DAIMLERCHRYSLER

Research and Technology North America, Inc.

Vehicle IT and Services Research

driving connectivity

DSRC for Vehicle Safety

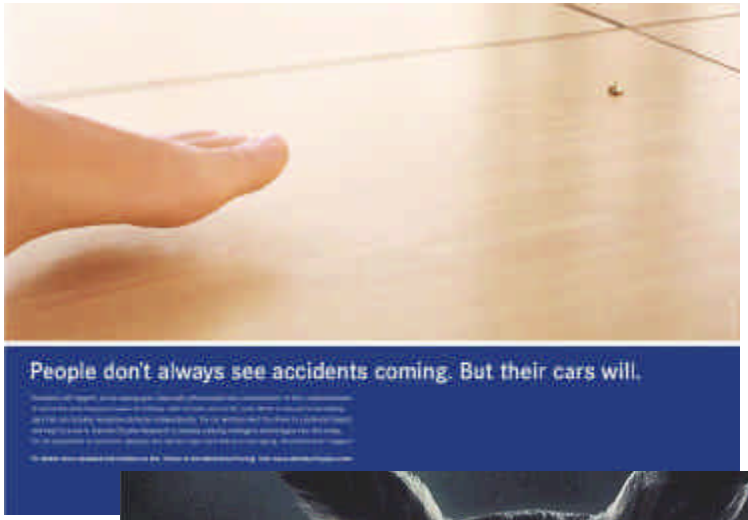
12th ITS World Congress 2005

Special Session 32: Essential Radio Communications Technologies for ITS

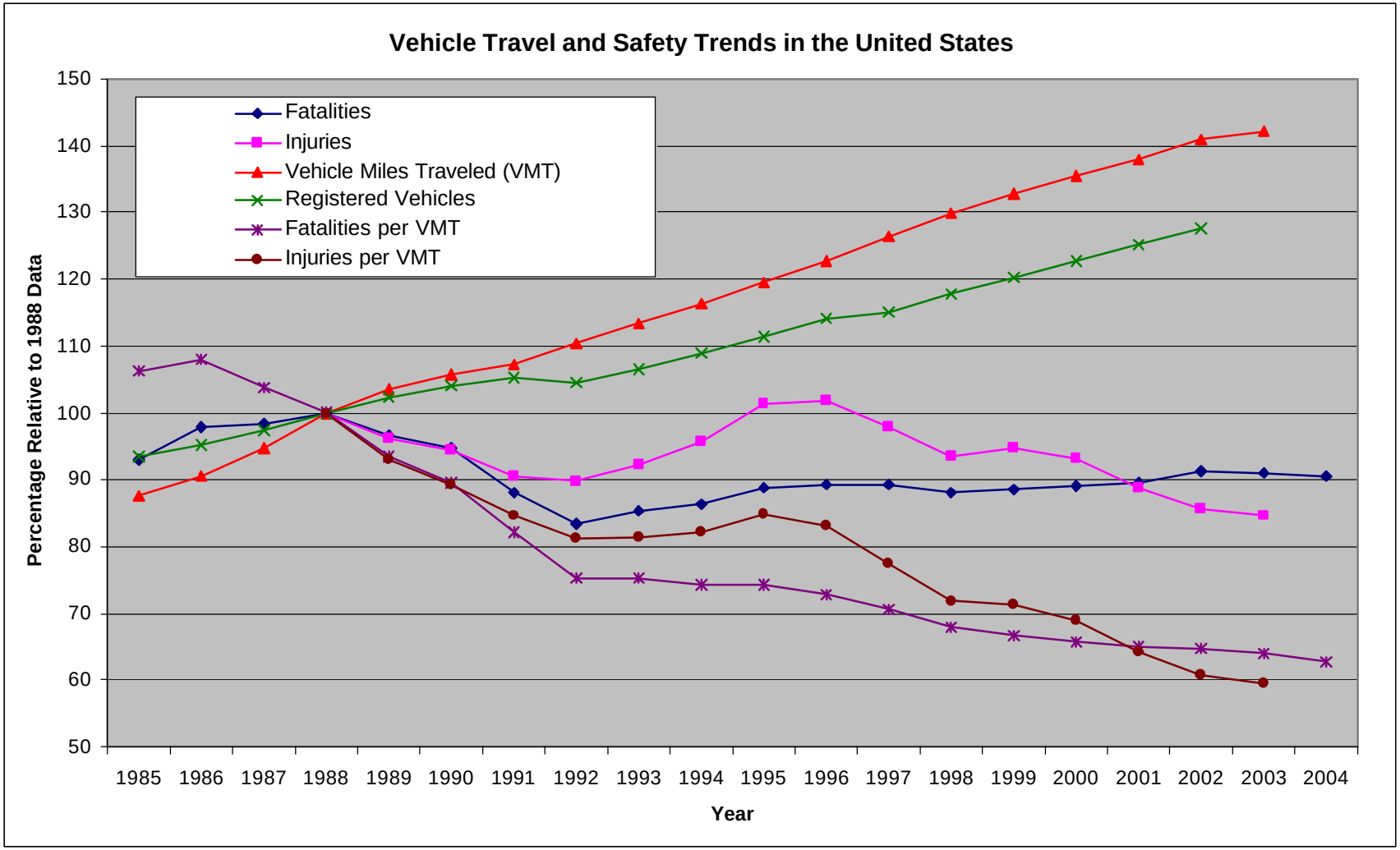
Dr. Wieland Holfelder, VP&CTO

DaimlerChrysler RTNA, Inc.
Palo Alto, California

Commitment to Safety: DaimlerChrysler's Vision of Accident Free Driving



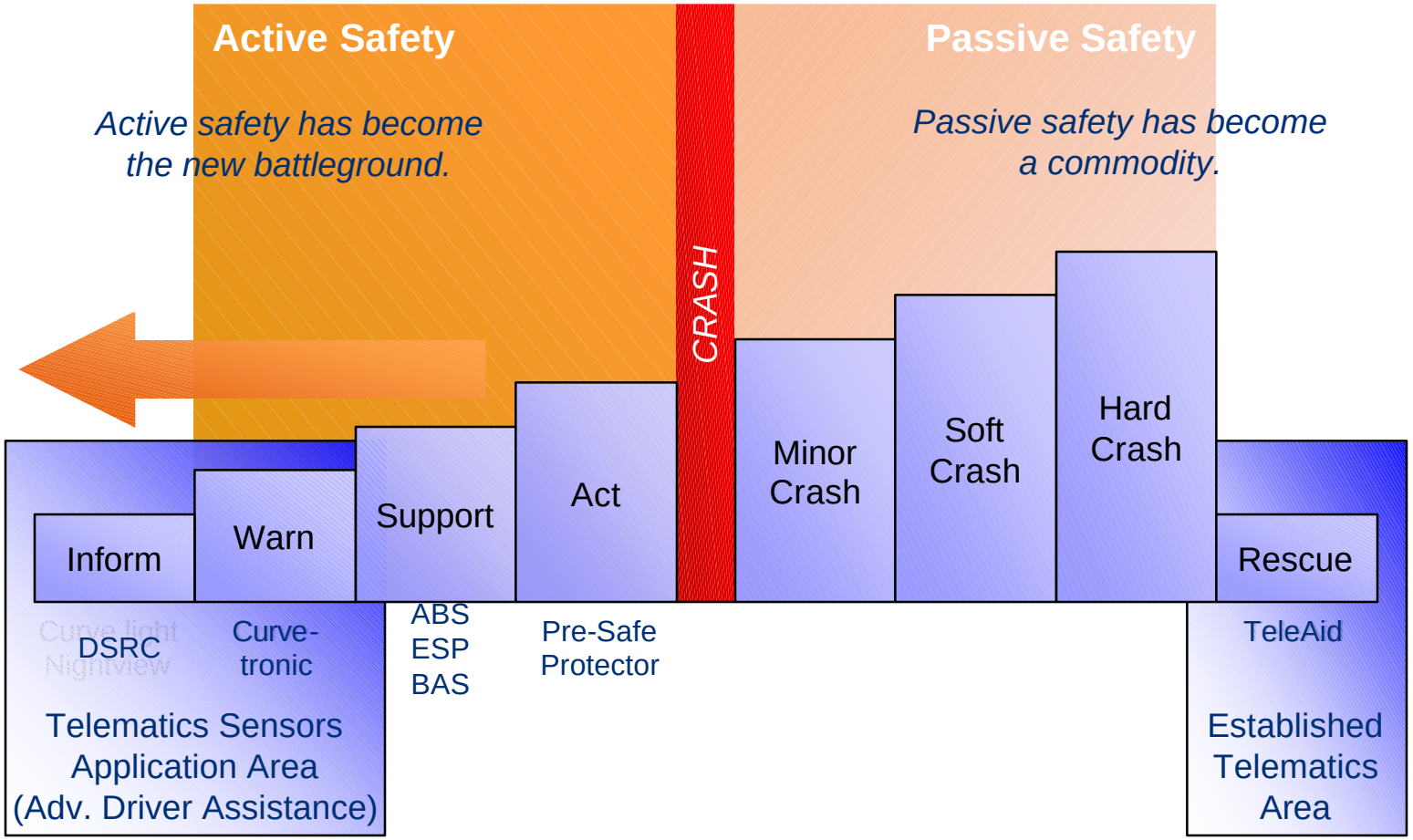
Safety Trends: Very encouraging, but always room for improvement



Source: Compiled from published data from National Highway Traffic Safety Administration, U.S. Department of Transportation

Safety Application Areas

Focus in safety shifts towards accident avoidance and collision mitigation.



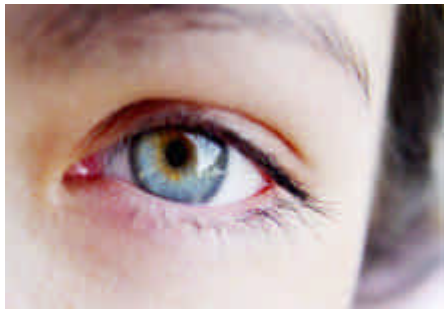
The Next Logical Step in Vehicle Safety

So far: „Feel“

- Sensing a critical situation by assessing vehicle state and driver actions
- PRE-SAFE® (since 2002)

Today: „See“

- Watching for obstacles on the road with radar
- PRE-SAFE® and Brake Assist PLUS (from 2005)

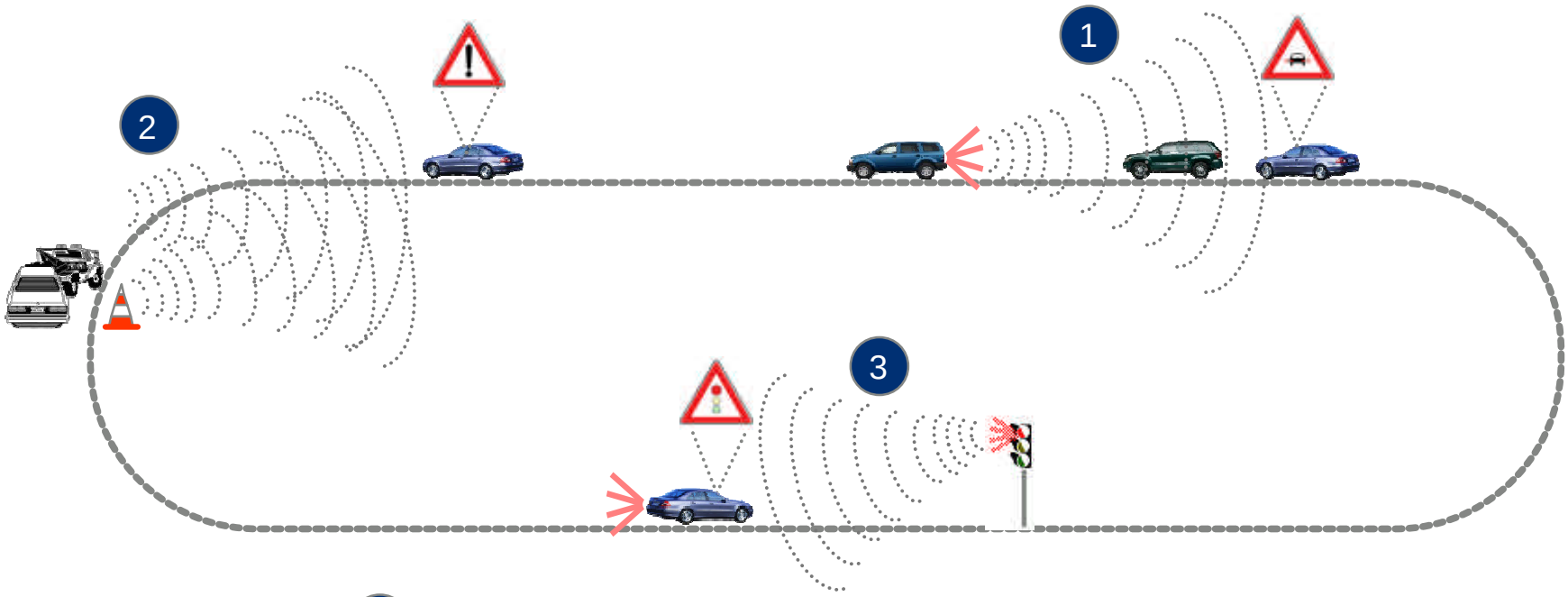


In the Future: „Speak“ / „Listen“

- Inform drivers about dangerous situations further down the road
- Warn others (to protect them and yourself)

DSRC – The Enabling Technology for Vehicles to Speak and Listen

DSRC allows vehicles to communicate with each other and with infrastructure.



1. V2V: Extended Electronic Brake light
2. V2V (V2I): Hazard Warning
3. V2I: Traffic Signal Violation Warning

Video

Other Application Examples

Applications between vehicles 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

Applications between vehicles:

- Approaching Emergency Vehicle Warning
- Blind Spot Warning
- Cooperative Adaptive Cruise Control
- Cooperative Collision Warning
- Cooperative Forward Collision Warning
- 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, U.S.

DSRC Standardization

Prerequisite No. 1:

Radio Frequency

FCC Federal Communications Commission

Prerequisite No. 2:

Communication Protocol

IEEE

FCC Rulings:

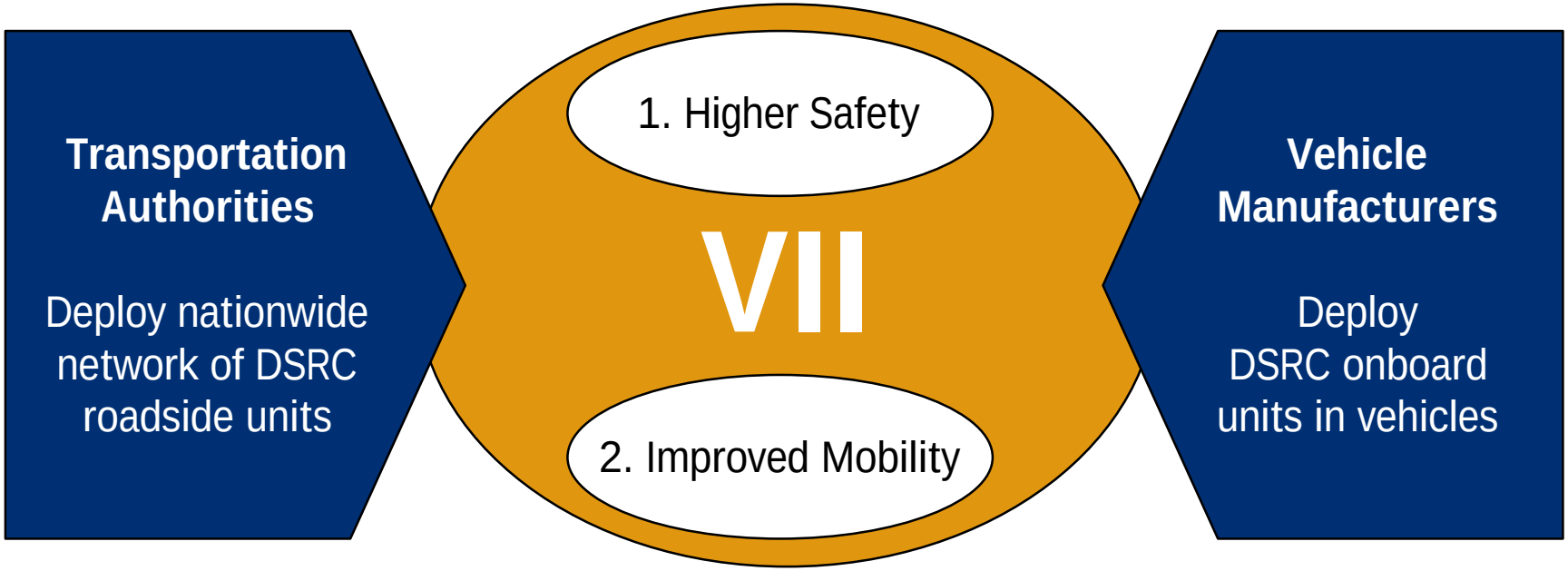
- Allocated exclusive spectrum for DSRC (5.850 – 5.925 GHz)
- Established licensing rules for the operation of roadside units (RSUs) and onboard units (OBUs)

IEEE Standardization:

- Future part of the IEEE 802.11 family of WiFi standards
- IEEE 802.11p a.k.a. WAVE (Wireless Access for the Vehicular Environment)

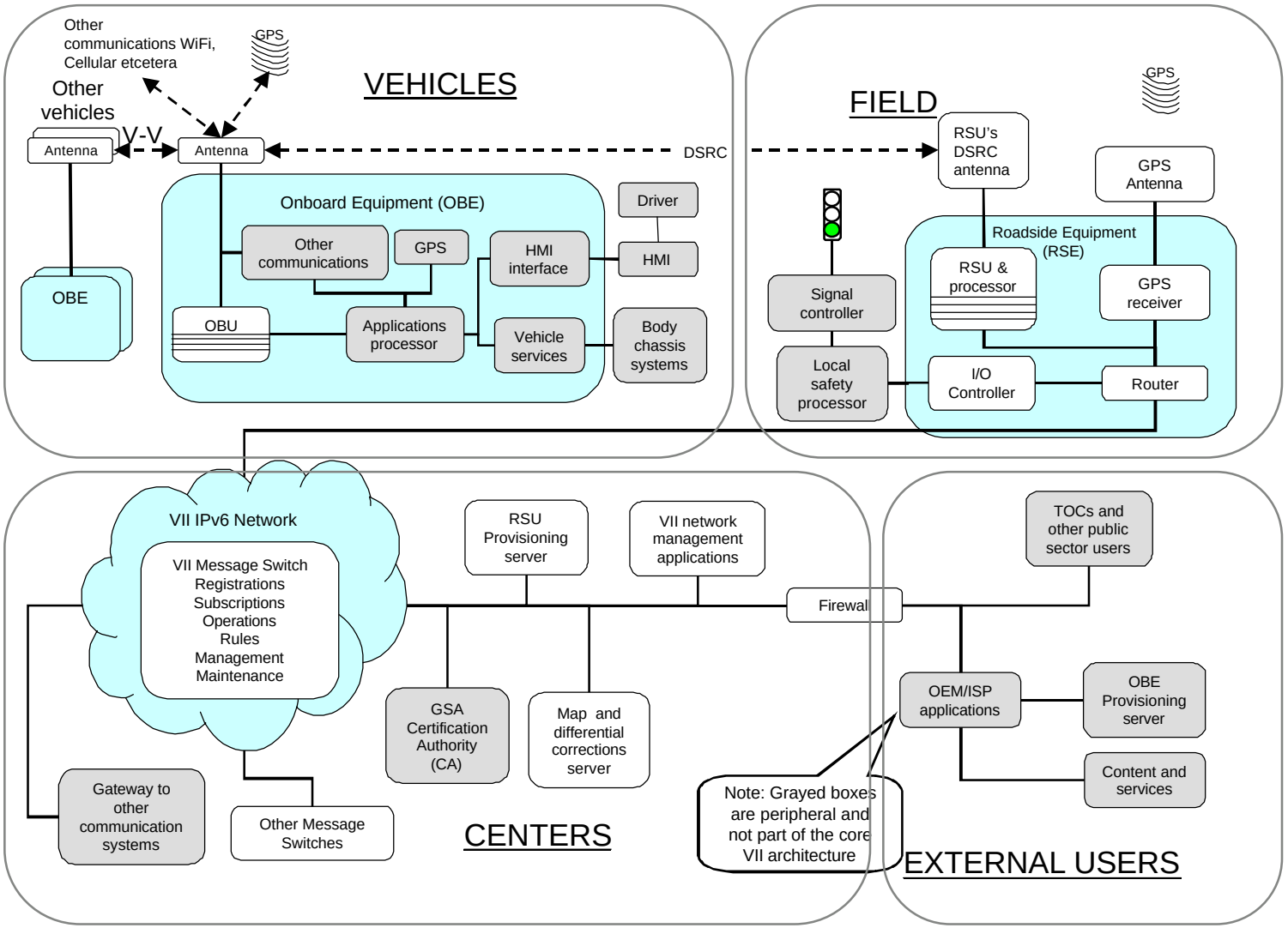
The Vehicle Infrastructure Integration (VII) Initiative

Transportation authorities and vehicle manufacturers will need to join forces to deploy DSRC. The VII Initiative forms the platform for this cooperation.



DaimlerChrysler will participate in the upcoming VII pilots over the next 4 years to prepare for a DSRC deployment decision before the end of the decade.

Possible DSRC Network Infrastructure proposed in VII



Conclusion and Outlook

- V2V and V2I Communication has the potential to have a significant contribution to the future of road safety and traffic efficiency.
- DSRC (IEEE 802.11p) is ***the*** enabling technology.
- VII (Vehicle Infrastructure Integration) will provide the necessary business and deployment framework over the next few years.
- There are still open issues to address before a widespread DSRC deployment:
  - DSRC Core Radio and Protocol Standardization and Validation
  - Overall VII Network Architecture Validation
  - Field Operational Trials including Applications, User and Acceptance Studies
- OEMs and Government Agencies will work together over the next years to be able to solve those issues and make an informed deployment decision before the end of this decade.