Under the initiative of Department of Transportation (DOT) a safety-critical, dual redundant, open source traffic signal control application is currently being developed. The system named SCOPE, for Signal Control Program Environment, currently implements standard 8-phase NEMA logic and the National Cooperative Highway Research Program 3-66 preemption logic. SCOPE is designed to be part of the Advanced Traffic Controller (ATC), making use of API standard 2.06b to integrate with the hardware. Safety-critical status is achieved through redundancy of application logic that constantly compares expected signal phase information. From baseline requirements, engineers independently program application code, one using Ada95 and the other using C++.

The Traffic Experimental Analytical Simulation Model, a microscopic single-intersection vehicular simulation, was used for initial validation and testing of the functionality of the system. The second demonstration of the SCOPE, used actuated detector data collected from a recording of a live intersection. Actuator calls were placed on SCOPE at the same times the vehicles triggered the detectors in the video (assuming the vehicles were not in-queue). Using SCOPE the real-world traffic was not only right-of-way safety yielded, but the traffic flow state time average time in-queue reduced. The final phase of testing will occur when the DOT performs Formal Qualification Testing, which is scheduled to occur in 2013.

Upon validation and subsequent release to the open source community SCOPE will provide users the ability to replace the proprietary application software residing in ATC cabinets. Transparency will be provided into another aspect of the traffic control signal thus taking the initiative of ATC one step further.

Major: Modeling & Simulation

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Approved for distribution by Essam Radwab, Committee Chair, on October 15, 2012.

The public is welcome to attend.