

# DAIMLERCHRYSLER

Research and Technology North America, Inc.



Vehicle IT and Services Research

*driving connectivity*

## Cooperative Vehicle Activities in the US

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A Company of the DaimlerChrysler Group



## VSC Outcome

### Communications Between Vehicle and Infrastructure

- Blind Merge Warning
- **Curve Speed Warning**
- Emergency Vehicle Signal Preemption
- Highway/Rail Collision Warning
- Intersection Collision Warning
- In Vehicle Amber Alert
- In-Vehicle Signage
- Just-In-Time Repair Notification
- **Left Turn Assistant**
- Low Bridge Warning
- Low Parking Structure Warning
- Pedestrian Crossing Information at Intersection
- Road Condition Warning
- Safety Recall Notice
- SOS Services
- **Stop Sign Movement Assistance**
- Stop Sign Violation Warning
- **Traffic Signal Violation Warning**
- Work Zone Warning

### Communications Between Vehicles

- Approaching Emergency Vehicle Warning
- Blind Spot Warning
- Cooperative Adaptive Cruise Control
- Cooperative Collision Warning
- **Cooperative Forward Collision Warning**
- Cooperative Vehicle-Highway Automation System
- **Emergency Electronic Brake Lights**
- Highway Merge Assistant
- **Lane Change Warning**
- Post-Crash Warning
- **Pre-Crash Sensing**
- Vehicle Based Road Condition Warning
- Vehicle-to-Vehicle Road Feature Notification
- Visibility Enhancer
- Wrong Way Driver Warning

Source: Vehicle Safety Communications Consortium

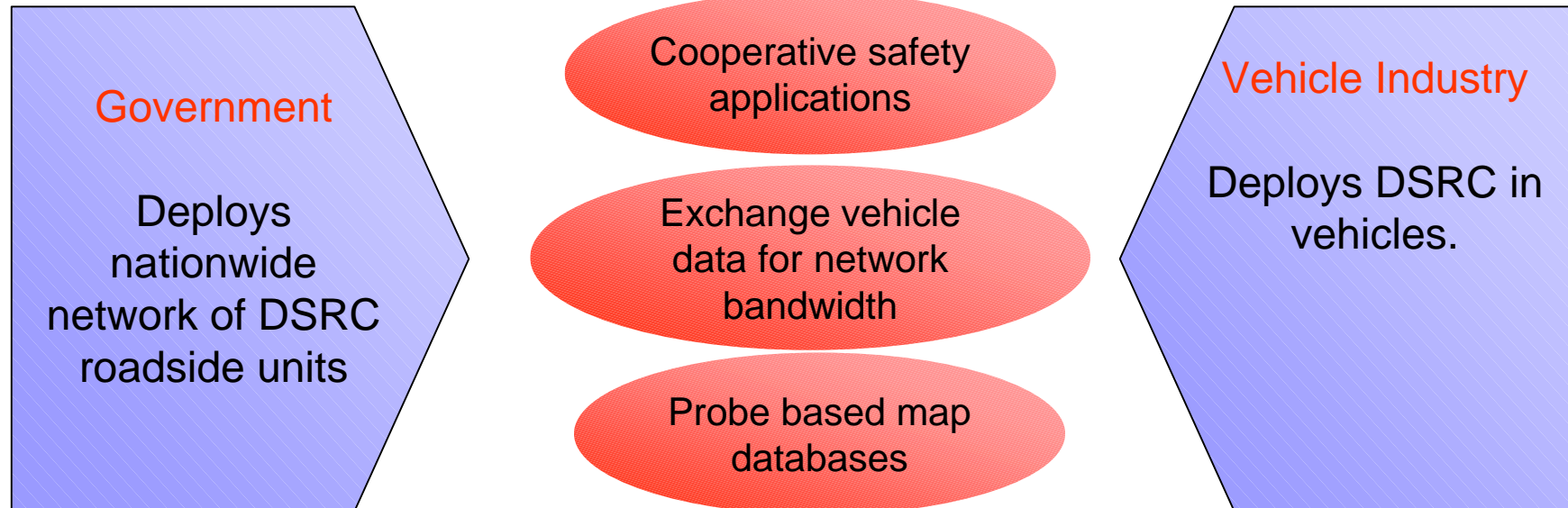


## Deployment model: VII

*VII Goal: An informed decision, late in this decade, regarding the deployment of a cooperative Vehicle-Vehicle and Vehicle-Infrastructure short range communications system.*



## Vehicle Infrastructure Integration



### Near term benefit:

Infrastructure provides early benefit to customers.

### Long term stability:

Controlling both ends of communications stabilizes technology.

“Transportation Internet”



## VII Supported Services

### ■ Safety

- Intersection Violation Warning
- Emergency Electronic Brake Lights
- Cooperative Collision Mitigation

### ■ Operations & Maintenance

- Traffic collection & dissemination
- Weather
- Probe applications
- Mapping
- Vehicle diagnostics & maintenance

### ■ Commercial

- Electronic funds transfer
- File transfers
- Location based services



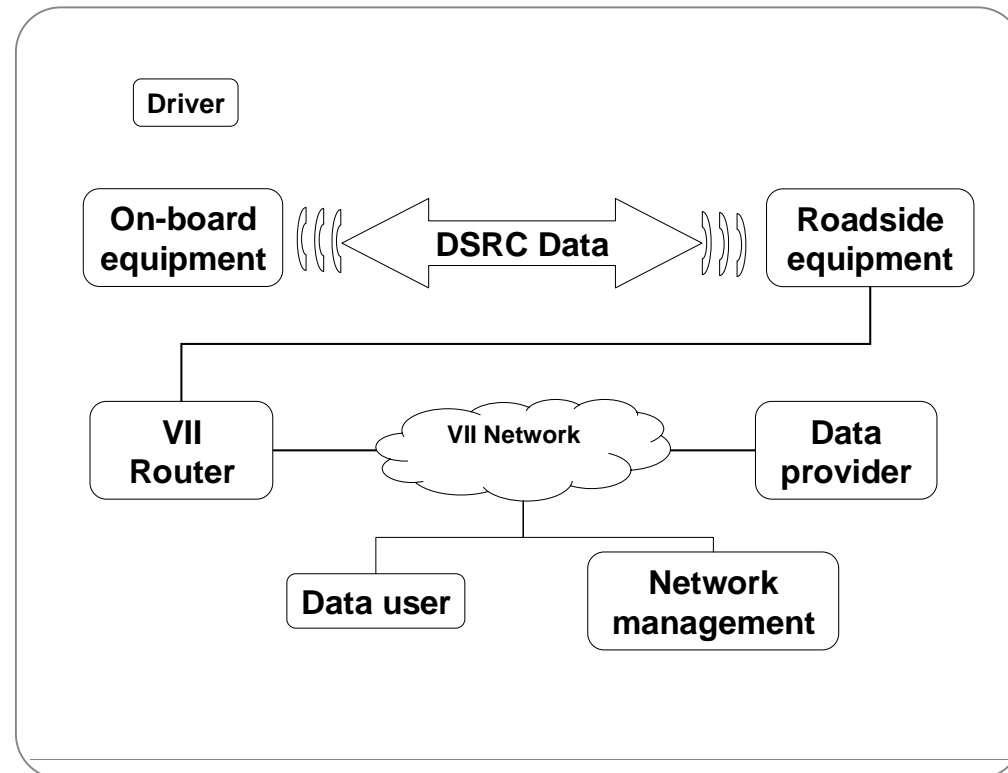
## VII Infrastructure Strawman

Decision to deploy ca. 2008

Some thoughts as to what might be deployed in the infrastructure:

~300,000 Roadside Units

- 50% of signalized intersections
- Urban highways every 1 mile
- Rural highways every 6 miles
- Fiber backhaul (also wireless)
- 86% of population
- 2.5-3.0 \$B capital investment
- \$100M /yr operational cost

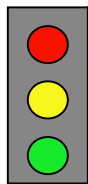




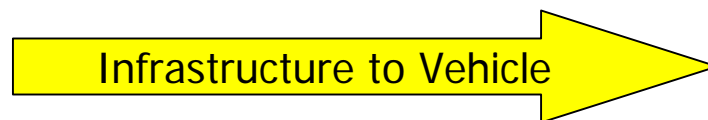
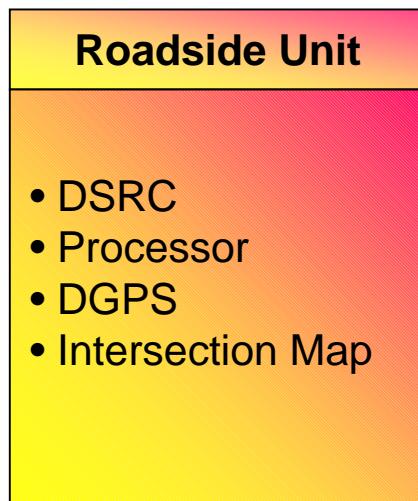
# Cooperative Intersection Collision Avoidance System



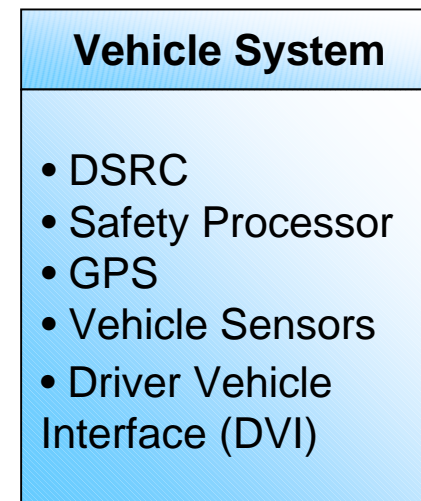
## Signal Violation Warning



↓ Current phase  
↓ Time to phase change



- Geometric Map
- Signal Controller Info
- Differential Correction
- Road Surface Conditions



- Relatively simple application
- Single vehicle problem
- Significant benefit
- Start on cooperation

Technology: Absolute positioning



## V2V



Early discussion phase for national project.

Will develop and standardize applications

- Emergency Electronic Brake Lights
- Pre-Crash sensing
- Forward Collision Warning

- Relatively simple applications
- Multiple vehicle problem
- Infrastructure independent

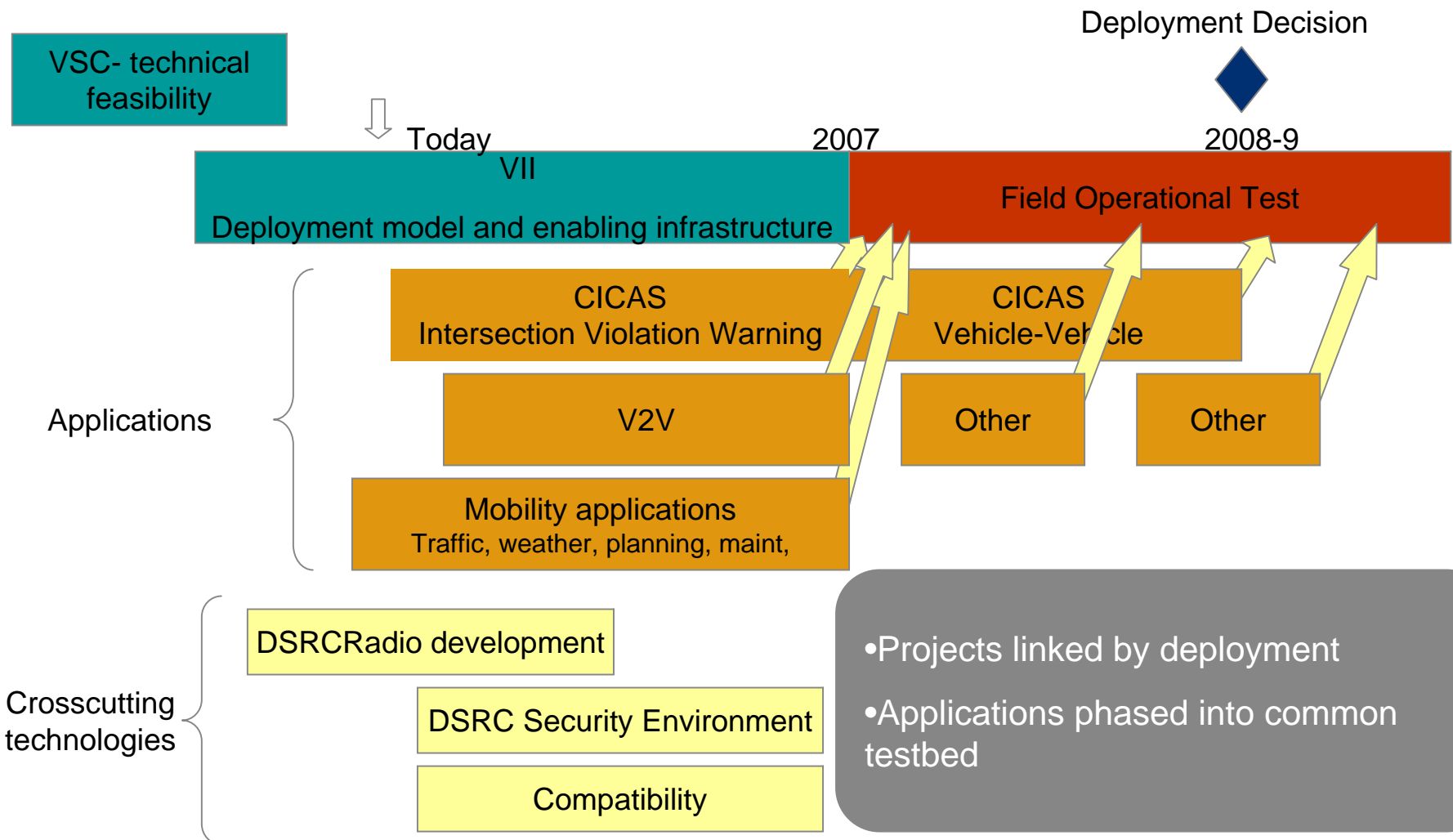
Technology: Relative positioning

These applications could eventually extend to all roads and almost every crash type.





# Program Overview





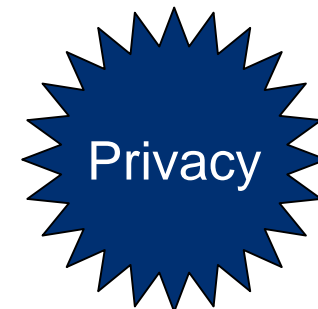
## Conclusion

Cooperative systems can provide significant gains for transportation.

Basic technology is here, and is feasible to deploy.

We are working to define and develop the applications, and more importantly, the relationships that will allow for cooperation, while ensuring that the interests of all participants are served, in particular, the public interest in privacy.

***Institutional cooperation is the hard part, not technology.***





## For Further Information

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