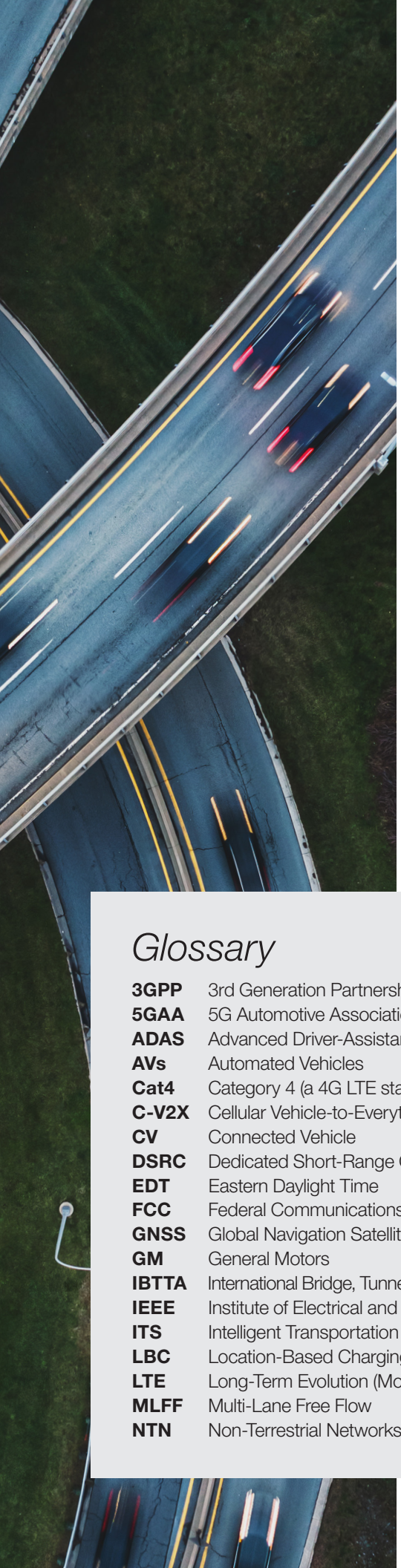
Kapsch TrafficCom

Reimagining Tolling and Transportation Funding Through Connected Vehicle Platforms

kapsch >>>
challenging limits

VOLKSWAGEN GROUP
OF AMERICA



Contents

Glossary

3GPP	3rd Generation Partnership Project
5GAA	5G Automotive Association
ADAS	Advanced Driver-Assistance Systems
AVs	Automated Vehicles
Cat4	Category 4 (a 4G LTE standard)
C-V2X	Cellular Vehicle-to-Everything
CV	Connected Vehicle
DSRC	Dedicated Short-Range Communications
EDT	Eastern Daylight Time
FCC	Federal Communications Commission
GNSS	Global Navigation Satellite System
GM	General Motors
IBTTA	International Bridge, Tunnel and Turnpike Association
IEEE	Institute of Electrical and Electronics Engineers
ITS	Intelligent Transportation Systems
LBC	Location-Based Charging
LTE	Long-Term Evolution (Mobile device wireless standard)
MLFF	Multi-Lane Free Flow
NTN	Non-Terrestrial Networks
OEM	Original Equipment Manufacturer
OTA	Over-the-Air
PC5	A direct communication mode in C-V2X
RFID	Radio Frequency Identification
RSU	Roadside Unit
RTK	Real-time Kinematics
RUC	Road User Charging
SAE	Society of Automotive Engineers
TAM	Toll Advertisement Message
TCU	Telematics Control Unit
TMC	Traffic Management Center
CTRMA	Central Texas Regional Mobility Authority
TSP	Transit Signal Priority
TUM	Toll Usage Message
USDOT	United States Department of Transportation
V2N	Vehicle-to-Network
V2X	Vehicle-to-Everything
VMT	Vehicle Miles Traveled
vRSU	Virtual Roadside Unit

Executive Summary

This report highlights the urgent need to harness advanced connected vehicle technologies to evolve tolling, parking, and automotive digital mobility payments in concert with safety and mobility solutions across North America —all while laying the groundwork to futureproof transportation infrastructure funding and provide transparency around the true costs to build and maintain roadways.

Wireless vehicle connectivity, particularly **Cellular Vehicle-to-Everything (C-V2X)**, is central to this transformation. C-V2X enables vehicles, infrastructure, and vulnerable road users to exchange messages via commercial cellular networks and low-latency direct communications operating over dedicated license-free 5.9GHz ITS frequencies.

The public benefits are many and clear: Traffic fatalities exceed the seating capacity of Fenway Park annually (40,901 in 2023), and commuters can lose over 100 hours each year to congestion. C-V2X can mitigate these issues by providing accurate and precise traffic warnings from a richer data source, ultimately enabling split-second collision avoidance even beyond the driver's line of sight. This can bring invaluable insights and cooperative driving capabilities to automated vehicles (AVs).

Beyond safety, C-V2X opens the door to **frictionless payments** for tolls, parking, and other transactions. With nearly all new vehicles equipped with connected vehicle (CV) systems, there's a major opportunity to enhance current tolling transponders and camera-based tolling systems with a data-rich, multi-solution technology. For example, toll agencies report up to 5% toll revenue losses on average due to leakage, and up to 60% of license plate-based tolls of unregistered users go unpaid . V2X-based tolling could chip away at these revenue gaps and increase operational margins.

C-V2X can tolling, reduce leakage, and support Vehicle Miles Traveled (VMT) fee systems. These systems are increasingly vital to the Highway Trust Fund, which currently faces a projected $284 billion shortfall by 2035. U.S. Congress and 14 states have already initiated VMT pilot programs.

Consumers benefit too. C-V2X enables seamless, secure, and standardized payments. Transactions can be displayed on vehicle infotainment screens, and integrated platforms can offer improved and transparent payment experiences.

As C-V2X adoption grows, tolling and parking operators will fall into three main categories:

1. **Innovators** using direct C-V2X for real-time services
2. **Early adopters** leveraging networked communications
3. **Traditionalists** relying on legacy systems

With the 5.9 GHz ITS safety spectrum now available in the U.S. (and soon in Canada), the foundation is set for connected vehicles to catalyze frictionless digital payments. This convergence of connectivity and mobility promises a safer, more efficient, and sustainable transportation ecosystem—reducing congestion, enhancing trip reliability, augmenting AV capabilities, and securing long-term infrastructure funding.

[1] https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813720
[2] https://mobility.tamu.edu/umr/congestion-data/
[3] https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2019/07/toll-benchmarking-study-2019.pdf
[4] https://www.ibtta.org/sites/default/files/2025-05/IBTTA_TRAC_RevFinderResults_FactSheet_Apr2025.pdf
[5] https://enotrans.org/article/highway-trust-fund-revenue-hole-approaches-300b-by-2035/

Technology Readiness

Automakers have integrated cellular technology into vehicles for decades, evolving from 2G to 5G to support telematics services. Since 2014, 4G LTE-enabled in-vehicle Wi-Fi, and more recently, 5G and satellite-based non-terrestrial networks (NTN) have expanded and enhanced vehicle connectivity. Vehicle-to-Everything (V2X) technology has also matured, with V2X now seeing widespread deployment overseas supported by robust roadside infrastructure and OEM adoption across passenger vehicles and commercial fleets. This connectivity enables a variety of impressive use cases and innovative business opportunities.

Regulatory Landscape

U.S. regulatory bodies have paved the way for CV commercialization. The FCC reallocated the 5.9 GHz spectrum, designating 30 MHz for CV use and endorsing C-V2X (3GPP Release 14/15 LTE-V2X) as the standard. A two-year transition period was set to phase out legacy DSRC (IEEE 802.11p) systems. Most agencies have completed this evolution, establishing a stable regulatory framework that boosts industry confidence and supports CV certification and operations.

The Role of Tolling Agencies in Advancing Connected Vehicle Use Cases

Tolling agencies are uniquely positioned to foster the deployment of CV technologies, aligning with their core mission of delivering safe, efficient, and reliable travel experiences. With the integration of roadside sensors, floating car data, and vehicle connectivity, agencies can shift from reactive operations to data-driven traffic management and operations.

The timing is ideal for tolling agencies to help drive this transformation. Early urban implementations of Emergency Vehicle Preemption (EVP) and Transit Signal Priority (TSP) have already demonstrated measurable returns—reducing emergency response times and generating operational cost savings. These successes underscore the value of C-V2X infrastructure in enhancing connected corridor performance.

As the presence of connected and autonomous vehicles grows, tolling agencies must prepare to manage increasingly complex traffic environments. Effective orchestration through Traffic Management Centers (TMCs) is essential to support mixed traffic flows and ensure compatibility with autonomous vehicle operations. Moreover, OEMs are actively seeking scalable, real-world use cases from roadway operators to support CV technology investments in upcoming vehicle models. By enabling these use cases, tolling agencies can play a pivotal role in shaping the future of mobility while reinforcing their value in a rapidly evolving transportation landscape.

OEM Perspective

Connected vehicles are already widespread, though there's a gap between available technology and deployed use cases. Automakers like Audi and GM began offering 4G LTE connectivity in 2014 and have since advanced to 5G V2N (vehicle-to-network), while many others still rely on basic 4G LTE (Cat4) and plan to offer 5G connectivity around 2026–2027 due to network longevity concerns. Audi's Traffic Light Information system—a V2N implementation which provides drivers with traffic light status and predictions—has been deployed across the lineup since 2016, providing key insights for V2X systems. Connectivity is essential for features like Over-the-Air (OTA) updates, especially for ADAS and software-driven systems.

GM pioneered V2X-direct with the 2017 Cadillac CTS, though domestic V2X deployment has lagged due to regulatory and technological shifts. C-V2X offers dual and complementary communication modes—network-based (Uu) and direct (PC5)—augmenting broader use cases beyond line-of-sight sensors (camera, radar, and LiDAR). These capabilities, along with integration into Telematics Control Units (TCUs), make C-V2X a practical and cost-effective solution, leading to its endorsement by the FCC for the 5.9 GHz band.

Connectivity delivers clear value to both OEMs and roadway operators, though success hinges on targeted use cases. V2X-based tolling is emerging as a leading business case, with support from the U.S. Department of Transportation and automakers like Audi. In his confirmation hearing, U.S. Secretary of Transportation Sean Duffy has expressed interest in tolling as a fair method for all vehicles to contribute to sustaining the Highway Trust Fund, offering an alternative to fuel taxes and mileage-based fees.

Infrastructure Technology Perspective

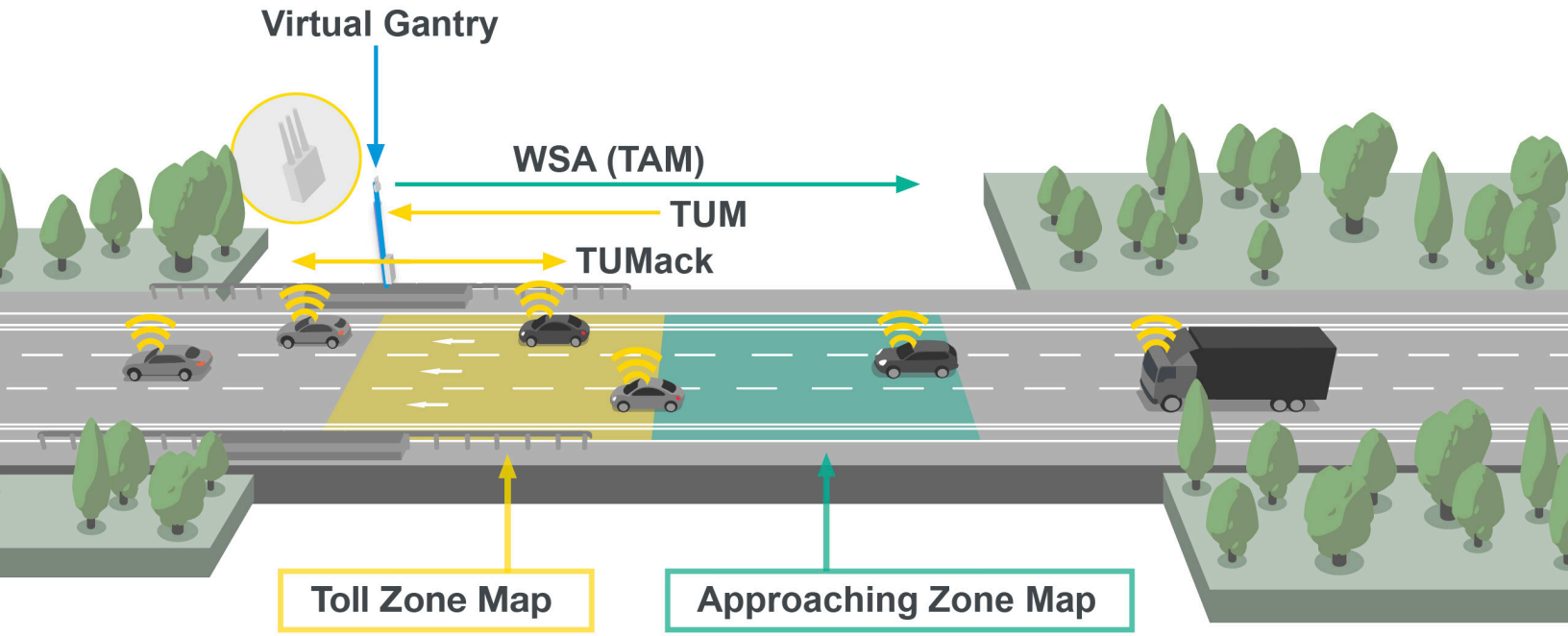
In recent years, C-V2X technology has seen rapid growth across the United States. While many deployments still fall under the category of pilots or proof-of-concept initiatives, the industry is now shifting toward fully operational systems. At the forefront of this transition is Kapsch TrafficCom, a global leader in intelligent transportation systems. Kapsch has played a pivotal role in moving C-V2X from experimental stages to real-world applications within the transportation sector, and was part of the first C-V2X deployment in the U.S. The company's vision extends beyond individual deployments, aiming to build a comprehensive digital infrastructure ecosystem that supports connected mobility on a broad scale.

As a provider of advanced solutions in tolling, traffic management, smart urban mobility, traffic safety, and connected vehicles, Kapsch is helping shape a future where road traffic is safer, more efficient, and more environmentally friendly—both in urban settings and on highways.

SAE J3217 and J3217/R: Enabling Scalable, Interoperable Tolling

North American standards organizations, with support from international bodies, are leading the development of connected vehicle services—especially CV-based tolling. Historically, the focus has been on safety and mobility use cases. Organizations like 3GPP, IEEE, 5GAA, and SAE (in collaboration with USDOT) have established key standards for radio, networking, data frameworks, and application performance to ensure interoperability and reliability. The OmniAir Consortium supports this ecosystem by certifying vendor devices.

Recent industry attention has focused on tolling, with significant progress on SAE J3217 (V2X-based fee collection) and J3217/R (V2X-based road user charging systems), with both specifications nearing publication. These standards introduce a collaborative, future-ready approach to tolling that coexists with other use cases of safety, efficiency, and automated driving augmentation. The process involves broadcasting a Toll Advertisement Message (TAM) to alert vehicles of an upcoming toll zone. Vehicles respond with a Toll Usage Message (TUM) containing relevant details, followed by an optional acknowledgment.



[6] https://www.fischer.senate.gov/public/index.cfm/2025/1/fischer-questions-sean-duffy-at-confirmation-hearing

SAE J3217 (V2X-based fee collection) offers the most direct path to widespread adoption by aligning with current tolling practices while evolving the infrastructure. It enables secure, interoperable tolling transactions using a single roadside unit (RSU) per toll location—significantly reducing infrastructure compared to legacy 915 MHz systems, which may require multiple transceivers per lane.

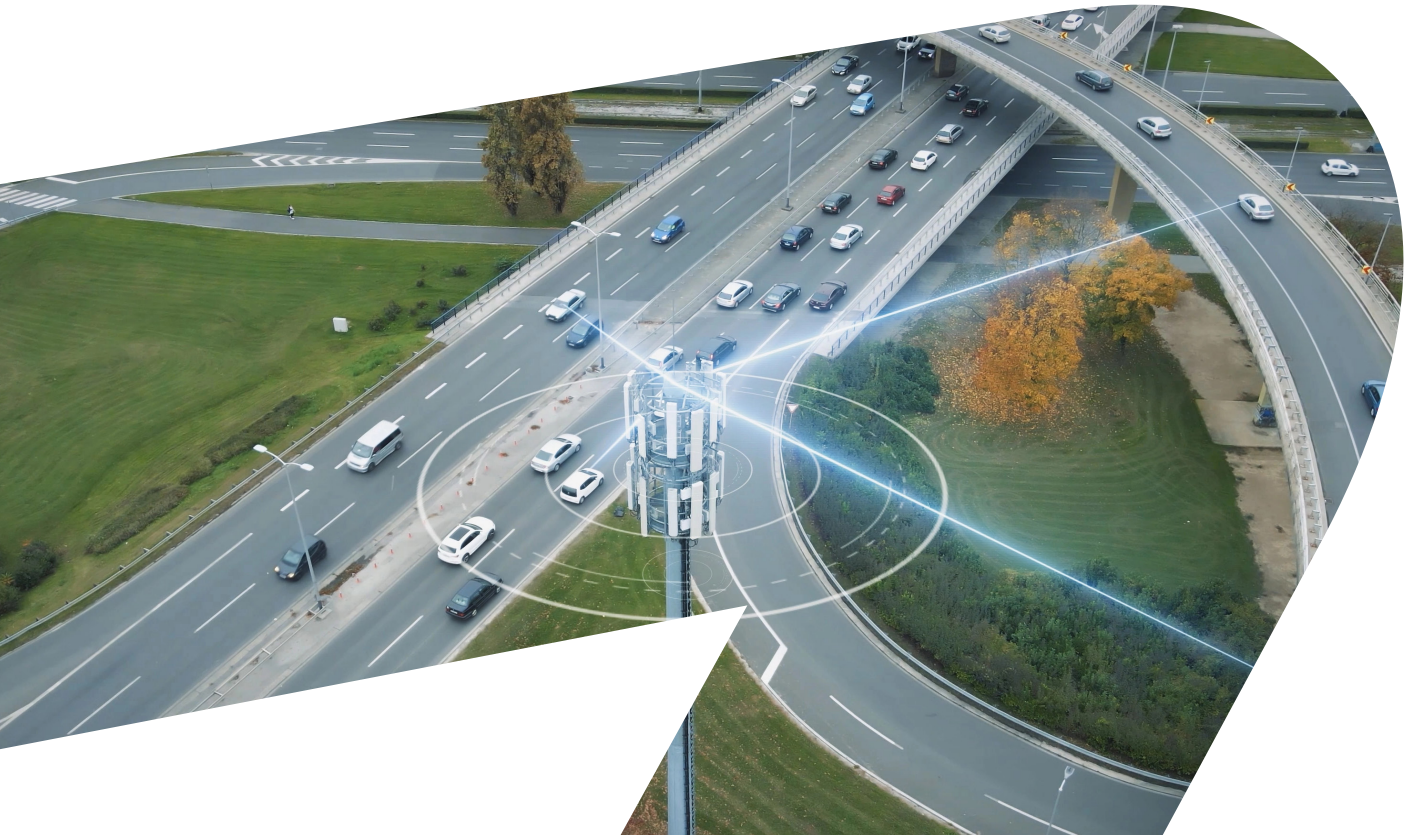
A key advantage of the J3217 approach is access to rich vehicle data and bi-directional communication. For example, managed lane applications can leverage in-vehicle sensors—like seat occupancy—to verify carpool eligibility, enhancing enforcement and efficiency. Another key advantage of following a SAE standards approach is the natural interoperability with safety and mobility use cases defined by SAE which supports seamless convergence between traffic and tolling solutions.

SAE J3217/R (V2X-based road user charging systems) complements J3217 by addressing broader applications such as distance-based charging and congestion pricing. It is particularly well suited for road usage charging (RUC) programs, including VMT fee programs, offering a standards-based framework for scalable, privacy-conscious fee collection.

Technology Fit

- **LTE-V2X (PC5)** may be better in scenarios for direct, real-time, low-latency roadside interactions such as tolling use cases requiring lane-level accuracy in GPS-challenging environments, signal priority, and safety alerts over the 5.9GHZ ITS band.
- **V2N (Uu) + GNSS** (Vehicle-to-network with satellite positioning) is better suited for applications requiring continuous tracking over large areas, such as RUC, and fleet management, utilizing commercial mobile networks.

Beyond tolling, deploying a CV system enables roadway operators to offer integrated traffic services—ushering in a unified corridor experience that combines safety, mobility, and payment capabilities, along with early notification of traffic.



Technology Methodologies and the Evolution of V2X Tolling

The tolling industry is undergoing a significant transformation, driven by the emergence of CV technologies. These advancements offer the potential to evolve toll collection, reduce operational costs, and enhance the overall transportation experience.

Current Systems and Their Limitations

Traditional tolling systems in the U.S. primarily rely on Radio Frequency Identification (RFID) and ISO 6C sticker tags operating in the 915 MHz band. These systems facilitate basic identifier exchanges between transponders and roadside receivers. While effective for toll collection and parking, they are inherently single-purpose, not multi-purpose, and depend on aftermarket devices that are not embedded by OEMs. This limits their integration with broader vehicle systems and future mobility services.

Modern V2X Tolling Technologies

Technologies such as LTE-V2X and V2N enable secure, private, bi-directional communication between vehicles and roadside infrastructure. These systems support a wide range of use cases, such as enhancing high occupancy tolling with a richer data set, and traffic services. LTE-V2X offers a communication range of up to 1km without obstruction—far exceeding the sub-100ft range of legacy RFID systems—and can support multiple applications through a single RSU, significantly reducing infrastructure and operational costs.

Key Technical Considerations

- **Latency** is critical for infrastructure-based tolling, where accurate vehicle-to-gantry association is essential for transaction integrity.
- **GNSS accuracy** becomes vital in managed lane scenarios, where precise lane-level differentiation is required, such as distinguishing between general-purpose and express lanes separated by minimal physical barriers.

Feature	Current Systems	Networked C-V2X	Direct C-V2X
Spectrum	Licensed (free) 900 MHz	Cellular (e.g., 4G/5G)	Licensed (free) 5.9GHz ITS
Latency	Near real-time	Medium	Near real-time for in-vehicle feedback
Accuracy	Lane level	Lane level (in good conditions)	Lane level (with RSU augmentation)
Coverage	Discrete coverage	Nationwide	Line-of-sight and beyond with RSUs
Infrastructure Needs	Heavy	Light	Light
Standardized	Varied by region	Yes (if SAE J3217)	Yes

Table 1: Expanded Technical Considerations

V2N and Location-Based Charging

V2N, often termed as Virtual RSUs (vRSUs), utilize mobile networks and can be implemented via mobile apps or in-vehicle telematics. Using SAE J3217-defined protocols, vRSUs support common tolling use cases even before widespread LTE-V2X deployment.

Location-Based Charging (LBC) represents a fully cellular approach to RUC, maintaining continuous connectivity through mobile or embedded devices. The application of GNSS, like vRSU (V2N), depends on GNSS precision in certain scenarios. However, these systems have already demonstrated scalability for state- and nationwide deployments, as evidenced by operational implementations overseas. Volkswagen is evaluating a V2N based approach.

Toward a Coexistence Model

There is no single definitive solution for V2X tolling or further convergence with traffic use cases. Instead, a phased and interoperable approach is likely—evolving from current RFID systems to V2X-based tolling through V2N/vRSU, LTE-V2X, and LBC. This evolution must address business rules, reciprocity, account management, and technical constraints. Certain use cases, such as vulnerable road user safety, are best served by low latency and high positional accuracy, achievable only through direct LTE-V2X communication (PC5). Others can be addressed with vRSUs. V2X Tolling will need the three methods as explained in this paper and further expands a pathway for RUC. V2N growth with 5G edge computing holds promise as real-time kinematics (RTK) improves accuracy, but it is not without performance challenges in dense urban environments, weather-related impacts, and dependency on operators for growing and managing a consistent nationwide footprint. As LTE-V2X deployment grows in parallel, it is likely to offer a more reliable longer-term solution for V2X-based tolling use cases requiring lane-level accuracy such as express toll lanes adjacent to general purpose lanes.

The Broader Evolution of Tolling

The U.S. tolling landscape is shifting from traditional heavy physical infrastructure-based systems to frictionless digital models which support existing Multi-Lane Free Flow (MLFF) and managed lane use cases. Looking ahead, LBC and RUC are gaining traction as sustainable funding mechanisms, especially in light of declining revenues in the Highway Trust Fund. Adoption, however, will depend on political support and public acceptance.

Internationally, congestion pricing and carbon-free zones —already implemented in cities like London and Stockholm—are beginning to influence U.S. consideration. These systems have demonstrated measurable benefits, including reduced congestion, lower emissions, improved safety, and increased municipal revenue. A V2X approach may further enhance these urban-focused use cases with similar benefits described for tolling in general.

Economic Imperative

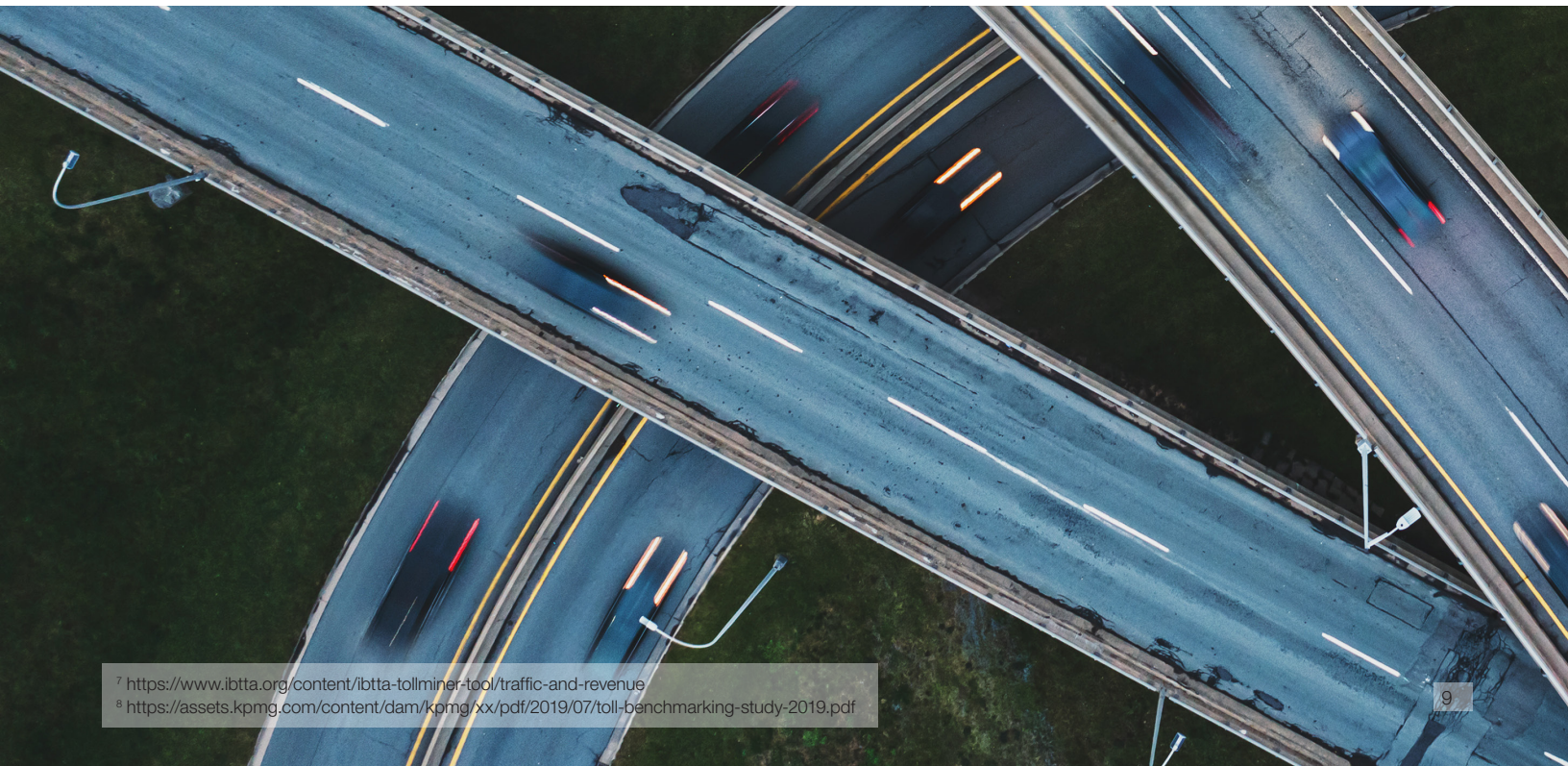
In 2023, the U.S. tolling industry generated over $23 billion in revenue across 317 agencies, processing 9.6 billion vehicle trips according to the International Bridge, Tunnel & Turnpike Association (IBTTA). Despite this, operational costs remain high—averaging around 15% —due to infrastructure, enforcement, and back-office processing. CV technology offers a compelling opportunity to reduce these costs through automation, improved data accuracy, and streamlined enforcement.

Why V2X Tolling Makes Sense Now

V2X tolling presents a scalable and future-ready evolution of legacy systems. Key advantages include:

- **Reduced Infrastructure Costs:** A single LTE-V2X RSU can cover an entire toll zone, eliminating the need for multiple in-lane sensors.
- **Improved Collection Efficiency:** Enhanced vehicle identification reduces reliance on license plate recognition and manual processing.
- **Expanded Payment Flexibility:** Supports frictionless digital payment platforms.
- **Enhanced User Experience:** Consolidates traffic and tolling information and alerts into a single, comprehensive user experience.
- **Automotive Readiness:** Works with equipment already installed or on the roadmap for OEMs.
- **Broader Use Case Support:** The same infrastructure can be leveraged for safety, mobility, and automated vehicle applications, maximizing return on investment.

The transition to V2X tolling is not a matter of if, but when. A methodical, standards-based evolution is already underway—one that balances technical feasibility, infrastructure investment, and policy readiness. By embracing this shift, the tolling community can unlock new efficiencies, improve user experience, and build a more sustainable and intelligent transportation system.



[7] https://www.ibtta.org/content/ibtta-tollminer-tool/traffic-and-revenue
[8] https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2019/07/toll-benchmarking-study-2019.pdf

Digital Payments in the Connected Vehicle Ecosystem

CV technology presents a significant opportunity to modernize digital payments across transportation, offering mutual benefits for both OEMs and roadway operators. These capabilities also enhance convenience and trust for end users through secure, seamless transactions.

While digital payments have rapidly advanced in other industries, transportation-specific solutions are still emerging. CV platforms, built on secure, private, and reliable communication protocols, provide a strong foundation for scalable, multi-service payment offerings.

Tolling is a natural starting point for CV-enabled payments, though the potential extends far beyond. Services such as parking, fuel/charging purchases, and other mobility-related transactions can be integrated into the CV ecosystem, enabling safe, efficient, and user-friendly payment experiences. As the transportation sector evolves, CV technology will serve as a critical front-end interface for the broader digital payment infrastructure.

Built-in Value Beyond Tolling

CV services are designed for flexibility, modularity and scalability for urban and highway use cases. Hardware and software solutions may be deployed as standalone offerings or integrated into broader mobility ecosystems. The CV services platform delivers cohesive, consolidated, and modular services, enhancing safety, mobility, and sustainability, while allowing authorities to expand capabilities as needs evolve.

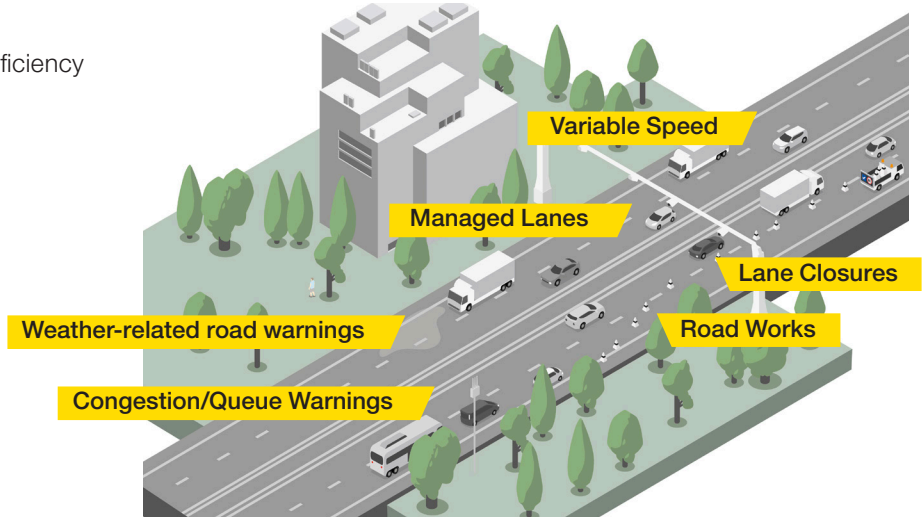
CV services build upon traditional solutions by introducing advanced digital services, including mobility hubs, and corridor supervision and orchestration. By digitizing transport corridors, we enable a new era of proactive safety and connected services, ensuring smarter, more efficient mobility for the future.

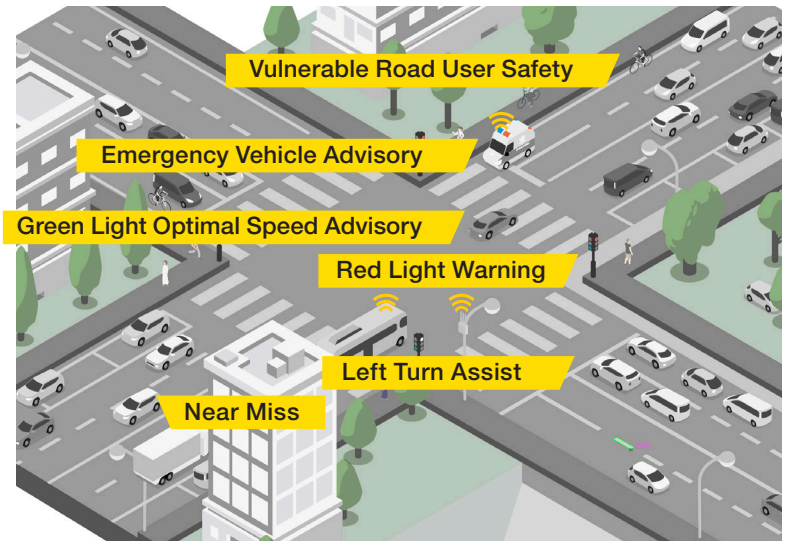
Connected Highway:

Traffic mobility insights which may impact the efficiency of travel within highways

Typical use cases include:

- Variable Speed
- Managed Lanes
- Congestion/Queue Warnings
- Weather-related road warnings
- Road Works/Lane Closures
- Road Hazards





Connected Intersection:

Safety awareness and mobility through an intersection or corridor of intersections

Typical use cases include:

- Transit/Freight Priority, Emergency Vehicle Preemption
- Vulnerable Road User Safety
- Left Turn Assist
- Green Light Optimal Speed Advisory
- Emergency Vehicle Advisory
- Near Miss
- Red Light Warning

Evolution in Action

kapsch >>>
challenging limits

Kapsch TrafficCom continues to lead the advancement of connected vehicle tolling, showcasing its enhanced V2X tolling and in-vehicle environment during the 2025 OmniAir Plugfest in Florida. Building on earlier demonstrations with Central Texas Regional Mobility Authority (CTRMA) and the first V2X-based tolling deployment in 2020, Kapsch has introduced a market-ready solution based on the SAE J3217 standard. This latest system features infrastructure-light installation, seamless back-office integration, and full interoperability with existing tolling systems—offering agencies a scalable, cost-effective path to modern mobility.

Designed to comply with industry standards, the solution ensures compatibility across diverse transportation networks while reducing infrastructure and maintenance costs. The system communicates directly with connected vehicles to deliver real-time tolling, pricing, and traffic information, including alerts for roadworks, emergency vehicles, and weather conditions.

Beyond tolling, Kapsch's V2X platform supports a broader vision for connected mobility, enabling dynamic vehicle-to-infrastructure interactions that enhance safety, efficiency, and system-wide responsiveness. As the only provider offering both RFID and V2X-based tolling technologies in the U.S. and globally, Kapsch delivers a complete, future-ready ecosystem supporting both current operations and the evolution toward connected and autonomous transportation.

Kapsch has measured positive feedback and early action taken by drivers when preventing and reacting to queue warnings in highways in actualized field implementations. In project results from Transport Ireland's Network Intelligence and Management System (NIMS), most pilot participants reported V2X improved their decision making, enhanced driving comfort, and helped them avoid congestion. The study also found, given the established link between speed changes from interventions and collision frequency and severity, V2X had the potential to significantly reduce accidents.

VOLKSWAGEN GROUP OF AMERICA

The Volkswagen Group through its Audi brand has been at the forefront of advancements in C-V2X technology globally, including production vehicles deployed in China. In the United States, Audi was one of the first innovators to receive a Federal Communications Commission waiver enabling initial deployments of C-V2X. These proof-of-concept activities involved partner innovators, state departments of transportation, and local agencies, such as school districts to develop C-V2X applications aimed at improving safety for vulnerable road users (VRUs). The initial deployments showed benefits from giving motorists and VRUs alerts to dangerous traffic conditions around them, demonstrating the technology's potential to reduce VRU fatalities, which have increased significantly in the US in recent years.

Audi and its associates found unexpected benefits to C-V2X deployment. Fulton County School District bus administrators found that C-V2X installed in communities provided their school buses with traffic signal priority, which improved route times by more than 13 percent and enhanced fuel economy for the buses by more than 10 percent.

These results along with the financial and consumer convenience opportunities expected from C-V2X deployment in tolling make a compelling case for the expansion of this frontier of intelligent transportation systems.

Conclusion:

Strategic Priorities for the Tolling Community

To advance V2X tolling and foster a competitive, interoperable ecosystem, the tolling community should focus on the following priorities:

1. Validate V2X Technologies at Scale

Continue real-world testing of C-V2X across all tolling use cases to confirm performance against key metrics such as latency, reliability, and accuracy. Current pilots by Kapsch and Audi are laying the groundwork and should be expanded and shared across the industry.

2. Develop a National Interoperability Framework

Technology and standards provide a foundation for achieving nationwide tolling interoperability, though a more unified approach is needed. Industry stakeholders must move beyond baseline SAE specifications to establish a comprehensive framework for communication between toll chargers and toll service providers. This framework should define consistent interface protocols, business rules, and certification pathways to enable open competition, seamless OEM integration, and scalable deployment across diverse tolling environments. A national framework will accelerate V2X adoption by reducing fragmentation and ensuring V2X tolling systems operate reliably across jurisdictions.

3. Build a Nationwide V2X Tolling Ecosystem

Leverage lessons from state-level initiatives, such as Oregon's RUC pilot, to create a coordinated national approach. This includes aligning policy, technology, and business models. IBTTA, in collaboration with automotive associations, can serve as a central convening body to drive this effort.

As Congress prepares the surface transportation reauthorization, explicit support for V2X tolling—through dedicated funding and streamlined approval pathways—would significantly accelerate deployment. Policy harmonization is also critical—requiring a unified regulatory framework supported by model legislation and alignment across federal and state agencies. Public-private collaboration should be formalized through strategic alliances, co-funded initiatives, and a national consortium to coordinate efforts and share best practices.

Finally, consumer education and adoption must be prioritized through awareness campaigns, OEM integration, and incentive programs that highlight the convenience, safety, privacy, and efficiency of V2X tolling. Together, these efforts will create a scalable, interoperable, and future-ready ecosystem.

By embracing V2X for tolling, parking, and future VMT fees, federal and state agencies can safeguard infrastructure funding, reduce administrative waste, and deliver seamless payment experiences. Early action on policy, standards, and pilots will position the U.S. as a global leader in connected-vehicle payments and smart transportation ecosystems.

4. Embrace the Convergence of Traffic and Tolling Solutions

C-V2X technology acts as a digital nerve center, enabling vehicles to communicate dynamically with their surroundings. This connectivity empowers drivers with real-time alerts about traffic congestion, alternate routes, and hazardous weather conditions, significantly enhancing safety and travel efficiency. Beyond passenger vehicles, C-V2X also supports critical applications in freight logistics, emergency response, and public transportation, contributing to a truly interconnected transportation ecosystem.

C-V2X is at the heart of traffic and tolling convergence, creating a comprehensive and collaborative ecosystem in which a single technology may offer a suite of solutions. Traffic and tolling have long stood separate and singularly focused. With C-V2X, a transportation ecosystem can now provide mutually beneficial solutions to all actors engaged within the environment whether for safety, mobility, or tolling.

Kapsch TrafficCom

Kapsch TrafficCom is a globally renowned provider of transportation solutions for sustainable mobility with successful projects in more than 50 countries. Innovative solutions in the areas of tolling and traffic management contribute to a healthy world without congestion.

With one-stop-shop solutions, the company covers the entire value chain of customers, from components to design and implementation to the operation of systems.

Kapsch TrafficCom, headquartered in Vienna, has subsidiaries and branches in more than 25 countries and is listed in the Prime Market segment of the Vienna Stock Exchange (ticker symbol: KTCG). In its 2024/25 financial year, more than 3,000 employees generated revenues of EUR 530 million.

>>> www.kapsch.net

Audi of America

At Audi of America, we are committed to responsible, sustainable growth through transformation. In 2024, Audi kicked off the largest product launch cadence in brand history, including all-new vehicle platforms – Premium Platform Electric and Premium Platform Combustion – offering the best in ICE and BEV. In 2024, Audi sold 196,576 vehicles in the U.S. Among those deliveries, Audi achieved record Audi Sport sales and had a record-breaking year in after sales.

Learn more about Audi of America at **audiusa.com** or **media.audiusa.com**

Contributors

Bernard Lamy, ***Kapsch TrafficCom***
Steve Sprouffske, ***Kapsch TrafficCom***
Brad Stertz, ***Audi-Volkswagen Group***
Anupam Malhotra, ***Audi-Volkswagen Group***

Kapsch TrafficCom AG | Am Europlatz 2 | 1120 Vienna | Austria | P +43 50 811 0 | F +43 50 811 2109 | ktc.info@kapsch.net | www.kapsch.net | www.kapschtraffic.com