IntelliDrive℠ Safety Program Policy Roadmap

Safety Program Workshop
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Two Approaches

Top-Down:
  • Policy Roadmap (version 8), December 2009
  • Cross-cutting policy constructs focused on deployment

Bottom-Up:
  • Specific technical policy issues focused on supporting ongoing research and major research milestones
  • Deconstruct technical research roadmaps
# Vehicle to Vehicle Safety Application Research Plan

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<td>Complete CAMP-V SC-A</td>
<td>Update Crash Scenarios</td>
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<td>DVI Effectiveness – Multiple Warnings</td>
<td>Driver Workload Issues</td>
<td>Driver Acceptance</td>
<td>CVO Regulation Decision</td>
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<td>IntelliDriveSM Principles</td>
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<td>TRACK 7 Commercial Vehicle</td>
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<td>Update Crash Scenarios</td>
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<td>Develop and Conduct Objective Tests</td>
<td>Driver Workload Issues and Acceptance Field Tests</td>
<td>FTA Implementation Decision (TBD)</td>
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Safety Program Policy Roadmap

Purpose:
• Outline policy and institutional issues in an organized, structured manner.
• Develop plan for research and analysis that results in options and recommendations in support of V2V and V2I for Safety.
• Research results and decision points are driven by:
  • Safety Pilot
  • The 2013 NHTSA regulatory decision
  • Deployment

Organization:
• Key policy questions
• Specific research tasks
• Stakeholder collaboration
• Stakeholder outreach/education
• Outcomes for major program milestones
• Timeline
Critical Policy Areas

Identified 8 key policy issue areas in collaboration with technical team and stakeholders:

- Device and Equipment Certification
- Certificate Authority for Security
- Risk Allocation and Data Ownership
- Benefit-Cost Analysis in Support of Deployment
- Rules of Operation and Application of Standards
- Spectrum Analysis and FCC Role
- Infrastructure and Deployment
- Governance Structure and Authority
Key Questions to Keep in Mind

• Are there other policy areas related to research on V2V and V2I for Safety that we have missed? What are they?

• Within each area, have we comprehensively identified the issues?
  • Priorities
  • Constraints on what can be accomplished

• Next steps are to define a plan for getting results:
  • What are most efficient strategies for moving forward on research and analysis?
  • What issues affect more than just the Safety program? What are variations? (i.e., data ownership or privacy)
  • Within each area, what are “ absolutes” in terms of requirements?
  • Who are experts and how do we engage expertise in complement with stakeholder collaboration?
Device and Equipment Certification

Definition
Certification provides a process that ensures all devices and equipment part of the IntelliDrive system meet specific standards relating to interoperability and performance, security, and privacy.

Objectives
- Define interoperability
- Identify risks and threats that can be addressed through certification versus those that need to be addressed by a governance authority
- Develop policies based on certification processes and management structure
- Evaluate types of impacts the certification process may have on industry or consumers due to access restrictions, costs, or other factors
- Analyze whether self-certification could be an option
Device and Equipment Certification

Expected Outcomes

Safety Pilot
- Initial recommendations on ways of identifying misbehavior and options for enforcement
- Model certification process to be evaluated during Safety Pilot
  - Evaluation of performance, costs, etc.
  - Stakeholder review
- Analysis of lessons learned and gaps
  - Where is further work needed? How will model process expand to include other elements?

NHTSA Regulatory Decision
- Analysis of industry impact
- Tested certification process that includes recommendations on certifying entities, roles, and responsibilities

Deployment
- Operational certification and enforcement processes
- Identified laboratories/facilities able to certify devices and equipment
- Guidance and training process for agency personnel
Device and Equipment Certification

CY 2010
- Stakeholder Outreach and Education
- Process Development
- Review of other industries, international examples, and I.D. Federal role.

CY 2011
- Certification Pilot
- Certification Evaluation and Lessons Learned
- Public Review of certification process

CY 2012
- Development Steps for Implementation
- Develop Guidance, Training
- Modification of Process

CY 2013
- Device and Equipment Certification
- Vehicle Updates
- Aftermarket Device Development
- Model Deployment Ramp-up and Preliminary Testing
- Model Deployment Full Scale Testing
- V2V Regulatory Decision Point
- Certification Process available for implementation
- Input to Industry standards based upon test results
- V2V Benefits Assessment

Stakeholder Engagement on Needs

Policy team
SE team
Outreach/Comm
Gold=Model Deployment

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Questions

• Missing anything?
• Key priorities?
• Ideas on next steps? Experts?
• Comments?
Certificate Authority for Security

Definition
An entity or process for issuing digital certificates that confirm or validate a person, vehicle, organization, and other entity looking to access the system is legitimate. A certificate authority (CA) structure is necessary to provide security and privacy protection.

Objectives
- Assist the technical team in CA design and address questions regarding a “centralized” or “split” CA through a trade-off analysis
- Engage privacy advocates to understand acceptable levels of privacy and gain their ‘buy-in’ to understand impacts on cost, scalability and deployment
- Analyze the trade-offs between security and privacy of the system
- Identify how misbehavior can be addressed and what enforcement mechanisms are feasible
Certificate Authority for Security

Expected Outcomes

Safety Pilot
- Concept of Operations for a CA
- Initial CA design for testing during Safety Pilot including processes for certificate management, issuance, updates, identification of misbehavior, enforcement options, revocation, reinstatement
- Understanding of trade-off issues between security, privacy, and cost
- Evaluation of impact to existing privacy principles

NHTSA Regulatory Decision
- Feasible CA design and certificate management process with appropriate security and privacy levels
- Identification of additional authorities needed for a CA entity (if any)
- Assessment of privacy issues

Deployment
- Operational CA
**Certificate Authority for Security**

**Model Deployment**

- **CY 2010**
  - Q1: Develop Security Scenarios
  - Q2: Conduct Trade-off Analysis
  - Q3: CA Analysis (review existing examples)
  - Q4: Engage Privacy Experts

- **CY 2011**
  - Q1: Develop CA design for testing
  - Q2: Test CA Model
  - Q3: Privacy analysis (determine privacy levels)
  - Q4: Modify CA Model

- **CY 2012**
  - Q1: Engage CA experts for input into CA design, roles, responsibilities
  - Q2: Develop CA implementation timeline and steps.

- **CY 2013**
  - Q1: Public Review
  - Q2: Suggested CA Design and implementation process

**V2V Regulatory Decision Point**

**Aftermarket Device Development**

- **Device Updates**
- **Vehicle Updates**

- **Model Deployment**
  - Ramp-up and Preliminary Testing
  - Full Scale Testing

- **V2V Benefits Assessment**

**Milestone, Review Point**

**Decision Point**
Questions

• Missing anything?
• Key priorities?
• Ideas on next steps? Experts?
• Comments?
Risk Allocation and Data Ownership

Definition
Allocation of legal risk and liability between participants of the IntelliDrive system. Cooperative data systems complicate the existing definitions of risk allocation, liability, and data ownership.

Objectives
- Develop definitions of ‘risk’ and ‘data ownership’ from the perspective of cooperative systems and multi-source data environments**
- Identify risk/liability associated with software failures, driver behavior (failure to heed warnings), or negligence (updates, failure to use)
- Engage legal expertise to determine current legal precedence and review existing laws on immunity
- Identify impacts to business and risk models, particularly insurance industry models
  - Engage insurance industry and gain acceptance
  - Engage insurance industry on opportunities for incentives with use of cooperative systems for safety

** This policy area has overlapping issues with the Data Capture and Management Program.
Risk Allocation and Data Ownership

Expected Outcomes

**Safety Pilot:**
- Clarity on risk, liability, and data ownership issues (differences) associated with:
  - Cooperative systems
  - Embedded systems, retro-fit systems, aftermarket devices

**NHTSA Regulatory Decision:**
- Initial model outlining potential risk allocation options
- Analysis of data ownership and data management plan, evaluation of industry impacts
- Legal assessment of government immunities and relevant case examples
- Determination on whether new legislation is necessary for liability issues

**Deployment:**
- Strategy with insurance industry on incentives, risk models, assessment of liability
Risk Allocation and Data Ownership

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**Model Deployment**
- Aftermarket Device Development
- Device Updates
- Vehicle Updates
- Model Deployment Ramp-up and Preliminary Testing
- Model Deployment Full Scale Testing

**Risk Allocation and Data Ownership**
- Identify data types and ownership issues
- Evaluate data ownership laws and practices
- Develop Risk Allocation/Data Ownership Model
- Modify Risk Allocation/Data Ownership Model
- Stakeholder outreach and education
- Identify data ownership issues and market analysis
- Engage legal experts
- Engage risk allocation (insurance industry, etc.) experts
- Input to Industry standards based upon test results
- V2V Regulatory Decision Point
- V2V Benefits Assessment
- Working Group Review
- Engage risk allocation (insurance industry, etc.) experts

**Milestone, Review Point**
- Green=Policy team
- Blue=SE team
- Pink=Outreach/Comm
- Gold=Model Deployment
Questions

• Missing anything?
• Key priorities?
• Ideas on next steps? Experts?
• Comments?
Benefit-Cost Analysis

Definition
Analysis examining all associated ‘costs’ and ‘benefits’ for deployment of IntelliDrive in support of decision making. Benefit-cost analysis (BCA) is necessary for making a regulatory decision and is an important tool for understanding the “value” of IntelliDrive to different audiences.

Objectives

- Develop a vehicle fleet model that includes revised assumptions including a retrofit perspective and current sales projections
- Identify the stakeholder impact/value proposition (e.g. OEMs, State and local transportation agencies, transit agencies, trucking companies……who else?)
- Perform various analyses on IntelliDrive:
  - Value propositions
  - Safety-benefit estimation
  - Costs identification
  - Cost-effectiveness and alternatives analysis for applications
  - Societal benefits / BCA
Benefit-Cost Analysis

Expected Outcomes

Safety Pilot
- Identification of data required for all of the various analyses and identification of which data will be generated from Safety Pilot and which data will be gathered from other sources
- Development of value propositions
- Analysis plan

NHTSA Regulatory Decision:
- NHTSA safety benefits-estimation, cost-effectiveness and alternatives analysis as inputs for decision
- Economic / industry / agency impact analysis

Deployment
- Societal benefits evaluation
- Understanding of potential costs
- Benefits presented for investment decision-making
### Benefit-Cost Analysis

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**Cost Benefit Analysis**
- **Q1 CY 2010**: Collaborate with stakeholders to develop initial BCA model.
- **Q4 CY 2010**: Conduct cost-effectiveness analysis on applications, includes comparison to alternatives.
- **Q1 CY 2011**: Review BCA model with public working group.
- **Q2 CY 2011**: Conduct industry impact analysis.
- **Q3 CY 2011**: Incorporate relevant outcomes and data from Safety Pilot.
- **Q4 CY 2011**: Finalize BCA.
- **Q1 CY 2012**: Modify BCA model.
- **Q2 CY 2012**:
  - **Q2 CY 2012 (Model Deployment)**: Collaborate with NHTSA to determine timeline and necessary data for regulatory decision.
  - **Q3 CY 2012**: Aftermarket Device Development.
  - **Q4 CY 2012**: Device Updates, Vehicle Updates.
- **Q1 CY 2013**:
  - **Q1 CY 2013**: Model Deployment Ramp-up and Preliminary Testing.
  - **Q2 CY 2013**: Model Deployment Full Scale Testing.
  - **Q3 CY 2013**: Data-Based Policy Recommendation to NHTSA.
  - **Q4 CY 2013**: V2V Regulatory Decision Point.
Questions

• Missing anything?
• Key priorities?
• Ideas on next steps? Experts?
• Comments?
Infrastructure and Deployment

Definitions
IntelliDrive Safety will include certain types of infrastructure for both V2V and V2I. Infrastructure here refers to roadside equipment (RSE), back office systems, and the maintenance and operations activities required to implement them – for safety. From a policy perspective, issues regarding infrastructure can be similar to other ITS infrastructure issues but may be tailored to meet the needs of a multi-jurisdictional IntelliDrive system.

Objectives
• Identify minimum level of infrastructure for maximum public benefit and develop deployment guidance:
  • Workforce needs for deployment, operations, and maintenance
  • Procurement guidance
  • Integration with existing systems, upgrade, maintenance, and other procedures
  • Options for financing, deployment, and operations of infrastructure
  • State and local public sector roles versus private sector roles
• Identify costs and financing/funding incentives for deployment
Infrastructure and Deployment

Expected Outcomes

Safety Pilot:
- Preliminary configuration of roadside infrastructure for testing certificate authentication
- Preliminary configuration of roadside infrastructure for testing Safety applications

NHTSA Regulatory Decision and for Deployment:
- Recommendations and input on minimum level of roadside infrastructure necessary to support V2V
- Synergies with potential FHWA Policy decision

Deployment:
- Guidance on funding, deployment, and maintenance options for roadside infrastructure
- Training for deployers, operators, and technicians
**Infrastructure for V2V and V2I Safety**

**Model Deployment**

- **Q1**:
  - Initial Evaluation
  - Infrastructure Needs Defined

- **Q2**:
  - Feasibility Assessment of Infrastructure Design & Cost
  - Determine staffing needs for maintenance and operations

- **Q3**:
  - Develop recommended process for technology upgrades and maintenance

- **Q4**:
  - Stakeholder outreach and education

**V2V Regulatory Decision Point**

- **Q1**:
  - Device Updates
  - Vehicle Updates

- **Q2**:
  - Aftermarket Device Development

- **Q3**:
  - Model Deployment Ramp-up and Preliminary Testing
  - Model Deployment Full Scale Testing

- **Q4**:
  - Engage key stakeholders for input and review

**Recommended level of infrastructure needs and O&M process**

- **Input to Industry standards based upon test results**

- **V2V Benefits Assessment**
Questions

• Missing anything?
• Key priorities?
• Ideas on next steps? Experts?
• Comments?
Rules of Operation & Standards

Definition
Rules of operation and standards provide the nationwide system of IntelliDrive with consistency and interoperability. They outline common standards by which participants of the system must adhere and identify use and enforcement within the context of federal, state, and local laws.

Objectives

• Assess who the system users are and identify their requirements
• Identify existing laws and variations in their application around the Nation
• Define policies and procedures for rules of use, standards, operations, maintenance, and upgrades
• Identify costs and institutional issues
• Define enforcement options, decision making processes, and oversight requirements
• Identify potential entities for decision-making, oversight, dispute resolution, and enforcement
Rules of Operation & Standards

Expected Outcomes

Safety Pilot

- Using ConOps, develop operational scenarios and define decision-making entities and test preliminary rules of operations – who makes what decisions, when, about what?
- Develop series of security scenarios for introduction into Safety Pilot to test select enforcement techniques

NHTSA Regulatory Decision

- Recommended rules of operation and standards for input into NHTSA decision

Deployment

- Rules of operations and standards for deployment – guidance documents and training
- Recommended plan for standards harmonization
- Recommended enforcement mechanisms and analysis
### Rules of Operation and Standards

**CY 2010**
- Q1: Stakeholder outreach and education
- Q2: Develop Preliminary Assessment (enforcement, standards, operational requirements)
- Q3: Analysis of state and local legislative issues
- Q4: Aftermarket Device Development

**CY 2011**
- Q1: Engage stakeholders and experts
- Q2: Analysis of international harmonization of standards
- Q3: Determine roles and responsibilities
- Q4: Input to Industry standards based upon test results

**CY 2012**
- Q1: Model Deployment Ramp-up and Preliminary Testing
- Q2: Model Deployment Full Scale Testing
- Q3: V2V Benefits Assessment
- Q4: V2V Regulatory Decision Point

**CY 2013**
- Q1: Rules of Operation
- Q2: Recommended Rules of Operation
- Q3: Input to Industry standards based upon test results
- Q4: V2V Regulatory Decision Point

**Legend**
- Green=Policy team
- Blue=SE team
- Pink=Outreach/Comm
- Gold=Model Deployment
- Milestone, Review Point
- Decision Point
Questions

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Spectrum Analysis & FCC Role

Definitions
The 5.9GHz space of the communications spectrum that would be used by IntelliDrive is subject to regulations and oversight provided by the FCC. It is necessary to understand the current rules of the spectrum, how they impact industry, and whether/how these rules work for the proposed IntelliDrive system.

Objectives
• Understand existing rules and procedures and determine whether changes are needed in support of IntelliDrive.
• Identify whether V2V and V2I will require the use of a “spectrum manager” and whether this is possible under the current rules.
• Need to work with the FCC on issues such as interference, enforcement, channel switching, valid use, and other issues.
• Identify how this area of the spectrum might be leveraged for commercial purposes once Safety is appropriately addressed.
Spectrum Analysis & FCC Role

Expected Outcomes

Safety Pilot
- Understanding of allowable uses and governance of the 5.9 Ghz spectrum
- Appropriate licensing for Safety Pilot testing

NHTSA Regulatory Decision and for Deployment:
- Recommendation on potential design of roles and responsibilities for IntelliDrive spectrum management (and whether the IntelliDrive goals could be achieved in the absence of a spectrum manager).
### Spectrum Analysis and FCC Role

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#### Spectrum Analysis & FCC Role
- **Assessment of Existing FCC Practices**
- **Coordinate with FCC for determination of role and responsibilities**
- **Conduct licensing process**
- **Analysis of spectrum management requirements**
- **License in place for Model Deployment site**
- **Identify potential spectrum managers**
- **Recommended spectrum manager and roles and responsibilities**

#### Model Deployment
- **Aftermarket Device Development**
- **Model Deployment Ramp-up and Preliminary Testing**
- **Model Deployment Full Scale Testing**
- **Device Updates**
- **Vehicle Updates**

#### V2V Regulatory Decision Point
- Input to Industry standards based upon test results
- V2V Benefits Assessment

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Questions

- Missing anything?
- Key priorities?
- Ideas on next steps? Experts?
- Comments?
Definitions
A governance structure defines the type and level of authorities needed for deployment, system operations, and enforcement, and defines the roles and responsibilities of the players engaged in the system.

Objectives
- Identify governance structures from other industries and apply lessons learned to IntelliDrive
- Design a governance framework
- Define roles and responsibilities
- Aggregate results of other policy areas into the framework
- Identify whether new legislation or authorities are needed and by whom
- Identify impacts
Governance Structure & Authority

Expected Outcomes

Safety Pilot:
• Concept of Operations for IntelliDrive system and evaluation of what potentially requires governance
• Preliminary identification of what can be governed through standards versus what requires a governance entity(ies)

NHTSA Regulatory Decision:
• Recommended governance structure in support of safety, outlining suggested roles and responsibilities

Deployment:
• Recommended governance entity with associated operations, roles and responsibilities
Governance Structure & Authority

CY 2010
- Q1: Assessment Governance Needs and Existing Examples
- Q2: Engage Governance Experts
- Q3: Develop Initial Governance Model
- Q4: Stakeholder outreach and education

CY 2011
- Q1: Modify Governance Model
- Q2: Working Group Governance Workshop
- Q3: Develop Implementation strategy for governance model
- Q4: Final Draft V2V Governance Model

CY 2012
- Q1: V2V Benefits Assessment
- Q2: Input to Industry standards based upon test results
- Q3: V2V Regulatory Decision Point
- Q4: Aftermarket Device Development

CY 2013
- Q1: Model Deployment Full Scale Testing
- Q2: Model Deployment Ramp-up and Preliminary Testing
- Q3: Vehicle Updates
- Q4: Device Updates
Questions

• Missing anything?
• Key priorities?
• Ideas on next steps? Experts?
• Comments?
Q&A