Editors’ Note
by Jim Schultz and Greg Larson

Welcome to this issue of VII Update, distributed at the 15th ITS World Congress in New York. The Congress features the largest fully-integrated demonstration of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication technologies. This is a major milestone that many in the VII community have been working toward to demonstrate and showcase their major VII developments and achievements since the last U.S. World Congress in 2005.

Previous newsletters suggested a growing impatience with moving from the R&D testing environment into deployment and operations. However, we feel this is a good time to take stock of where we have been and where we are going. We have emphasized the need for developing a VII strategic plan and while the recommendation has received generally favorable reactions, not much has been done. This edition attempts to better define the plan.

Once we have a VII strategic plan, the next step is to identify the public and private applications we want to enable. We can then determine the number and location of road-side equipment (RSE) sites to deploy, and address when and if we will provide a backhaul communication network to each unit. Finally, both practically and financially, we need to determine a phased RSE deployment for each of the enabled applications. Only then can we discuss business models, possibly unique to each deployment. Clearly, we will need a good grasp on exactly what we want to deploy and how it will be operated and maintained.

We’ve been asked if this is the right time (with the Highway Trust Fund going broke, financial bailouts, and budget deficits) to dream about a future transportation initiative. But the U.S. will continue to face global competition and we need to be in the forefront of developing technologies that improve safety and increase mobility. Historically, investments in science and technology have fostered economic growth and helped improve the quality of life for all Americans. Surely the decision to move forward on VII is not a question of “if” but of “when.”

ITS America’s View of Deployment

Ideally, the federal role in building VII, or the 21st century version of President Eisenhower’s interstate highway system, is clear: The return on investment of federal monies to create and sustain a V2V and V2I real-time data sharing network will result in fewer highway deaths and injuries, save energy, and protect the environment.

Consistent with the state DOTs’ and local agencies’ desire to develop a VII strategic plan, the U.S. DOT is considering how to best frame VII in the minds of the public, road users, and the ITS community to better explain, justify, and fulfill its VII vision. When combined with a commitment to move beyond research into the application and assessment of VII, through emerging and tested business models that make economic, social, and environmental sense, we will begin to see real movement.

Both the challenge and opportunity for ITS America stems from it representing the entire community of ITS stakeholders—public, private, and academic. While there is consensus on the importance of ITS in general and VII in particular, defining a plan that lifts everyone’s contribution and role demands and deserves “sweating the details.”

ITS America is developing a white paper to capture the evolution of VII, represent alternative pathways for deployment, and promote a way forward for the many partnerships among ITS stakeholders at federal, state, and local levels. In the coming year, we envision regular workshops and a national VII convening to highlight successful initiatives and activities are essential and should be framed effectively to inform the bill and its passage. As we anticipate this bill, we appreciate that at its heart will be meaningful language on improving performance of our road systems. VII must be a central component of the bill, given its contribution to the effectiveness and efficiency of our transportation systems.

For more information, contact Tom Kern, Executive VP, ITS America, 202-721-4211, tkern@itsa.org.
**VII Mission:**
Partner with public agencies, the automotive industry, and telecommunication industry to research, develop, and deploy a sustainable national VII program, by providing the public foundation for automotive information technology and ensuring improvements in transportation systems safety, operational performance, and commercial applications.

### Framework for Developing a VII Strategic Plan

AASHTO and its local agency partners agree that we need to develop a VII strategy to ensure that the necessary road-side equipment (RSE) infrastructure is deployed in North America. This will enable us to improve safety, traffic management, and asset management. The strategy needs to focus on partnering, developing, and deploying a VII infrastructure and test beds, increasing safety and mobility, improving asset management, developing outreach programs for better VII exposure, justifying the need for VII, and determining creative VII funding venues. It needs to capture the vision, mission, needs, goals, activities, and measures of success that will guide a coordinated, efficient, safe, and integrated vehicle infrastructure system throughout the nation. The plan will initiate a course of action toward establishing the required public- and private-sector partnerships that will ensure leadership, innovation, and progress across North America.

The plan includes partnering with key organizations and providing international leadership to research, develop, and deploy VII. Many strategic elements and interrelationships will need to take place in the next five years to achieve the VII mission and vision. Increased safety, more efficient mobility, and economic development are the primary end products for AASHTO’s pursuit of VII. To ensure this plan is truly a working document, activities will be pursued, measured, and updated continuously.

Current activities include, but are not limited to, developing relationships with OEMs by participating in a National VII Technical Working Group with state, local, and national transportation-industry members; designing, testing, and deploying a wireless infrastructure; designing a self-supporting test bed, active collision-avoidance systems for safety, and en-route accident/construction/event alerts for traffic management; and collecting infrastructure deterioration data for asset management.

Five key components of strategic plans are typically vision, mission, customer and partner identification, customer and partner needs, and strategic goals and objectives. The VII strategic plan needs to ensure that VII is an integral part of long-range transportation plans, the ITS architecture, and transportation improvement plans.

For more information, contact Jim Wright, VII Liaison and Coordinator, AASHTO, 651-271-1889, jwright@aashto.org.

### Long-Range Transportation Plan: Vision Statement

The San Francisco Bay Area Metropolitan Transportation Commission (MTC) has developed a strategic plan, *Transportation 2035: Change in Motion*, whose content or structure could possibly serve as a model for a national VII strategic plan.

MTC is a member of the National VII Executive Leadership Team and Working Group and a partner of the VII test bed in California. Its plan sets forth a bold vision of the future, where, in part:

- Mobility and accessibility are ensured for all residents and visitors, regardless of race, age, income or disability.
- Bicycle and pedestrian facilities, public transit systems, streets, and highways are safe and well-maintained.
- A regional high-occupancy toll lane network, bridges, and roadways help not only to manage the demand on a mature transportation system but also to pay for its improvements.
- The metro area is transformed by a growth pattern that creates complete communities with ready, safe, and close access to jobs, shopping, and services that are connected by reliable and cost-effective transit services.
- Technology moves out of the lab and onto the street, including clean fuels and vehicles, sophisticated traffic operations systems to manage traffic flow and reduce delay and congestion on our roadways, advanced and accessible traveler information, and transit operational strategies that synchronize fare structures, schedules, and routes to speed travel.
- MTC leads and mobilizes a partnership of regional and local agencies, businesses, and stakeholders to take effective action to protect our climate and serve as a model for national and international action.
- Transportation investments and travel behaviors are driven by the need to reduce our impact on the earth’s natural habitats.
- All residents enjoy a higher quality of life.

For more information, contact Melanie Crotty, Director, Traveler Coordination and Information, MTC, 510-817-5880, MCrotty@mtc.ca.gov.
VII Deployment

VII Deployment Alternatives

The original concept of VII was to improve safety, mobility, and operations by coordinated deployment of communication technology in all vehicles on all major roadways by 2030, with annual production of 15 million vehicles equipped with dedicated short-range communications (DSRC) in on-board equipment (OBE).

The rapid evolution and market growth of mobile technologies, however, contrasts sharply with the 15-20 year OBE deployment if we are to rely solely on installing the technology as original equipment only. The use of nomadic devices has been suggested as a way to accelerate deployment.

If we approach deployment based on enabling some applications, we need to understand the required communication links between the vehicle and infrastructure, and among vehicles. Also, mobility and safety applications often require location, speed, or other information to be sent to central locations for processing and to generate warnings and/or recommendations for rerouting. This can be accomplished in a variety of ways, e.g., by private backhaul or public cellular networks. A possible alternative for some safety applications would be installing non-networked autonomous on-board sensors and warning devices.

Some industry experts suggest that the transportation sector now has an opportunity to “change the game” by making multipurpose investments and leveraging open platforms to spark innovation. They’ve suggested developing and prioritizing a taxonomy of applications. Some dimensions of this taxonomy might include: vehicle-to-vehicle; comfort and convenience; hard safety vs. soft safety, scheduled vs. event-driven vs. on-demand; location-aware vs. location-independent; unicast vs. multicast; elastic traffic streaming; public sector vs. private sector applications; latency-sensitive vs. latency-insensitive; single-hop vs. multi-hop vs. completely arbitrary; and point-to-point vs. point-to-any-point.

For more information, contact George Gilhooley, HNTB Corporation, 407-805-0355, ggilhooley@hntb.com.

VII TOLLING: APPLICATION-DRIVEN DEPLOYMENT

VII Tolling enjoys long-standing support from the U.S. tolling industry for the adoption of DSRC technology for electronic toll collection (ETC). New VII tolling systems operating at 5.9 GHz have lower latency and higher read distances, data rates, and security than current 915 MHz systems. VII tolling is based on IEEE open DSRC standards and will be interoperable, which eliminates dependence on proprietary ETC systems. VII tolling also enables safety and mobility applications.

Several enterprises are testing VII tolling systems and one has a completed product. VII tolling can be tactical or classic. Tactical employs aftermarket tag-like DSRC units and OBE designed primarily for tolling. Deployment is not dependent on a national network. In classic VII, vehicles have embedded OBE as well as GPS and on-board safety systems. Deployment is through a national network with wide-scale interoperability.

Application-driven tolling deployment would feature carry-in devices that evolve as the unit’s functionality increases; applications form a platform on which later services are built. Road-side equipment (RSE) will likely sit aside legacy toll systems and use their existing classification and violation enforcement equipment. Bottom line: less risk and funding comes from the application that derives the benefit.

VII tolling is being tested at live toll plazas in California and Denver, and has been shown to work in the Detroit test bed. The test beds are showing that only light infrastructure is needed to perform the equivalent of today’s transponder-based toll transactions. This shows that 5.9 GHz DSRC is a world-class technology that can be deployed soon and an evolving foundation of a competitive, scalable, and long-term platform.

The transportation community, including operators of unpriced facilities, wants and needs to address the challenge of improving mobility. VII tolling is a great example of innovation and resourcefulness applied to this challenge. If you believe as the author does that creativity is one of the key elements of success, then VII was founded on it and is still driven by it. Despite the uncertainty and changes of late, this is a time of anticipation and confidence. 5.9 GHz DSRC endures and VII tolling can be the system that carries the day in the U.S.

For more information, contact Timothy McGuckin, Executive Director, OmniAir Consortium, Inc., 703-531-1817, mcguckin@omniair.org. Jack Opiola of Booz Allen Hamilton contributed to this article.

Coming Soon: VII Tolling Workshop

A conference planning committee is being formed to host a VII Tolling Workshop in summer, 2009. The workshop will continue a dialog of the advantages of VII tolling vs. ETC, formulate a VII tolling deployment and phasing plan, and determine how we might pay for it.

If you are interested in joining the planning committee or sponsoring this event, contact OmniAir Consortium, Inc., 703-531-1817, info@omniair.org.
A Time for Change

Both 2008 presidential candidates claimed change was needed. Change is definitely needed for transportation. As a sign of things to come, the Highway Trust Fund will incur a negative balance by October 2009, due largely to its source of revenue. Fuel tax revenues are negatively impacted by changes in driving, gas prices, and use of more fuel-efficient vehicles. At the same time, costs for road construction, operation, and maintenance are rising.

Clearly, the next version of SAFETEA-LU needs to address how we finance transportation at the federal level. Further, if we do not wish to increase the federal gas tax, then what other options do we have?

The transportation funding question is equally critical for states. For states to receive federal funds, they must have matching federal funds, in many cases 80% federal and 20% state dollars. Current state gas tax revenue may need to be devoted to operations and maintenance. This leaves major construction projects begging.

Some have suggested that there are at least two solutions to consider: 1) replacing or supplementing the gas tax with road user pricing, and 2) privatizing existing toll road operations. We suspect a lot more discussion on this subject over the next year.

In parallel, it is interesting to reflect on issues discussed in the presidential debates, such as energy independence, carbon emission footprints, and job creation. How does VII fit into that discussion?

If and when the country moves to road pricing, many jobs will be created: construction jobs for deploying road-side equipment and high-tech jobs in R&D for developing the applications and fine-tuning the architecture. Once the system is ready, more high-tech jobs will be created for deploying, operating, and maintaining the system.

Beyond high-tech jobs, there are also many opportunities to address fuel efficiency and greenhouse-gas emissions. For example, to improve fuel efficiency, VII tolling/electronic toll collection allows drivers to travel at speed while paying tolls, which reduces braking and idling. In the area of freight and fleet-administration, technologies such as PrePass toll tags allow trucks to bypass weigh stations to reduce fuel use, time, and emissions.

To maintain momentum of the VII deployment vision, while the new administration sorts out funding and leadership roles, a short-term plan to support road-use tolling can considerably benefit key stakeholders while moving VII closer to implementation. Radio DSRC technology has been proven in many of the initial Day 1 applications and would be a low-risk adoption by the tolling industry. Further, the licensed frequency at 5.9 GHz, with a 75 MHz spectrum allocated by the FCC, is at risk of being reallocated if the VII community does not use it soon. Once committed to these initial deployments, other applications (such as secure border crossing, parking payments, etc.) would quickly follow. Commercial vehicles are also significant potential benefactors of VII deployment. Both fleet operators and freight haulers have significant interest in providing safe, secure, and efficient operating environments for their drivers. Clearly, these potential new stakeholders need to be brought into the national VII discussions.

The presidential election cycle may have delayed progress of the VII initiative, but the uncertainties of leadership, funding, and priorities will sort themselves out within a year. During this period, the VII community can move forward by developing DSRC tolling technologies as private applications that have demonstrated positive market and business models.

For more information, contact Jim Schultz, ITS Program Manager, MDOT, 248-483-5131, SchultzJ3@michigan.gov, or Ralph Robinson, UMTRI Office of ITS Integration, 734-764-2181, ralphrob@umich.edu.