

The Arizona E-VII Initiative is Underway

The Arizona DOT, Maricopa County DOT, FHWA and partners from the academic and private sectors have embarked on a VII initiative that is focused on supporting emergency responders and incident management activities. The Arizona E-VII program is in the early stages of development, and will build on the successful incident management and emergency traffic response programs already established in the Phoenix metropolitan area for freeway and arterials (REACT and ALERT). **The goal of the Arizona E-VII initiative is to develop and test advanced technologies and integrate roadway systems with emergency responder vehicles to improve emergency response to traffic incidents as well as enhance responder safety.**

MCDOT and ADOT are continuing with leadership in ITS to better serve the public by initiating a phased deployment of VII in Arizona. The Arizona E-VII strategy is focused on five key elements:

- 1) Focus on VII applications in incident management and signal operations to improve mobility and safety.
- 2) Build VII partnerships within the State of Arizona, with AZTech™ partners, and with national stakeholders.
- 3) Develop and implement a phased program initiating with field operational tests that progress to full-fledged deployment.
- 4) Design and develop specific VII projects and propose for federal, state and other grants to fund those projects.
- 5) Participate in the national VII committees and forum to leverage developments by others and share our experiences and developments

Arizona E-VII Pilot Project Phasing

The Pilot Project of the Arizona E-VII program has been designed in two phases. Phase 1 of the project involves research and development of the prototype applications and is expected to be complete by **Winter 2008**. In Phase 2, a proof-of-concept in-the-field “parking lot” demonstration site will be established in Maricopa County to test the applications, equipment interfaces, and driver interaction with the on-board systems in a real-world environment. The target for completion of the demonstration field site in Phase 2 is **Summer 2009**. As the technology matures further, the Arizona E-VII program will:

- Continue to extend the coverage of the E-VII system across the state of Arizona, to include rural deployments;
- Develop additional E-VII applications related to incident management and response; and
- Integrate other VII applications into the Arizona E-VII system, as developed by other initiatives

E-VII Applications Concept of Operations

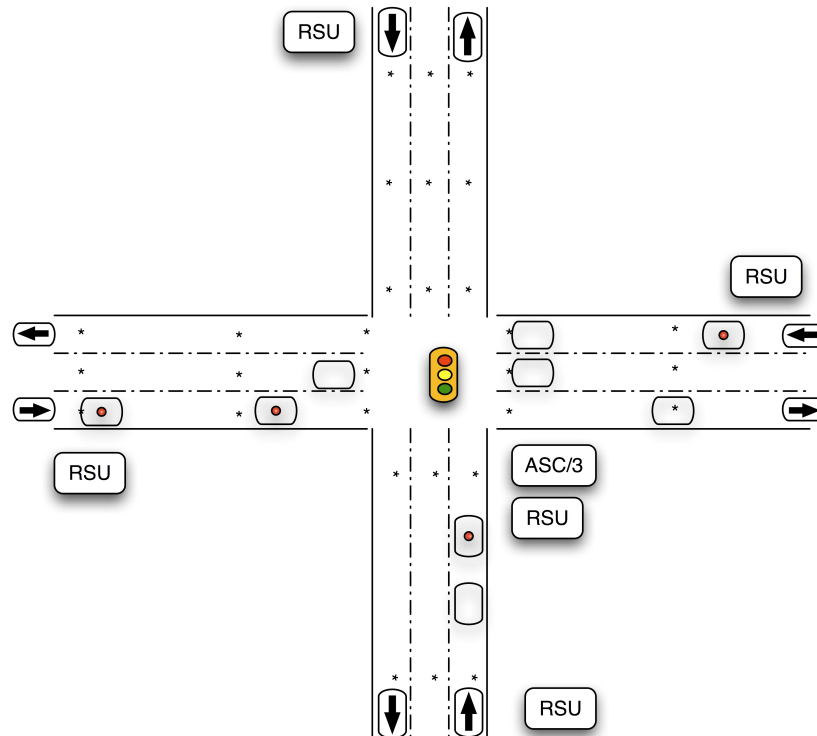
From the many applications that could be pursued by the program, the E-VII pilot project will address four (4) capabilities that will demonstrate the effectiveness of VII technologies to improve the safety and

performance of incident response teams. While there are many potential opportunities for applications developed from VII technologies, these four key capabilities have been selected based on the joint University team's strengths and the local and national needs to improve incident response:

1. Preemption and Priority Operations at Traffic Signals,
2. Preemption Operations at Ramp Meters,
3. Ad hoc Incident Warning Broadcast,
4. Lane, Road Closure, and Incident Information Communication to TOC.

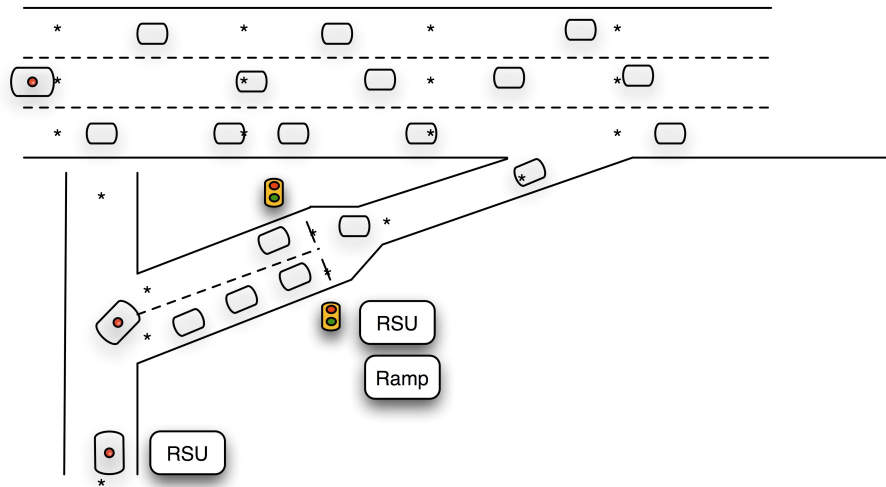
In addition, these capabilities do not require widespread deployment of VII technology in the private vehicle fleet or significant involvement with vehicle manufacturers. These VII applications can be developed wholly with aftermarket equipment and integration with existing legacy traffic control and information systems.

Capability 1 (Preemption and Priority Operation at Traffic Signals) replaces the current optical detector method of requesting preemption. This project will now utilize DSRC communications between the vehicle and the traffic signal to request preemption, as well as to allow the traffic signal to send information to the incident response/emergency vehicles about the status of the traffic signal and other approaching first response vehicles that are, or have, requested priority. It is envisioned that this capability will extend the range of the preemption request (PSOBE range is up to 1000m) and will improve safety of the vehicles at the intersections. This effort is relatively low risk due to the research team's existing capability and expertise, and will demonstrate the utilization of the VII/DSRC system and technologies.

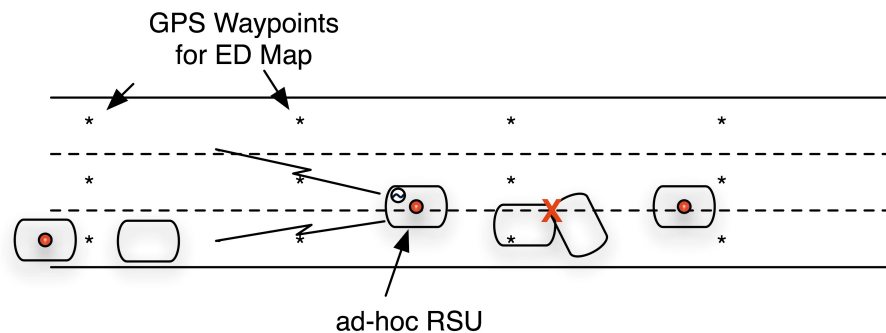


Capability 2 (Preemption Operations at Ramp Meters) will extend the preemption concept to ramp meter operations. It is not believed that there is an existing ramp meter preemption capability today, but there is a need to improve the response time of first responders when they must enter a controlled access highway

through an on-ramp. The use of VII/DSRC will be similar to the traffic signal preemption request communications. The ramp preemption logic (see full description below) will be based on allowing one lane (left) to clear in front of the responding vehicle. If there are two or more lanes, the other lanes will be stopped with a red indication. The risk of this effort is higher than that of the traffic signal preemption/priority since there is the additional need to develop ramp metering timing plan/logic that will support the concept of operations and determine which mode of operation will be acceptable to stakeholders.



Capability 3 (ad hoc incident warning broadcast) will utilize the *vehicle-to-vehicle communication* capability of VII to allow an incident response vehicle to broadcast information from the incident site to approaching vehicles to alert them to lane blockages and road closures. This capability will be useful to VII equipped vehicles, such as other first responders and privately owned vehicles (which likely will not be equipped for some time, but this is where the real value of VII lies). An ad-hoc network will be established with one first responder vehicle acting as the Road Side Unit (RSU) to broadcast the incident information. The ad-hoc RSU will be required to cooperate with other incident vehicles to determine the incident extent and closure information. Due to the need to establish an ad-hoc network, the risk of this effort is higher than the signal preemption/priority test, but lower than the ramp preemption test. This VII application was of extremely high interest to stakeholder groups and grew out of discussions with the incident response community including the NTIMC and PSAG. This capability also demonstrates the need for and use of an enhanced-digital (ED) map as a VII-enabling technology.



Capability 4 (lane and road closure information to the TOC) will leverage the result of Capability 3 to collect incident data and communicate it back to the TOC where it can be integrated with the AZ 511 system. The ad-hoc RSU will establish a connection using either DSRC to a nearby RSU that has

backbone communication capability or via radio or cellular capability on the vehicle to communicate the data to the TOC. The risk of this development effort is relatively low due to the anticipated success of the development of Capability 3; it only depends on the availability of a nearby RSU or backbone communications. This capability provides real-time and enhanced incident information on traditional legacy ATIS sources automatically without operator input. This capability also demonstrates the integration of VII technology with existing legacy systems; in this case, integration with existing ATIS systems and distribution methods.

These four core capabilities span a broad range of applications within the VII environment to support Emergency/Incident Management services. Successful completion will result in a strong and well established E-VII system development capability. Lessons-learned and challenges will be communicated to the National VII program and documented in a final report that will be distributed among the VII community. Early technology transfer activities will also be undertaken to share information with other States pursuing VII programs, as well as those States that are not currently pursuing their own program.

Arizona E-VII Partners and Funding

A \$200K research grant from the Arizona Transportation Research Center and \$200K cost match from the Maricopa County DOT is providing the funding for Phases 1 and 2. The Arizona Transportation Research Center (ATRC) is a state-wide agency that provides funding and project tracking for transportation-related research projects across a wide range of focus areas. Research proposals are competitively evaluated by a panel of representatives from ADOT and partner agencies across the state. Not all projects that are submitted for funding are approved. The E-VII project was selected and approved by the voting panel of ATRC in mid-2007. Each project is then managed and guided by a Technical Advisory Committee (TAC) made of appropriate representatives from stakeholder agencies and departments. Cost-sharing is required by contracted agencies. In this project, UA and ASU are cost-sharing almost \$50K towards the conduct of the project, in addition to MCDOT's \$200K cost match.

Partner Agency	Role	Personnel
Federal Highway Administration	Oversight and national liaison	Alan Hansen
Arizona Transportation Research Council	Project Management	Steve Owen
Maricopa County DOT	Arizona VII Program leadership and development, funding support, VII implementation, and program expansion	Faisal Saleem, Marty Scott
Arizona DOT	Arizona VII Program leadership and representation at National VII Coalition	Victor Mendez, Scott Nodes, Lydia Warnick
University of Arizona	Application research and development	Larry Head, Pitu Mirchandani
Arizona State University	Evaluation of Proof of Concept	Soyoung Ahn, Aaron Golub
Kimley-Horn and Associates	Program Support	Lisa Burgess, Doug Gettman
Econolite, Technocom, Shel Leader, LLC	Equipment and field deployment support	Frank Provenzano, Shel Leader
Technical Advisory Committee	Guidance and technical direction	Jim Decker (City of Tempe), Jeff Jenq (City of Mesa)
Public Safety Stakeholder Coalition	Review of concept of operations and functional requirements identification	To be determined

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