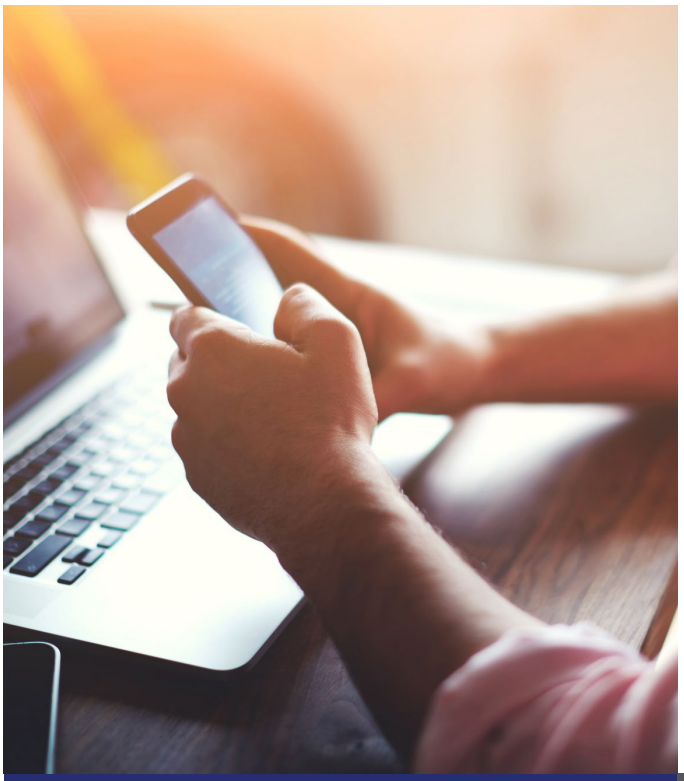


The Eastern Transportation Coalition

Mobile Apps for Toll Payments and Account Management

Tolling agency alternatives in mobile app development and deployment.

Technical Memo in Support of
TVER Working Group

December 11, 2020

Note: The views, thoughts, and opinions expressed in this report do not reflect the opinions of all Coalition member agencies.

Contents

Acronyms

ACH – Automated Clearing House

AET – All Electronic Tolling

API – Application Programming Interface

COVID-19 – Coronavirus Disease 2019

CSC – Customer Service Center

DOT – Department of Transportation

FTE – Florida's Turnpike Enterprise

KTA – Kansas Turnpike Authority

MTC – Mobile Cashless Tolling App

NJTA – New Jersey Turnpike Authority

NCDOT – North Carolina Department of Transportation

NTTA – North Texas Tollway Authority

PTC – Pennsylvania Turnpike Commission

TCA – Transportation Corridor Agencies

TVER – Toll Violation Enforcement and Reciprocity

VDOT – Virginia Department of Transportation

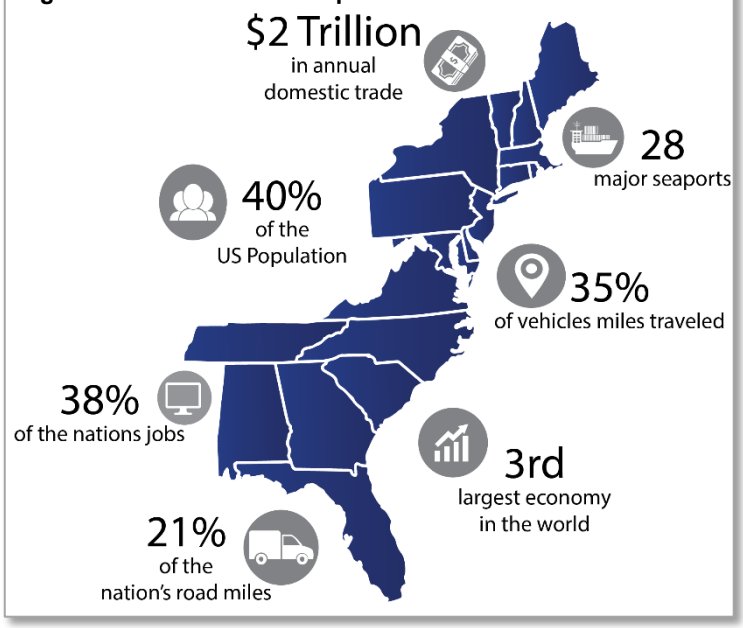
1.0 Introduction

1.1 About the Coalition

The Eastern Transportation Coalition (Coalition) is a partnership of State Departments of Transportation, and related authorities and organizations, working together to accelerate improvements in freight and passenger movement. This collaborative organization, founded in 1993, brings together over 100 transportation agencies representing multiple jurisdictions, modes, disciplines, and programs up and down the Eastern United States.

The Coalition, through its diverse membership, provides member agencies with the opportunity to leverage resources through multi-state/agency operations coordination, planning, and data sharing. The Coalition strives to keep its members at the forefront of industry innovation through participation in transformative technology pilots/research, best practices sharing, and unique professional development opportunities.

Figure 1: The Eastern Transportation Coalition



In 2019, the Coalition established a Toll Violation Enforcement and Reciprocity (TVER) Working Group. The TVER working group meets regularly with member agencies to identify areas of concern or importance for improving tolling operations within and amongst the agencies. As a result of these regular meetings, the Coalition identifies short research and documentation tasks on various subjects to support member agency tolling operations. Since the formation of this group, members have met to discuss reciprocity agreements, strategies to reduce heavy toll violators, and innovations in toll collection methods.

At the TVER working group meeting in April 2020, the attendees focused on answering the question: "if we make it easier for customers to pay, will that ease issues that toll agencies have with collecting outstanding payments?" In this workshop, the Coalition presented the results of the *Toll Payment Methods* white paper which documented various payment methods offered by toll agencies and facility operations with a specific focus on highlighting innovative features or products. As part of this workshop, representatives from five members agencies (Georgia State Road and Tollway Authority, Pennsylvania Turnpike Commission, North Carolina Turnpike Authority, Virginia Department of Transportation, and Florida's Turnpike Enterprise) shared their innovative toll payment experiences with the group.

At the conclusion of the April 2020 meeting, the TVER group established an Action Plan for the coming year. The Plan includes:

1. Advance smart payment options regionally.
    a. Establish a sub-committee of members tasked to work on a payment app that would work in multiple states.
    b. Hold a "Vendor Forum" on smart payment options.
    c. Document case studies on how agencies have implemented innovative payment methods.
2. Working closely with DMVs and AAMVA, continue to collaborate for implementable solutions that overlap between tolling and DMV role.
3. Increase awareness of toll payment options and reduction of toll violations for motorists.

1.2 Purpose and Need

Based on the Action Plan developed in April 2020, the TVER leadership agreed that the most logical next step would be to explore a set of case studies of agencies that have experience specifically with mobile tolling apps. Building off the work presented in April, members identified questions such as:

- What are the benefits of tolling apps?
- How are they being developed?
- How are they being implemented?

As a group, comprised of toll agencies within one region, participants also wondered whether there were opportunities to collaborate on a regional app-based payment system. This paper is the compilation and synthesis of the case study work completed to begin to answer these questions.

1.3 Organization of this Paper

One of the immediate findings that came out of the case studies for this effort was that the mobile toll payment world is quickly evolving. Mobile apps in the tolling industry have been around for some time, but there are new players and new models entering the picture at a rapid pace. The new players and stakeholders are testing a range of business models and starting to understand the benefits and the challenges from all perspectives including the agencies, the customers, and the vendors.

With this comes the reality that among the options studied for this paper there is a wide spectrum of apps and third-party solutions with different features, business models, and agreements with agencies. This paper explores these options through the mobile technology (Section 2), app delivery models (Section 3), and some key questions that agencies should consider when pursuing a mobile toll app implementation (Section 4).

Finally, Sections 5 and 6 discuss the impacts of COVID-19 on agencies, and the key insights and lessons learned from the interviewed agencies. The conclusion wraps up the discussion

with a comparison of the two delivery models and is followed by an Appendix which includes the case studies from each agency interview or information exchange.

1.4 Defining a Mobile App

From a mobile device, a customer can digitally interact with an agency to manage their account or pay a toll either through a responsive website or a mobile app. The subject of this paper is on the development and deployment of mobile apps, but it is important that distinction between the two is understood.

Responsive Website

A responsive website is simply an agency website that is capable of detecting that it is being accessed through a mobile device and then adjust the format, size of links, and other features to be more easily used on a smaller screen with a touch interface. The responsive website is usually much simpler and has fewer features than the full version. A responsive website is broadly accessible to mobile phone users because they do not need to download an app in advance; users simply visit the website on their mobile browser. Responsive websites are also relatively inexpensive to deploy and maintain.

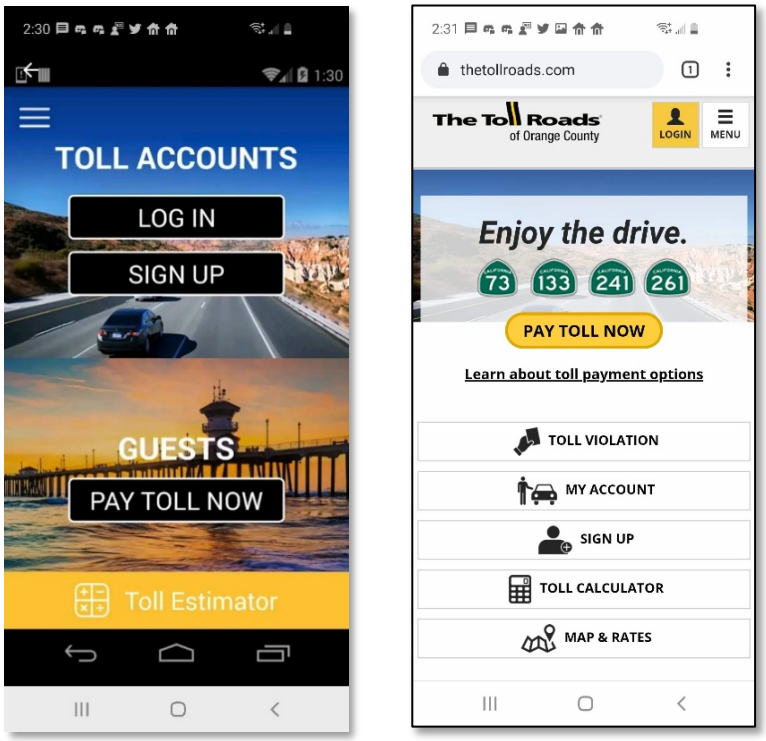
Mobile App

A mobile app is an application that a toll road customer can download to their mobile device from the Apple App Store or Google Play. Once downloaded, a customer can then manage their toll account or pay tolls. Mobile apps are typically user friendly and can access the phone's features such as biometric credentials to offer convenient sign-in without a password, sustained use of location services for providing notification when a user travels on a toll road, and camera utilization for imaging license plates or mobile credit cards for easy entry. Apps also can send push notifications for critical alerts or to notify a user of a low balance account. Mobile apps do require another layer of integration for an agency, complicating the back office and customer service center systems. However, with the general population adopting the same technology throughout other areas of their lives, it can provide a high level of customer convenience.

Comparison

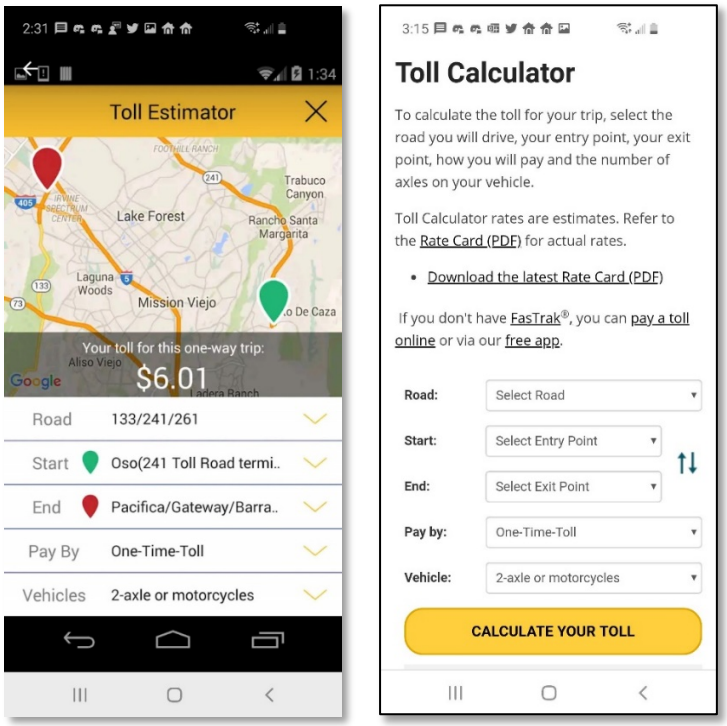
Side-by-side comparisons of TCA's The Toll Roads app and responsive website pages are shown below in Figure 2 and Figure 3. TCA has an excellent responsive website, but it is still clear that the interface on the app provides a better user experience.

Figure 2: Mobile App Vs Responsive Website - Login



Mobile App **Responsive Website**

Figure 3 - Mobile App Vs. Responsive Website - Toll Calculator



Mobile App **Responsive Website**

A comparison of mobile apps to responsive websites is shown in Table 1-1.

Table 1-1. Mobile App and Responsive Website Comparison

Element	Mobile App (Download to Phone)	Responsive Website (Phone Browser)
Access to phone features	Location, camera, mobile wallet, tap to call/email, etc.	None
Cost	Higher Cost	Lower Cost
Interface	More intuitive and allows personalization	Broader audience reach, but can have compatibility issues with large variety of phones and browsers
Communication	Push notification with links to app actions, tap to call/email/pay	Not capable – can use text as alternative, but requires phone number
Ease of Access	Can be linked to phone credentials	Requires username, password, and possibly dual authentication

While there are many similarities between a mobile app and a responsive website, the differences between the two in cost, customer experience, and features are significant.

2.0 Case Study Agencies

The agencies interviewed provided a view into a wide variety of mobile apps and implementation options. Some agencies had previously deployed multiple versions of these apps or were in the process of implementing a new mobile app at the time of the interview. In addition, some agencies have not yet proactively adopted mobile apps or are in the process of setting up their systems to adopt them. Together, these case studies provide an interesting and diverse range of options and approaches. However, this study is not inclusive of all agencies using mobile apps, and only represents the perspectives and experiences of those interviewed. Interviews were conducted with the following agencies:

- Florida's Turnpike Enterprise (FTE)
- Kansas Turnpike Authority (KTA)
- New Jersey Turnpike Authority (NJTA)
- North Carolina Department of Transportation (NCDOT)
- North Texas Tollway Authority (NTTA)
- Pennsylvania Turnpike Commission (PTC)
- Transportation Corridor Agencies (TCA) - Orange County, CA
- Virginia Department of Transportation (VDOT)

A high-level summary of the agency's relationship to mobile apps is provided on the next page. Appendix A contains full summaries of the agency interviews.

2.1 Agency Summary

Florida's Turnpike Enterprise
The Florida Turnpike Enterprise does not currently have any apps or direct relationships with third-party customer service centers that offer apps. However, because of FTE's interoperability relationships with agencies that have partnered with third-party apps, customers are able to pay using apps. Customers can choose from a few of these third-party apps to pay tolls including Paytollo, BancPass, and unaffiliated companies such as Peasy.

Kansas Turnpike Authority
The MyKTAG app was developed by PayIt Solutions, a third-party vendor providing an off-the-shelf solution for managing accounts. The product was pitched as a one-stop-shop for all things related to the department of transportation including tolling, vehicle registration, driver's license management, and potentially others. The tolling authority was to become the first agency within the state to roll-out the app, with others intended to follow. The app was customized to some degree and is branded "MyTAG powered by PayIt." KTA was in the process of procuring a new mobile app at the time of the interview.

New Jersey Turnpike Authority
The NJ E-ZPass Group consists of seven agencies and is working on two apps, one third-party (Payit) and one in-house developed through Conduent (NJ E-ZPass). These two apps are targeted to very different users. Specifically, the Payit app is for use by customers without an E-ZPass who arrive at a toll booth with insufficient funds, while the Conduent app is for use by E-ZPass account holders.

North Carolina Department of Transportation
The NCDOT does not currently have a mobile app. Instead, NCDOT is creating an application programming interface (API) to allow a variety of vendors to offer app-based toll payment services to customers.

North Texas Tollway Authority
The NTTA has a mobile app called TollMate and offers their TollTag users a convenient way to access, update, and make payments on their accounts. In addition, NTTA provides roadside assistance and customer service through the app platform.

Pennsylvania Turnpike Commission
The Pennsylvania Turnpike Commission launched a mobile app in 2019 to allow customers to manage their E-ZPass accounts. PTC also embarked on the process of developing the Mobile Cashless Tolling App (MCT). MCT was to be a new method of paying a toll without an E-ZPass transponder. However, the project was cancelled due to technology challenges and inability to meet established benchmarks.

Transportation Corridor Agencies
The Transportation Corridor Agencies in Orange County, California was one of the first tolling agencies in the country to deploy a mobile app. The app provides customers with the ability to manage their accounts and make payments, including the payment of violations.

Virginia Department of Transportation
Similar to NCDOT, VDOT does not have a mobile app. Instead, the agency has set up an interface to allow mobile app developers to have access to the back-office and a standard agreement has been developed. Mobile app vendors must enter into an agreement with VDOT in order to provide toll payment services to their customers.

3.0 Mobile App Options – Getting them into the Hands of Customers

The agencies interviewed for this paper had broad perspectives on the paths to deploy mobile apps. They ranged significantly in agency involvement, from very active (e.g. they develop and manage the app for customers) to passive (e.g. they provide an interface for vendors). It is also possible for an agency to have no involvement at all, yet their customers can still use an app to make payment. This can occur if an interoperable agency has a relationship with a third-party mobile app provider allowing tolls and payments to travel across the data exchange. Despite these many approaches, there are generally two models to mobile app implementation:

1. **Agency mobile app:** The agency implements a mobile app procured or developed by the toll agency.
2. **Third-party mobile app**: A third-party vendor creates and operates an app that sits between an agency customer service center (CSC) and the toll paying customer.

More detail on each of these approaches are discussed in Section 3.1 and 3.2 respectively. A summary of agency use of these approaches is shown Table 3-1.

Table 3-1: Agency App Status Summary

Agency	Agency App	Third-Party App
Florida's Turnpike Enterprise	No	Yes
Kansas Turnpike Authority	Yes	No
New Jersey Turnpike Authority	Yes	Yes
North Carolina Department of Transportation	No	In Progress
North Texas Tollway Authority	Yes	No
Pennsylvania Turnpike Commission	Yes	No
Transportation Corridor Agencies	Yes	No
Virginia Department of Transportation	No	Yes?

3.1 Agency-Developed Mobile Apps

An agency developed mobile app is one that has been procured or developed by an agency to provide their customers with another way to manage their toll accounts and/or make toll payments. These apps are developed and operated under the control and oversight of the agency, either internally or through a contracted vendor. There are two proactive methods for an agency to pursue an app that will operate as an integrated and branded part of their toll payment system:

- Procure an app which is custom built for an agency
- Procure an app which is off-the-shelf and customized for the agency

Within the procurement of a custom-built app, there is an option to either use an existing back-office vendor or internal developers, or to use a company that focuses on app development. These options are discussed below along with advantages and disadvantages of each.

Agency Procured Custom App Implementation

Building an application from the ground up, or from a framework an app developer already has, allows the agency full access to implement features they feel their customers need in a structure that can most enhance the customer experience. However, this approach also typically takes longer to design and implement and can cost more.

The selection of the provider of the app was a significant factor in the decision-making process of agencies interviewed. Development was either through a company that specializes in mobile app development, the agency's existing back-office vendor, or website developer.

Table 3-2 describes the advantages and disadvantages of each approach as reported by the interviewed agencies.

Table 3-2. Advantages and Disadvantages of Mobile Tolling App Partners

Alternative	Advantage	Disadvantage
Back-Office Vendor or Current Website Developer	• Understands the data and integration needed • Knows the activities the customers need to perform • Has a contractual relationship with the agency • Capability of deep integration with the systems	• App development is typically not a core competency of the firm • Apps tend to be more like a mobile website • Described as the agency having to learn the app development process along with the vendor
Mobile App Developer	• App development is their core competency • More customer centric and streamlined interface • Updates and native apps for each Android and iPhone are seamless	• Developer must learn the needs of the agency • Integration with the systems may not easily allow complex functions • New procurements are typically necessary

As one agency representative summarized the decision-making process:

Use an App Developer if:
"I want the app to work out of the gate and work well for customers but my app decisions [interface layout] are made by the experts."

Use the CSC or Website Vendor if:
"I want to define all of the features and it is so tightly integrated with my system that I can change things as I go."

COSTS

Specific costs of custom mobile apps were not widely available from interviewees. However, the cost models were discussed. Generally, they fell into two categories:

- Up-front development cost and monthly maintenance
- Up-front development cost, cost for each major update/feature change, and no monthly maintenance

A majority of agency procured apps used an up-front cost model with ongoing maintenance.

As an example, TCA has gone through a couple iterations of their app, always paying the cost up front. The original back-office design of The Toll Roads app cost the agency approximately $35,000. A newer version was then designed by a third-party app developer and cost approximately $65,000. Today, the app is mature and on a stable platform and does not require a significant amount of ongoing maintenance. If a major update is needed because of an iPhone or Android system update, the fee is negotiated with the vendor. Small updates are included in the upfront costs of the app.

NTTA, by contrast, noted a significant cost and challenge in deploying app updates to keep current with operating system updates.

SCHEDULE

Most agencies interviewed were not able to provide information on the schedule to deploy custom apps, however they noted how important thorough testing was. TCA was able to report that their custom mobile app took about eight months to develop.

Agency Procured Off-the-Shelf App Implementation

An off-the-shelf app is one developed by an app development company and then lightly customized for the agency and the features desired. The customization is relatively limited to the visual interface. These are produced by mobile app developers and have the same advantages and disadvantages as shown in Table 3-2, excepting the advanced customization and features available with a custom built app.

COSTS

There are two business models for companies providing these off-the-shelf products:

- Up-front cost for the app, customization, and maintenance
- Cost per financial transaction with no up-front or ongoing maintenance costs.

Up Front and Ongoing Maintenance

This is a traditional procurement in which the agency typically has a competitive request for proposals, selects a vendor, and pays for the product and subsequent services. Maintenance costs are usually charged regularly, or as needed, to keep the app up-to-date as mobile operating systems are updated.

Cost per Financial Transaction

This business model is beneficial because it has no up-front or ongoing maintenance cost for the agency. Users are charged a small fee every time they execute a financial transaction, such

as replenishing their account or paying a toll or violation. The fee covers the credit card/debit card processing and the cost and maintenance of the app. The agency does not profit from those transactions. The impact, of course, is to the users.

KTA is relatively unique in how they engaged with PayIt Solutions, who uses this business model. The PayIt Solutions app was pitched to the Department of Transportation (DOT) as a statewide DOT solution to handle transactions from driver's license renewals to tolls. The transaction-based model would work well for those, but not as well for tolling, according to KTA. KTA did not want to charge customers for using the app and to make payments. Instead, KTA negotiated an annual fee estimated to cover the per transaction fee PayIt would have received from customers. This amounted to $100,000 the first year and $50,000 annually thereafter.

KTA's compared using an off-the-shelf app with a transactional business model for tolling to "fitting a square peg in a round hole."

SCHEDULE

Again, agencies were not able to provide much information on the schedule. KTA said that their off-the-shelf mobile app took about nine months to implement.

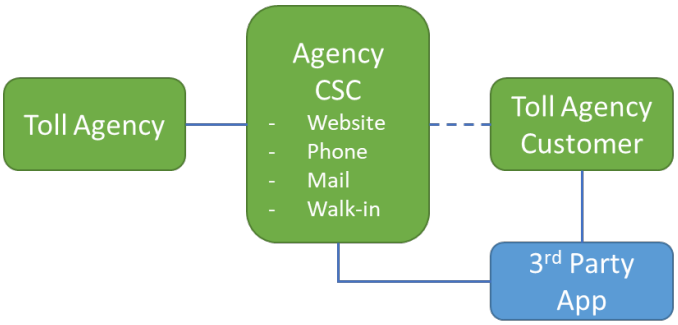
3.2 Third-Party Mobile App

Third-party mobile apps are provided by vendors who want to provide an app as an additional service to toll agency customers. The third-party typically needs to coordinate with the agency to facilitate the exchange of data and payment. In some cases, the product is not publicly endorsed or marketed by the agency, and in others it is co-branded. Often, the interface between the agency and mobile app provider is through an agreed upon data exchange process.

The third-party apps typically provide non-E-ZPass account holders or infrequent toll users another way to pay their tolls. The users register within the app by entering their license plate, email, and payment information. When the user travels on one of the toll roads, the app will either use GPS or data from a toll agency to assign the toll to the customer, then collects payment and remits the toll payment to the tolling agency. The user is charged a fee for the service. An example of this type of service is Paytollo. Paytollo operates in Florida[1] and uses GPS and the vehicle license plate to charge customers and make payment to the agency. Third-party mobile app companies like Paytollo typically do not provide any customer service other than technical support or troubleshooting.

[1] Paytollo does not have an agreement with the Florida Turnpike Enterprise but is operational on their toll roads due to an interoperability agreement with the Georgia State Road and Tollway Authority (SRTA). Note: the project team attempted to include SRTA as one of the case study agencies, but SRTA staff were unavailable for an interview due to internal project commitments.

Figure 4: Third-Party App



The third-party app connection could allow vendors with a wide range of capabilities to plug into the customer service center and provide customers with another way to pay tolls or manage their accounts. They may only offer an app or may provide many other services too. For example, some of these third-parties provide a full service customer service center, intended to augment or supplant an agency's own customer service and account management. The third-party may fill a gap in existing services offered by the agency with additional account types, payment methods, and/or customer interfaces. The full-service component means that the vendor has its own customers and accounts, and everything that is involved with it. The vendor could also bundle the toll payment service with other products or services (e.g. transit tickets, parking, gas, or food/beverage products). The assumption is that this bundling of services allows vendors to establish unique market opportunities and increase profits through revenue services. The toll agency may have no direct contact with the vendor's customer in these cases.

Third-Party App - Implementation

Agencies wishing to take advantage of a third-party app provider would allow these vendors to connect to the agency's toll system to exchange data and post payments. The third-party can typically connect or exchange transaction and payment data with an agency in one of two ways:

- An Application Programming Interface (API)
- A "mega" account or a large account through the agency's customer service center

An API allows a vendor to exchange data with the agency CSC to efficiently receive the toll transactions due from the agency and pay the transaction on behalf of their customer.

A mega account is simply a large commercial account that a third-party has with an agency. Depending on the size of the third-party account, this method may still require the exchange of data files to effectively manage the transaction, transponder numbers, and license plate data.

COSTS

With this business model, the third-party typically charges their customers a fee for using their service. Users are willing to pay this cost because the third-party often provides additional benefits to their customers that a toll agency does not. These may include simple one-time payment accounts that an agency may not support, cash reloading at retail locations, interoperability between agencies that do not have agreements, and more convenient account management. Companies such as BestPass save their customers money by passing along the

discounts afforded by some agencies, which are only available based on high volumes of transactions.

SCHEDULE

These third-party apps can be set up fairly quickly. A mega-account requires the agency to establish an approach for setting up an account and the exchange of information. Typically, a mega-account will require more direct exchange of data than using an agency's website. If that is the case, it can still be accomplished within a few weeks.

On the other hand, once an API is established for a third-party to connect with, implementation may only take the time to establish an agreement between the agency and third-party, and to test the interface. This may be accomplished in a couple of months.

MARKETING

Generally, the marketing method follows the pricing model of the app developer and who paid it. When developed by a third-party and the costs are passed directly to the customer, the developer markets the app itself to encourage adoption and as an alternative or supplement to the agency's CSC. An agency may or may not decide to market or endorse these third-party apps.

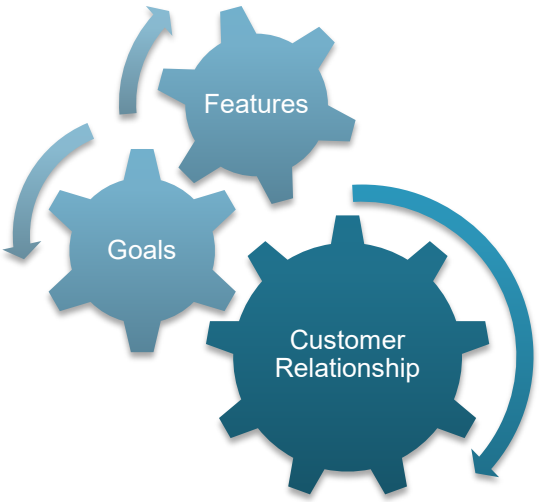
For VDOT, it was decided that the third-party apps that integrate with their back-office would not be specifically endorsed or marketed by the agency. VDOT considers these app providers to be E-ZPass account holders themselves. Some toll agencies that use VDOT for E-ZPass transactions and violation processing do market these alternative options. For example, the Dulles Toll Road facility (operated by a public authority) informs customers that GoToll is an option for payment. The Elizabeth River Crossings (privately owned/operated AET facility) does advertise a third-party app as a way to pay.

4.0 App Consideration Factors

Focusing on three main questions can help an agency determine the best course to mobile payment app development and implementation:

1. What are your goals in adding an app to your customers' options?
2. What relationship do you want with your customers?
3. What features or capabilities are important to you and your customers?

Each of these questions are discussed below along with a comparison of the options available.



4.1 What Are Your Goals?

Agency motivations for implementing a mobile app often include:

- Improving customer satisfaction/experience
- Reducing costs
- Improving payment rates
- Future preparing for the tolling system

Improve Customer Experience and Satisfaction

A customer's experience and satisfaction in interacting with an agency primarily includes the responsiveness of customer service representatives and the level of effort, time to manage an account or make payment, and the number of times a customer ends up in bad standing with a violation or penalty.

A mobile app is intended to streamline a user's experience managing their account. This can include easier sign-in using an apps biometric sign-in features, accessing an account anywhere at any time, and an intuitive interface only requiring a few taps to execute transactions. The customer experience can also be enhanced with push notification to remind customers of payments due or other actions needed, reducing violations or penalties which lower customer satisfaction.

KTA's motivation was to create a one-stop-shop for all customer payments within the Department of Transportation's services, including tolls, driver's license renewal, and vehicle registration renewal.

Reduced Costs

It is expected that a mobile app will reduce costs overall for an agency through reduced interactions with the customer service call center and lower violation rates which are more expensive to process.

An app provides another method for customers to manage their account and make payments, and inherently more convenient with an intuitive interface. Another payment method that is in a user's pocket will likely promote more timely payment of tolls due and more frequent updates to user profile information such as license plate numbers and contact information.

Timely payments, accurate contact information, and reduced contact with representatives in the customer service call center all can reduce transaction costs and likely improve payment rates.

Unfortunately, agencies interviewed did not have conclusive data to show this cost reduction, and instead sited the app adoption rate and transaction volume, concluding that some of those app transactions would have otherwise been with the call center.

Improved Payment Rates

Smartphones are in the hands of 81 percent of American adults and the average person checks their phone every 12 minutes during the day. A key benefit of an app is that it is always

available, and a customer can react immediately as they remember they need to make a payment, receive a push notification, or receive a text message. This is expected to improve payments and reduce violations or penalties a customer may otherwise incur.

Agencies interviewed didn't have data to demonstrate improved payment rates once an app was implemented but do point to the app adoption rate and transaction volume, concluding that some may have otherwise not have been paid.

Future Prepare the Tolling System

Agencies that open their CSC to third-party apps are doing so for a number of reasons. Namely, to lower costs, allow private sector innovation and competition for customers, and to future prepare their system. Agencies acknowledge that they are slower to adapt to changing customer needs and new technologies as compared to industry.

VDOT's and NCDOT's primary goal in connecting with third-parties was to future prepare their system and encourage third-party customer service. Looking to the future, this could allow agencies to operate in a cloud environment without the burdens of owning and operating tolling systems and equipment.

For example, vehicles are now being equipped with vehicle to infrastructure communications, which may allow for alternatives to the transponder or in-vehicle payment. Agencies such as VDOT and NCDOT are creating or using an API to allow these third parties to interface with the toll collection system and collect tolls on the agency's behalf. These agencies could potentially avoid the past approach of buying toll and back-office systems and instead move into a cloud environment which will allow for new business models. These business models may provide more convenience for customers, bunding the toll collection features with others like drive-through restaurant or parking payments.

Comparison

On the next page, Table 4-1 compares the goals across implementation approaches. Because the third-party app services vary widely from a conduit for one-time payments to a full-service CSC, we have separated that category into two columns.

Table 4-1: Comparison of Goals Across Approaches

Goals	Agency App	Third Party	
		App Only	Full-Service
Improved Customer Experience	Depends on current agency customer satisfaction and quality of the third-party services		
Reduce costs	Low	Low	High
Improve payment rates	Likely	Guaranteed Payment*	Guaranteed Payment*
Future prepare the system	Low	If an open API is used it is highly adaptable to vendor innovation	

* Third-parties often will guarantee payment from their customers, but this may vary by company.

4.2 What Customer Relationship Do You Want?

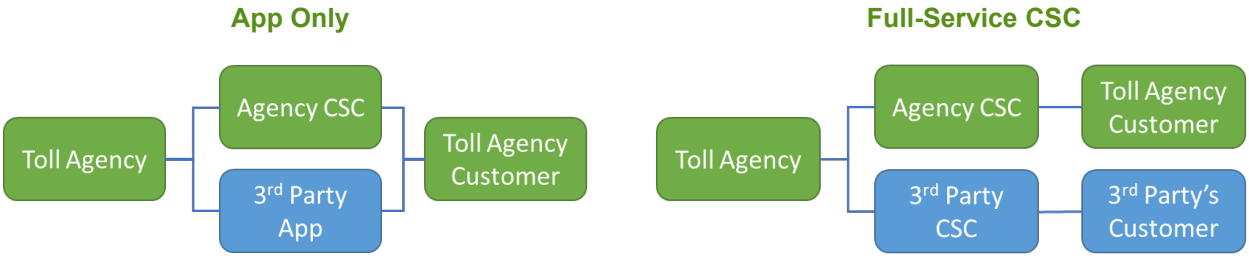
Customer service centers and tolling agency have been one and the same for decades. Whether the CSC is operated by the agency itself or through a procured vendor, the agency has customers with whom they interact including opening, managing, and closing accounts, mailing transponders, invoicing, processing phone calls and mail, and enforcing tolls. The agencies often market their tolling products to encourage the adoption of electronic toll collection accounts and decrease violations. However, this relationship between the agency and customers is changing for some agencies.

An agency's approach to customer service generally falls into three categories:

1) Managing all customer service internally or through a directly managed vendor
2) Allowing third-party entities to provide some CSC services (e.g. an app)
3) Allowing third-party entities to provide a full-service CSC.

Figure 5: Traditional Agency Customer Relationship

Figure 6: 3rd Party Customer Relationship



Agencies can also choose to have a combination of these relationships. The New Jersey CSC offers an app created by their back-office vendor, and a third-party app is also available. Similarly, KTA offers their procured app while also hosting mega-accounts for companies like

BestPass and BancPass. The best approach for an agency is to evaluate each, and combinations of each, to identify which would work best for them. However, agencies should also recognize that they may not have a choice. Interoperability agreements have connected agency back-offices and transactions will flow between agencies regardless of their source or who paid. For example, a driver may use an app that is connected to Georgia's State Road and Tollway Authority to pay for a toll as they drive through Florida.

Comparison

Table 4-2 shows a comparison of the customer relationships for each of the approaches above. These are subjective assessments based on the interviews with the subject agencies.

Table 4-2: Comparison of Customer Relationship Approaches

Customer Relationship Elements	Agency App	Third Party	
		App Only	Full-Service
Direct control over customer relationship	High	Medium	Low
Full access to customer data	High	Varies	Low
Ability to react to customer app feature requests	High	Low	Low
Cost of customer service	High	Low	Low
Agency exposure to enforcement and collections against a customer	High	Varies	Low

4.3 What Features or Capabilities do You Want?

The desired features and capabilities will significantly impact the approach to interacting with a customer through an agency app or third-party. Because an agency will have less control over the features and capabilities implemented by a third-party, those agencies that require specific features may have to encourage the third-parties to do so or implement an agency app. Discussed below are specific mobile app features and customer service capabilities identified in the interviews.

Mobile App Features

Mobile app features offered should tie back to the agency's goals and the customer's needs. The primary features offered within the mobile apps are relatively consistent across agencies, focusing on toll payment and account management and include:

- Opening an account
- Viewing account balances
- Updating payment information
- Updating or adding vehicle information (such as license plates)
- Making a toll payment

Agencies have also identified specific features that align with their unique goals and requests from customers, such as:

- Contact and feedback functions
- Plate image capture
- Toll trip cost calculators
- Roadside assistance requests
- In-App and push notifications
- Custom reports

CONTACT AND FEEDBACK FUNCTIONS

A contact or feedback function is a feature which allows a customer to send a message to the agency to ask a question, provide their opinion on the app functions, or suggest new features. It can also be used for customer service. TCA implemented a feature to allow customers to provide feedback from the app, which was sent to the customer service team via email. Feedback came in the form of suggested features, identified bugs, and customer service inquiries. Some features currently in the app came from this feedback function.

PLATE IMAGE CAPTURE

Mobile apps can take advantage of a phone's features, such as the camera. This may allow for a customer to take a picture of the license plate or use the camera to take information from their credit card without having to type it in. This reduces errors in data entry and ultimately erroneous billing (e.g. a bill is mailed instead of charged to an account because of an incorrect license plate number being entered). The PTC's proposed Mobile Cashless Tolling App included this feature in the requirements and expected to be implemented.

VIOLATION AND INVOICE PAYMENTS

Whether or not an app has the capability to accept violation and invoice payments is largely a function of the account types an agency offers. For example, an agency offering one-time-payment accounts or post-pay accounts will likely accept these types of payments, while an agency that only has pre-paid accounts may not cater to the infrequent violator. NTTA's app includes a link to the agency's website page for violation payments instead of allowing it within the app. On the other hand, TCA's app includes a feature for users to make one-time payments.

TOLL TRIP COST CALCULATORS

Apps can include a calculator into which a user can input a start and end point, and vehicle classification to see the toll amount. It may also include features such as time of day or live rates for variably priced facilities. TCA includes a toll price calculator which features a full map to illustrate the route.

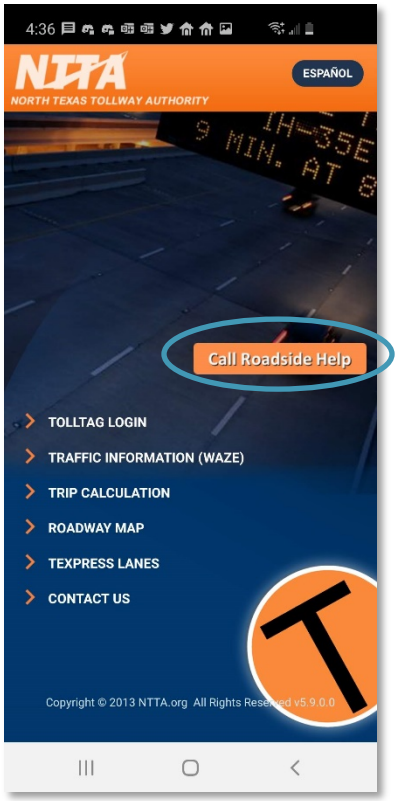
ROADSIDE ASSISTANCE

Another feature which can improve safety is a roadside assistance feature. Within NTTA's TollMate app, roadside assistance is accessed through a prominent button on the app which connects them to #999, the region's safety operations line. Safety operations will then speak with the tolling app user and dispatch troopers and other personnel or resources when necessary. A snapshot of TollMate's home screen is shown in Figure 7 on the following page.

IN-APP AND PUSH NOTIFICATIONS

In-App notifications are notices that show on the screen while a user has the app open and on the screen. Push notifications are messages that appear on the phone even when the app is in the background. These messages may appear on their lock screen, notification bar, and/or alert the user with a buzz or sound depending on user settings for push notifications. Agencies are selective about the number and types of notifications to customers due to concerns about overloading their customers with emails, text messages, in-app notifications, and push notifications. NTTA was the only agency interviewed that currently uses push notifications. Their current app sends notifications mainly when the balance drops below a certain amount or is depleted. Alternatively, TCA uses in-app notifications for low account balance and credit card expiration.

Figure 7 - NTTA's TollMate app with "Call Roadside Help" Feature



CUSTOM REPORTS

One of the more unique features found through this study was a custom report feature for KTA customers. Users can specify transactions to print or email in a PDF which is often used by customers for employer expense reports or tax purposes.

Customer Service Features

CAPTURE OF UNBANKED OR UNDER-BANKED CUSTOMERS

Making payments and account management easier for unbanked or under-banked customers is a critical step to improving customer service and payment rates. Often, unbanked and under-banked customers are also low-income populations. Low income populations also often use their phone for internet access, not having broadband at home. This is another reason to offer apps for this user group.

> *PTC reported that an estimated 25 percent of their customers are unbanked or underbanked, and providing an app to give those customers with an additional payment method is a primary goal for their future app – mostly driven by the conversion of the facility to all electronic tolling.*

In-app payments typically use credit cards, debit cards, or Automatic Clearing House (ACH) payments requiring a bank account. However, apps also have the ability to accept additional payment methods such as PayPal which are more accessible to unbanked or under-banked customers. Additionally, some third-parties, such as BancPass, have specific features to support unbanked customers. This includes partnerships with retail locations allowing cash re-loads of accounts. Manual or cash reload customers are also at a higher risk of having a low balance compared to account holders with a credit card on the account. An app with push notifications becomes even more valuable to alert cash reload customers of a low balance.

ADAPT TO FLEET, RENTAL CAR, INFREQUENT, AND OTHER NICHE CUSTOMER BASES

There are many unique toll user groups with very specific needs. Rental fleets, truck fleets, infrequent customers, and unbanked or underbanked customers are all examples. Truck fleets, for example, desire to receive the discounts offered by each tolling agency but can't unless they have an account with each. Unbanked and underbanked users desire cash reload locations for additional convenience in managing their accounts. These are some examples of groups for which agencies and third-parties have found solutions.

It is challenging to be everything to everyone, and agencies are no different. Third-party vendors have the ability to narrowly target a customer base to provide unique and customized solutions. Often, these third-parties have in-depth knowledge of a customer based, such as BestPass's knowledge of trucking fleets and their owner's and operator's needs. Likewise, BancPass knows how to work with unbanked and underbanked customers.

Comparison

Table 4-3 shows a comparison of the availability of features and capabilities against each of the approaches. The major takeaway here is that agencies do not have direct control over what features and capabilities are provided by third-parties, but they do have control over their own app and CSC. However, private companies exist to fill a void or an unmet need of a customer base, and it is likely that these third parties will continue to evolve and adapt to the needs of the customers to grow their business, and may engage with an agency to assess desirable features.

Table 4-3: Availability of Features and Capabilities

<table>
<tr><th rowspan="2">App/CSC Features & Capabilities</th><th rowspan="2">Agency App</th><th colspan="2">Third Party</th></tr>
<tr><th>App Only</th><th>Full-Service</th></tr>
<tr><td>Open an account</td><td>Available</td><td colspan="2" rowspan="6">These features are determined by the third-party. The agency can request or negotiate for features.</td></tr>
<tr><td>Viewing account balances</td><td>Available</td></tr>
<tr><td>Updating payment information</td><td>Available</td></tr>
<tr><td>Updating or adding vehicle information</td><td>Available</td></tr>
<tr><td>Making a toll payment</td><td>Available</td></tr>
<tr><td>Other "unique" features</td><td>Available</td></tr>
<tr><td>Capture of unbanked or underbanked</td><td colspan="3">Depends on other features available and the customer base of the vendor/CSC</td></tr>
<tr><td>Ability to adapt to niche customer bases with unique needs (e.g. one-time user, rental, fleets)</td><td colspan="3">Depends on other features available and the customer base of the vendor/CSC</td></tr>
</table>

5.0 Impact of COVID-19

There is no doubt that the global COVID-19 pandemic has had a significant impact on the tolling industry. Through the course of this study three main trends relevant to mobile payment apps were observed:

- Expedited transition to all electronic tolling (AET)
- Implementation of additional contactless communication and interface methods
- Decrease in toll revenues – making collection rates more important than ever.

5.1 Expedited AET

Many agencies converted to all electronic tolling (AET) quickly to eliminate risk of virus transmission between payment collectors in booths and drivers. While this has accelerated the permanent adoption and conversion to AET for some, other agencies have already returned to cash collection. NCDOT believes that the pandemic has accelerated adoption of cashless payment in the economy in general and for the tolling industry in particular—like for NYSTA—and will inevitably lead to more interoperability sooner than would have occurred otherwise.

5.2 Contactless Communication

The main reason for AET conversion was to limit person-to-person contact, and the same applies to customer service centers and walk-in centers. This included closing walk-in centers and encouraging call center customer service representatives to work from home.

As a result of the pandemic, TCA, along with every other agency that spoke about the topic during their interview with the Coalition, was forced to close their walk-in centers. The mobile app remained fully available to customers as well as the agency's other existing payment methods. Upon reflection, TCA noted how thankful they were to have these options available to their customers.

For VDOT, the third-party mobile apps available were promoted, by the third-parties, as a method to limit COVID-19 exposure for those drivers that paid their tolls with cash. This became even more applicable during the period between April and June when staffed toll collection was suspended at most toll facilities in Virginia.

5.3 Decreased Toll Revenues

Travel data show that COVID-19 has had a large impact on tolling as the average number of vehicle trips went down rapidly. Agencies have reported a 30 percent to 80 percent reduction in toll revenue in the early phases of the pandemic. While many have recovered some, agencies have worked to mitigate the impacts to customers resulting from rapid AET conversion, reduction or elimination of walk-in-center hours, and longer hold times by phone due to reduced staffing levels. They have done this by extending the due date of violations or billed transactions and forgiving violation fees. Ultimately, collection of toll revenue has become even more important due to the reduction in trips, and agencies have taken measures to accommodate customer needs and encouraging them to pay the toll.

6.0 Key Insights and Lessons Learned

Each agency faced unique challenges during the development and implementation of mobile apps. This section includes an overview of the lessons learned and recommendations from these agencies.

Understand the Cost and Maintenance Needs

One difference in agencies interviewed is the cost and impact of maintenance. NTTA expressed that high maintenance and update costs should not be underestimated and considered them significant. They reported that updates were difficult to keep up with. TCA on the other hand, has a contract in which ongoing maintenance and minor updates are included in the initial cost of the app and with paid major updates. It is important to understand all of these costs up-front and have a plan for paying for frequent app updates.

Create a Level Playing Field

If opening the back-office transactions up for third-party app and CSC providers, it should be open to multiple vendors. This will encourage competition and provide more options and features to customers.

Solicit Feedback from Customers

Continued engagement from the customers and analyzing data can inform agencies about the most useful features of the app, and what new features the customers desire. TCA's in-app feedback features is well used, both to resolve customer service issues and collect feedback on features. One of the primary goals of most agencies was to improve the customer experience, and that feedback tool can be a cost-effective way to engage users and get input.

Own the Data and Source Code if it is an Agency App

Depending on the business model, a third-party app developer may be unwilling or reluctant to share detailed customer data with the agency. Information on data usage, customer interaction with the app, and even the customers themselves may not be shared unless agreed upon up-front. This could result in losing customer data if the agency switches apps or vendors. Agencies recommended establishing metrics and reporting up-front when developing the app.

If the app itself is custom developed by a vendor or app developer, it is important to get the source code and all updates to the source code so that it could be transferred to a new operator if desired. TCA did this successfully with minimal costs. Maintaining complete and accurate documentation of the app and interface with the CSC is also essential.

Carefully Select the Developer

It is critically important to select the right developer for the type of application wanted. As discussed above, this depends on the approach of the agency and desired customer relationship. Agency priorities, with tradeoffs between app features and user experience, may also drive selecting an app developer versus an agency's current CSC or website vendor.

It is also important that the app developer's business model aligns with the agency's model. KTA found that their vendor used a transaction (account reload) cost-based approach, which is

generally not how KTA feels tolling should work. They also didn't want to pass the costs along to the customers and instead adopted an alternative compensation model.

Consider How App Customer Service Will Work
If a customer has an issue with the app itself, will they be calling the agency or the app developer? Typically, app developers who are not the CSC vendor themselves, don't have polished customer service, and instead customers are routed to technical troubleshooters. An agency should understand how the app developer's customer service and troubleshooting works and agree upon an approach.

Consider the Future
Transponders are the most efficient and ubiquitous method of toll collection today, but it may not continue that way in the future. Consider using an open API to encourage industry innovation and other technologies to remain flexible and adapt to customer preference.

Let the Specialist Design the User Interface
For TCA, their first version of the app was heavily influenced by agency personnel who were website centric in their approach, which didn't result in an ideal user interface. Web development and app development require different sets of skills. Dedicated app developers are typically considered to be more effective in the development of mobile user interfaces and customer experience on a mobile platform.

7.0 Conclusion

There are many approaches to implementing a mobile app and enhancing the customer experience using third-party apps and services. An agency's approach to each should be determined by the customer relationship they desire, goals for the agency and customer experience, and the features and capabilities they want to provide.

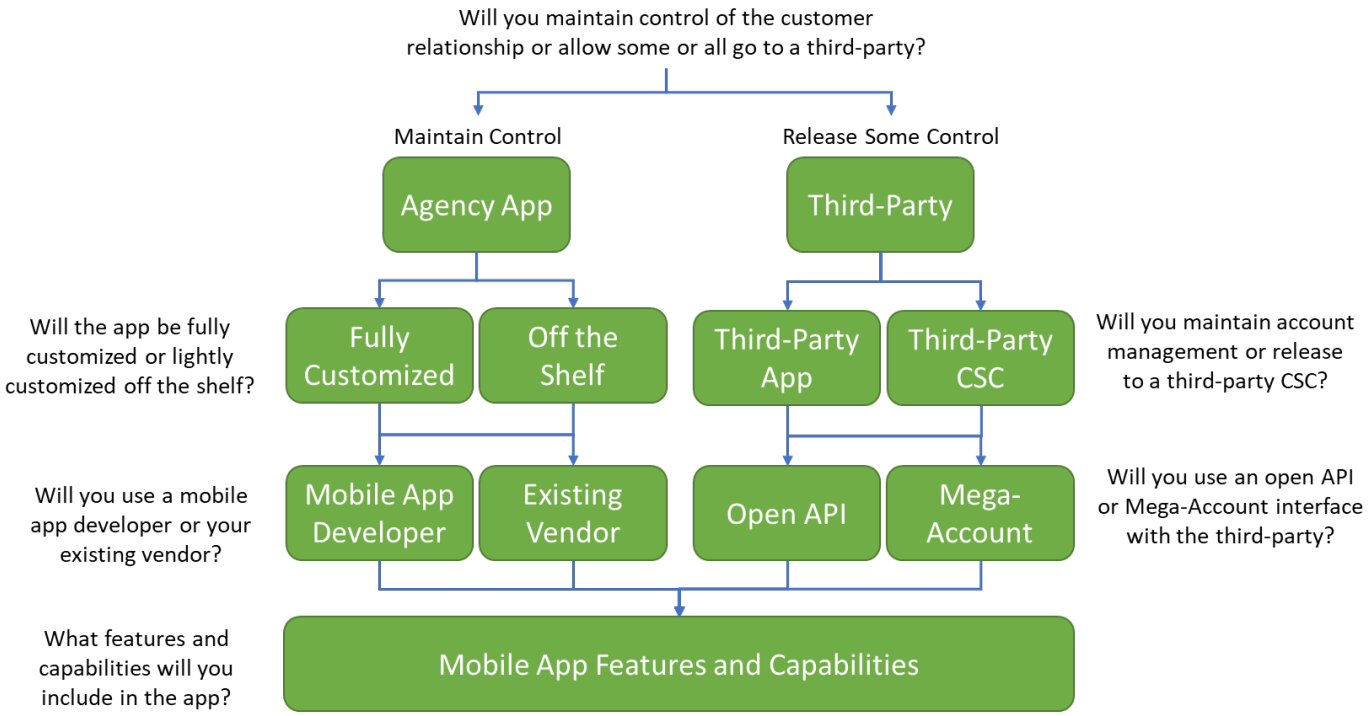
On the following pages, Table 7-1 combines the comparison tables from the discussions above to show the relationships between approaches and customer relationship, goals, and features/capabilities. Figure 8 follows with a simplified decision flow diagram.

Table 7-1: Comparison of Approaches

	Factors	Agency App	Third-Party	
			App	CSC
Customer Relationship	Direct control over customer relationship	High	Medium	Low
	Full access to customer data	High	Varies	Low
	Ability to react to customer app feature requests	High	Low	Low
	Cost of customer service	High	Low	Low
	Agency exposure to enforcement and collections against a customer	High	Varies	Low
Agency Goals	Improved Customer Experience	Depends on current agency customer satisfaction and quality of the third-party services		
	Reduce costs	Low	Low	High
	Improve payment rates	Likely	Guaranteed Payment*	Guaranteed Payment*
	Future prepare the system	Low	If an open API is used it is highly adaptable to vendor innovation	
Features and Capabilities	Contact and feedback functions	Available	These features are determined by the third-party. The agency can request or negotiate for features.	
	Plate Image Capture	Available		
	Violation and Invoice Payments	Available		
	Toll Trip Cost Calculators	Available		
	Roadside Assistance	Available		
	Custom Reports	Available		
	Capture of unbanked or underbanked	Depends on other features available and the customer base of the vendor/CSC		
	Ability to adapt to niche customer bases with unique needs (e.g. one-time user, rental, fleets)	Depends on other features available and the customer base of the vendor/CSC		

Figure 8 is a simplified decision flow based on the approaches discussed in this paper. As mentioned in the introduction to this paper, this is not a linear decision-making process and there are combinations of approaches and features that cannot be represented here. For example, an agency may implement multiple paths of customer engagement, with an agency app and open API to various vendors.

Figure 8: Decision Flow



The world of mobile apps in the tolling industry has evolved rapidly and will continue to do so, With the many benefits that can be realized by customers and agencies, and the general use of mobile apps increasing in the industry, there is no doubt that more options will become available and more authorities will implement them. As the many products and models are tested in the marketplace, it will be more important than ever to share and learn from the experiences of others. In addition, it is critical that the implications of this technology be considered within the context of multi-state travel and interoperability.

8.0 Appendix – Interview Summaries

Florida Turnpike Enterprise

Interview Summary

Background
FTE currently does not have any agreements with any apps directly, but customers can choose from a few third-party apps to pay tools:

- Paytollo will work because it is set up as a business account. Processing these payments require FTE to complete the license-plate matching process. Because customers receive the SunPass rate while FTE incurs the cost of the license-plate matching, the agency does not recoup costs like it would under normal protocol through surcharges on pay-by-plate.
- Bancpass will work because Georgia's State Road and Tolling Authority (SRTA) uses it, and this agency is interoperable with FTE. SRTA maintains the license plate database and FTE has no knowledge of how payments are completed through this method.
- Others apps such as Peasy claim interoperability, but FTE has no knowledge of them or how they interact with customers. It possible they are functional through a business account.

Decision-making Process
Because FTE does not currently have a payment app arrangement, this section describes current efforts and plans.

The agency is requesting information from providers and has also received information unsolicited from vendors through various forums. Many business models exist and the agency is determining which best fits its needs. A key need any payment app must fulfill is serving infrequent users such as tourists and rental cars, which are common in the state. Recently, Florida's Turnpike Enterprise (FTE) joined the IAG and will soon accept EZPass transponders, making it easier for out-of-state visitors to pay tolls. However, there will always be non-transponder customers and the agency recognizes the need to serve these customers in a way that is not a major administrative burden. Because SunPass transponders remain the most efficient payment method for the agency, any effort towards providing app-based payment options should not compete with SunPass and instead focus on serving non-transponder customers.

Other considerations include how to address the complexity of vehicle types, and the fact that toll rates are based on the number of axles. For example: can the app provide a solution for passenger vehicles as well as commercial vehicles, trailers, etc.? Can users be trusted to accurately self-report and pay the appropriate toll? Additionally, transportation network companies (TNCs) have their own travel patterns that can complicate transactions. For example: multiple charges for a single vehicle within a short time may not in fact be an error, but

actually two separate TNC customers completing trips using the same driver/vehicle. Related, a rental car could incur tolls from two separate drivers in the same day.

Regardless of the solution, the agency seeks to understand the technology and how it might work with existing systems and technology. It is unlikely the agency would brand the app itself and would expect the vendor to undertake marketing.

Implementation
While the original goal was to have vendors selected by the fall, the agency decided to extend the period to provide more vendors an opportunity to present options. Currently the plan is to make a selection early in 2021.

Results
No results yet as the agency is still evaluating potential vendors.

Lessons Learned
While transponder usage is most cost-effective for agencies, the world is changing and agencies must adapt.

COVID-19 Impacts
Exploration of app payment was not spurred by the pandemic, but it did force changes to operations including de-staffing lanes and amending business rules to avoid charging customers administrative fees.

Kansas Turnpike Enterprise

Interview Summary

Background
The MyKTAG app was developed by PayIt Solutions, a third-party vendor providing an off-the-shelf solution for managing accounts. The product was pitched as a one-stop-shop for all things related to the department of transportation including tolling, vehicle registration, driver's license management, etc. The tolling authority would become the first agency within the state to roll-out the app, with others intended to follow. The app was customized to some degree and is branded MyTAG "powered by PayIt."

Decision-making Process
PayIt approached the state's Secretary of Transportation and pitched PayIt as a one-stop-shop for all payments related to DOT functions including vehicle registrations, license renewal, and tolling. It would also integrate with other agencies for fishing and hunting licenses, parking tickets, etc. The app was well-received by the Secretary and the agency opted to move forward. Unfortunately, the app was only rolled out by the Kansas Turnpike Authority (KTA) due to the tight timeframe, with others expected to join shortly after. They have not done so yet.

KTA's hope was for the overall convenience and use of the app would be increased as other agencies added services to it. With all payments for the state government in one place, the thought was that payments would be received in a timelier fashion.

About five years ago, KTA felt an app was needed because it seemed to be the expectation, however this may not be true. The agency plans to conduct market research to determine what customers want. Currently, the agency's website is responsive, but without access to phone features, the functionality is more limited compared to an app.

When deciding between developing an app in-house, procuring one, or using a third-party option, the agency the third-party option because multiple solutions were available that fit the intended purpose (to simplify a user's interaction across multiple DOT functions). Third-party options could also be deployed faster than an in-house or fully customized application. In addition, no up-front payments to the vendor were required for the third-party option; pricing is based on monthly payments and/or transaction fees.

Implementation
The app was provided by the third-party platform called PayIt and was customized in part, but largely limited because of the transaction-based nature of the solution. As a customer makes a payment, PayIt collects a transaction fee. However, KTA did not want the users to see that fee, and as a result negotiated a fixed payment per month from KTA to PayIt.

KTA paid $100,000 the first year to get the app running and to cover the first year of "transaction fees." Thereafter the agency will pay $50,000 annually to cover the cost of transactions for users. This value is based on the historical average number of transactions.

The schedule for roll-out was approximately 9 months, with simultaneous app and API development.

The app allows customers to make payments (mostly post-paid accounts), order new KTAGs, turn off KTAGs, change payment methods, see all transactions, and create an itemized statement for reporting (this was a feature requested by customers so they could create expense reports).

The app does not utilize push notifications, but customers receive email alerts and can opt into text message alerts, so the push notifications seemed like a potential to overload the customer with communication. However, KTA may consider push notifications in the future.

Aside from the added convenience of a mobile app platform, there were not any specific improvements to the customer experience identified as a result of the app. The intent was to create a one-stop-shop for all DOT accounts, but only the Kansas Tolling Authority ended up integrating with the app.

Customers must have a KTAG account with the tolling agency before downloading and using the MyKTAG app. Then they must create another account with PayIt to access the app. Within the app, the user then enters their KTAG account information. This dual account sign-in has created a lot of confusion for customers.

Results

KTA did not select specific performance measures going into the app development process, but the overarching goal of creating a simplified, one-stop-shop for department and possibly statewide payments drove the process.

Because of the accelerated delivery timeline, the app did not actually accept payments upon deployment, which created a significantly negative reaction. The app also does not allow users to pay for violations. This function was considered, but was not pursued because the agency did not expect users would download an app to pay for once-time violations. KTA estimates that the app has 3,000 unique users each month, though it has been challenging to obtain data from PayIt, potentially due to the dual sign-on requirements. Overall, the lack of adoption by customers and by other agencies within the DOT suggests the deployment has been less successful than hoped.

While the app has not necessarily reduced operations costs related to invoices and violations, the agency highly values the relationship it now has with BancPass. Although this has not been documented, it is possible that the app has attracted customers to KTAG and this result is considered more successful than the app itself so far.

Lessons Learned

Make sure the agency and developer are on the same page from the beginning. The developer/product needs to be the right fit for what the agency is trying to achieve. In particular, the transaction-based model did not seem compatible with the way the tolling agency worked. In the interest of ensuring both parties are on the same page, identify clear goals going into the process and communicate those goals to all parties involved.

Launch the app with all the functionality promised. Small things can be phased in, but all major functions must be ready on launch.

Consider how customer service will work. For example, if a customer had an issue with the app itself, they would call PayIt. However, PayIt's employees are developers that perform technology troubleshooting and are not customer service representatives.

Understand what data the agency wants from the app developer. It is critical for the agency to "own" the data for a number of reasons: so that customers are not lost with a change in vendor, to make better decisions on features, and to measure app usage.

A key success was the launch of an itemized expense reporting feature in response to customer requests, which was also added as a feature of the website.

Unfortunately, the app was not adopted by other agencies, and thus adoption by customers remained low.

COVID-19 Impacts
No comments provided.

New Jersey Turnpike Authority

Interview Summary

Background
The NJ E-ZPass Group consists of seven agencies:

- Delaware River Joint Toll Bridge Commission
- New Jersey Turnpike Authority (NJTA)
- Delaware River Port Authority (DRPA)
- Delaware River & Bay Authority (DRBA)
- Burlington County Bridge Commission (BCBC)
- South Jersey Transportation Authority (SJTA) (Atlantic City Expressway)
- Cape May County Bridge Commission

This group was formed around 20 years ago when first implementing E-ZPass to enable the agencies to have a single back office and reduce overall costs. Currently the customer service, toll processing, and violation enforcement back office operation is run by Conduent Incorporated under a contract with the affiliated toll agencies comprising the NJ E-ZPass Group.

This group is working on two apps, one third-party (Payit) and one in-house developed through Conduent (NJ E-ZPass).

Payit is for use as a payment method for customers who use a manual lane but have insufficient funds when they arrive at the toll plaza. Collectors will give the customer an Insufficient Funds Form (ISF) in hard copy while an image of the license plate is taken by lane cameras. The customer can then use Payit to pay the toll by credit card (or mail payment, which continues to be an option). If the customer fails to pay, the agency uses the license plate image to send a bill. This app is seen as an interim step until all-electronic tolling (AET) is rolled out system-wide. The app could be used for other service payments such as towing, but this is still in conceptual planning stages.

The NJ E-ZPass app has the same functionality as the website, allowing customers to add funds, add/change vehicles, save credit card information, etc. The app will work for all the agencies listed above. It is seen as a companion to a transponder rather than a replacement; a transponder is still required for payment on the road, but customers can pay violations through the app.

Decision-making Process
The group has been working with a consultant to understand the options available. At this point the tolling agencies in New Jersey are not comfortable with GPS-based apps and suggested that other agencies have received negative feedback about them. However, staff see the industry moving in this direction and consider it likely that the group will need to adopt such a tool in the future. At the same time, the agencies are staying abreast of new technology such as vehicle as transponder.

Goals for the NJ E-ZPass app include reducing call volumes to the customer service center and facilitating account reloads. While the current website is mobile-friendly, the group decided that people were more likely to use an app.

On the other hand, Payit is aimed towards customers that are not using transponders. The group considers transponders the most efficient toll collection method and would like as many customers as possible to use this method; however, the Payit app will provide a additional payment option for customers who choose not to use transponders and who do not have cash when traveling.

Implementation
the E-ZPass app is in the final testing stages and the group hopes to launch to friends and family in Fall 2020. A full launch will occur after this period. Agencies will conduct a marketing campaign including inserts in mailings, notices in lanes, variable message signs (VMS) if permitted, media campaigns, and social media posts.

The group is aware that Pennsylvania tolling agencies are considering developing similar apps for E-ZPass customers and will coordinate with those agencies.

The contract with Payit has been signed, and they are working toward implementation of that app as well.

Results
Apps will be considered successful based on performance among a set of measures related to downloads, account refreshes, and reduction in call center volume, among others.

Lessons Learned
Toll agencies are at a disadvantage because technology changes quickly, but coordination with IAG and others helps the group to stay up to date on new technology and vendors.

The main focus for toll payment will continue to be transponders as this is considered the best way to collect tolls.

COVID-19 Impacts
In April, toll collection booths were de-staffed, forcing a change to internal protocols. Customers without transponders received an invoice by mail in the same way a violator would, but first notices did not have the typical $50 administrative fee added. If customers failed to pay the first notice, second notices were sent with the fee added.

North Carolina Department of Transportation

Interview Summary

Background
NCDOT is creating an application programming interface (API) to allow a variety of vendors to offer app-based toll payment services to customers. The agency is focused mainly on receiving toll payments rather than the method of payment and this system will shift the point of sale to vendors, reducing agency costs.

The goal is to enable the agency to be nimble and adapt to future changes as they arise. For example, mobile phone service may soon be integrated into vehicles and could then be used as a payment mechanism bundled with a customer's wireless bill.

Decision-making Process
The agency's goal is to avoid the past approach of buying toll and back office systems and instead move into a cloud environment which will allow for new business models.

To this end, staff began looking outside the toll industry for solutions. Companies like Apple and Amazon were surprisingly willing to talk to the agency about their systems and processes. While traditional vendors are interested, the agency is asking about integration and ensuring options meet its needs rather than purchasing off the shelf.

Implementation
The system will allow all types of toll collection technology (e.g. RFID, video tolling, future connected vehicles, etc.). For those that are plate-based app vendors will be required to register customer accounts that include license plate information.

For customers that do not have a transponder, the system will capture an image of the license plate. If the license plate is not in the system registered with a transponder account, vendor account records will be checked. For drivers who have accounts with more than one vendor, there will have to be an order of preference for paying the tolls (e.g. most recent active account pays first).

The vendor will pay the same toll amount as if payment was made directly from a plate image capture, but each vendor can charge an additional fee if desired. Customers will be able to choose in the marketplace of apps and between apps and a transponder depending on their preferences and needs.

The agency believes app developers will not see toll payment services as a viable business alone but will likely bundle toll payment with other services to make a business case. It could also provide an opportunity for businesses to market promotions (e.g. offer a free coffee after three trips on the toll road).

Issues with toll payment would be resolved by vendors. The vendor relationships would be equivalent to business accounts and as such would be responsible for paying and resolving

customer disputes. In this way, the agency receives the toll payment and is insulated from risk. The agency will receive the toll from the vendor and the vendor resolves payment/dispute with the customer to recoup costs.

As of October 2020, the agency has partnered with one provider to conduct a pilot. The goal is to obtain a post-pilot provider by the end of the year and add additional providers on an ongoing basis.

No RFP was issued, aligning with past agency efforts—like vendor shootouts—toward a more open approach to obtaining services. The open approach allows the agency to remain on the cutting edge and innovate. One example of agency innovation is the use of Amazon to deliver transponders.

While vendors like Payit and Paytollo are interested in partnering, each wants an exclusive agreement which the agency is not willing to do. For cloud services, the agency is running pilots with WEJO and Snowflake to understand how new data will be managed.

Results

A toll agency's focus is collecting tolls and this will remain the key measure of success. Ongoing monitoring and audits will allow the agency to determine if app payment is cost-effective and toll revenue is being received as it should be.

Lessons Learned

The agency expects that the API model will take the agency out of a scenario where they are in competition with vendors. For example, the agency would have been competing with Mastercard (as they begin to build payment solutions into vehicles, etc.) but now is partnering with the company instead.

The agency intends to provide a list of approved vendors on its website, but will likely not market the services, leaving marketing efforts to individual vendors.

State laws restrict co-branding, but there may be potential for such efforts if laws change in the future.

The agency is working with peers through the Alliance for Toll Interoperability (http://www.tollinterop.org/) which will soon change its name to the Alliance for Toll Innovation. There is also a group of agencies in the same stage of considering new payment systems and upgrades. Recently, staff engaged in a group call to understand what did and did not work from peer implementation.

COVID-19 Impacts

The pandemic has accelerated adoption of cashless payment in the economy in general and for the tolling industry in particular—like for NYSTA—and will inevitably lead to more interoperability sooner than would have occurred otherwise.

North Texas Tollway Authority

Interview Summary

Background
The Tollmate app connects to TollTag transponder accounts and allows users to:

- Update account information
- View account balance
- Make payments
- Add vehicles
- Calculate the cost of tolls for trips
- Call for free roadside assistance
- Contact customer service
- Pay for airport services

While the app does not support payment of invoices, it does link to the agency's website where this can be done. In the future, the agency intends to expand the roadside assistance capabilities. This service is currently accessed through a prominent button on the app which connects to #999 for safety operations, which dispatches state troopers and other personnel as necessary. The new app will utilize GPS to provide dispatchers routing information to reach the customer's location.

The app provides a convenient option for customers and improves roadway safety when incidents occur. A Spanish version is also available.

Communication to customers uses push notifications mostly to alert customers of low balances, but the agency wants to limit the number of notifications so have limited communication to push and email (no SMS).

Decision-making Process
NTTA's goal was to make it easier for customers to make payments and update account information. The user experience was the most important component. Currently, the agency's website is not responsive so the decision was made to focus on an app before updating the website because an app is more user-friendly than a responsive website. However, the website will be updated to be responsive as part of a new back office contract. Customer preference dictates that an app be the first priority.

NTTA noted that they had to choose between using the toll service vendor or an app developer for the effort. They noted that when done though a typical toll vendor, the agency and back office typically learn together how to develop the app. If app development is not in the vendor's core business, the vendor may not have the expertise needed. NTTA observed that on the other hand, companies that only do apps know the operating systems better, particularly the subtleties between them and how updates work. App developers are nimbler and more in-tune with providing an optimal user experience. However, this customer experience component was

important to the agency and therefore the first app was done by an app develop. However, the new app is being developed by the current back-office tolling vendor because of the feature integration they need.

Implementation
The app was paid for by the agency through a procurement process, with a one-time capital cost paid upfront plus ongoing maintenance and update costs.

> NTTA noted that it is important to consider whether the app will be “general” or “native” to Android and iPhone. The difference is the user experience where native apps will have more capabilities while general apps will have fewer capabilities but be able to work with both operating systems. In addition, NTTA noted that app developers are more nimble and know the operating systems well. Toll vendors are not as savvy.

Results
While the Tollmate app was successful overall, the agency is developing a new app with improved features and the capability to accommodate future needs including a more open structure to integrate with other services such as parking.

The app is advertised well, which has led to increased adoption with over one million active users. There is also a customer rewards program which is both integrated into the app and accessible via the website.

Lessons Learned
The key to a successful app is choosing the right partner (app developer v. toll vendor). If an agency is interested in having an app work well immediately and is willing to let decisions be made by others, an app developer will likely be a good fit. However, if an agency wants to define all features and ensure tight integration with the back office, a toll vendor may be a better choice.

Agencies should not underestimate maintenance needs and the costs associated with it. Frequent updates are necessary to accommodate phone versions and software updates. iPhone versioning is particularly frequent and has been a major challenge for some agencies.

COVID-19 Impacts
None.

Pennsylvania Turnpike Commission

Interview Summary[2]

Background
The Pennsylvania Turnpike Commission (PTC) embarked on the process of developing a toll payment application, the Mobile Cashless Tolling App (MCT). However, the project was cancelled due to technology challenges and inability to meet established benchmarks. The information here provides an overview of this effort.

MCT, as it was designed, required users to set up accounts prior to use. Users would complete the vehicle registration process including vehicle description and a picture of the license plate along with payment information.

Geofencing was used to register entry and exit points, which would be recorded in the vendor's back office. The vendor was responsible for calculating the toll and sending transaction account data to the PTC back office for validation on a daily basis. Affirmed transactions would then be paid to an MCT account by the vendor. License plate recognition was also used in combination with PTC photo records to validate the license plate number at entry and exit points when possible. Note: at the time near the app's launch date, photos of entry were not available across the roadway which would have mitigated the background runtime issue to some extent.

To use the app to pay a toll, the app had to be active and not run as a background process on a user's phone. This was due to the possibility the phone may require additional resources and shut the app down, possibly in mid trip.

The app was free to customers using the roadway while the vendor paid its development costs and ultimately would have made money on a per transaction cost.

Initial customer support was to be provided by the vendor via in-app communication capability. It is important to note that MCT customers were the responsibility of the vendor; customer service issues would only be escalated to PTC as a last resort.

Decision-making Process
The PTC understood the need to capture unbanked customers, those individuals that choose not to take advantage of the banking system and whose life revolves around the mobile phone. The agency's strategic plan involves moving toward a cashless system or toll-by-plate, which necessitates a non-tollbooth payment solution for unbanked customers. A key goal for the payment app was to capture a portion of unbanked and cash customers which represent approximately 25 percent of total customers. At the same time, the agency wanted to provide

[2] PTC launched an app in 2019 that supports their E-ZPass customers which is a separate product from the one described by staff in this document. More details on the E-ZPass app can be found here: https://www.paturnpike.com/toll/ezpass_app.aspx.

multiple payment methods for customer choice without reducing the usage of E-ZPass. E-ZPass remains the lowest cost toll collection method for the agency and therefore it is important to encourage as many customers as possible to use this method.

Implementation

PTC issued an RFP and received around seven responses which was narrowed to three finalists. Following a demonstration from the three finalists, a single vendor was selected and business process and app development started within a few months. The MCT development costs, as set forth within the RFP, were the responsibility of the vendor. PTC paid only the development costs of the back-office application enhancements. Both parties maintained intellectual rights to their specific application development.

Prior to launch, 100 percent of the current PTC roadway was to undergo extensive testing with the app. A test plan was developed which comprised 230 test scripts. All scripts were completed during multiple rounds of testing by PTC and vendor personnel driving the roadway.

Results

The project ultimately failed to reach production. While the technology and back office functionality worked, the system as a whole did not meet the established standards of PTC or the vendor. Geofencing was problematic in certain areas due to cell coverage limitations and certain testing scenarios failed to meet operational expectations as a result. In addition, PTC defined a maximum threshold for unmatched entry and exit data points (orphan entries/exits) that the app was unable to stay beneath. The vendor and agency came to a mutual agreement to release each entity of responsibility and cancel the contract.

Lessons Learned

Consider whether the agency wants enhanced capability from an app such as the ability to also pay for E-ZPass, local parking, etc. or simply wants another payment method. Carefully identify the value to the customer and the return on investment for the agency.

Plan for a longer development period than expected. The more payment options and business rules that are included, the more complex the solution. A standard trip was relatively easy to record with the app in situations where cell signal was excellent and entry/exit images were available. However, app functionality related to anomalies and unusual occurrences was difficult to accomplish with repeatable accuracy. For example, if a customer stops on the roadway for a short time, the app immediately backtracks to the closest exit point to record the trip.

Additionally, testing 230 scenarios was time consuming for agency staff who still needed to complete their normal daily assignments.

In hindsight, the agency believes this effort would have been better to undertake after conversion to AET. MCT appears to be more feasible with segment-based ORT rather than trip-based interchange tolling due to issues with geofencing accuracy and business rule complexity.

COVID-19 Impacts

Not applicable.

Transportation Corridor Agencies

Interview Summary

Background
While TCA had a good website, customers were requesting an app specifically tailored for mobile devices. At the time, about six to eight years ago, accessing websites on mobile devices was not particularly functional. The agency's first app was only a little better than the website experience, partly because the app was designed by the agency's back office website developers rather than app developers. It allowed customers to start using it and they began providing suggestions and complaints. The second round involved a competitive procurement to hire a firm that focused on mobile apps. The selected firm spent time interviewing TCA staff and custom-built an app.

The app connects to a customer account at TCA and allows customers to:

- Open an account
- Make payments on an account
- Make changes to an account
- Pay violations
- Make non-account payments

The agency is considering adding parking payments and trip planning as additional features. The app does not use push notifications, but in-app notifications are used to communicate regarding low balances, expiration of saved payment information like credit cards, and other important information. Customers can opt-in to receive SMS messages.

The app is now seen as an extension of the customer service department, which is a key way it improves the customer experience. Feedback can be sent within the app, which sends an email to the agency's IT team and to the customer service contractor. The contractor then directly contacts the customer to respond or request additional information. The whole process takes about a day.

The app is paid for by the agency, including initial development and deployment, changes, and updates required due to mobile operating device updates. Small updates and maintenance are included as part of the initial development cost or bundled with major updates.

Decision-making Process
App development was undertaken to improve customer service and to reduce costs for the agency through reduced customer service call volumes. There was a clear preference from customers for an app over a responsive website. In general, apps provide a better experience due to optimized screen display and because they are better able to integrate with mobile phone features. For example, the Toll Roads app integrates with FaceID for sign-in, reducing access issues for customers.

The first iteration was completed by the agency in-house, which worked well as an initial step because it allowed the agency to refine objectives before pursuing a full-scale procurement for the second iteration. An app developer allowed a greater improvement in customer experience, which was one of the main goals of the effort.

Implementation

To develop the in-house responsive website in the first iteration, the agency held a series of workshops. The communications department worked closely with the developers and was focused on the website concept and ensuring a matching look and feel. In the second, procured iteration, the agency knew the app did not need to match the website exactly and it would be better to use an app-specific design to improve the customer experience.

The current app was procured and custom built for the agency. The agency owns all data and source code, which allows an easy transition between app developers as needed. It took approximately eight months to complete development and cost $65,000 with project-based costs dependent on needs. However, the app is mature and stable so there are few ongoing maintenance needs. The original back-office design cost the agency $30,000.

Results

Customer feedback has been largely positive and the in-app feedback feature works well. Suggestions from customers are implemented if the TCA team considers it worthwhile. The app has reduced call volumes as well, so both objectives of the app have been met.

There are almost two million accounts and overall approximately 15-18 percent of all customer interactions occur via the app.

The app allows one-time payments. As the most used feature, this likely reduces the number of delinquent accounts and outstanding violations. The second most used feature is updating account license plate information, another likely source of reduced violations.

Lessons Learned

The biggest challenge for the agency was adjusting from a web-centric perspective to an app-first approach. TCA recommends that any agency with customers who use its website consider developing an app. If agencies do choose to develop apps, make sure to hire a company that knows how to do them well and ensure close coordination between the back office and mobile app developer. This working relationship should continue as updates are made over time.

COVID-19 Impacts

TCA has seen a major reduction in the average number of trips. The agency closed walk-in customer service centers and increased toll payment periods from 5 days to 10 days. The agency's multiple alternative payment methods were critical for customers who would have used the walk-in centers.

Virginia Department of Transportation

Interview Summary

Background
VDOT has four toll facilities it owns and operates while 12 other facilities in the state are operated by private partnerships, localities, and authorities. There is a variety of facility types ranging from traditional gate lanes to all electronic to facilities with hot lanes. VDOT also serves as the central clearing house for processing all E-ZPass related transactions for each Virginia toll facility.

Mobile apps target people who do not have an E-ZPass account for various reasons, such as not wanting to open an account or not wanting to carry a balance or because they are only occasional toll road users.

Because the agency is the owner/operator (O/O) of the E-ZPass back office, nearly every noncash transaction comes through it as an attempt to post to a funded E-ZPass account. The agency has set up an interface to allow mobile app developers to have access to the back office and a standard agreement has been developed. This arrangement is not considered a partnership, but more along the lines of a commercial account focused on vehicle license plates instead of transponders.

An app developer who wants to interface with the agency's back office will need to agree to the terms of the standard agreement and proceed through the integration, testing, and approval process. Cost recovery by the agency for the onboarding process is considered in the standard agreement. Once the account is funded by the vendor and approved by the agency, public access to the mobile app can provided.

Two apps have been implemented (GoToll and Slora), and one other app vendor is in the planning process of implementation.

Details for GoToll Slora are provided in the remaining sections of the summary.

Decision-making Process
To avoid the process of having to select a particular app, the agency simply opened up the back office so a variety of developers could come in with different solutions. A standard agreement ensures a level playing field for all developers and reduced effort for the agency.

Implementation
The GoToll app belongs to a private entity. GoToll customers download the app and provide a payment type and license plate. The GoToll customer's license plate information is sent to the agency's back office, allowing the back office to post tolls to the GoToll app account based on image captures at tolling facilities. This avoids the need for GPS, RFID, or other technology for app integration. For GoToll customers, VDOT can access license plates but does not know who is associated with that plate. There is no relationship between VDOT and GoToll's customers.

GoToll operates as a commercial account, so the app developer is required to have funds available to pay all toll transactions. If the vendor fails to keep the account sufficiently replenished, the agency will declare the account insufficient and not post image-based transactions to the account.

Because transactions associated with mobile app accounts are image-based, there are additional processing costs related to image review that are not part of a transponder based transaction. These additional costs incurred by the toll facility are accounted for by way of a $0.15 per transaction video-matching fee paid by the app provider noted in the agreement. Each app provider can determine how much of this cost to pass on to customers. GoToll has chosen to charge the customer $0.85 per toll transaction which covers the vendor cost. The customer is paying this fee for the convenience of avoiding opening an E-ZPass account and setting up a transponder.

VDOT reassesses the $0.15 video-matching fee annually and may change it if needed. Contracts allow the fee to be increased or decreased depending on actual costs to the agency to support app integration. Staff made clear that the agency is not interested in making money from these transactions, but rather seeks to cover costs and hopefully overall decrease its costs by reducing violations that must be pursued.

At AET facilities, customers who pay-by-plate are charged, in addition to the toll, a processing fee 2 times the E-ZPass base toll rate, but if GoToll is used, customers pay the lower E-ZPass rate plus $0.85. Therefore, for customers without transponders, the app provides a real cost savings over pay-by-plate.

For customers with transponders, the GoToll account can also serve as a back-up system. If the transponder is not in the vehicle, or not read for some reason, payment can be processed through GoToll rather than count as a violation. The system will first try to post the payment by transponder, but if this fails the license plate can be matched to the GoToll account.

Customers using rental cars can easily add the rental car plate to an existing GoToll account with specific start and end dates that indicate the period of use of that vehicle. This allows customer to avoid the high fees that rental car companies charge for redirecting toll payments.

VDOT has put the impetus on GoToll and other vendors to communicate how the system works to their customers. This may be particularly relevant when customers are worried about being charged twice via both transponder and GoToll. If customers do call the customer service center, however, the agency takes an understanding approach as the main goal is to have the system work well.

The agency has been careful to not promote GoToll because the Secretary has made clear the app is not considered a partner but rather an E-ZPass account holder. Toll facilities on the other hand, are actively creating awareness for this additional toll payment channel. For example, the Dulles Toll Road facility (operated by a public authority) informs customers that GoToll is an option for payment. The Elizabeth River Crossings (privately owned/operated AET faciity) is more aggressive in advertising the app as a way to pay.

Results
To date, the agency has not solicited feedback from customers regarding the GoToll app, but staff consider it a positive sign that people are using it; usage has grown considerably since launch. It appears that customers are using this payment method to avoid additional fees.

Another positive outcome is the reduction in effort for invoicing and notices. Overall, the app provides another payment option, which is an important goal for the agency.

Lessons Learned
A key lesson for other agencies considering payment apps is to create a level playing field for all app developers and ensure that agency costs are covered in every case.

Developers are looking for access to a specific customer base and see toll payments as just one service offered to customers via their platform.

One GoToll limitation—applicable to all image-based transaction apps—is that it cannot be used in a gated environment because it cannot be linked to the toll system to open a gate. Another limitation is that not all Virginia facilities accept GoToll either because they have gates or because they do not have a system to create an image-based transaction. It is up to the mobile app vendor to let customers know where it can be used. To avoid customer resistance, agencies should have terms in agreements with vendors that require the vendor to communicate facility compatibility to customers. In some cases, GoToll uses GPS to alert it's customer that a toll transaction posting may be forthcoming.

One outstanding question with payment apps is how a regional system might be developed. Currently, an app developer would need to have an agreement with every back office, which is not efficient. North Carolina has shown some interest and Maryland is implementing a similar approach so there is potential to expand the same service into neighboring states. Mobile app providers need to clearly communicate with their customers regarding usability.

COVID-19 Impacts
Toll payment via mobile app was promoted as a method to limit Covid-19 exposure for those drivers that paid their tolls with cash. This became even more applicable during the period between April and June when manned toll collection was suspended at most toll facilities in Virginia.

For customers who use toll facilities infrequently or are reluctant to open an E-ZPass account, the cost of a missed toll or a violation makes it well worth paying tolls with a mobile app. For example, the pay by plate toll rate at the downtown/midtown tunnel is $6.02 but using a mobile app, the customer would only pay $3.18.

Additional information (not from interview)

Source: https://www.wric.com/news/virginia-news/you-can-now-pay-virginia-tolls-using-an-app/

The Slora app was launched by Globalvia and allows customers to pay tolls in real time without the need for an EZ-Pass transponder. It is available for use on almost all major toll roads in

Virginia (full list available here: https://slorapp.com/en/usa/). Users must enter license plate information and a credit card for payment and the app will pay the toll on their behalf each time a facility is used.