Pooled Fund Study

Scope of Work

Program to Support the Development and Deployment of Infrastructure IntelliDrive^SM Applications

Phase 1

Foundational Planning and Research to

Prepare for Field Demonstration and Early Deployment

Lead State: Virginia Department of Transportation

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PROBLEM STATEMENT

IntelliDrive[SM] holds the potential to support a fundamental advance in surface transportation. While the vehicle component and infrastructure component of the transportation system have traditionally been only loosely coupled (through static signing, vehicle presence detectors, etc.), IntelliDrive[SM] will allow the components to "work" actively together. This provides the potential for reduction in congestion, safety improvements, and improved traveler services. In order to realize this potential, IntelliDrive[SM] will require unprecedented cooperation between the private and public sectors, on a scale not required in the current loosely coupled system.

To date, the IntelliDrive[SM] initiative has focused largely on "how" to technically accomplish the integration. A large amount of solid technical work has been devoted to developing the DSRC communications standard, developing and deploying field equipment for small scale prototype/proof-of-concept testing, and high-level architecture development. As this work has progressed, it has become increasingly clear that there will not be a single way to "do" IntelliDrive[SM]. For example, recent activities in the national program have made it clear that so-called aftermarket equipment and other wireless communications than purely DSRC should be considered to demonstrate and explore IntelliDrive[SM].

As owners and operators of the nation's surface transportation infrastructure, state and local transportation agencies are at the core of IntelliDrive[SM]. While automakers and device manufacturers will dictate availability of vehicular equipment, transportation agencies will control the deployment of roadside infrastructure, and the incorporation of IntelliDrive[SM] into infrastructure applications (such as traffic signal control). To guide transportation agency involvement in IntelliDrive[SM] deployment, AASHTO is in the process of developing a strategic plan. What emerged from a planning meeting held on March 17-18 to support the development of this plan is that a significant level of effort will be required to guide and support deployment of IntelliDrive[SM] in the transportation infrastructure. In particular, there is an immediate need for infrastructure providers to (1) create an IntelliDrive[SM] infrastructure deployment plan, (2) participate in the creation of a viable IntelliDrive[SM] business plan, and (3) conduct targeted, applied research to develop applications that will make full use of IntelliDrive[SM] capabilities.

OBJECTIVES

Through a set of pooled fund studies, the Virginia Department of Transportation (VDOT) proposes to work with federal, state and local departments of transportation, to establish a multi-phase program to facilitate the development, field demonstration, and deployment of IntelliDrive[SM] infrastructure applications. In phase 1, the participants in this program will create an IntelliDrive[SM] infrastructure deployment plan, participate in developing an IntelliDrive[SM] business plan, and complete applied research to create deployable IntelliDrive[SM] infrastructure applications. Future phases of the program will focus on large-scale field demonstrations of IntelliDrive[SM] infrastructure application and evaluation.

The purpose of this program is to provide a means to conduct the work necessary for infrastructure providers to play a leading role in IntelliDrive[SM], as described in the AASHTO IntelliDrive[SM] strategic plan. All efforts will be coordinated with the partners currently engaged in the IntelliDrive[SM] program – namely USDOT and automobile manufacturers.

PROGRAM MANAGEMENT

VDOT will act as the lead state and program manager for this pooled fund study. VDOT staff will work directly with the University of Virginia's Center for Transportation Studies (UVA CTS), which will provide administrative and technical leadership for the program. VDOT and UVA CTS have a long history of close partnership in innovative research and development initiatives, and will work as a single cooperative entity in this program.

Each participating organization will provide a representative to the *Program Steering Committee* (PSC), which will oversee the activities of the Program. This representative shall be of sufficient management level in their organization to make decisions regarding the resources of the program. The PSC will meet approximately two times per year, typically in conjunction with other events, such as the ITS America Annual Meeting, in order to reduce travel costs. Other PSC discussions and information exchanges will take place via teleconference and email.

Participating organizations will also provide a representative for the *Technical Advisory Committee* (TAC). This representative will ideally be someone with expertise and experience in the technical aspects of IntelliDrive[SM] and transportation operations. The role of the TAC will be to provide recommendations to the PSC on technical matters pertaining to the activities of the program. The TAC will not have regular face-to-face meetings, but will instead rely on electronic means in order to perform its duties.

WORK PLAN

The program work plan will consist of two tracks – deployment/business planning, and applied research. These tracks are described below:

Deployment/Business Planning Track

Task 1. Scope IntelliDrive[SM] Infrastructure Deployment Plan

      UVA CTS, working with the PSC and TAC, will develop a detailed scope to guide the development of the IntelliDrive[SM] Infrastructure Deployment Plan. The product of this task will be a RFP that may be used to hire a consultant to complete the plan.

Task 2. Develop IntelliDrive[SM] Infrastructure Deployment Plan

      UVA CTS, with guidance from the PSC and TAC, will hire a consultant to complete the IntelliDrive[SM] Infrastructure Deployment Plan. A draft of the deployment plan will be completed by September 30, 2009. The TAC will review and meet in mid-October to work with the consultant in identifying remaining issues to be resolved. Following this, the plan will be revised for a December 31, 2009 delivery.

Task 3. Scope IntelliDrive[SM] Business Plan

      The IntelliDrive[SM] Business Plan must include all components of the system – including the vehicle and infrastructure. The purpose of this task in the pooled fund study is to scope the infrastructure component of the business plan. In short, it will address financing of construction, operations, and maintenance of infrastructure elements of the IntelliDrive[SM] system. UVA CTS will develop this scope in conjunction with the PSC and TAC.

Task 4. Develop IntelliDrive[SM] Business Plan

      As stated in Task 3, the development of the business plan is envisioned to be an activity in scope larger than this pooled fund study. With the infrastructure scope developed in Task 3, in this task the pooled fund study participants will work with partners in US DOT and auto manufacturers to complete the IntelliDrive[SM] Infrastructure Business Plan. There are many possible contracting/delivery methods that may be used to accomplish this. It is anticipated that resources from the pooled fund study will be combined with partner resources to fund this work.

<u>Applied Research Track</u>

Task 5. Identification of Applications

The IntelliDrive[SM] Infrastructure Deployment Plan will identify specific infrastructure applications that will be supported by IntelliDrive[SM]. In most cases, current infrastructure applications are not designed or configured in a manner that will take advantage of IntelliDrive[SM] capabilities. In this task, UVA CTS will analyze the applications identified in the deployment plan to identify specific research and development needs to make them deployable. Based on this assessment, the TAC will then prioritize applications for applied research.

Task 6. Development of IntelliDrive[SM] *Operations Applications*

Based on the prioritized list of applications developed in Task 5, a set of IntelliDrive[SM]-enabled transportation system operations applications will be developed. While much of this work will be algorithmic, this task will also entail hardware and communications analysis. UVA CTS and the TAC will solicit and select research and development organizations to participate in this task in order to bring the best skills and abilities to the challenge. At the completion of this task, fully developed applications will be available for simulation testing.

Task 7. Evaluation of Applications in Simulation Environment

In this task, the applications developed in Task 6 will be evaluated using a large-scale IntelliDrive[SM] simulation environment at UVA CTS. This environment incorporates the ability to "overlay" a IntelliDrive[SM] implementation on top of a microscopic simulation environment. Currently, the environment works with VISSIM, Paramics, and Aimsum.

The evaluation task will focus on quantifying benefits of the applications, and understanding the impact of OBE penetration rates on the applications. In addition, wherever possible, simulation animations will be included in order to allow for demonstrations of the proposed applications.

Task 8. Deployment Analysis

The success of IntelliDrive^{SM}-enabled applications will not be solely dependent on technical or algorithmic details. Rather, all applications are dependent on maintenance, policy, personnel, and other deployment-related factors. In this task, each of the applications will be critically analyzed in terms of field deployment. Specific risks, opportunities, and needed changes will be identified and addressed in this task.

Task 9. Preparation for Large-Scale Field Demonstrations andTesting

Based on the results of the previous tasks, the team will prepare for Phase 2 of the research program, which will include field demonstration and testing of the highest potential IntelliDrive^{SM} infrastructure applications. This preparation will include identification of test sites, inventory of existing equipment/capabilities, preliminary design and cost estimates, and an assessment of policy issues. With the results of this task, a clear understanding of the field testing will be used to formulate the follow-on pooled fund study to provide the mechanism to carry out Phase 2. It is expected that Phase 2 will be a 2 year effort.

TRAVEL

Since this topic of research is of national importance and requires collaboration among experts from various states, some travel will be involved. All attempts will be made to combine program meetings with other conferences, so that a maximum pool of program participants can be consulted with minimum travel cost. Travel costs estimated within this proposal cover airline expenses and per diem. Travel is needed for PSC members to travel to two large conferences per year. These travel expenses will be paid out of the contribution that each state DOT makes to the regional pooled fund study.

FUNDING REQUIREMENTS

VDOT agrees to provide $75,000 per year for the program. Other participating organizations will be asked to contribute at least $50,000 per year. State DOT's who find that the full $50,000 contribution from their State Planning and Research (SP&R) allocation is a hardship, may join by contributing a "fair share." Fair shares would be determined based on the percentage of the annual SP&R funds for the state, so that small states are not unfairly burdened. It is estimated that the funding level needed for this effort to reach full potential will be $700,000.

Table1. Study Budget

Item	Amount
Phase 1 - Planning	$200,000
Phase 2 - Applied Research	$400,000
Administration & Meeting Costs	$50,000
PSC Travel	$50,000
Total	**$700,000**

SCHEDULE

This regional pooled fund study will begin on June 1, 2009, and run through May 31, 2011. The schedule for the pooled fund study is detailed below: