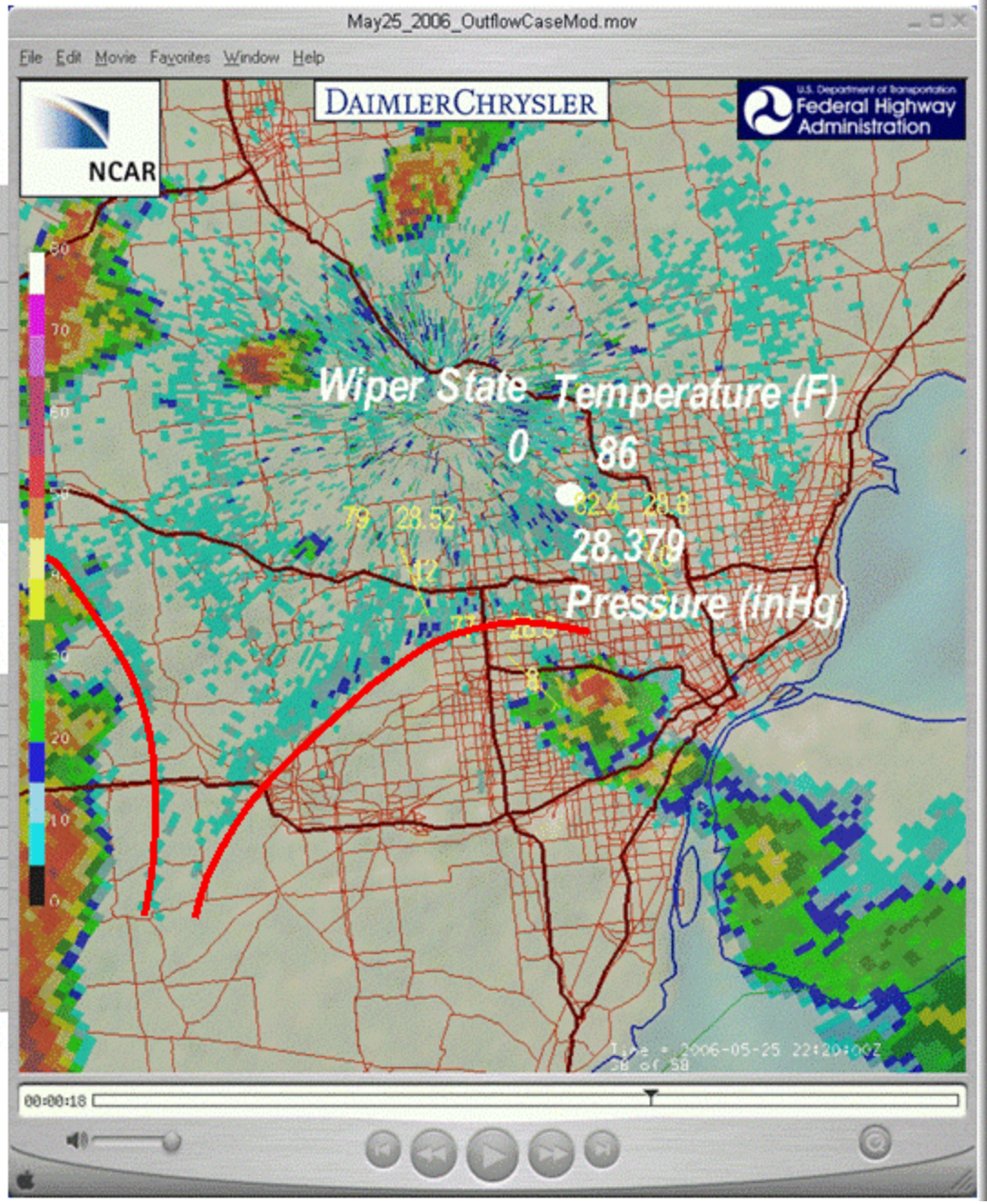
Air Temperature



Pressure



22:20 UTC



PoC Test Environment - Detroit

Test Bed Layout

- 57 Roadside Units (RSUs) to be installed
- 13 along Interstates (I-96/I-275)
- 44 along arterial routes
- Most RSUs will be located at signalized corners
- Interstate RSE's on CCTV masts or 25' steel towers in medians

PoC Testing

- PoC Start: 1 Nov 2007
- PoC End: Jan 2008
- Fleet of 25 VII-enabled vehicles
- Operated by professional drivers
- All data to be archived
- Each public application to direct fleet for one week
- Michigan DOT may run SEMSIM trucks along routes to gather data

Potential Vehicle-based Elements

- Hours of operation
- Elevation
- Accelerometer data
- Vehicle speed
- Heading
- Steering wheel rate of change
- Exterior temperature
- Windshield wiper rate
- Rain sensor
- Sun sensor
- Adaptive cruise control radar
- Impact sensor
- Barometric pressure
- Fog lights
- Headlights
- Relative humidity
- Anti-lock braking system
- Traction control
- Stability control
- Pavement temperature
- Brake boost
- Wiper status

Elements Available in PoC

- Hours of operation
- Elevation
- Accelerometer data
- Vehicle speed
- Heading
- Steering wheel rate of change
- **Exterior temperature**
- **Windshield wiper rate**
- Rain sensor
- Sun sensor
- Adaptive cruise control radar
- Impact sensor
- **Barometric pressure**
- Fog lights
- **Headlights**
- Relative humidity
- **Anti-lock braking system**
- **Traction control**
- **Stability control**
- Pavement temperature
- **Brake boost**
- **Wiper status**

Data Analysis

- Hoping to collect a diverse dataset (e.g. day, night, rain, snow, etc)
- Statistical Analysis
  - Compare vehicle data to fixed & mobile data
  - Determine if there are biases, quality errors, outliers, etc
  - Estimate minimum number of samples required to result in quality data

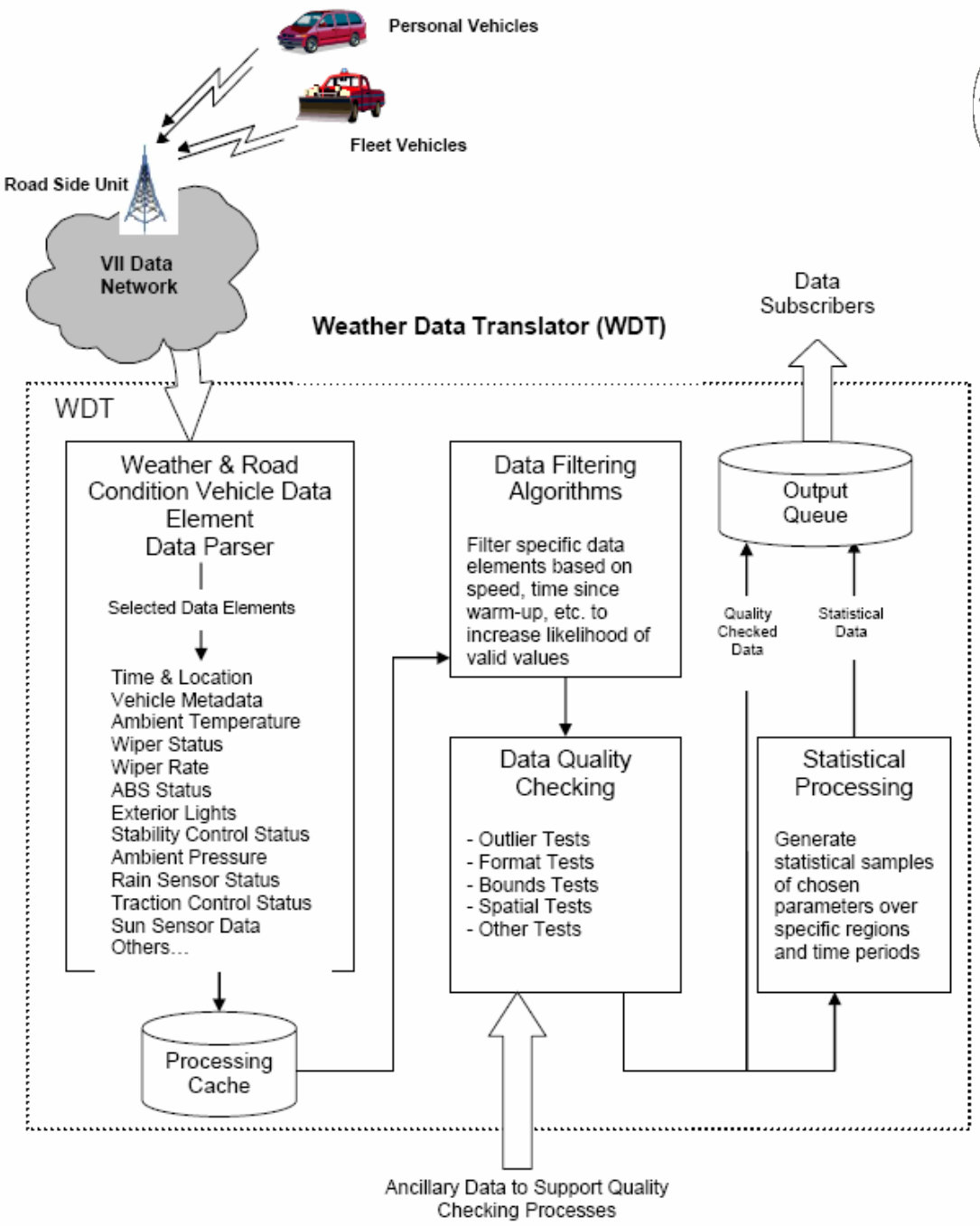
Data Integration

- Integrate VII-based data with other weather data sets
  - Determine correlation of weather radar reflectivity data and wiper status/rate
  - Determine correlation of ABS/VTC/VSC activation with slippery road surfaces
  - Correlate air temperature with ABS/VTC/VSC events

Dealing with a fire hose of data…

- Potentially there could be
  - millions of vehicles providing data
  - 10’s to 100’s of millions of probe messages
  - available 24/7/365
  - on both interstates and arterials
- How do we deal with all of the data?
  - Weather Data Translator (WDT)
  - Data segmentation

Weather Data Trasnlator (conceptual)



More Info at Session 6 of Clarus!

Upcoming VII Workshops

- Real-time System Mgmt. Information Program
  - Section 1201, SAFETEA-LU
  - Identify approaches for public & private sectors to attain possible quality benchmarks
- Transp. Information Management Data Quality Wkshps.
  - Review quality metrics identified in 2006 Request for Comments
- Explore VII data with respect to "Day One" Applications
  - Road Weather
  - Traveler Information
  - Signal Operations/Ramp Metering
  - Integrated Corridor Management
- Workshops to be held Fall, 2007 – Spring, 2008
  - Synthesis & recommendations report in late Summer 2008
- Point of Contact is James Pol (James.Pol@dot.gov)