Managing Congestion

A Guide to Influencing Traveler Behavior, Reducing Emissions and Increasing Revenues with Road User Charging

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GETTING STARTED

Successful congestion management requires a combination of Intelligent Transportation System (ITS) and Electronic Toll Collection (ETC) technologies, services, tools and policies tailored to a designated area or region. This white paper focuses on the role of Road User Charging to support congestion management policy. Key decision makers have difficult choices to make balancing shrinking revenues with the increasing cost of operations. The strategies presented throughout represent our best faith effort to identify and expand on international best practices for a holistic approach to congestion management. As a global leader in designing and delivering transport solutions, our team regularly consults with our vast network of clients and vendor partners worldwide, conducts market research on emerging trends and documents our lessons learned across our engagements in delivering various projects.

Today we see a confluence of ITS tools and ETC technologies to enable congestion management systems that can sense, adapt and influence driver behavior so that planners and policy makers can optimize their transportation networks. Given the current changes in traveler behavior due to the pandemic, there is increasing interest in road user charging schemes as a new approach to manage and finance regional transport systems. We wanted to take this time to share emerging trends, strategies, and specific solutions developed by our team of experts to support the needs of the industry.

As road user charging definitions often vary, the definition to be understood for this document is as follows: Road User Charging (RUC) is the generic term that refers to direct charges levied for the use of roads, including road tolls, distance or time-based fees, congestion charges and charges designed to discourage use of certain classes of vehicle, fuel sources or more polluting vehicles. These charges may be used for revenue generation, usually for road infrastructure financing or as a transportation demand management tool, to reduce peak hour travel and the associated traffic congestion or other social and environmental strategies associated with road travel, such as air pollution, visual intrusion, noise and road traffic collisions.

Forms of road user charging include tolls (usually a fixed fee), congestion pricing (generally a variable fee depending on location, time of day and levels of congestion), cordon fees (typically less dynamic in price, but also charges a driver for entering into a congested area) or distance-based fees (based on vehicle miles traveled). Each of these categories have varying methods of implementation and the technologies utilized will likely vary as well, depending on policy goals, infrastructure and other factors.

For quick reference, we have added solutions icons to each section to assist the reader in linking challenges to Cubic solutions. Below is our solutions icon key.

![Cubic Road User Charging with Urban Mobility Back Office](image1)
![Cubic Transport Management Platform](image2)
![Cubic Trafficware](image3)
![Cubic GRIDSMART](image4)
![Cubic Data Management Analytics Platform](image5)
![Cubic Services](image6)
As the world’s population continues to grow and increasingly settle in urbanized areas, infrastructure is strained and becomes expensive to maintain, much less improve due to limited physical and financial resources. Cities must balance the competing needs of expanding road networks to mitigate traffic, commercial development to increase employment, and/or prioritize housing to meet growth needs. When approaching this balancing act, cities need to consider the far-reaching implications of congestion, including impacts on health and productivity, but can also underpin the success of new residential and commercial developments by making them more attractive places to live and work. These choices are not mutually exclusive if modern management strategies are enabled.

In 2019 alone, the cost of congestion in America totaled $88 billion dollars of unseen revenues\(^1\). Revenue losses are not limited to the movement of people and include losses in economic productivity due to inefficient movement of freight and goods. While traffic congestion strains economies, it also disproportionately impacts the health of our vulnerable communities and the environment. Poor air quality causes over 40,000 early deaths in the United Kingdom alone and the cost of these health impacts is estimated at £20 billion every year\(^2\).

While there is a foundational understanding in government, research and advocacy groups that congestion has multiple negative impacts on society, there are not necessarily cohesive policies established on how to deal with these challenges. As user behaviors shift, the funding mechanisms that support those activities must be more flexible than they are today. Taxes collected for surface transportation are often not adequate to cover operation and maintenance, let alone improvements. Traditional funding strategies such as parking charges and gas taxes, are becoming ineffective due to increased usage of shared mobility options and fuel-efficient electric vehicles, both of which are positive moves towards sustainability, but lack accountability in current policy funding mechanisms.

Cities are faced with unprecedented challenges on how to fund critical, new and existing programs and infrastructure. Road user charging policies and programs offer a potential solution to both crises by creating new revenue streams to fund critical infrastructure and mobility options and managing congestion in a way that accounts for the total cost of the system.

Key challenges for cities to consider when creating a road user charging strategy:

- Structuring policy around equity and inclusion
- Eliciting public buy-in and communicating value to citizens
- Adapting to changes in the ecosystem
- Incorporating all mobility choices and breaking down silos
- Optimizing the network through informed, holistic options for users
- Accessing actionable data and insights to monitor progress
- Establishing transparency and accountability in decision making and oversight
- Continually improving the system as it grows

This whitepaper provides examples of common challenges, solution requirements, and a description of the ideal tools available in the market to facilitate implementation of a new operational model that uses road user charging to manage congestion, increase economic productivity, improve health outcomes and create sustainable funding streams to enable the mobility networks of the future.

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\(^2\) [https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution](https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution)
STRUCTURING POLICY: Taxes, Fees, and Everything In Between

While this white paper is primarily focused on congestion management challenges and how technology solutions and related services can solve for them, we would be remiss if we didn’t touch on a cornerstone for implementing a road user charging program – Policy. A recent white paper published by the Eno Foundation outlines the stages of a policy development process that would be valuable to any authority embarking on the road user charging journey. Although the Foundation’s paper was written for a U.S. audience, there are clear parallels to the global transportation industry. Many regional governing bodies such as New York Metropolitan’s Regional Plan Association have developed specific guidelines for implementing these systems to include “specific objectives and metrics to meet traffic, environmental and health goals to ensure the benefits are equitably shared.”

Ideally, policy decisions begin with the most vulnerable in mind to ensure historical inequalities and socioeconomic divides are corrected and accounted for. This process would include robust public engagement to understand the needs of a variety of users from their own perspective. Following existing regulations for discount programs may be a good start, but may not meet the unique differences in program requirements. For instance, discount programs for transit passes are well established in state and local code, however the user base may be vastly different than those affected by a road user fee. For this reason, ensuring equity and justice in congestion management policy requires a dedicated dialogue with the affected stakeholder groups. Starting these discussions early in the process can help ease tensions and gain community acceptance reducing delays in project execution.

As cities and regions address budget shortfalls, policies to introduce new taxes and fees will no doubt be an important part of the discussion. When implemented, tolls and other forms of road user charging are often considered a tax and as transport industry leaders point out, a key challenge for many regions in implementing a congestion management program is the sense of tax fatigue among residents. Increasing taxes on gas, promotion of tolling and priced facilities, vehicle miles tax, road user charging, parking charges, etc. are all strategies to introduce new funding methods. The politics involved in each choice tells us that one size does not fit all. Addressing this challenge requires creating active stakeholder engagement and public education from problem identification through to execution with clear accountability and measures.

HNTB’s America THINKS survey, Funding Congestion Solutions — 2018

MULTIFACETED APPROACH TO CHARGES: LONDON

In addition to a congestion charge, London also implemented low emission zones and ultra low emission zones to charge users in direct relation to the travel choices they make.

TO GET THE TRANSPORTATION SYSTEM THEY NEED AND WANT, AMERICANS ARE WILLING TO PAY HIGHER TAXES AND TOLLS FOR INFRASTRUCTURE IMPROVEMENTS.

73% Willing to pay more
46% Tolls and other fees paid only by the users of those specific roads, bridges or tunnels
27% Higher taxes paid by everyone
27% Not willing to pay anything more

73% Willing to pay more
Establishing Traveler Trust

Authorities face intensifying challenges as the number of journeys continue to increase and customers demand an efficient, reliable and intuitive user experience. With the wave of digital information impacting every facet of our lives, transport systems should be designed to accommodate and adapt to the way people live and interact with their world. Citizen acceptance for road user charging requires a solution that is trusted, effortless and reliable.

As travelers are already being asked to pay for road usage, they demand that the solution makes it easy to access information, causes few exceptions and ensures that issues are efficiently resolved with few frustrations or investment of time. This will require decisions that take into account how the system as a whole responds to individual actions.

**CUSTOMER FOCUSED**

**Challenges:**
Public acceptance.

**Solution Needs:**
Intuitive and simple customer service experiences; minimize personal time and effort demands on users, eliminate barriers, confusion and errors to build trust and reduce confusion, maintain high standards for satisfaction; low demand on customer service.

**Solution Benefits**

**PROVIDE FLEXIBLE PAYMENT OPTIONS:** Customers expect flexibility and a feature-rich experience that links payments to a specific user account, similar to most other consumer experiences outside of transportation. Public transportation agencies are implementing dynamic account-based systems delivering this flexibility, allowing customers to pay efficiently using their preferred payment method; be it contactless media, mobile wallets or cash. For roadway managers targeting similar goals, a unified customer experience may be the simplest way to achieve success by leveraging a common back office that can integrate tolling and transit accounts, while reducing operational costs. For users, it means a single place to maintain and manage payment options, simplifying their experience.

**SUPPORT A RANGE OF CUSTOMER SERVICE CHANNELS:** It is important to ensure both reach and simplicity in communication so customers understand charges and can pay easily in order to minimize the cost of service and leakage. A system works best if it is available in their preferred method of interaction – and for a variety of user needs and abilities. Some customers may prefer in-person support, while many others may self-service through web or mobile apps.

**BE TRANSPARENT:** While legacy systems rely on reactive customer engagement processes, a preferable solution allows proactive, real-time engagement between customers and transportation providers through a mobile app. Proactively notifying users of payment issues increases collection rates and increases customer satisfaction. By linking congestion pricing, tolling, parking, traffic management, and public transit data, cities can better inform customers of real-time travel conditions, providing customers multiple options as they plan and undertake their door-to-door journeys.
Adapting to Changes

An efficient transportation system needs to adapt as the environment, network and users evolve over time. We are in a period of unprecedented change in how people and goods move through out cities. It is critical that the investments Authorities make today are ready to handle the network ten years down the road. Tolling authorities won’t be the only ones that need to integrate into this system; incorporating other mobility solutions develops a synergy that your customers will benefit from. As cities grow and new facilities are introduced, systems will need to be flexible and scalable.

As a mobility leader, authorities will need to position investments to adapt and accommodate new technologies as the industries continue to change. The emergence of disruptive technologies such as connected and autonomous vehicles, rapidly changing mobile apps, and the Internet of Things (IoT) means that authorities need to make sustainable technology decisions today, that allow them to adapt to a rapidly changing environment. Travelers will expect more as technology evolves and authorities can implement platforms now that will prepare them to adapt quickly.

BUILT-IN ADAPDABILITY

Challenges:
Adaptive to shifting travel patterns; future travel options such as Autonomous Vehicles; integrating with other services such as personal mobility and deliveries including freight; preparing for changes to security and payment card industry standards.

Solution Needs:
Plays nicely with other services; is Mobility as a Service (MaaS) and Mobility on Demand (MOD) compatible; unlimited scaling; open architecture; flexible and configurable business rules; promotes resiliency.

Solution Benefits

OPEN ARCHITECTURE: Open architecture provides authorities the flexibility to capitalize on changing technologies, falling costs, and gives them the freedom to adjust individual software and hardware components. The Cubic RUC solution embeds specific deployment requirements within business processes rather than compiled code, resulting in low-cost, future-proof deployments that are both horizontally and vertically scalable. The platform can be adapted to integrate with new technologies, operational and payment models and can easily scale to add capacity, facilities and agencies, including multi-authority support and multimodal transportation.

PLAYS NICELY WITH OTHERS: Authorities can benefit from a scalable platform that has interoperable compatibility with 3rd party devices, ensuring the system is utilizing current technologies on the market and not reliant on a specific manufacturer. In order to maximize current investments, it is ideal to leverage existing infrastructure, tech or systems. Cubic offers a system that is designed to support commercial, off-the-shelf product integration saving time and money when authorities need to make adjustments.

ENHANCED PRIVACY, SECURITY AND DATA STORAGE: International privacy standards such as the European Union’s General Data Protection Regulation (GDPR) continue to define how user information can be shared, accessed, stored, and deleted. Technologies used to manage road user charging must adhere to security and privacy standards for data that is stored, accessed and utilized to minimize vulnerabilities in sensitive data.
Think About Mobility – Not Just Cars

Road user charging is one tool in a mobility toolbox, and it should engage with other mobility tools. With an integrated system, authorities can integrate with ride-share, parking, micro mobility and public transit options available in the region. Interoperability, or the sharing of the back-office system and infrastructure, will correlate with lower total transaction costs and higher efficiency. In order to serve more customers and more of their mobility needs, authorities can look for opportunities for integration with overlapping modes or neighboring services that might feed into the network. As a user, an all-in-one mobility management interface would make planning travel easy and convenient.

MULTIMODAL CAPABILITIES

Challenges:
Reducing bus delays; managing parking; many users are multimodal; understand, inform and influence multimodal riders’ decisions; encourage sustainable modes.

Solution Needs:
Integration with other modes; customizable user interface with filters and preferences; supports multiple purses; has proven accounting and financial clearinghouse capabilities to support interoperating agreements.

Solution Benefits

SEAMLESS PAYMENTS – REGARDLESS OF TRAVEL MODE: Provide a unified view of travel and accommodate a single interface for mobility booking and payments. The system accommodates multiple payment types and seamlessly manages all the financial transaction balancing.

CREATE AN INTEGRATED TRAVEL EXPERIENCE: An account-based platform offers a solution with the foundational elements necessary to provide both new payment methods and mechanisms for enabling regional interoperability between agencies. It also provides a foundation for multi-modal travel and will make it easier for customers to interact between traditional modes, as well as future modes that will come in the future. In addition, both customers and agencies desire enhanced real-time and user-centric information to analyze service detail and commuting patterns with more sophistication allowing for dynamic, responsive and predictive multi-modal travel planning.

INTEGRATED CUSTOMER SUPPORT: With all modes currently serviced by singular customer service channel, users have their preferred one-stop-shop for travel management whether through the app, online or customer service center. This approach makes it simple and easy for customers to maintain and manage their transport needs in one place. It can drive efficiencies for both the agencies and customers within call centers as the duplication of roles is minimized and removes the need for customers to action multiple calls to manage their transportation queries.
Make Holistic, Informed Decisions

Integrating other road network systems and modes of transportation into a single mobility solution allows synergy and holistic network management. This also creates opportunities to coordinate planned demand against capacity management across different modes; cross elasticity could be estimated and make it easier to encourage or discourage specific choices. As an example, consider a community that is interested in reducing Ozone Action Days. Imagine if a RUC mobility application could push alerts to users that drive and provide an additional discount to travel off-peak, or perhaps issue a credit covering public transport travel that day. Likewise, freight and deliveries could shift to provide prioritized access during non-peak hours or receive dedicated parking in exchange for meeting impact goals. Not only can authorities begin to influence behavior, but also collect valuable information about the network over time. This type of system unleashes incredible potential for managing a transportation network holistically and actively maximizing efficiency and capacity.

COMMON OPERATING PICTURE

Challenges:
Creating a holistic common operating picture that includes multimodal travel, corridor and intersection management.

Solution Needs:
Capability to integrate with other modes; customizable user interface with filters and preferences; ingests data from several navigation tools such as GFTS, SIRI, and Waze.

Solution Benefits

COMPLETE MOBILITY SITUATIONAL AWARENESS: High levels of situational awareness will enable operators to adjust charging rates to help balance the network. For example, increasing the price for specific routes for a specified time to minimize further traffic entering a disrupted area of the network while temporarily reducing prices on routes where operators want traffic to disperse. Artificial Intelligence (AI) can provide predictive traffic loads to allow users to make informed decisions about future travel choices.

INTEGRATION WITH ITS SYSTEMS: From detection to collection, the Cubic Road User Charging platform can be integrated with traffic management platforms and intersection management technologies to create a common operating picture. This enables planned and unplanned incidents to be identified more quickly and managed to conclusion, taking control actions, including adjusting road charges to balance the demand across all modes of the transportation network and disseminating meaningful information about transportation impacts to travelers to inform and influence their journey.

Road User Charging Within a Traffic Management Center

- Change rates in response to accidents or to not penalize people to go through congestion zone if no other options
- Implement dynamic pricing to manage and balance congestion
- Create temporary congestion charging zones to proactively manage traffic coming into a particular area of the city while encouraging alternate routes
- Inform travelers of alternate modes that get them to the same destination
Rich Data, Actionable Insight

Collecting data is easy, interpreting it and turning it into knowledge is much harder. Transportation agencies and authorities collect gigabytes of information from the day-to-day activities of end users. As 5G rolls out, we will have even greater opportunities to collect rich data through vehicle-to-vehicle and vehicle-to-roadside communication systems. Organizing, sharing and utilizing these information rich resources can be overwhelming without the right tools in place. Anonymized, aggregated travel patterns across several modes provides the groundwork to develop cross-elasticities and increase the accuracy of mobility network modeling. Imagine using this information to test pricing scenarios, anticipate traffic volumes, or plan for special events. Effective and secure data collection and management is critical to deliver intelligent mobility.

DATA ANALYTICS & INSIGHTS

Challenges:
Collecting accurate and detailed network usage; dealing with data from many different sources; maintain data security for personal information.

Solution Needs:
Scalable platform that enables the offline and real time ingestion of numerous; large and disparate data sets; cleaning data and transforming it a meaningful way so that it can be combined to drive operational insights and actions.

Solution Benefits

CENTRALIZED DATA FOR INSIGHT INTO CUSTOMERS’ END-TO-END JOURNEYS: Centralized data allows for easy implementation of both data analytics and AI tools that provide insight for urban planning, working toward truly integrated transport and Maas/MOD to enhance customer experience. Anonymized trip information and network status will provide profiles of customer types. As authorities monitor the network, they can also measure responses from travelers to information (e.g. push notification about an accident ahead), price changes, and service alterations.

ACTIONABLE DATA FOR PLANNING THE FUTURE: Internally, authority and agency staff need quality information for day-to-day tasks, such as forecasting ridership and traffic volumes, and for formal operational or capital planning projects. Collection and validation of data can be time consuming and expensive, and limited to a single mode. Imagine the significance of generating accurate, linked multimodal activity – being able to assess user choice and behavior across a network, adjusting services to match customer demand and driving up patronage. Understanding cross-elasticities, modeling user behavior changes, and evaluating improvements will be much easier and more accurate. Analysis of this information will drive new ideas and push transportation planning into a new era of true intermodal network management.

LEVERAGING ITS DATA: Collecting data from vehicles and roadside equipment can help authorities better understand traveler journeys and implement impactful policies. Through our Trafficware and GRIDSMART suite of products, we are able to retrieve and process data from new sources as communications capabilities evolve.
Transparency and Accountability

Access to information is a key form of transparency and allows leaders and their stakeholders to evaluate results and guiding policies. Transport agencies use taxpayer dollars to provide inclusive service to the entire community. As such, the public has an expectation to have access to how these funds are used and the agency has the responsibility to share this information with its constituency. With the availability of modern technology, a focus on providing relevant, easily digestible, organized and timely information is essential to building trust in the community. Transparency helps build user confidence and trust. Many agencies embrace openness and utilize online dynamic dashboards to present results. Road user charging in particular draws scrutiny when there is a lack of accountability.

SHARE WITH STAKEHOLDERS

Challenges:
Developing metrics, measuring and reporting; communicating to the public; improving operations and service and addressing user issues.

Solution Needs:
Analytical interface; supports metrics and key performance indicator (KPI) monitoring; integrates with reporting tools and dashboards; controls access to PII and other sensitive information based on defined roles; straightforward data management that is easy to audit; utilizes standards for open data access and reporting (e.g., APIs).

Solution Benefits

ACCOUNT-BASED SYSTEM: With an account-based system, registered users can access their information across multiple channels including online or by calling the customer service center. Travelers will have control of their account and can set permissions, privacy controls and payment settings. In addition, users can customize minimum balances, notification settings, and default trip planning filters.

CLEAR AND DETAILED BILLING: When authorities provide customers with more travel options, trips and charges could become more complex. An effective system will provide customers with enough detail of their trips and transactions without being messy or confusing. Clear billing, auditable activity statements, and accessible account management support encourage trust and confidence in your system.

PRIORITIZE MEASURING AND REPORTING PROGRESS: As authorities develop core metrics in the planning and implementation stage, it is wise to also draft a schedule for reporting. A system that makes it easy to communicate key measurements and results will add value and ideally gain stakeholder trust. Customers are not the only groups who will want to see reduced congestion, “where the money goes” or how well initiatives are meeting policy targets. Developing clear goals and communicating progress and results clearly and openly keeps the conversation on topic – mobility policy – and reduces chances of project failure. Culturally, this reinforces a responsibility to your stakeholders and strengthens commitments to your goals.
An Intelligent Network that Learns

Combining multiple data sources from transportation agencies creates new opportunities for delivering actionable insights through a common back office. Real-time information can nudge drivers to take another route and incentives can entice them toward shared, active, or other modes instead. With access to rich data for multiple modes and cross-elasticity analysis of anonymized travel behavior, authorities can support dynamic and sophisticated pricing strategies through understanding and influencing their customer’s behaviors across all available modes.

LEVERAGE SMART TECHNOLOGIES

Challenges:
Remaining agile over time; adapting to new travel modes or patterns; improving network flow by affecting user behavior.

Solution Needs:
Utilizes AI; has dynamic relationship controls and can provide incentives to change travel behavior.

Solution Benefits

ARTIFICIAL INTELLIGENCE WORKING BEHIND THE SCENES:
Centralized data allows for easy implementation of both data analytics and AI tools that provide intelligence for urban planning — working toward truly integrated transport and MaaS/MOD to enhance the customer experience.

ACCOUNT BASED SYSTEM THAT PROVIDES ADVICE:
A robust and coordinated account-based system enables authority-specific business rules while laying the groundwork for creating interoperability which functions across transportation modes. This includes features to notify customers in advance that their journey may be disrupted and propose an alternative route or mode — subtly “nudging” customers to minimize congestion on the roads and spread demand to other modes that have available capacity. This is most effective when “pushed” in real-time through a mobile app, but can also be delivered through email, text message or social media notifications, and as cars become more connected this information will be available to be pushed directly to the vehicle.

SUPPORTS REALISTIC JOURNEY PLANNING:
A next-generation system for supporting complex and flexible pricing strategies across integrated city and regional travel modes will go far beyond simple toll pricing and transit fare capabilities. A state-of-the-art account-based environment should include a powerful rules-based trip building and pricing engine that offers flexibility and complexity based on distance, zones, vehicle classifications, duration of presence, and can be expanded to emissions levels, driver class, vehicle class, and other behavioral elements. This capability allows agencies to implement policies that meet their needs, including dynamic pricing, to influence customer behaviors in a more granular, and therefore, fairer way.

LIVE ANALYSIS AND INCIDENT MANAGEMENT:
Provides “intention” data to the authority’s traffic control center, allowing routing policies to be predictively updated, to better manage congestion, especially during unplanned disruption. This knowledge combined with customized notifications can keep all users updated with current network status.

CUBIC’S ACCOUNT-BASED BACK OFFICE CAN LINK TO OTHER ACCOUNT-BASED SYSTEMS IN THE ECOSYSTEM SUCH AS FASTRAK, E-ZPASS AND OTHER REGIONAL TOLLING NETWORKS AND DEPARTMENT OF MOTOR VEHICLE SYSTEMS TO NAME A FEW
CREATING THE CITY OF TOMORROW

As the transportation industry undergoes another phase of transformation, resilient cities will meet these challenges with optimism. We must anticipate the reality and likelihood of continued disruption and take the opportunity to make a difference. The goal is to emerge stronger and prepared for a dynamic world and a better quality of life. Authorities will realize long-term success by implementing a road user charging program that embraces 21st Century mobility technology with strong focus on the customer’s needs. Next-generation transportation networks foster adaptability, expansion, openness, regional interoperability, flexible pricing that promote equity and sustainability, and real-time data for informed decision making. This “City of Tomorrow” is prepared for any number of emergencies including planned impacts such as major sporting events, to unplanned emergencies like natural disasters.

While revenue may be a secondary motivator behind easing congestion and other policy objectives, it is a benefit that can equate to a win-win for cities searching for a reprieve of their ongoing infrastructure funding challenges. However, when citizens incur additional charges for using roadways, there is an elevated expectation set for service. Cubic’s Road User Charging solution was designed to not only meet and exceed the needs of transportation authorities, it leverages over 40 years of experience in delivering fare payment systems with some of the most advanced public agencies in the world, to bring the latest in customer-focused mobility and payment solutions to solve for real transportation problems.

It is important that any potential partner clearly state their capability to provide an open architecture platform and the intention to continue innovating with them throughout the life of the service. Technology moves fast and the public sector must trust that their partner will move fast with them to achieve ongoing excellence. We are proud to say that Cubic is a partner that will support you in co-creating and delivering solutions to meet your challenges of today to deliver the city of tomorrow and beyond.

If you are ready to explore new techniques to solve transportation challenges, please contact us. Proposing, designing and implementing a sophisticated road user charging scheme will be an intense, complex process. It’s best to pick your partners wisely, and instead of retaining a bespoke tolling system supplier, we suggest engaging a mobility specialist who understands:

1. Technology is a tool to inform and execute your policy.
2. Your context and environment are unique.
3. You will be more successful when the relationship is collaborative.

By engaging Cubic, you will have a strategic partner that brings proven experience and innovation to the table. When you begin the visioning process, reach out to Cubic to start a conversation.
Cubic – A Long Term Partner That Delivers

The Cubic Road User Charging solution with Urban Mobility Backoffice is a robust, integrated and customer-focused solution that offers efficient, accurate and low-cost revenue collection. The solution was developed to enhance operations, customer services, and financial security management. With a focus on customer journeys, the solution is designed to create an integrated travel experience with flexible payment options, easy access to real-time information and self-service tools to put the customer in charge. The solution features multi-modal integration, complex pricing models and a single user account for managing all transportation needs.

Cubic's approach is a scalable mobility platform that has a 'plug and play' compatibility with third party devices, ensuring the system is utilizing the best technology on the market and not reliant on a particular manufacturer. A mobile app approach allows for direct and real-time communication with the traveler, more accurate charging mechanisms and linkages to journey planning and demand management. With this data, it is also possible to “nudge” behaviors in response to demand management and provide improved traffic flow and alternative journey solutions, including linkages to public transport and walking. From the user’s perspective, there is a higher level of control and adaptability that makes road user charging personal and not a blanket charge for all.

Customer Case Study

**Customer:** New Hampshire Department of Transportation  
**Agency:** E-ZPass® Tolling Back Office and Customer Service System  
**Timeline:** 2015 - Present

In 2015, Cubic was awarded a 5.5-year contract by NHDOT to transition its E-ZPass® back office and customer service system from Conduent to Cubic, with on-going service delivery. This included delivering back office systems that integrate world-class, enterprise-level applications to support electronic tolling, video tolling, and E-ZPass Group reciprocity for New Hampshire’s tolling system. The NHDOT tolling system has amassed more than 450,000 established customer accounts and processes an average of 8.3 million monthly toll transactions.

The project scope includes financial management, billing, transponder inventory (product) management, financial and operations reporting, interoperability with sister agencies, customer service operations and image review, including a redesigned website and a new mobile app for New Hampshire’s tolling road customers. The scope of this project required significant data migration from the legacy system, interoperability with the E-ZPass Group operators, and integration with existing lane host systems and with third parties such as multiple State DMVs (Departments of Motor Vehicles) and payment channels. Implementation included Cubic designing, testing, installing, and providing maintenance services.
NextCity, Cubic’s vision for city management and integrated traveler payment and information, centers on three core principles: the delivery of an integrated customer experience, one account, and integrated operations and analytics. As the world’s population moves to urban centers, the result is greater traffic congestion, frustrated travelers and lessened productivity. Intelligent and actionable information is the key to ensuring that everything is running as smoothly and efficiently as possible within the travel networks – and will empower travelers to make smarter, more informed decisions based on facts.

NextCity provides a roadmap for a coordinated framework – using legacy and emerging payment methods and information systems to integrate all travel information and payment, customer experience, operations and analytics in the region for all modes of transportation. The NextCity vision is built on a model for real-time data gathered across a transportation network through payments, sensors and other touchpoints, increasing travel efficiencies without losing individual authority flexibility.
SEAMLESS INTEGRATION OF INTELLIGENT TRANSPORTATION SYSTEMS

Cubic’s Intelligent Transport Systems Suite of Products integrates best in class hardware, software, and services to fully address the challenges of congestion management. Road user charging is one tool authorities can leverage to truly understand the movements within a region. A combined offering that leverages an account-based road user wallet connected to the insights that come from traffic management systems is the realization of Cubic’s NextCity vision. This is precisely why we have invested in a suite of solutions that not only manages congestion, but truly optimizes the network so that cities can prosper, and citizens have full view of the impact of their choices. A brief description of each of these products is on the following page.

“AT CUBIC, WE UNDERSTAND THAT EACH PROJECT IS UNIQUE AND THAT THERE IS NO ONE-SIZE-FITS-ALL SOLUTION TO MANAGING TRAFFIC CONGESTION. THAT’S WHY WE’VE CREATED A ROBUST SUITE OF ROADS MANAGEMENT TOOLS THAT ARE OPEN, CONNECTED, AND PROVEN TO HELP YOU MEET YOUR CITY AND REGION’S UNIQUE POLICY GOALS.”

- Jeff Lowinger
President, Cubic Transportation Systems
The Cubic Transport Management Platform (TMP) integrates data from all modes of transportation to deliver improved situational awareness to transportation operators in a common operating picture. TMP provides a rich and robust toolset to Authorities to centrally optimize transportation infrastructure usage in their region, through open standards interfaces and a variety of detection methods. Allowing both automated rules to be applied, as well as streamlining manual intervention in response to real-time situational information. The solution enables planned and unplanned incidents to be identified more quickly and managed to conclusion, taking control actions to balance the load across all modes of the transportation network and disseminating meaningful information about transportation impacts to travelers to inform and influence their journey choice.

Cubic Trafficware provides a suite of integrated tools that enable the optimization of intersections and corridors to ensure that drivers see more green lights. This suite of tools consists of traffic signal controllers to enable the connectivity to the roadside, the algorithms to coordinate intersections and corridors and the technology to deliver information directly into the vehicle. The solution constantly monitors real time flows of traffic at all approaches and dynamically adapts to adjust signal timings to match any fluctuation in traffic volumes, while ensuring that pedestrians and cyclists remain protected and transit and first responders are given priority at intersections to get them to their destinations quickly and on time.

Trafficware’s connected vehicle capability leverages developing advancements in smart city communication to further support safe and efficient travel. As a driver approaches an intersection the solution uses state of the art in-vehicle technology to put the real-time signal status and time to phase change (red or green) of that intersection directly onto the dashboard of their vehicle enabling them to efficiently move through intersections, reducing delay, idling and optimizing their fuel consumption.

The solution can be combined with Cubic’s Transport Management platform to dynamically adjust signal phasing as part of incident response plans in order to accommodate the changes needed to the network to keep traffic moving.

Cubic GRIDSMART provides enhanced detection and classification of vehicles, bikes and pedestrians at intersections to ensure that the algorithms that manage the lights have all the information they need to optimize an intersection and a corridor. It is a first of its kind omnidirectional camera that replaces 4 traditional cameras saving up front and ongoing costs. Not only do we use a single camera to observe traffic flow through an entire intersection, but we also have Vehicle to Intersection (V2I) capability, where VIN numbers can be linked to the customer account, providing a higher certainty of revenue collection than Automatic License Plate Recognition alone.

The Cubic Data Management and Analytics Platform (DMAP) helps authorities understanding the whole network and can provide valuable insights for scheduled planned events (e.g. roadwork) to ensure they can be accommodated within the constraints of the network at that particular time and location. Additionally, the managing authority may identify a level of service issue on the transportation network, typically congestion at peak time. Using a Data Management and Analytics Platform, authorities can identify the customer profiles causing this congestion and derive a “nudge” campaign centering around these specific profiles to ease congestion. Once the campaign is deployed, the analytics tool can monitor and report on the success of the campaign by reporting on the shift in usage specific to specific customer profiles.

To learn more about Cubic’s Road User Charging solution please contact industry expert Marc Delfin at marc.delfin@cubic.com.
CUBIC – A LEADER IN INTELLIGENT TRAVEL SOLUTIONS

At Cubic, we believe our identity is intrinsically linked with our customers, and the people our customers serve. How they get from one place to the next – how that impacts their lives, their fellow travelers and their cities – and how it feels along the way.

That’s why we’re passionate about developing transportation solutions that improve the way we move throughout cities. Innovation is in our culture, and our history speaks for itself. In our 45-year history, we’ve delivered public transport fare collection systems to over 450 operators, including 20 regional back office systems, and traffic and transportation management systems for major cities and regions on four continents.

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