



Vehicle Infrastructure Integration: An Excellent Start

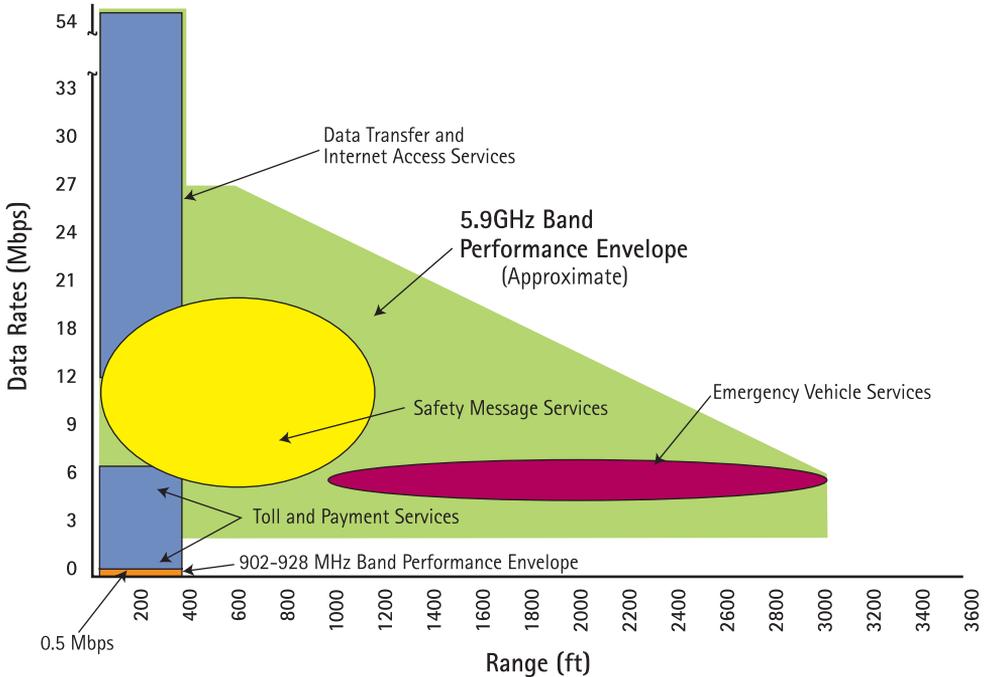
By Tim McGuckin

The U.S. DOT Vehicle Infrastructure Integration (VII) program and its underpinning technology, 5.9GHz dedicated short-range communications (DSRC), are clearly of interest to the U.S. toll industry. The prospect of a nationally interoperable network of DSRC systems, which VII would afford, is compelling. That the system devices, designed by toll industry suppliers and suitable for tolling, will be certified standards-compliant and interoperable should be out-and-out thrilling. This would address one of the few grievances electronic toll collection (ETC) operators have had about current-generation ETC: the lack of variety in suppliers that would respond if there were an open standard and a healthier device market.

The 5.9GHz DSRC platform is a high-data-rate, low-latency, secure communication system that supports critical safety, mobility, and other intelligent transportation applications the U.S. DOT wants. Based on open standards and featuring 27Mbps data streams, 50-millisecond access times, up to 3,000-foot “read” zones, and advanced transaction security, it is a significant performance leap in vehicle-to-roadside communications. This performance allows applications not possible with current technology (see Figure 1).

With 5.9GHz, the tag is already “in” the vehicle, integrated on the auto manufacturer’s assembly line. For the toll industry, this is exceptional, as it eliminates the need to specify, procure, manage, distribute, replace, repair, and dispose of tags—all of which constitutes a significant cost today. Moreover, since the technology isn’t proprietary, a choice in suppliers becomes a reality, removing a stubborn imperfection in the current market for ETC equipment.

Figure 1 5.9GHz Band Performance Envelope



While the new 5.9GHz DSRC platform addresses the proprietary-technology issue at the device level, it brings the toll industry only part of the way toward true interoperability (TI). (Here, “TI” is defined as the capability of users of electronic payment services, or EPS, to roam without condition and enjoy vehicle-to-roadside payment applications using the same payment media, resulting in seamless service, much like with cellular plans or other purchases via credit card.) To get the rest of the way to TI, tolling needs a national interoperability specification for EPS. The OmniAir Consortium, an independent, non-profit association of DSRC operators, manufacturers, integrators, and transaction service providers, is actively working toward that goal.

Implications for ETC

For 5.9GHz, ETC warrants special consideration because of what it means to the toll industry for a system to be integrated, interoperable, and even of interest:

Integrated: In ETC, integration implies a joined network of systems and services considered seamless and viewed as one by the merchant and the end user. An example is a bank that allows ATM withdrawals by users who don't have an account there.

Interoperable: Interoperability denotes the ability of a system to use the parts or equipment of another system. In ETC, this entails the ability of a service provider to purchase devices from different sources and have them work together. Just as important is their ability to accept electronic payments from customers with accounts from different issuing authorities with the least possible friction. The E-ZPass InterAgency Group, the 21-agency toll "system" in the Northeast, permits this at a regional level.

Note: With 5.9GHz, service providers will see the value of, and opportunity for, attracting more customers by providing them a more convenient method of payment. Likewise, customers should embrace the payment method because it will extend the convenience of EPS to a broader number of service providers.

These terms represent the minimum characteristics a 5.9GHz DSRC-based EPS system would need before ETC operators would consider it.

The Missing Factor in the TI Equation

In an effort to fill the interoperability gap and supply the missing factor in the TI equation, the OmniAir Consortium is developing an electronic payment services national interoperability specification (EPSNIS). This document and the associated business model express what the industry needs in its future: open, interoperable, and competitive applications and transaction services for toll-collection and other EPS providers.

In a nutshell, the EPSNIS is a set of technology requirements based on regional and national standards, software interface documents, and security

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architecture guidelines applied to the execution of a national, multi-operator, vehicle-to-roadside payment system. It is voluntary, doesn't steal from anyone's individual brands, and will eventually serve as an OmniAir-approved standard outlining the structure and operation of EPS systems using 5.9GHz DSRC and/or legacy equipment.

Though the industry won't see 5.9GHz DSRC devices for some years, the time is now to prepare to take advantage of device interoperability by creating application interoperability.

Why does the industry need this specification, and why are OmniAir's members developing it? Because it's time. The ETC market has never felt the pressures of standardization seen in other IT industry segments. Take word-processing software: Through the '80s and early '90s, there were a dozen contenders. But, facilitated by the Internet, the need and ability to share documents easily led to a standard. For practical purposes, there's only one word-processing application today—Microsoft Word, the market Goliath.

The reason ETC avoided standardization is that it started organically, from the ground up. Because the application was new, the toll industry's regional nature didn't penalize operators for choosing one vendor's proprietary solution over another. Coexistence wasn't necessary. But most readers know what this led to: The cost of deploying, maintaining, and upgrading ETC systems, perhaps the most popular DSRC application to date, has

become rather price-inelastic, despite large-scale deployments and customer buy-in.

Two things caused a reassessment of this business model: (1) the success of the toll industry (including operators and suppliers), as evidenced by growing regions and customer demand for more and seamless ETC; and (2) 5.9GHz DSRC technology.

When the on-board unit (OBU) for the technology is embedded in cars, it will have the hardware needed to communicate with a roadside service provider—no matter where the vehicle was shipped or bought. Though the industry won't see these devices for some years, the time is now to prepare to take advantage of device interoperability by creating application interoperability.

This approach poses challenges that must be addressed, but they're more institutional and policy related than technical:

1. Do operators lose the relationship with their customers if they don't "own" the toll account anymore?
2. Can operators be assured that the same level of service they provide is offered by a third-party customer service center?
3. Can these new customer service centers manage the complex transactions inherent across tolling (for example, vehicle classification schemes, frequency, time of day, and other factors that affect fees)?
4. Credit cards offer consumers protection: in case of a billing dispute, one can "reverse" a transaction. Can we do this for tolling?
5. Most operators use a prepayment system, charging the customer up front and placing the money in the operator's fiduciary account. Conversely, the credit card model is post-pay. Can tolling adopt this method practically and legally?



Regardless of these questions, which OmniAir members are currently addressing, there is clearly the potential now for private issuance of OBUs and accounts for anyone interested in a clear, conspicuous change from how the business of ETC works today. Furthermore, it isn't revolutionary, but evolutionary. Many of the model's aspects are already in place (see Via-T in the Spanish toll system, for example) or are rather ordinary to non-toll-industry purveyors of transaction processing and electronic commerce.

Creating Their Future

Fortunately, OmniAir's EPS committees aren't standing still. Rather, they're creating their future: a managed open system accessible to any transaction service provider and OmniAir-certified to preserve core interoperability.

The model is flexible and supports the creation of whatever elegant, value-added advances a supplier or operator would want to offer to distinguish itself from its peers or competition. But for those who want the basics, the EPSNIS would ensure the interoperability of the service.

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