

## IntelliDrive<sup>SM</sup> Pooled Fund Study

### Program to Support the Development and Deployment of Infrastructure IntelliDrive<sup>SM</sup> Applications

University of Virginia Center for Transportation Studies

Progress Report  
September 2010

#### Project Activities/Progress

##### Project Management

##### 1. *Pooled fund study meeting on September 23<sup>rd</sup> in California*

- A face-to-face meeting of the pooled fund study members was held in Irvine, California on September 23<sup>rd</sup>. Specific items discussed at this meeting were:
  - General updates on the pooled fund study
    - The role of UVA CTS as technical oversight and administration provider
    - Updates on the current financial status of the PFS
    - New and potential members
  - Year 2 applications selection
    - After extensive discussion, two projects were selected to comprise the Year 2 program:
      - Development of a Multi-Configurable (cell, satellite) 5.9 GHz OBE and Retrofit/After-Market IntelliDrive Equipment for Light-Duty Vehicles
      - Standards Compliance and Interoperability Certification for IntelliDrive Hardware and Software
    - Draft scopes of the selected projects were started in late September
  - MOU between PFS and USDOT for Dynamic Mobility Applications
    - Applications supported by USDOT funding can be selected at the PFS members' discretion as long as the applications are mobility related.
    - Sources of projects to be considered include, but are not limited to, USDOT's DMA applications list, the list from the AASHTO Deployment Plan, PFS projects not funded in Year 1 or 2, and other ideas suggested by the PFS members.
    - An initial list of potential applications will be prepared in October.

##### 2. *Participated in related meetings and conference calls*

- TRB ITS Committee mid-year meeting in Irvine, California on September 20-22
- IntelliDrive System User Needs Workshop in Washington, DC on September 29-30

- Conference call of the SAE J2735 Public Safety and Map Subcommittee on September 9<sup>th</sup> 4:00-5:00PM
- Conference call on the AASHTO Deployment Analysis on September 10<sup>th</sup> 1:00-3:00PM
- Conference call on the AASHTO Deployment Analysis and preparation of the meeting in Irvine on September 16<sup>th</sup> 1:00-2:00PM

## IntelliDrive<sup>SM</sup> Traffic Signal Algorithms

### 1. *Task 2 and 3 Reports*

- The project team completed the Task 2 report on IntelliDrive algorithms, and continued work on the Task 3 report on signalized intersection performance measures with IntelliDrive.

### 2. *Algorithm coding in VISSIM network*

- The rolling horizon algorithm continued to be ported to a four-signal corridor based on a section of Route 50 in Chantilly, VA.
- The project team completed coding of the vehicle clustering algorithm (formerly the network optimization and platoon-based algorithms). The algorithm performed well against an optimized fixed time strategy. The algorithm is being refined to improve signal coordination and number of stops, which were higher than expected in preliminary simulations.

### 3. *Preliminary Results*

- For the oversaturation situation, the ECG algorithm and LSG+SSC algorithm were tested in detail, for 4 levels of market penetrations less than 100% (20%, 40%, 60% and 80%), and with three approaches to account for the lower market penetration levels:
  - Naïve approach: Assuming that the last IntelliDrive<sup>SM</sup>-equipped vehicle marked the end of the queue.
  - Surrogate Queue: Using a known IntelliDrive<sup>SM</sup> market penetration level, the number of vehicles in the queue was estimated, beyond the last IntelliDrive<sup>SM</sup>-equipped vehicle in the queue.
  - Surrogate Queue with Estimate Market Penetration: In this approach, the number of vehicles in the queue was estimated, as in the above approach. However, the actual market penetration was estimated based on the number of IntelliDrive<sup>SM</sup>-equipped vehicles in the standing queue.
- All the above three approaches produced comparable results. The benefits linearly increased with the market penetration levels.
- The IntelliDrive<sup>SM</sup> data may be subject to some errors. In these algorithms, the location and the speed of the vehicles are the data elements of value. The location error, up to 2 car lengths (5ft, 10ft, 20ft, 30ft, 40ft), and speed errors up to 40% (5%, 10%, 20%, 30%, 40%) were independently and randomly introduced for each vehicle,

in the ECG algorithm. The deterioration of benefits were negligible even at 40ft. location error, or 40% speed error, illustrating the robustness of the algorithm.

Further experiments are currently planned for evaluating the effects of both the location and speed errors together. That will conclude the experiments. The next step is to explore and identify the challenges of full scale deployment for the oversaturation algorithms.

#### 4. *SAE J2735 Standard Review*

- The project team continues to track development of the SAE J2735 standard, the primary standard governing IntelliDrive Message Set Dictionary.

### **Project Status**

The project is on schedule. A couple of conference calls will be held 1) to discuss/finalize the scopes of the two selected year 2 projects and 2) to select the projects supported by USDOT DMA fund. Further algorithm development, refinement, coding, and simulation continue in September.

### **Invoice Notes**

None