



UNITED STATES
DEPARTMENT OF TRANSPORTATION

V2V Safety Research Track 2 - Interoperability

Mike Lukuc
NHTSA

August 2, 2011

OVERVIEW

V2V Interoperability

- The ability for V2V safety systems to successfully function across any, and all, equipped vehicles regardless of make/model

Research Team

- Collaboration between USDOT and Crash Avoidance Metrics Partnership (CAMP) Vehicle Safety Consortium 3 (VSC3)
- Team members: NHTSA, RITA ITS JPO, Ford, GM, Honda, Hyundai-Kia, Mercedes Benz, Nissan, Toyota and VW-Audi



Task 2 - Coordination with Other Related USDOT Programs

Goal:

- Coordination of V2V-Interoperability research results with other organizations, programs and technical activities



Task 2 - Activities

- Active participation in IEEE and SAE standards development
- Facilitation of international standards harmonization
- Interaction with USDOT Systems Engineering Task
- Interaction with other related USDOT activities
- Coordination with VII Consortium



TASK 3 - VEHICLE-TO-VEHICLE SAFETY COMMUNICATION INTEROPERABILITY

Goal:

- To achieve V2V safety communications and security interoperability between On Board Equipment (OBE) systems from different manufacturers



TASK 3 - ACTIVITIES

- Specify OBE requirements for V2V safety communications and security interoperability
- Work with three-to-five suppliers to develop interoperable OBEs which support the requirements identified above
- Test the OBEs from the different suppliers to determine if interoperability has been achieved
- Analyze the test results and develop remediation recommendations to address any identified anomalies or gaps in the standards
- Incorporate remediation recommendations in relevant standards and back in the OBEs



TASK 4 - COMMUNICATIONS SCALABILITY

Goal

- Conduct testing in real-world conditions with a sufficient number of vehicles and OBEs to determine if the planned channel congestion mitigation techniques will support large-scale deployment



TASK 4 - ACTIVITIES

- Test how DSRC will perform as larger numbers of DSRC radios are added to the system
- Calibrate communication simulation environments with real world large scale test data
- Identify congestion control and mitigation techniques likely to be the most effective at supporting the desired level of scalability
- Integrate security system (developed within Task 5) into the scalability test bed
- Incorporate remediation recommendations in relevant standards

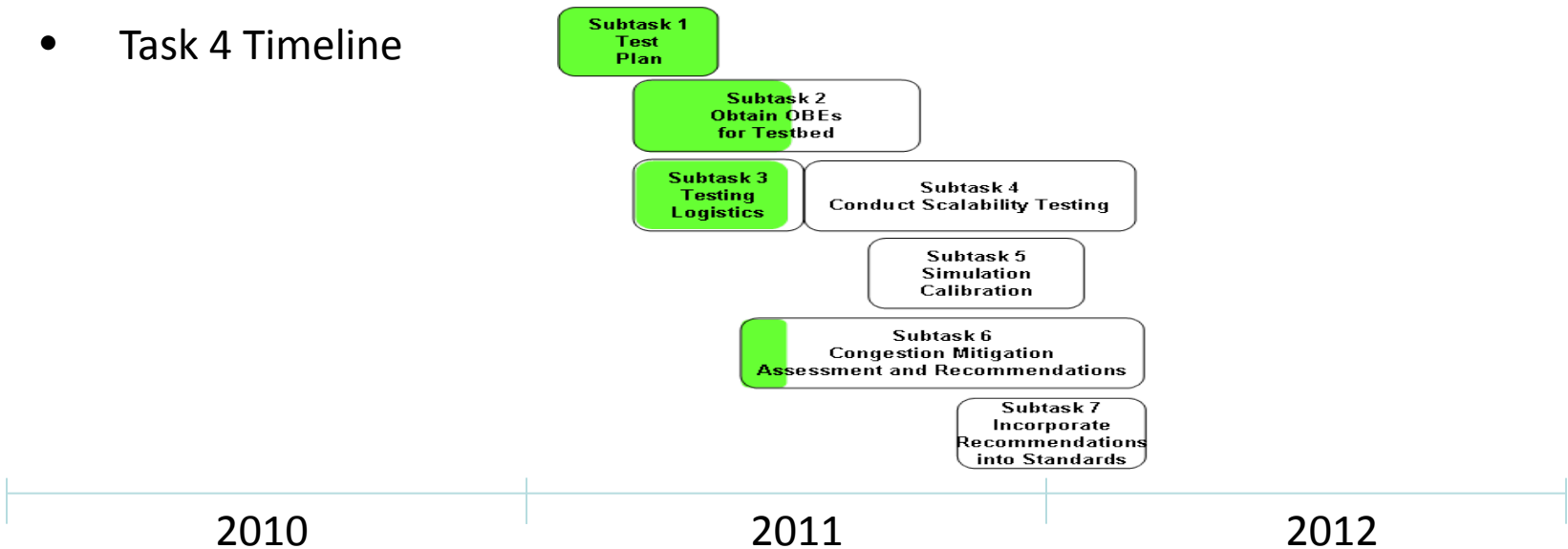


TASK 4 – TIMELINE

- Task 4 –Communications Scalability of the V2V-Interoperability Project consists of the following subtasks:

- Subtask 1: Test Plan
- Subtask 2: Obtain OBEs for Test bed
- Subtask 3: Testing Logistics
- Subtask 4: Conduct Scalability Testing
- Subtask 5: Simulation Calibration
- Subtask 6: Congestion Mitigation Assessment and Recommendations
- Subtask 7: Incorporate Recommendations into Standards

- Task 4 Timeline



TASK 5 - SECURITY MANAGEMENT

Goal:

- Develop technical requirements and build a prototype security system, test this system, and utilize it within the scalability testing in Task 4



TASK 5 - ACTIVITIES

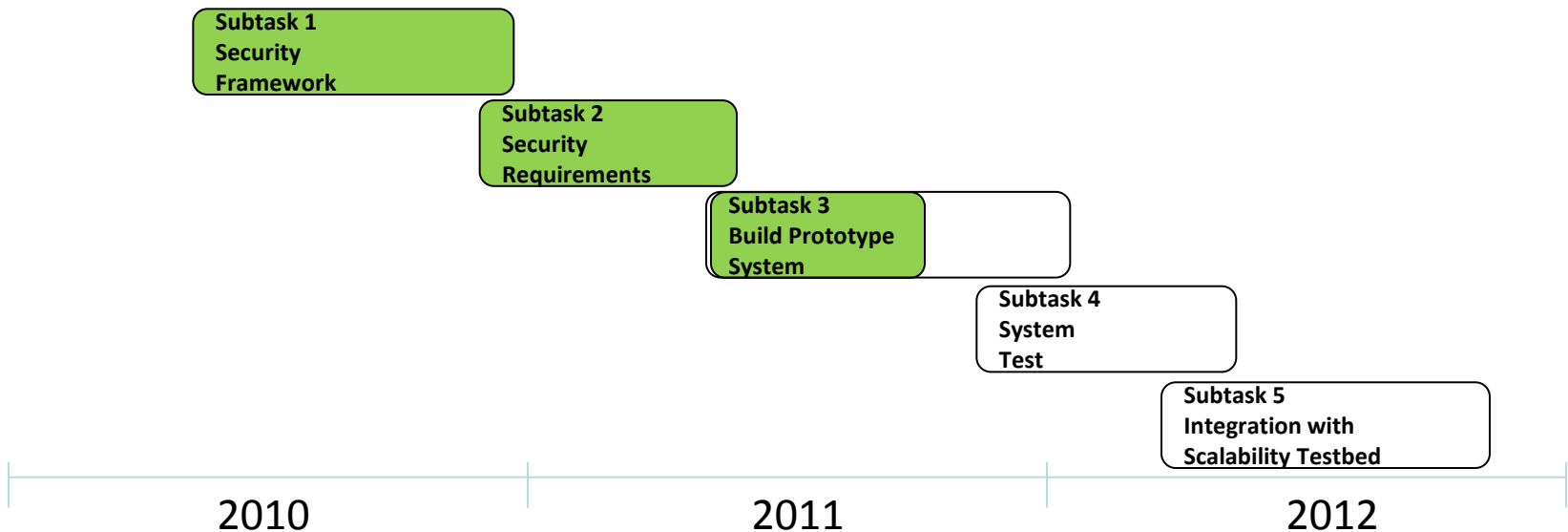
- Develop a functional security framework that does not presuppose the existence of any particular wireless technology
- Address all the functions that will be required in order to provide an effective security solution for vehicle safety applications
- Develop and define technical requirements for the functional nodes and interconnections among nodes
- Build a prototype security system capable of providing a technically feasible approach to guide policy decisions
- Test the prototype security system and analyze results
- Integrate the prototype security system with the scalability test bed



TASK 5 – TIMELINE

- Task 5 – Security Management of the V2V-Interoperability Project consists of the following subtasks:
 - Subtask 1: Security Framework □
 - Subtask 2: System Requirements □ ←
 - Subtask 3: Build Prototype System
 - Subtask 4: System Test
 - Subtask 5: Integration with Scalability Test Bed

- Task 5 Timeline



TASK 6 - DATA INTEGRITY AND RELIABILITY CERTIFICATION

Goal:

- Assessment of requirements necessary for vehicles to trust the accuracy of the data in the over-the-air messages and allow the correct functioning of the safety applications



TASK 6 - ACTIVITIES

- Determine any differences in the outcome of the objective tests when the sensor data are varied within the current accuracy ranges
- Define procedures to ensure compliance with accuracy and timeliness requirements
- Define compliance verification and certification procedures
- Assess retrofit units (OEM-controlled design and installation) and aftermarket units (with no, or limited, connection with vehicle networks) in terms of capabilities and certification procedures
- Determine accuracy and trust requirements for vehicle safety applications that use autonomous braking and/or steering



TASK 6 – Timeline

- Task 6 – Data Integrity and Reliability Certification of the V2V-Interoperability Project consists of the following subtasks:
 - Subtask 1: Definition of Accuracy and Timeliness Requirements for the OTA Data □
 - Subtask 2: Definition of Test and Certification Procedures □
 - Subtask 3: Certification of After-market and Retrofit Devices □
 - Subtask 4: Analysis of Data Reliability Requirements for Safety Systems that use Automatic Vehicle Control
 - Additional: Detailed Analysis of Other Data Elements with Simulation Tools



- Task 6 Timeline

