VII Strategy for Safety and Mobility

Michael Cops
Program Manager
Vehicle Infrastructure Integration Consortium

Sept 29 2006
Outline

• Reason For VII
• VIIC Organization
• Program Schedule
• Applications
• Deployment
VII Goals

Reduce Societal Costs of CRASHES

NHTSA Administrator Nicole Nason has stated…

- 43,000 deaths / year
- 2.7 million people injured / year
- $230 billion social cost

Reduce societal costs of CONGESTION

- Personal and business hours lost in traffic
- Inconvenience of missed flights, meetings, schedules
- Gasoline wasted
- Freight costs higher, lost productivity
Vehicle Infrastructure Integration (VII)

- Satellite to Vehicle (GPS)
- Control & Map Database
- Traffic Management Center (TMC)
- Private Sector Uses
- DSRC Vehicle-to-Vehicle
- DSRC Vehicle to Roadside
- Hot Spot
VII Technologies Enabling Cooperative Highways

• Critical SAFETY Technologies
  – *DSRC radio* for fast, interactive communications (Vehicle-to-Infrastructure and Vehicle-to-Vehicle)
  – Accurate and fast *vehicle positioning* sensing
  – Precision *roadway database*

• Critical MOBILITY Technologies
  – *Real-time probe* vehicle data (speed, direction, location, situational variables)
  – Data processing and information dissemination
VII Program Initiation

• One of nine major initiatives announced by USDOT in 2004
  – Vision:

  “Nationwide deployment of a communications infrastructure on the roadways and in all production vehicles could improve transportation and the quality of American life in ways not imagined a generation ago.”
  (source: USDOT ITS Joint Programs Office)

• National VII Coalition established to oversee program to assess deployment feasibility
National VII Coalition

• Subcommittees:
  – Technical/Architecture – Technical Feasibility Analysis
  – Business Models – Economic Feasibility
  – Institutional Issues – Social / Political Feasibility
  – Outreach – Consensus Building

• Reach a consensus decision on whether to collectively recommend national deployment to the US Congress
  – Projected timing – 4QTR 2008
VII Consortium

- Industry consortium founded to develop pre-competitive safety technologies
- Michigan 501 (c6) non-profit
- Eight (8) light-duty vehicle manufacturers

- BMW of North America, LLC
- DaimlerChrysler Corporation
- Ford Motor Company
- General Motors Corporation
- Honda R&D Americas, Inc.
- Nissan North America, Inc.
- Toyota Motor Engineering & Manufacturing North America, Inc.
- Volkswagen of America, Inc.
VII Consortium Organization

VIIC Board
- ELT
- Deployment Decision

Membership Comm.
- Organizational oversight
- Strategic planning
- External Relationships

Policy Committee
- Policy Coordination

Program Oversight Comm.
- Coop. Agreement oversight

Business Mgr
- Contract Services
- Legal
- Financial

Office Admin
-- Clerical
-- IT support
-- Receptionist

Program Management
- Schedule
- Costs
-- Resources
-- Project compliance
- Reports/Reviews

Systems Engineering
- Requirements
- System Integration
- System Testing

Work Order #1

Work Order #2

Work Order #...

Work Order #12
VIIC Program Work Tasks

- WT1 – Program Management
- WT2 – Systems Engineering
- WT3 – Radio (DSRC)
- WT4 – Deployment Analysis & Policy Support
- WT5 – OBE System
- WT6 – Application Development
- WT7 – Positioning
- WT8 – Security
- WT9 – Testing and Lab Facilities
- WT10 – Field Operational Test
- WT11 – Alternative Studies
- WT12 – Network Services
Targeted Milestone Timing

- DSRC frequency allocation: 2003
- USDOT adopted VII as major initiative: 2004
- VII Consortium founded: 2004
- USDOT/VIIC Cooperative Agreement: 2005
- VIIC Proof-of-concept testing: 2006-2008
- Field Testing: TBD
- VII Deployment Feasibility Determination: Dec 2008
Potential VII Features Over Time

Reduce CRASHES

- Improve Driver Situational Awareness
  - Emergency Vehicle Warning
  - Inter-Vehicle Warning
- Minimize Effects of Driver Error
  - Intersection Collision Avoidance
  - Curve Speed Deceleration
- Increase Automation?
  - Automatic Driver Assistance?
  - Vehicle Platooning?

Reduce CONGESTION

- Improve Traffic Information
  - Real time traffic information
  - Alternative route guidance
- Improve Situational Roadway Awareness
  - Dynamic roadway condition info.
  - Emergency situation management
- Manage Traffic Flow?
  - Dynamic flow control?
  - Dynamic roadway pricing?

Timeline
Probe Data Collection

-- CONCEPT --

DaimlerChrysler Research & Technology North America, Inc.
Intersection Collision Avoidance

-- CONCEPT --

DaimlerChrysler Research & Technology North America, Inc.
Emergency Vehicle Warning

-- CONCEPT --

DaimlerChrysler Research & Technology North America, Inc.
Inter-Vehicle Hazard Warning

-- CONCEPT --

DaimlerChrysler Research & Technology North America, Inc.
Key Initial Use Cases

1. Signal Violation Warning
2. In-Vehicle Signage
3. Dynamic Traffic Information
4. Roadway Conditions (weather and potholes)
5. Traffic Management and Control
6. Alternative Route Guidance
7. Payment Transactions (tolls, gasoline, parking)
8. Provisioning and Security management
Conditions for Deployment

- Substantial DSRC coverage of major US roadways
- High network availability and reliability
- Predictable, stable and cost-effective access
- National consistency:
  - Policy/legal governance same nationwide (no variability state-to-state, city-to-city)
  - Uniform deployment of standardized, non-proprietary technology
Deployment - VII Equipped Vehicle Population Projection

Assumes:
- 250 million vehicles on road
- 16 million built each year

Antique and Collector vehicles not converted
Phase 1 Infrastructure Deployment

- 50% of all signalized intersections in urban areas containing 50% of the population
- All freeways and interstates in same urban areas (< 2 minute delay)
- Every interstate interchange (< 10 min delay)
- 131,800 total road side units
- Complete by 2011
Phase 2 Infrastructure Deployment

- 70% of all signalized intersections in 454 urban areas
- Extra 10,000 road side units for smaller communities
- Additional 14,000 on interstates
- 239,000 total road side units
- Installation for 2012 to 2017
Rural RSE Deployment
Base Network (2004 National Highway System)
Governance Framework

• Public
  – Example: Federal government agency
    • Federal Aviation Administration (FAA)
    • Federal Communications Commission (FCC)
  - OR -

• Public-Private
  – Example: Federal government corporation
    • Tennessee Valley Authority (TVA)
    • Communications Satellite Corporation (COMSAT)
Must Address Public Concerns and Policy Issues

- A VII system that is technically and economically sound must also be socially and politically acceptable
  - VII must preserve privacy and civil liberties protections
    - Anonymity preserved for non-optional services
    - Secured from unauthorized access
    - Authorized access subject to legal due process
  - Access rules to protect public interest
  - Liability issues addressed
  - Deployment framework meets public standards for good governance
In Summary

• VII is a broad and complex undertaking that presents many potential opportunities to improve safety and mobility, as well as many challenges.

• The vehicle industry is committed to work cooperatively to explore the opportunities and work to address the challenges.

• Much already has been accomplished through our cooperative efforts with the federal government, state and local DOT’s and suppliers. The program is well underway.
- End of Presentation -