



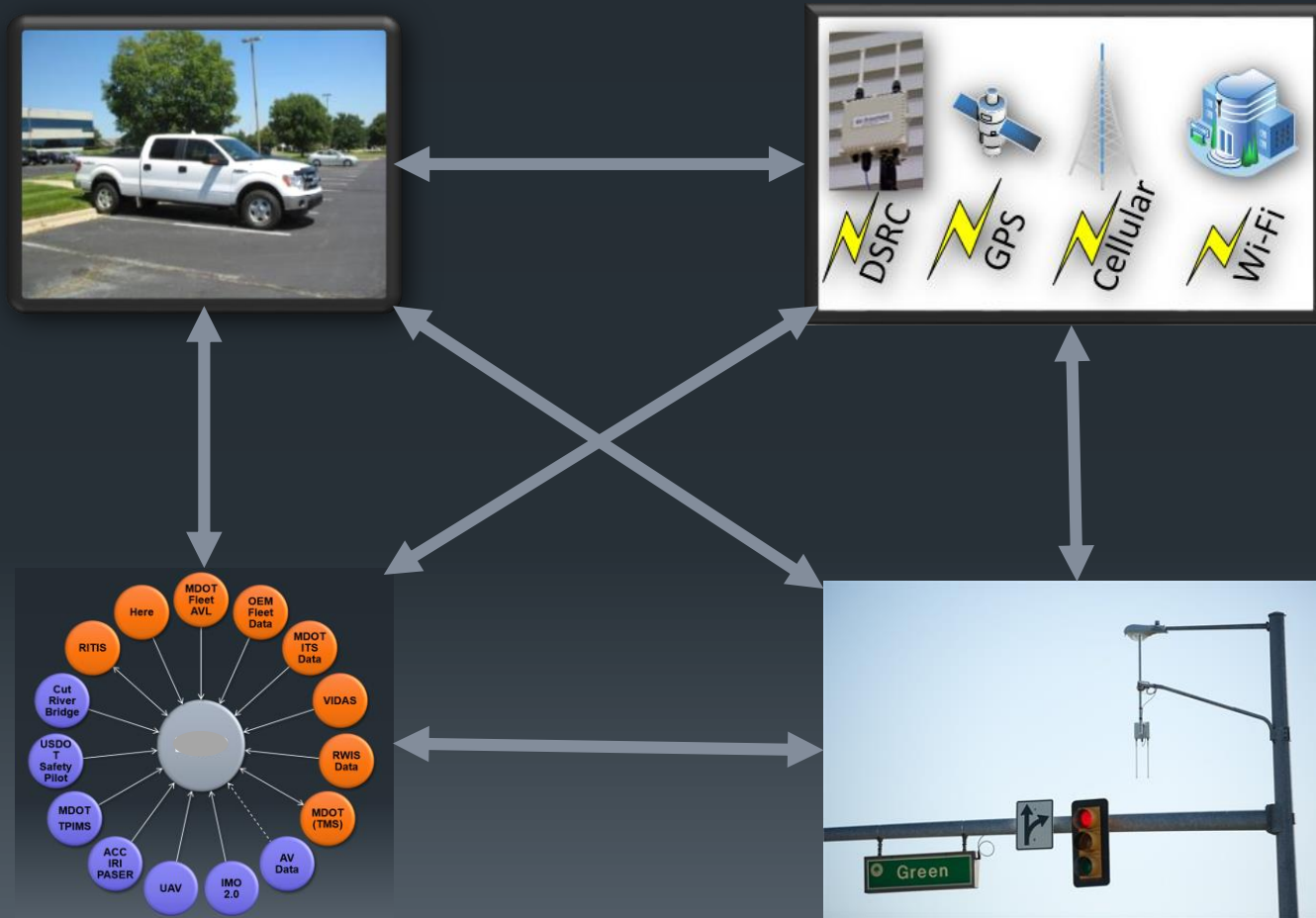
# Michigan Connected Vehicle Developments

October 27, 2015

Matt Smith, P.E.  
ITS Program Administrator  
Michigan Department of Transportation



# Components of a V2I System



# Connected Vehicle Environment

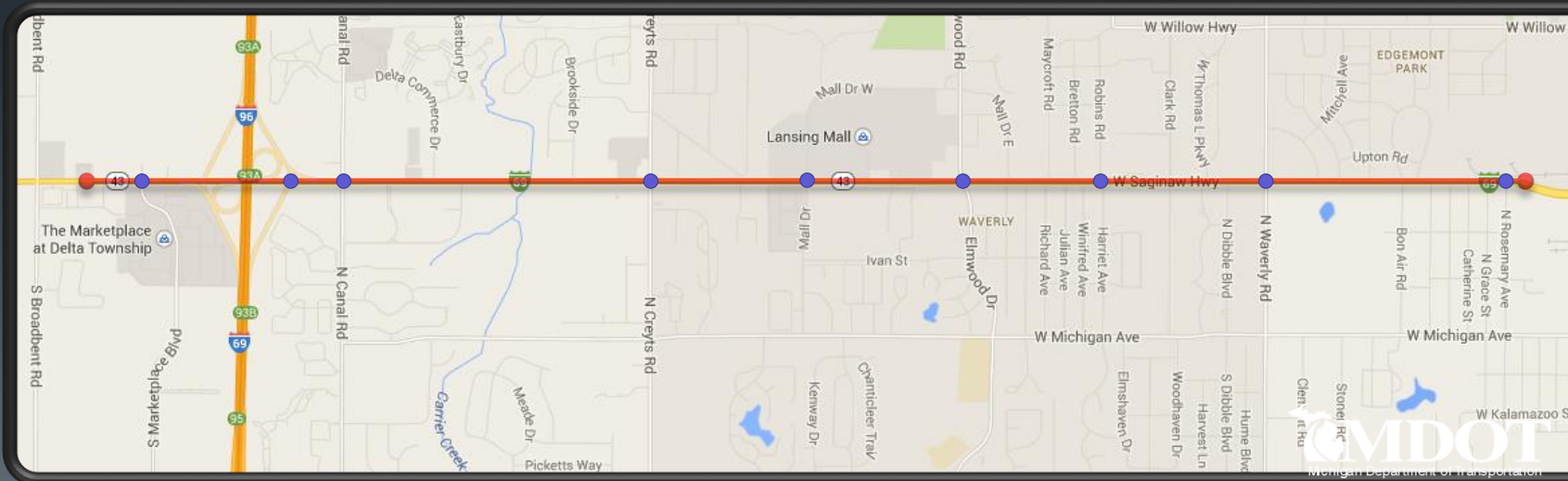
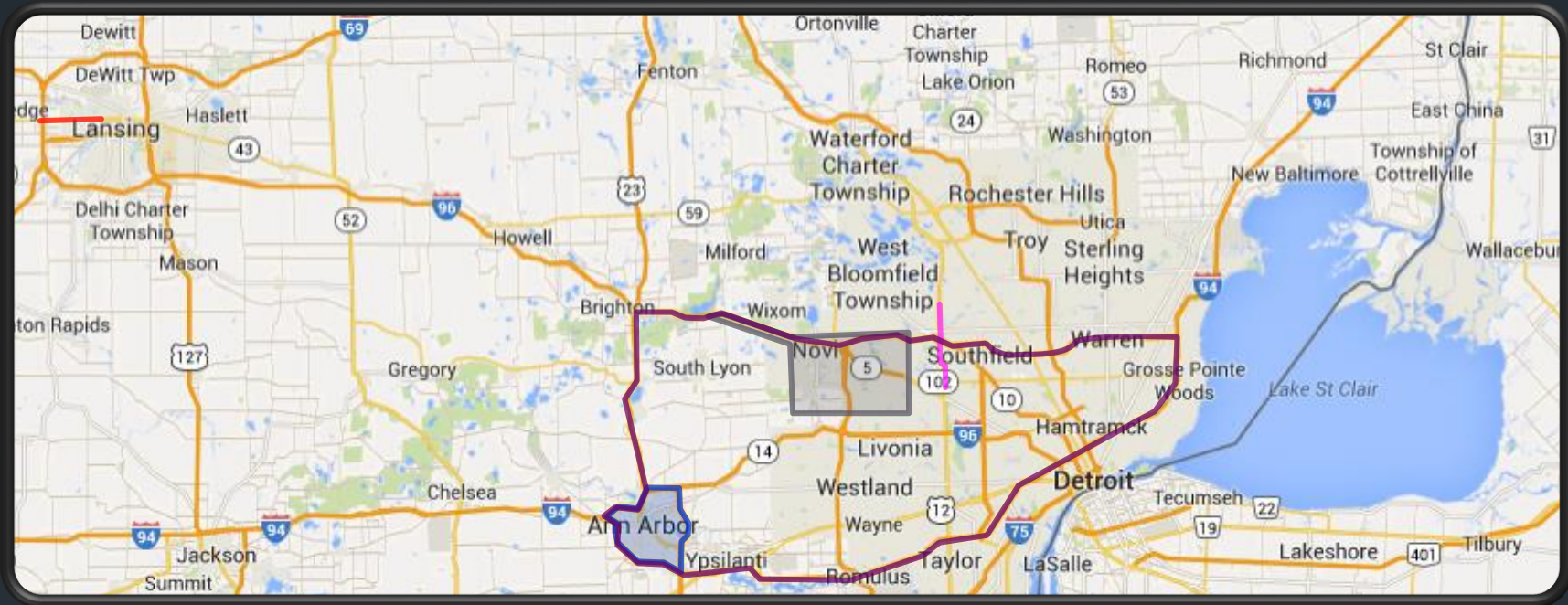
## Smart Corridors



**DETROIT** – The Michigan Department of Transportation (MDOT) is partnering with General Motors, Ford Motor Co., and a University of Michigan (U-M) consortium to deploy vehicle-to-infrastructure (V2I) communication technology-enabled corridors on more than 120 miles of Metro Detroit roadway, including stretches of I-96, I-696, I-94 and US-23.



# Michigan DSRC Deployment



# V2I Application Considerations



- Public Benefit
- Agency Benefit
- Industry Need/Use
- Application Readiness
- Data Availability



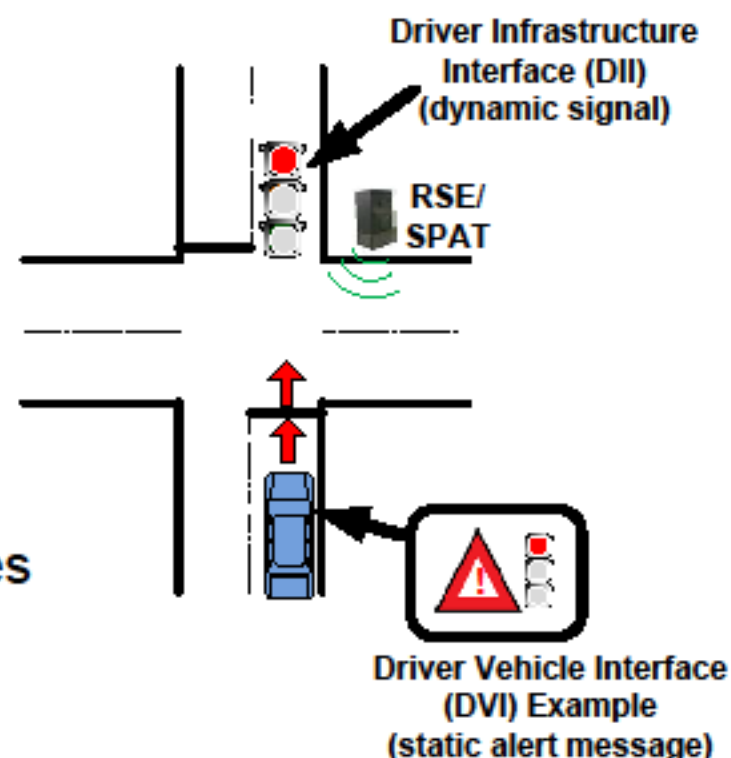
# Applications

- Red Light Violation Warning
- Work Zone Warning / Management
- Road Weather Management
- Pavement Condition



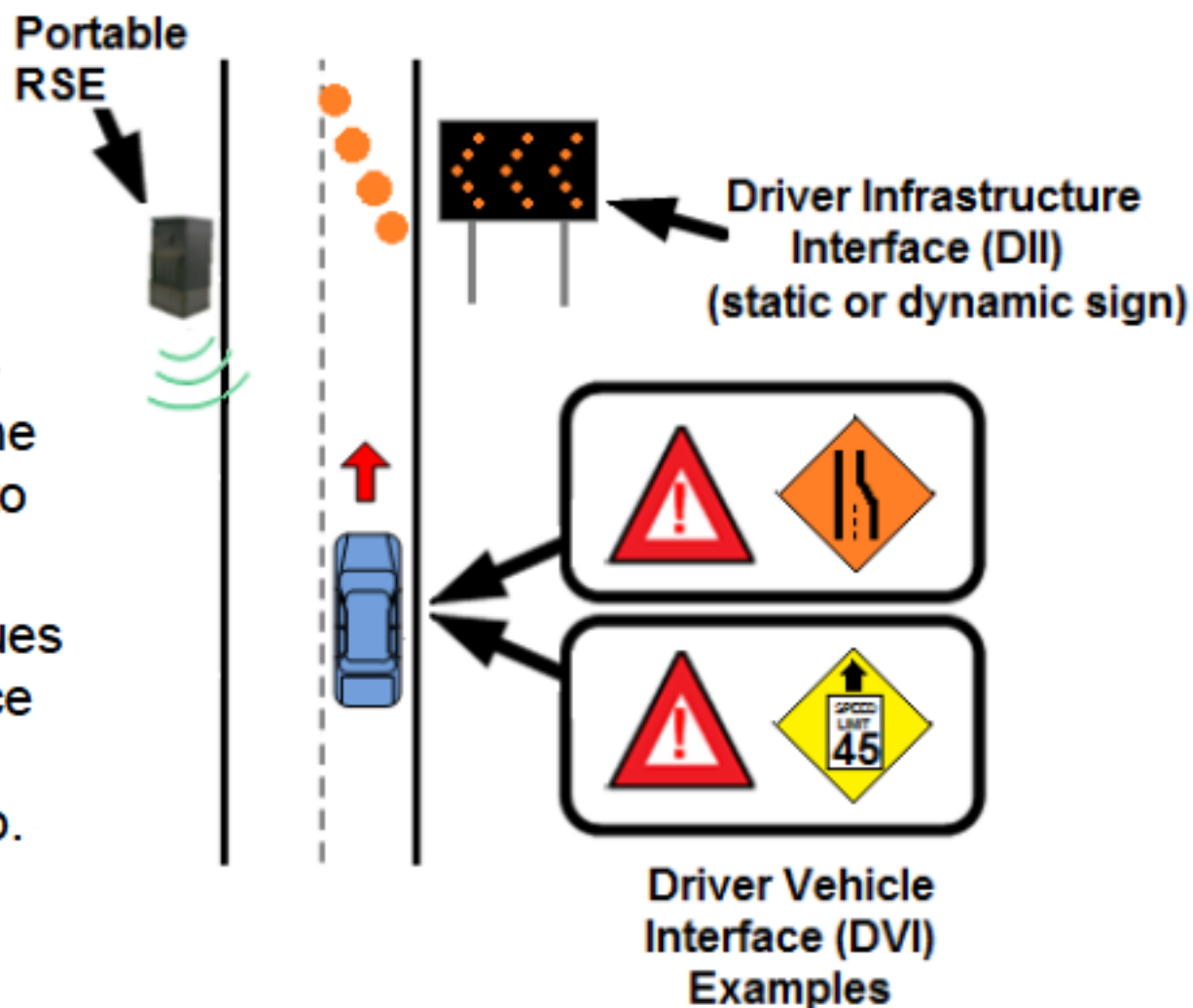
# Red Light Violation Warning

- Roadside Equipment (RSE): broadcast Signal Phase and Timing (SPaT) message, map data, and GPS correction.
- In-vehicle Device: determine if the vehicle is in danger of violating a red light.
- Traffic signal logic may be evaluated to determine if extension of all-red phase is warranted to prevent crashes involving early violators.



# Reduced Speed/Work Zone Warning

- Roadside Equipment (RSE): connection to TMC and/or local network in work zone.
- Speed limit / work zone information provided to vehicle.
- In-vehicle device: issues alert to driver to reduce speed, change lanes, and/or prepare to stop.





# Weather Responsive Traveler Information



**DUAP**  
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MDOT Michigan Department of Transportation | MIXON HILL

Logout

Map | Reports | Analysis | Config | Feedback

**Date Selections**  
Start Date: 12/02/2014 22:00:00  
End Date: 12/03/2014 02:00:00

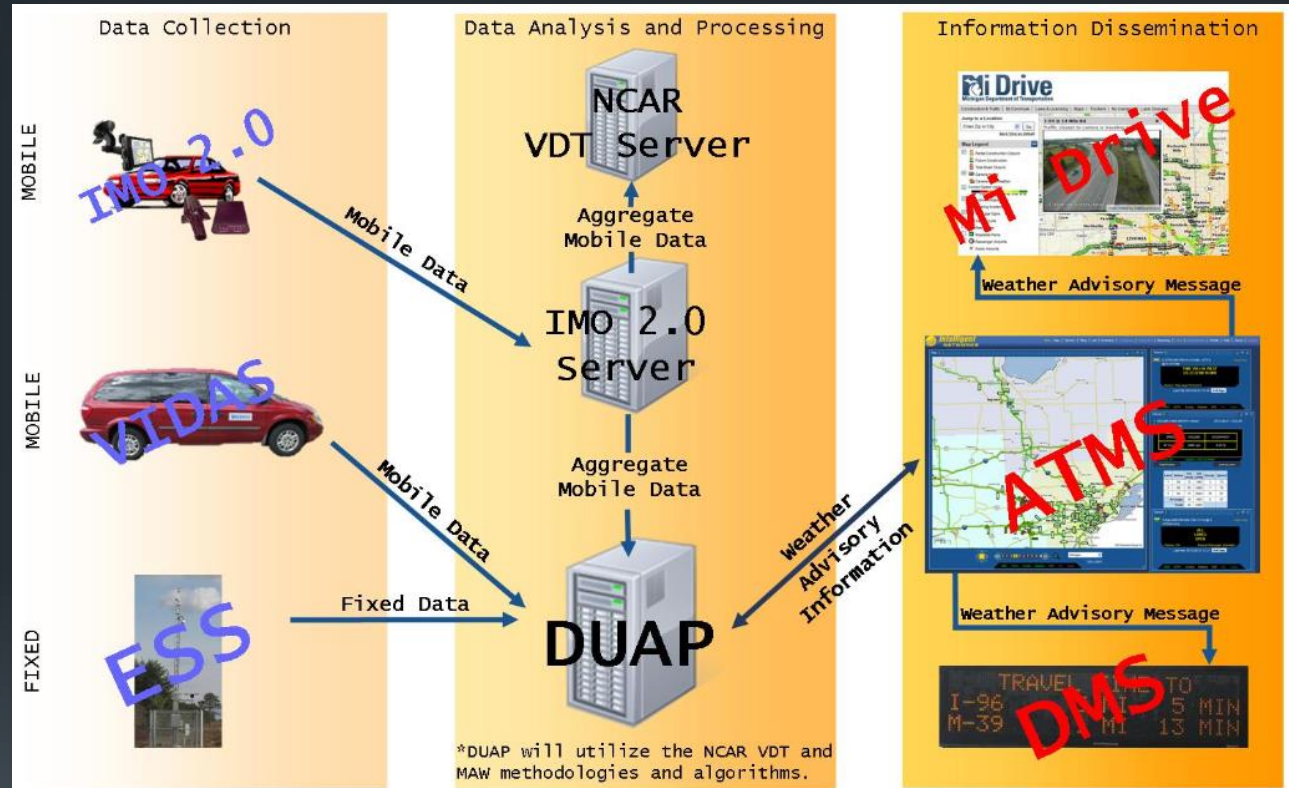
**Weather Selections**  
Current | By Date | Animate  
Wx Stations | DMS  
Alert: Display Alert | Clear Alert  
Alert Time: 12/02/2014 22:10:00  
Radar: Base Short Range Reflectivity | All Stations | Display Radar | Clear Radar  
Radar Time: 12/02/2014 22:11:00  
Opacity: [Slider]  
Display Alert Radar | Clear Alert Radar

**Trip Data**  
Time: [Input]  
Latitude: [Input]  
Longitude: [Input]  
Elevation: [Input]  
Speedometer: [Input]  
Speed GPS: [Input]  
Heading GPS: [Input]  
RPM: [Input]  
Throttle Position: [Input]  
ABS Activation: [Input]  
Brake Activation: [Input]  
Traction Control Brake: [Input]  
Traction Control Engine: [Input]  
Electronic Stability Control: [Input]  
Wiper Activation: [Input]  
Surface Temperature: [Input]  
Ambient Temperature: [Input]  
Dew Point: [Input]  
Humidity: [Input]

30 km  
10 mi  
Leaflet | © OpenStreetMap

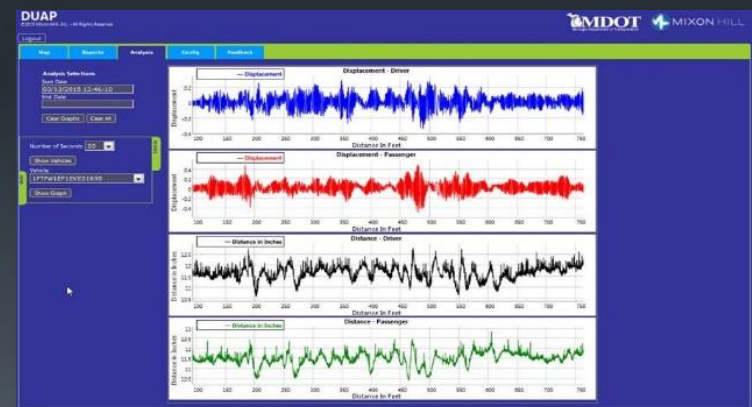
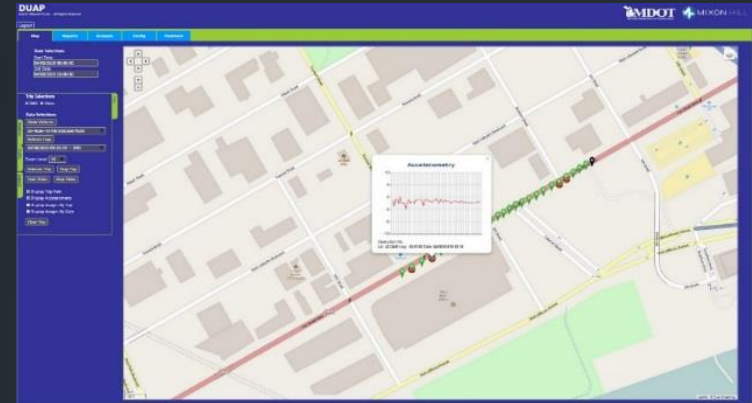
# WEATHER INFORMATION SYSTEM ARCHITECTURE

- Data Collection
- Data Ingestion
- Quality Checking
- Data Processing
- Data Analysis
- Info Dissemination



# Pavement Application

- Supports:
  - Maintenance
    - Perf. Based Maintenance
    - Pavement Defect Detection
  - Design
    - Pavement Warranties
    - Pavement Life Cycle Analysis
  - Asset Management
    - Surface Condition
    - Ride Quality





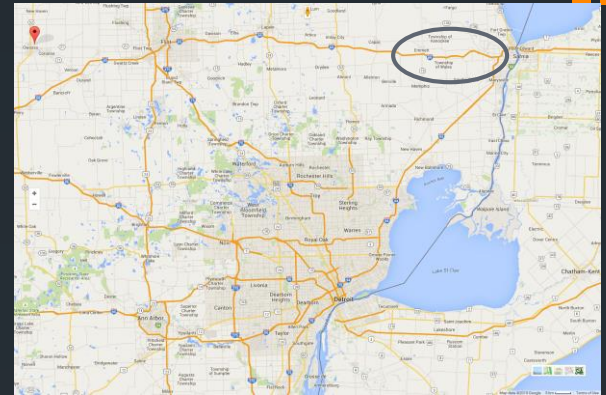




# MDOT Fleet Connected Vehicles

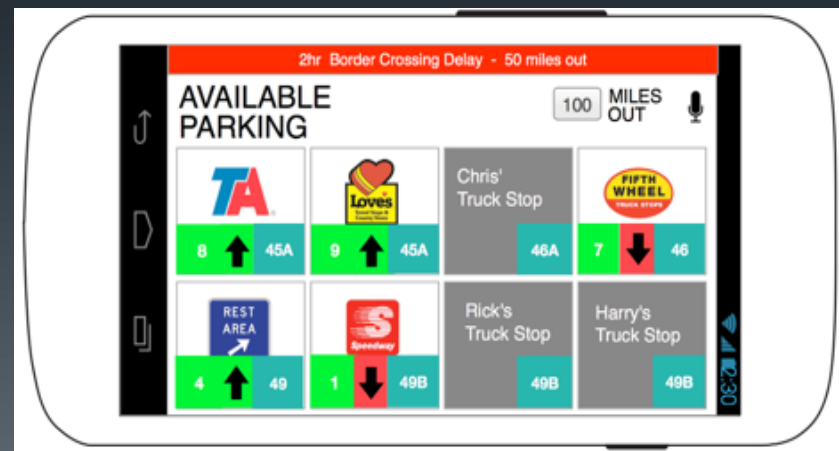
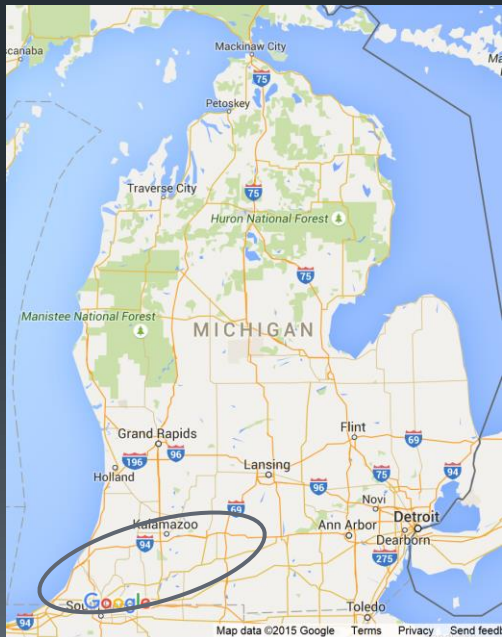


# Freight Vehicle Platooning



# I-94 Truck Parking Information System (Indiana to I-69)

- Sign Infrastructure
- Website
- Smartphone Application
- Cellular and DSRC Communications





# Mutli-state Truck Parking Initiative





# M-City



All photos courtesy of the University of Michigan



Leadership  
Circle Members



**TOYOTA**



**HONDA**

**DELPHI**



**BOSCH**

**NISSAN**

**MOBILITY  
TRANSFORMATION  
CENTER**



**QUALCOMM®**

UNIVERSITY OF MICHIGAN

**DENSO**

With Support From



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# MTC AFFILIATES

- Auto Club Enterprises an AAA affiliate
- AGC Automotive
- Allstate Insurance Co.
- Arada Systems, Inc.
- Autoliv
- Brandmotion LLC
- Calspan Corporation
- Changan Automobile
- Cohda Wireless
- Desjardins
- DURA Automotive Systems
- Faurecia
- Harada Industry of America, Inc.
- Harman International Industries
- HERE, a Nokia company
- Hitachi, Ltd.
- IAV
- IDIADA
- LG Electronics
- New Eagle
- Mechanical Simulation Corporation
- Miller Canfield
- MOBIS
- Munich Re
- Nexteer Automotive
- OSISOFT, LLC
- PTC, Inc.
- Realtime Technologies, Inc.
- Renesas Electronics America Inc.
- Savari Inc.
- Subaru
- Sumitomo Electric Industries, Ltd.
- Suncorp Group
- TASS International, Inc.
- TRW Automotive
- Zip Car

# Michigan Next Steps



Next Phase of Infrastructure Deployment

Explore Business Models

Refine Applications

Increase vehicle fleet

Incorporate Local partners

Multi-state initiatives



# Questions?

