

REQUEST FOR LETTERS OF INTEREST

The Greater Dayton Regional Transit Authority (RTA) is interested in purchasing a new electronic payments solution.

Through this Request for Letters of Interest, RTA hereby solicits information from only those payment solutions vendors that meet the vision statement outlined in this letter.

For addition information, please send a request to Tamea Wiesman Greater Dayton Regional Transit Authority, 4 South Main Street, Dayton, OH 45402 or email to twiesman@greaterdaytonrta.org.

The Letters of Interest are due by 2:00 PM on May 15, 2018.

Vision Statement

RTA in order to provide high quality, accessible services to its customers, is looking to replace its existing cash and magnetic tickets-based Automated Fare Collection (AFC) system with a new electronic payments solution. The payments solution will be an integral part of a MaaS platform planned for the Greater Dayton region, which may span a minimum of 9 counties. This solution must provide customers with an easy-to-use, open and integrated payment platform, connecting along all mobility modes identified in the region. Mobility modes include, but are not limited to fixed route transit, demand response (including ADA complementary paratransit) transit, human services transportation, ridesharing services, taxis, transit network companies (TNC), bike share (B-Cycle), parking meters and garages. The report, *Final Memo- Mobility as a Service Concept,* provided along with this Request for Letters of Interest highlights key elements of the MaaS concept Dayton is planning to implement.

Payment Solution Overview

Key goals for the new solution include (1) providing an open and nonproprietary architecture, (2) enhancing ease of use, (3) enabling accessible payment options and (4) phasing out and ultimately eliminating all on vehicle cash transactions by 2020.

The payments solution must be 100% contactless and eventually cashless by 2020 across a fleet of 300 fixed route and paratransit vehicles. Key elements of the solution include:

- An account-based back-end that at least 1) manages customer payment accounts, associated sub accounts and payment products, 2) manages payment transactions and funds processing, 3) provides 3rd party integrations, 4) supports apportionment/settlements and reconciliation with 3rd parties; 5) supports web-based general public, institutional and discount/benefits portals
- Payment media will include RTA-issued contactless smartcards, third party- issued contactless smartcards, mobile phones, and wearables. Third party smartcards may include identification cards issued by State of Ohio, businesses and institutions such as local public schools, universities and colleges. Other payment media may include contactless credit or debit cards, digital wallets like Apple Pay and Google Wallet.



- 3. On-board readers/validators must read contactless smartcards and validate mobile tickets using Near Field Communications (NFC) and Bluetooth. At this time, RTA is not interested in review of solutions that may provide mobile ticketing validation using barcodes/QR codes or flash pass approach.
- Account-based back-end must provide integration with RTA's on-demand transportation billing software to support integration with state agency programs such as Medicaid, Non-Emergency Medical Transportation (NEMT), in order to deliver seamless, paperless billing for all providers and mobility managers.
- 5. Account-based back-end should support account replenishment in partnership with retail merchants.
- 6. Account-based back-end should support integration with third party payment systems such as parking, bikeshare, TNCs etc to pay for trips booked using RTA's multi-modal trip planner/booking system.
- 7. On-board solution should support dual door boarding on all fixed route vehicles.
- 8. The solution should provide fare capping functionality to ensure that customers pay a fair price, which will be expanded beyond RTA fixed route and paratransit services so all customers can choose the best mobility mode for their trip and know they'll pay a reasonable price.

Response Format

When submitting the Letter of Interest with the details of your solution, please respond to the following questions

- 1. Describe your capabilities and experience in providing account-based system that is used for payments for multi-modal trips that may also include non-transit components (e.g. parking, taxis, bikeshare, TNCs, etc.)
- 2. Describe your capabilities and experience in providing web-based portals for management of payment accounts and products for the general public and institutions and for management of special program such as discounts, benefits and loyalty.
- 3. Describe your capabilities and experience in the proposed solution for providing flexible pricing/tariff management. Is it possible to bundle services from multiple providers, as needed for MaaS? Please refer to the included report, *Final Memo-MaaS Platform Concept*, for details on the concept of mobility packages.
- 4. Describe your capabilities and experience in working with third party operators in a large geographic area for enabling payments on their vehicles or for back-end integrations.
- 5. Describe your experience in handling payments for non-emergency medical transportation (NEMT) trips and other related human services transportation.
- 6. Describe the flexibility in your solution to enable third party (non-transit) payment systems. Specific examples should be asked for TNCs, parking, taxis, bikeshare etc.
- 7. Describe the capabilities of your on-board solution for validation of media. Also, respond to the following:
 - a. How flexible is the product to adopt future standards for payments?
 - b. What are the needs for PCI compliance, if any?
 - c. Describe your experience with not-so mainstream validation concepts such as Bluetooth low energy (BLE), Near Field Communication (NFC) and contactless EMV.
- 8. Describe your general experience in helping agencies implement cashless strategies
- 9. Describe your experience in supporting partnership with retail merchants for account reload.
- 10. Provide information on total cost of ownership of solution that can meet RTA needs:
 - a. Provide a breakdown by capital and annual cooperating costs
 - b. Provide details of payments as-a-service approach, if offered.

Evaluation of Responses

RTA plans to evaluate responses and invite vendors for oral presentations for further clarifications. This presentation may be attended by RTA staff, key stakeholders for Dayton MaaS initiative and representatives from other transportation agencies in the State of Ohio.

Please note that evaluation process is part of our industry review process before releasing the Request for Proposal. At this time, RTA is not looking to make any awards through this evaluation. Key criteria to be used for the evaluation are:

- 1. Technical capabilities of the proposed solution to meet project vision and goals
- 2. Product life cycle, expandability, reliability, maintainability
- 3. Vendor and proposed team qualifications and experience
- 4. Time required to implement the system and terms and conditions for vendor support and maintenance
- 5. Total cost of ownership

Next Steps and Projected Timeline:

- 1. Presentations from Fare Payment Solution Vendors Letters of Interest Respondents June 2018
- 2. Request for Proposals Released for Fare Payment Solutions System 3Q 2018
- 3. Award Fare Payment Solutions System 4Q 2018
- 4. Fare Payment Solutions System Installations 2Q 2019
- 5. Fare Payment Solutions Initial Phase Completed, Functioning and Cashless by end of 4Q 2019



Final Memo Mobility as a Service (MaaS) Platform Concept

ΙΒΙ

Prepared for RTA by IBI Group March 29, 2018

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1 Introduction

1.1 Background

1.1.1 Context for Greater Dayton MaaS Platform Development

Greater Dayton Regional Transit Authority (RTA) provides fixed route service, Americans with Disabilities Act (ADA)-compliant complementary and countywide paratransit service, demand response service, and, most recently, on-demand first/last mile service in Montgomery County and western Greene County, within the Greater Dayton region.

RTA's vision is to transform the landscape of mobility for the entire region (Figure 1) and blur the lines among all mobility modes, creating one seamless experience. This vision will transform RTA's role from a conventional transit service operator to a "*mobility manager*" to manage "all things *alternative mobility*" in the region.

In addition, with the growing mobility needs among senior citizens, disabled and low-income populations, RTA's strategic plan also calls on the agency to position itself as the region's mobility manager. In this capacity, RTA will work to coordinate all alternative mobility modes, ensuring the efficient delivery of a seamless mobility network while increasing service quality and access for all. It is not RTA's desire to expand or grow its network but instead better coordinate the multitude of available alternative mobility providers that are often underutilized.



Figure 1 - ODOT TRANSPORTATION AND PUBLIC HEALTH 2017

Currently, senior citizens, persons with disabilities and low-income individuals seeking employment or medical care typically learn about mobility services by word-of-mouth or from numerous calls to public and social service agencies. As a result, RTA's most vulnerable population is subject to decreased independence due to being unaware of the mobility services available to them.

In recognition of these challenges, RTA wants to assist social service agencies and Human Service Transportation (HST) providers by developing and delivering advanced technologies with the goal of redefining and positively enhancing the service delivery of HST.

One commonly used concept to meet such HST needs is One Call/One Click, launched and supported by the US Department of Transportation in recent years. However, as shown in Figure 2, HST services require coordination among various government and non-government entities. Along with institutional challenges associated with coordination, there are a lot of challenges associated with technologies enabling booking, payments and revenue apportionment/

Consumer with Mobility Needs Covernment

settlement/ reconciliation functions since there is no standard and open central technology platform to support such transactions.

Figure 2. Human Service Transportation One Call/One Click Vision from USDOT

In addition, while advancements have been made in technology, the application of newer technologies to solve transportation barriers is long overdue. While innovation is growing outside the transit industry with the emergence of ridehailing companies, only a small number of vendors offer transit-specific solutions. However, given the proprietary nature of these solutions, their applicability is limited in the context of ever evolving modern mobility landscape. Given limitations with closed solutions, agencies are restricted in adopting new technologies or innovative service delivery approaches. Also, when such integrations may be available, agencies generally find them cost-prohibitive, particularly when integration among various technology platforms is involved.

To meet such extensive service delivery needs and support the RTA's vision, RTA is planning a Mobility-as-a-Service (MaaS) platform (see Section 3.1 for further description of the concept) in the region so customers have a platform for discovery, booking, payments, real-time information and completion for theirs trips that may involve a mix of mobility modes including but not limited to public transit services, bikeshare, TNCs, third party shared-ride services, park and ride and parking. RTA is already underway in coordinating such mobility improvements in partnership with local mobility service providers in other counties, human service agencies, bike share, City of Dayton parking services and private sector partners such as taxis and Lyft, as discussed in Section 1.1.3.

1.1.2 Enabling Seamless Payments Experience within the MaaS Platform

An integrated payment platform is a key component of a MaaS platform to provide seamless mobility while customers travel across modes by utilizing the benefit of mobility packages¹ (explained further in Section 3.4). RTA's overall vision for the MaaS platform is to provide customers with an easy-to-use, integrated payment platform, that providers customers with streamlined, highly accessible payment options throughout the region, focusing on 100% contactless electronic-only payments. Also, such platform will enable apportionment, settlement and reconciliation of revenue among various providers that may be involved.

Several changes in policies and technologies related to payment systems, as discussed in Section 3, will be required to make MaaS successful in the region. Currently, RTA employs a flat

¹ Mobility package refers to a transportation service bundle that includes lump sum payment for various transportation services such as transit, park and ride, parking, taxi, carshare, bikeshare, TNC and other single use or shared-ride transportation modes and services. Payments for such packages/ bundles can be made either through a monthly subscription fees and/or through a pay-as-you-go pricing model.

fare policy for fixed route and demand response services, and accepts on-board payment by cash, token (to be eliminated by the end of 2018), and magnetic stripe passes. Pricing strategy for mobility packages, as discussed in Section 3.4, will build on current fare policy for transit payments to include other modes to enhance mobility experience of customers.

A portion of the agency's customer base (10 to 15%²) still uses cash as their means of fare payment. Through the implementation of new electronic payments platform, RTA has a goal of achieving cashless payments on-board all RTA fixed-route and paratransit, and partner vehicles by the start of 2020. Cashless payment target may be achieved by deploying various strategies such as promoting the use of electronic media for payments, building robust account reload infrastructure, and partnering with vendors such as PayNearMe for cash-dependent customers wanting to remain anonymous and unbanked/underbanked customers.

1.1.3 Solution Partners and Stakeholders

RTA has partnered with TransLoc to develop the central on-demand trip booking and operations management solution for the MaaS platform. TransLoc is currently on schedule to deliver this technology application for fixed route, bike share, TNC, taxi, paratransit and microtransit services by the end of 2018 and the remaining full MaaS suite by 2020.

IBI Group is assisting RTA with the concept development of the payments solution for the MaaS platform. The concept development work will be followed by a payments solution procurement and deployment.

The payments solution vendor will coordinate with TransLoc to provide a seamless trip booking and payments experience for customers. In addition, the payments solution vendor will create an open API ensuring the addition of any future third party trip booking application.

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Along with these solution partners, RTA currently has several key stakeholders as follows:

- State of Ohio Department of Transportation
- State of Ohio Department of Medicaid
- Miami Valley Regional Planning Commission
- Montgomery County Human Service Agencies
- City of Dayton
- Dayton Public Schools

- Bike Miami Valley
- B-Cycle
 University
- University of Dayton
- Sinclair Community College
- Wright State University
- Lyft and other local not-for profit and for profit mobility providers

1.2 Document Overview

The memo focuses on the details of an integrated payments system for customers while identifying other related technical and operational components of MaaS. Also, the memo discusses procurement and implementation strategies for various systems and components of the platform. The content is organized in the following sections:

- Needs Assessment: provides a summary of findings from the series of interviews IBI Group conducted with various stakeholders
- **Technical Concept:** provides a high-level overview of the technical and operational concept of the MaaS platform and provides further details of the underlying payment system platform
- **Procurement Strategy:** provides recommendations on potential procurement methods for systems and technologies that will have to be procured for the MaaS platform. The focus of the discussion, however, is on the payment system procurement.

² Cash usage for payments was 35-40% in 2017 but after recent fare policy implementation, pass usage has increased up to 80% and cash fare payment has dropped to 10-15%

• Implementation Strategy: provides a high-level implementation plan for design, development and testing of the payment system. Please note that the document does not discuss the details of MaaS implementation since some of those activities are already underway through TransLoc partnership.

2 Needs Assessment

2.1 Overall Findings

A series of telephone interviews were conducted with stakeholders from various departments at RTA to identify mobility and payments solution needs that supports the agency's vision and goals for a MaaS platform. The departments/roles represented include the Chief Executive Officer, Executive Management, Operations, Maintenance, Finance, Planning, Customer Service, Information Technology, and Communications. These sessions provided a high-level understanding of how the agency currently meets the mobility needs of its customers, the state of the current fare collection system and any of its limitations, and the prevailing desires for the future integrated payments system in order to meet the growing mobility needs.

Based on interview discussions, we have summarized high-level, agency-wide mobility and payments system needs under four functional areas: 1) Technology, 2) Policy, 3) Infrastructure, and 4) Data/Reporting. Figure 3 provides summary of these needs. A detailed discussion of these needs is provided in Sections 2.2, 2.3, 2.4 and 2.5.



Figure 3. Needs Summary

2.2 Technology Needs

Technology needs are primarily focused on developing an account-based back office that can help consolidate contactless electronic payments for all services offered by RTA and its partners in the region and support the payments need of the MaaS platform. Further details of such needs are as follows.

• Provide a flexible, account-based fare collection system that supports partnerships with other transit agencies, bikeshare, HST and transportation network companies: As part of the MaaS initiative, RTA is seeking to expand its service area beyond Montgomery County for customers and supplement its provisions with other transit and other local, regional and state mobility service providers through an integrated mobility portal for trip planning, booking, payment and real-time information.

In order to provide customers with a seamless transportation experience throughout the service area, an account-based payment solution should be provided so fare payment is independent of the electronic media carried by customers or vendor providing the payment hardware. Customers will be able to pay with contactless smartcards, smartphones (validation through NFC and Bluetooth), and other third party media.

Account-based solutions also providers the benefit of back-end integration through systemto-system token, eliminating the need for customers to carry a fare media for payments. This application may be possible for paratransit trips where payments for paratransit trips could be made through integration between payments solution back-end and paratransit software.

The account-based system should feature simple fare determination, issuance and collection across service providers. Specifically, the solution should support the integration of RTA's account-based payment system with back-office systems used by other public and private service providers that connect to and supplement RTA service in the region, including Link Bike Share (bike and bike station vendor is B-Cycle), City of Dayton parking meters, and other service providers.

• Consider the farebox as a cash drop box as customers move away from cash fare payment: Mechanical and electronic issues within a farebox often create service disruptions and can lead to decreased revenue in situations where service is maintained while fareboxes are nonoperational. Also, there is a substantial cost associated with cash collection. While eventual RTA goal is to completely move away from fareboxes, Title VI considerations require that unbanked and underbanked customers have a way to pay fare using non-electronic payment method.

As RTA slowly moves customers away from cash payment over the next couple years by implementing strategies for cashless payments, current fareboxes may get eventually treated as cash dropboxes. Doing so may involve modifying farebox components to convert current validating fareboxes (e.g., eliminating ticket processing units) into simple cash registering or non-registering fareboxes. Such modifications will significant help the RTA in reducing the number of road calls and the maintenance cost associated with current ticket processing units.

 Deliver back office revenue reconciliation for Medicaid services such as nonemergency medical transportation (NEMT) and other benefit-backed human services transportation: RTA would like to make it easier for individuals with disabilities, older adults, and people with low incomes to book rides and make fare payments electronically. Also, given RTA's goal of becoming the region's mobility manager for all things alternative mobility, this would also include HST and related coordination efforts. RTA is currently using Trapeze Pass for reservations, scheduling and dispatch with an integration to Clever Devices' Greyhawk for on board communications to the operator.

Also, RTA has been working with TransLoc to develop an open platform for on demand/mircotransit trip booking and dispatching as the goal is to move paratransit to a same-day on demand service model which is currently not implemented using Pass.

This would allow customers to book rides and make payments with the payment solution vendor platform through integration with the back-office component of the new accountbased payment system. Trapeze Pass, however, offers billing, cost allocation and reporting features that may not be available within TransLoc and should be reviewed as an option. This option should include the review of up front and ongoing costs and open integration considerations. Automated billing and reporting is critical for NEMT and other benefit backed human services transportation.

- Explore integration of tools and technology used by partnering contractor service providers, for future expansion: In order to effectively expand the region's mobility network with supplemental mobility services provided by private and not-for-profit agencies, onboard technology used for location tracking and dispatching, and fare payment should be determined to ensure that partnering systems can provide a seamless ride experience for customers. It is understood that the technology platform under development with TransLoc will also be made available to qualifying mobility providers who need these technologies in order to participate in the region's MaaS.
- **Operations Management Tools:** Real-time operations management tools (e.g., vehicle tracking and dispatching) will be critical for MaaS. RTA utilizes Clever Devices, Trapeze PASS and also intends to use TransLoc for on demand and mircotransit services but local partners may have their own operations management solutions. Particularly, services such as bikesharing, carsharing and parking have their own management systems. MaaS design should account for integrations with individual management systems such that transfer connection protection and real-time status of assets is available for multimodal booking, payments and real-time information.

2.3 Policy Needs

This category of needs refer to provisions for changes in current RTA policies to meet goals of the new payment system and MaaS framework. Key needs in this category relate to cashless payments, partnerships with local, regional and state institutions, removal of on-board sale of fare media and human service transportation management and coordination. Further details are provided below.

Transition to cashless payment in the long term: Cashless payment will eliminate several issues and pain points currently experienced by the agency, including high costs for cash processing and handling, high costs for cash collection equipment maintenance, service impacts related to farebox issues, and increased customer loading dwell time. Cash payment was estimated in 2017 at 35 to 40% which includes roughly purchase of 25% of passes (day passes) on board utilizing cash/coin. After recent fare changes were implemented in February 2018, cash payment has decreased to 10-15% and pass usage has increased up to 80%. Changes in policy of selling day passes on-board may further help with reduction is cash-based payments.

RTA will need to provide various cashless options to accommodate fare payment for a variety of customers, including those who want to remain anonymous, are unbanked and underbanked. At a high-level, cashless strategy will involve targeting customers by market segment and taking actions to move them towards cashless fare payment. One of the key actions will involve providing customers access to mechanisms (e.g., online portal) or locations (e.g., retail reload network) to load their fare accounts. RTA should review engaging and signing on additional retail outlets or contracting this effort out to a third party who can also assist in meeting Title VI related requirements in terms of outlets to identified populations.

• Partner with colleges/universities and large employers for pass and fare product management: RTA is interested in partnering with schools and employers to provide fare product integration with the entity's ID card, particularly in the context of offering a comprehensive mobility package through the MaaS portal. With an account-based system, student IDs linked to an Account ID within the payment solution could be used to validate

fare payment and for any other mobility service (e.g., bikeshare). Similar approach can be taken for accepting personal ID cards as fare media from large employers in the region. Future integrations may also include other transit agencies fare media and state issued ID cards provided by various state departments.

- **Minimize driver-passenger interaction:** Driver-passenger interactions should be reduced with the new solution, allowing drivers to boost efficiency with fewer fare related interruptions to focus on providing great customer service. Onboard sales of day passes, as well as other driver-passenger interactions currently performed with the farebox, should be eliminated with the new solution in order to meet RTA's goal of cashless on board payments by 2020.
- Manage fare distribution and collection for all human service transportation in the region: A significant portion of RTA's paratransit customers (35 to 40%) use Medicaid or other benefit-backed programs to pay for fares. In addition, customers traveling on benefit-backed programs are also taking fixed route services. It is estimated that on RTA services alone, over \$1M is spent annually on county social service agency related transportation. Currently, local human services agencies and not-for-profit purchase tickets from RTA and sell tickets at their facilities. In order to fully meet the goal of mobility manager for the region, the agency would like to streamline this payment process by allowing benefit-backed revenue to flow through RTA rather than through various human services providers and agencies, as in the current arrangement. This would allow the agency to more efficiently distribute fares and services, track revenue for related human services transportation programs in the region.
- Faster Boarding Process
 - Explore off-board payment validation options: With the fare collection system upgrade, RTA may explore opportunities to provide off-board payment validation in an effort to reduce dwell time at stops. Off-board payment, however requires proof of payment inspection which can be very expensive.
 - All door boarding: Make bus boarding seamless and reduce dwell time at stops by allowing bus customers to board through any door.
- Guarantee customers pay a fair price through a policy known as fare capping, a single fare option for all RTA mainline services, and new partnerships via MaaS with emerging mobility providers, so customers can choose the best mobility mode for their trip and know they'll pay a reasonable price. Fare capping is intended to compliment RTA's other option of a mobility package payment as outlined within this document.

2.4 Infrastructure Needs

This category of needs refers to improvements in internal and external system environments required to support payment and MaaS platforms. Further details are provided below.

- Eliminate Ticket Vending Machines (TVMs) or review the purchase or utilization of existing TVMs: The agency would like to review its options regarding the use of TVMs at major transit hub locations, in part to support access for customers paying by cash to buy fare media.
- Build a robust retail point-of-sales (POS) network for fare media sales and loading: RTA customers can currently purchase fare products at a limited number of TVMs and POS locations. In order to support the use of account-based fare media and its goal of going cashless, the agency will need to provide a range of fare product payment options. It will be critical to build partnerships with third party businesses that can support fare product sales

and loading throughout the agency's service area. POS locations should be accessible within close range of all RTA transit stops.

- **Provide Customer Loyalty Programs to support MaaS initiative:** RTA is interested in customer loyalty programs for the future MaaS platform. Goals for loyalty programs are to incentivize the use of transit, improve the agency's brand, and provide discounts or rewards for regular fare product purchases.
- **Partner with local attractions to offer pricing promotions:** The agency would like to partner with local attractions (e.g., museums, theaters, etc.) to provide benefits that promote transit service accessibility and local special interests.
- Provide payment options for unbanked customers: Cashless payment should not limit mobility accessibility for any customers. In order to transition to cashless payment, RTA must provide payment options for its unbanked customers and educate customers on the available fare payment options. As a result, RTA plans to review options such as implementing low income programs and fare capping to ensure access to fair and reasonable pricing with the new cashless payment solution.
- Partnership with Other Service Providers: As RTA looks to manage mobility throughout the entire 9-county region, the role of third party service providers from both public and private sector will be critical. With the availability of MaaS and integrated payments platforms, local transit operators in other counties (e.g., Greene CATS and Miami County Public Transit), local taxis and TNCs will be able to offer their services under a common platform. Also, as discussed earlier, partnership with parking service providers (City of Dayton downtown parking), bikeshare (Link Bikeshare), carshare (Zipcar in University of Dayton) and any other relevant third party services will enhance the mobility options available to MaaS customers within Montgomery County and across a 9 county region.

2.5 Data/Reporting Needs

This category of needs refers to needs for acquiring, managing and maintaining data from various systems and subsystems either currently operational or to be procured as part of the payment system procurement. Further details are below:

- Data Needs
 - Provide/utilize open data for Multimodal Trip Planning: RTA will utilize open data, either using standard formats such as General Transit Feed Specification (GTFS), GTFS-realtime, GTFS-Flex, General Bikeshare Feed Specification (GBFS) and upcoming demand response transactional data specification though TCRP-G16 project, or through standard and open application programming interfaces (APIs) from service providers.
 - Provide customer origin-destination-transfers data for better service planning: RTA's Communications, Planning and Service departments would like easy-to-access data on customer origin-destination patterns and transfers (commonly known as ODX data) to better inform service planning and marketing strategies throughout the agency's service area.
 - **Provide data for operational performance management:** RTA's technology solution partners should provide data as necessary for managing performance in real-time and for offline analytics. Such data include but are not limited to travel time, mode choice, trip completion/performance, and payment transactions.
 - Provide data for system performance: RTA's technology solution providers and other technology partners should monitor all systems and applications responsible for MaaS and payment solutions operations to obtain real-time health status of all

hardware, software and communications assets and alert appropriate personnel. Systems should provide necessary data for real-time and/or offline diagnostics and resolution of issues

- Reporting Needs:
 - Provide a central datastore and business intelligence (BI) solution for onestop-shop reporting: As shown in Figure 10, several systems and applications will be required for the MaaS operation. Each of those systems will generate enormous amount of data as mentioned above. RTA should plan to develop a central data store and BI tool to gain actionable intelligence on system and service operations and maintenance.
 - Interface among back-office systems: RTA is already utilizing central systems from Clever Devices, Trapeze, TransLoc and Genfare and some other back office systems to help with finance, maintenance management, customer service and other functions. With deployment of MaaS and payments solution, several other solutions will go live. As part of central data store development, RTA should plan to build interfaces between back-office systems and applications so the goal of onestop-shop reporting can be completed.

Particularly, as pointed out by Finance department, RTA should plan to build an interface between the finance/accounting system and new payments back office to allow RTA to easily to track accounts payable/receivables related to fare media/tickets sold to third parties and reconcile customer fare payment as well as billing, invoicing, and payment for any future partnership subsidy provisions.

3 Technical Concept

3.1 Introduction to MaaS

Mobility-as-a-Service is an emerging concept in the field of mobility and transportation services, and various interest groups and stakeholders have different definitions of and perspectives on MaaS. The MaaS Alliance, established as a public-private partnership at the ITS World Congress in 2015, defines it as *"the integration of various forms of transport services into a single mobility service accessible on demand"*. The Rocky Mountain Institute defines MaaS as, *"the ability to schedule vehicles and travel on an on-demand basis depending on the travelers' needs, seamlessly getting people where they want, when they want, how they want"*.

In essence, MaaS is a concept in which travelers have access to all public mobility and associated services through a single platform. This platform provides the framework for bringing together the various transportation services and associated payments so that customers can customize and choose from a mix of multimodal mobility options that best serve their needs. Figure 4 demonstrates a high level framework for a MaaS offering as defined by Transport Systems Catapult. As shown, the MaaS provider links the various transport operators, and their assets and services to the MaaS customers.



Figure 4: Developing the MaaS Offering (Transport Systems Catapult, July 2016)

There are various service models for MaaS concept and the application of those varies by geographic area and available population density. For example, core urban districts with high population density provide potential for high-frequency public transportation whereas rural areas require creative mix of public and private transportation services. Figure 5 illustrates how mobility context varies due to land use and population density by change in proximity to a city center.



Figure 5. Illustration of Variability in Land Use and Population Density in a Region by Proximity to City Center

Given a mobility context, agencies can adopt a suitable service model to become sole providers of all transportation services as a MaaS operator or identify a commercial entity as the MaaS operator to coordinate delivery of services from various providers in a geographic region. Those service models have their advantages and disadvantages. Holmberg et al (2016) explored the role of public transportation service providers in acting either as providers of the MaaS platform or as collaborators to a private MaaS provider. The study, however, was focused on the Swedish and European context. They identified likely advantages and disadvantages to each approach. They indicated that as a direct MaaS provider, a public transportation service provider may "design the service to maximise use of the existing public transport system, rather than maximising the service satisfaction of the customers", but would be able to provide "longitudinal stability (guaranteeing service existence in time) to the service, and lateral coverage (guaranteeing a regional coverage of the service)". In the case that a commercial private entity is the MaaS provider, they identified that they would "try to maximise number of subscribers to its service, rather than maximising the use of public transport" and the service would "most probably not have the same lateral coverage". However, private MaaS providers' customer base would "experience a well-functioning CMS service as very priceworthy and a higher willingness to pay for it".

One of the potential solutions offered in this study to balance the two was for the public transportation service provider to partner with the private commercial entity to provide the MaaS platform. RTA is pursuing the same approach which has also been identified as preferred approach in suburban/rural context by many researchers. RTA's RTA Connect service which already includes RTA-provided services and offerings from Link Bikeshare and Lyft can be enhanced to include other providers and for development of MaaS.

3.2 MaaS in RTA Context

As stated earlier, given the changing mobility needs in the Greater Dayton region and RTA being the largest transit agency in the region, RTA is planning to become the MaaS operator in collaboration with other service providers and technology partners.

This will allow RTA to meet its objective of providing or overseeing the widest available range of efficient public and private mobility services available to travelers, while still ensuring that services are equitable and fair. One of biggest elements of a MaaS framework is an appealing pricing structure for one or more "mobility packages." The mobility package includes various mobility options (in this case, primarily public transportation) accessible via a single payment either through monthly subscription or as they use the service. This payment model will provide customers an option to pay for all trips or activities within their travel chain through a single payment.

Figure 6 shows how key entities in the planned RTA MaaS framework will interface with each other.



Figure 6: RTA MaaS Framework

These entities include the following:

- **MaaS Provider:** Refers to both MaaS operator (RTA) and technology platform provider (TransLoc)
- **Data Provider:** Refers to all systems and application provider who will provide data necessary for trip planning, booking, real-time information and enabling payments. These systems currently include Clever Devices, Trapeze, TransLoc, City of Dayton, Link Bikeshare and human service agencies.
- Service Providers: Refers to public and private sector service providers that may include RTA, transit operators in other counties, taxis, bikeshare and carshare, parking, TNCs and other services.
- Customers: Refers to travelers who will use MaaS offerings,

A list of key stakeholders, as currently identified, is below:

- State of Ohio Department of Transportation
- State of Ohio Department of Medicaid
- Miami Valley Regional Planning Commission
- Montgomery County Human Service Agencies
- City of Dayton

- Dayton Public Schools
- Bike Miami Valley
- B-Cycle
- University of Dayton
- Sinclair Community College
- Wright State University
- Lyft and other local not-for profit and for profit mobility providers

Each of these entities will exchange data/information through open APIs. Customers will use services provided by providers using electronic payment media enabled by an integrated payments platform.

Given payment is such a key ingredient of MaaS framework, the key piece of the puzzle is a seamless payment platform enabling different mobility service providers to work together. The next section discusses how RTA's MaaS framework defines and is supported by the new payments solution.

3.3 MaaS and Payments Solution

The list of key stakeholders as outlined in Section 3.2, demonstrates various services provided to customers under the MaaS platform. There are a few key features of a MaaS platform that need to be closely coordinated and planned for in the design of the new RTA payments solution:

- Open and interoperable data
- Seamless payment
- Unified mobile and computing platform

Open and interoperable data

Over the last decade, the use of open, standardized, and interoperable data has become increasingly important in the transportation industry. The proliferation of schedule and real-time data through the de-facto standards GTFS and GTFS-realtime has contributed to a thriving and innovative industry of transportation and information service providers. The success of these has provided evidence of the value proposition of open, standardized, and interoperable data to transit. Further standards such as GTFS-Flex and GBFS have emerged in recent years to support flexible transportation, shared ride, bikeshare services. It has proven that private companies of all sizes can benefit from and build upon public agency data, while also providing benefits to transit agency users.

However, GTFS –like standards currently only support trip discovery (e.g., looking up travel options) and do not support transactional data exchange (e.g., trip booking, modification and payment). Due to such limitation, coordination among demand response service providers is not seamless. Transportation Cooperative Research program (TCRP) has undertaken an initiative as TCRP-G16 to develop such transactional data standard and will hopefully be available in time to be utilized by RTA for building the MaaS framework. One such standard has been developed and maintained by SUTI, formed as a non- profit organization in Sweden in 2002 to provide standard-based data exchange among demand response service providers. SUTI is very commonly used by providers in the Nordic countries.

The MaaS framework builds upon these successes, and relies on the openness and interoperability of data to provide an equal playing field for various transportation service providers. The development of various Open (or at the very least standardized) APIs therefore



needs to be a key feature of the future payments solution to ensure compatibility and integration with the MaaS platform.

Figure 7: MaaS Customer Services (Rocky Mountain Institute, 2015)

Seamless payment

There are various services provided under the MaaS framework and each of these services have their own associated payment processes and rules. For intermodal travel, the interaction of multiple travel services with each other introduces an additional layer of complexity. Users are typically most interested in the total cost of a particular trip, and not necessarily each element of the trip. In addition, user preference is typically for making a single payment using a single fare media, rather than separate payments for each service. This is the key to the MaaS framework and therefore, the payment solution system needs to be capable of handling the complexity of MaaS payments in the backend.

In order to make customer payment process seamless, RTA will have to implement several back-office integrations between new payment solution and other systems. Please refer to Section 3.5.6 for identification of such interfaces.

Unified mobile and computing platform

As identified by the MaaS Alliance, "In the MaaS ecosystem, the mobile phone or application will be the remote control and command centre for personalized mobility, replacing tickets and cash as unnecessary elements in the operations".

The MaaS framework relies on traveler use of mobile devices loaded with the MaaS application. The MaaS application is a front-end interface providing various features and functions to enable users to plan for, pay for, and validate their travel. Figure 9 demonstrates some of the various functions provided by the MaaS Operator to the users.



Figure 8: Functions of a MaaS operator (MaaS Alliance, 2017)

As illustrated, various functions related to payment and ticketing are a core part of the MaaS functions. The MaaS front-end platform is supported by a variety of back-end processes and systems that might be built and operated by multiple service providers, including processes and services that would be part of the payments solution. Where possible, it is important to present a single unified front-end interface to customers in order to make the process seamless to users. This will be vital to ensure in the Payment solution design and integration with the MaaS. RTA needs to closely integrate the MaaS platform in the backend and might consider open and standardized APIs to enable this integration.

Figure 10 demonstrates a proposed system architecture highlighting the three key components described above. The back office module identifies several key applications³ at conceptual level as necessary for enabling trip discovery, booking, payments, completion and real-time information. Actual configuration of components in the final implementation may be slightly different than the representation in Figure 10. These components include:

- **Trip Planning**: This component includes the back-office solution component that will combine open data (GTFS, GTFS-real time, GBFS, GTFS-flex and others) from transit service providers and bikeshare and open APIs from other service providers (TNC, parking, carshare) to present customers their mode options for a given origin and destination..
- **Dynamic Scheduling:** This component will allow customers to book their trips by integrating with scheduling systems of individual service providers. Also, this module will monitor trip performance and recommend changes to current booking to address circumstances such as missed connections and service anomalies that can cause delays for customers.
- System Monitoring: This component refers to automated health monitoring and selfdiagnostics capabilities
- **Usage Analytics:** This component will track trip performance data to understand mode choice and travel behavior. Particularly, RTA is interested in analyzing origin-destination-transfers patterns.

³ Note that the focus of this document is on payments solution and not on the actual MaaS components so further details of MaaS components are not discussed here.

- Resource Management: This component will track pertinent details related to driver, vehicle and other relevant resources required for completing booking, dispatching, customer information and payments.
- Analytics and Reporting: This component will include a central data store and business intelligence functionalities for real-time and offline analytics.
 - This component will provide additional data and analytics features for managing overall MaaS performance for predefined key performance indicators (KPIs)
- Connection Protection (implementation TBD): This component will interact with various operations management solutions (Clever Devices, TransLoc, Pass and third party systems) to ensure customers are able to timely connect between modes in the event of transfers.
- Account-based Payment (part of payment solution): As described earlier, this component will enable payments using RTA-issued contactless smartcards, mobile payments (NFC and Bluetooth) and potentially contactless bankcard based payments. Also, this component will allow integration with third party payment systems to accept and validate their media for payments.
- **Billing and Reconciliation (part of payment solution):** As stated earlier, NEMT and some other benefit-backed trips require billing of trips upon completion for payment. This component will interface with payment solution, trip booking/dispatching systems (TransLoc and Pass) and finance/accounting system to perform cost allocation, billing, invoicing and manage account payables/receivables.

Also, as Figure 10 indicates, following external elements will guide the overall operation of the RTA MaaS platform as follows:

- **Standards**: Standards include open data and other transactional standards (booking, payments, on-board data exchange, networking/communications)
- **Policy:** Policies and procedures related to operations and maintenance of a MaaS platform will play a prominent role in day-to-day functions and handling of operational anomalies. Policies should be reviewed based on system performance and if necessary corrective actions should be taken for improvements.
- Service/Business Model: As stated earlier, MaaS can be operated under different business/service models. RTA is currently pursuing a hybrid of commercial and public sector operation model. Additional details such as service agreements with partners/operators, customer loyalties, discounts/incentives are still under development. MaaS operation should be monitored and any necessary adjustments should be made for improvements.

The diagram highlights payment elements clearly shaded in brown color. The payment elements are key components of the Payment solution and present throughout, being a part of the user data stream, the MaaS back office, as well as the back end data APIs. As shown in Figure 10, while payment transactions will be handled in the back-office, payment transactions may originate with both customers and service providers (on behalf of customers). Transactions will be accomplished via open or proprietary APIs, as applicable.



Figure 9: MaaS and Payments Solution components

3.4 Pricing Strategy

MaaS framework provides a tool for the MaaS operator to offer value proposition to its customers to use services offered by its service providers. However, the appeal of the value proposition would depend highly on the bundling of mobility options and the available tiered pricing. The concept is very similar to other "as-a-service" commercial models available in other industries such as on-demand entertainment (e.g., Netflix), e-commerce (e.g., Amazon), document management (e.g., Dropbox, Box etc). One of the early implementers of the MaaS concept was done by MaaS Global through "Whim." An example of tiered pricing and mobility packages available through "Whim" are shown in Figure 11. As shown in the diagram, these packages basically enhance the services and benefits available through a common monthly pass RTA already offers and provide other services such as taxi, parking, carshare, bikeshare either for a discounted price or through all-inclusive package such as "Whim Unlimited."

	Whim To Go	Whim Urban	Whim Unlimited	
Monthly payment	Free	49€	499€	
Local public transport	Pay per ride	Unlimited Single Tickets	Unlimited Single Tickets	
Taxı (5km radius)	Pay per ride	10€ per ride	Unlimited	
Car	Pay per ride	49€ per day	Unlimited	
City Bike	Coming spring 2018	Coming spring 2018	Coming spring 2018	
Cancel anytime	\bigcirc	\bigcirc	\odot	
Add-ons incl regional HSL 🗸				
Add-on Car subscription	\bigcirc	\bigcirc	\odot	
Add-on HSL Regional	Pay per ride	+50€ per month	+50€ per month	
Add-on HSL Regional 3	Pay per ride	+100€ per month	+100€ per month	

Figure 10. Example of Mobility Packages (source MaaS Global)

While unlimited plans provide all-inclusive package, for pay as you go (PAYG) options, multimodal, multi-operator mobility services need to be presented as clear and concise options to customers to allow them to make a suitable mobility decision. This means that the complexities of pricing for individual services, transfer fees, discounts, and other benefits must be handled by the MaaS system and the payments system through software before being presented to travelers.

The MaaS system and the payments system together need to incorporate various services and processes to create trip itineraries, receive (and potentially negotiate) pricing information for each individual operator's service, and finally combine and present simplified pricing to customers. The MaaS and payments platform together need to be capable of sending itinerary data, receiving pricing data, and storing the data to inform future itinerary creation and pricing.

These data interfaces should be designed to be secure but open wherever possible to allow new service providers to provide mobility services.

The payments platform also needs to be capable of handling benefits programs so that the benefit pricing can be incorporated and presented to customers during the trip-planning process in form of discounts.

Loyalty programs should also be integrated within the same MaaS framework so customer rewards are accumulated and can be cashed according to programs and incentives as promoted by RTA as the MaaS operator.

Conceptual studies have also explored the potential to incentivize certain services in order to meet environmental, congestion reduction, financial, or other goals, and RTA may have to consider the incorporation of discounted pricing for these incentives in the MaaS and/or payment solution platform.

3.5 New Payments Solution

RTA's future payments solution will be an account-based system that will manage all fare accounts held by RTA customers, including both individual customers and customers associated with an institution. There are many benefits that the account-based system architecture may provide to RTA. These include:

- The flexibility provided in incorporating and integrating new fare media and in the future, such as mobile devices, smart watches, smart tokens, and other fare media that can store encrypted ID information;
- The ability to more easily implement new fare policies and programs through direct changes in the central software system, including strengthening or expanding retail programs, and implementing special event programs;
- The ability to link the account with other related services that RTA customers might use, including bike-share services, ridesharing services, car-sharing services, and other services.

Figure 12 defines an overall system architecture for RTA's future payment solution in the context of RTA's overall operational support systems.

The major system architecture elements shown can be categorized according to the following:

- Central Systems
- Vehicle Environment
- Fare Media
- Field Equipment
- Public Web Applications

These are described in more detail in the next sections.



Figure 11: RTA Payments System Architecture

3.5.1 Central Systems

The payment solution Central System should be comprised of various components and services that interact both with each other and with equipment and services external to the central systems to enable collection, management, and processing of fares.

The major components, as defined in terms of functionality, should include:

- Account Management This subsystem should enable the storage and management
 of all account related information for both individual customers, and customers linked to
 institutions or communities. This includes creation of new accounts, action list of
 accounts (positive or negative list), and setting account alerts.
- **Transaction Management** This subsystem enables processing of transactions and storage of past transaction information. The subsystem will be closely linked to the transaction processing gateway.
- **Apportionment/Settlement/Reconciliation** This subsystem enables revenue apportionment, settlement, and reconciliation with all the linked services and systems such as the demand response software and third-party services.
- Administration This subsystem enables the overall administration of the accountbased system central software. This includes monitoring of services and equipment, and configuration of systems.
- **Fund Processing** This subsystem enables storage and processing of funds associated with user and institutional accounts.
- Security This subsystem enables management of system and data security. This includes managing authorization and access to various systems and databases, threat protection and alerting features, and other security protocols necessary to ensure security.
- Fare Media and Product Management This subsystem enables the management of fare media and fare products offered to customers, including managing good and bad lists of fare media, and defining and implementing the fare policies and rules defined by RTA.
- **Discounts/Benefit Management** This subsystem enables the management of discount and benefits programs for transit users, including defining and implementing the discount and benefit programs, policies and rules defined by RTA.

In addition to the above components, a data store and integrated Business Intelligence (BI) and reporting services should be included to enable future data integration, analysis, and reporting. These will also allow RTA to make use of data mining and machine learning processes to improve the payment solution and MaaS services in the future.

3.5.2 Vehicle Environment

The onboard system components of the fare collection system should include:

• **Fareboxes** - The existing fareboxes will continue to be maintained (not replaced) in the short-term to issue single (cash) fares, until the eventual discontinuation and full decommission of cash/coin fareboxes by 2020. The existing fareboxes are also being used for magnetic ticket-based payments. RTA should coordinate with those customers to convert them to smartcard media by incentivizing smartcard use.

 Onboard Validators - All vehicles should be equipped with onboard validators that validate contactless smartcards, NFC and Bluetooth mobile payments, digital wallets like Apple Pay or Google Wallet, and a new contactless RTA-issued smartcard. The validators should also have the capability to provide contactless EMV cards which may be enabled in the future. Each vehicle should be equipped with at least one onboard validator installed near the front door, and for dual door vehicles, RTA will also considering the evaluation of an onboard validator installed at the rear door for faster boarding.

While most payment for paratransit customers can be accomplished through system-tosystem token in the back-end by developing an interface between paratransit software and payment solutions back-office, RTA will equip paratransit vehicles with validators since first and last mile and future microtransit customers will be accommodated on paratransit vehicles.

3.5.3 Fare Media

The RTA payments solution will be built around the account-based system functionality and therefore should be able to natively support multiple types of electronic fare media that are capable of storing account identifier. The primary supported fare media should be at least the following:

- **Mobile Fare Payment Application** RTA customers should be able to download a RTA-branded mobile application in order to purchase fare, and act as fare media. The mobile application will provide NFC or Bluetooth validation of mobile tickets and passes. The mobile application will support single- and multi-use products, as well as mobile payment products.
- Physical Smart Card Media RTA customers should be able to procure contactless smart cards as fare media. The smart cards will only store an account identifier⁴., and customers should be able to reload fare value, tickets, and passes to their associated account through either the public web portal, or through the RTA partner retail locations that support reloading of smart cards.
- 3rd Party Media The payment solution should support third party media. Third party media may be ISO 14443 (Type A and B) compliant contactless smartcards, mobile tickets, wallet based media (Apple Pay, Samsung Pay, Google Pay etc.). Validation could be enabled via contactless smartcard readers, Bluetooth and NFC. Depending on the service (transit, bikeshare, demand response, TNC etc.), different levels of authentication and validation may be needed when customers present media at a validator.

3.5.4 Field Equipment

The field system components of the fare collection system should include:

 TVMs – RTA currently has five TVMs located at major transit hubs that accept cash and credit cards. RTA does not plan to acquire any additional TVMs, but replace or utilize existing TVMs to be upgraded and integrated into the account-based central system, if

⁴ Note that while secure cards such as MIFARE DESFire can encrypt customer data such as account ID, Account-ID is not always required to be read by the validator to authenticate fare media. Validators can read card serial numbers (CSN) from smartcards (e.g., implementations at Utah Transit Authority (Salt Lake City) and The Rapid (Grand Rapids), which are not stored in secure storage and use that information to verify fare media since CSN is linked to a unique account in the back-office. This approach, however, is not preferred due to security reasons since CSN can be easily spoofed. RTA will conduct further design-level discussions to adopt the best media and account identification/authentication approach for this implementation.

possible. The upgraded or replacement TVMs should support reloading of physical/contactless and NFC compliant mobile devices and smartcards.

3.5.5 Public Web Applications

The public web application components of the fare collection system should include:

• **General Public Fare Portal** - The Public Fare Portal should enable customers to purchase fare media and fare products, manage their fare accounts, review fare program rules, frequently asked questions, and receive online customer service. This portal should enable RTA customers to perform fare media self-service, including remotely updating their accounts, viewing transaction and trip history, and reporting lost cards. Customers should be able to connect checking, credit and debit card accounts for account replenishment needs.

In order to comply with Title VI and equity provisions to account for unbanked and underbanked customers, RTA may implement policy for customers to either physically pay by cash at a customer service location or mail checks for account replenishment needs.

- **Transit Benefits Program Portal** The Transit Benefits Program Portal should allow transit benefits program users to manage their benefits programs and services. This portal should provide transit benefits program users manage benefits accounts, view benefit information, and provide other benefit program self-service features.
- Institutional Program Portal The Institutional Program Portal should allow institutional users and community managers to manage institutional accounts and the associated pass programs and services. This portal should allow institutional users to remotely add or update their user accounts, view their billing information, and provide other institutional self-service features. This should also include HST agencies such as Jobs and Family Services in order to load, register or qualify their clients within the backend system of the payment solution.
- **Retail POS Portal** The Retail POS portal should enable retail merchants to manage sales and reload of fare media and fare products. RTA will review relationships with companies like PayNearMe, and the Retail POS may be integrated with these companies to enable cash-based fare payment options, ensuring equal access for all customers.

3.5.6 Communications and Interfaces

The communications interfaces are envisioned to be a key element of RTA's Payment solution. Designed as standardized (or at least published) application programming interfaces (APIs) enabling specific functional elements, these interfaces should be used to integrate both existing and future technology without any need for significant changes or costs to the central system software and services. The APIs should be designed either as open (wherever possible) or closed interfaces depending on the data sharing requirements and would include any protections required for information privacy, data security and system security.

All closed solution options should be reviewed in depth prior to integrating to the new system, ensuring the overall open and flexible goal of new payment solution is met.

Some of the sets of APIs envisioned would include:

• Fare Payment APIs to enable payment of fares with a variety of media and through other service providers (e.g., demand response service, parking, bikeshare, TNC).

- Fare Validation APIs to enable validation of fares.
- Account Information APIs to enable users to access information about their respective accounts, and to enable account information exchange between systems.
- Customer Information APIs to enable customers to access information about RTA services and fares and transactional usage information.
- Institutional Services APIs to enable institutional users of RTA's fare collection system to manage their accounts.

The APIs should also be designed to enable integration of other existing and future systems with the account-based fare collection system. These would include bike sharing programs (such as the Link bike share system), parking management, customer information, trip-planning, and other programs.

The envisioned payment solution will utilize a (primarily) online communication network with realtime or near-real-time connectivity to all devices, but will also include provisions to maintain operation when devices and systems are offline for a period of time. A customer with valid fare media must be able to travel through the transit network regardless of whether devices are or are not online. Customers who need to add value or purchase products may however require network connectivity. The payment solution should be designed to minimize transaction times and end-user interfaces should be designed to indicate to customers if devices are offline if the network connectivity in any way impacts their service.

4 Procurement Strategy

As stated earlier, MaaS will consist of several distinct vendor systems/technologies to support functions such as trip planning, booking, data management, real-time information and payments. Providers of these systems/technologies may or may not respond to a single RFI or RFP. We understand that TransLoc has already been working with RTA to provide at least trip planning, booking and real-time information for paratransit, microtransit, demand response and flex services. Thus, RTA can continue to work with TransLoc to advance features as relevant to the MaaS platform discussed in this document. However, a separate RFI or procurement may be required for at least the payment functionalities. Also, TransLoc may need some assistance in data aggregation and management capabilities and that requires further discussion with them. We recommend that the following steps are followed for procurement of technologies relevant to the MaaS platform:

- Continued engagement with Transloc to enhance required features for RTA MaaS
- If needed (if TransLoc cannot provide), request for proposal for a data aggregation and management platform
- Vendor survey and request for proposal for an account-based fare collection (payment solution) system provider.
- Request for proposal for physical smartcard media
- Request for proposal for a customer relationship management (CRM) software

4.1 Request for Information

Given the extent of fare system features and integrations required for MaaS and ever growing mobile payment marketplace, we recommend that RTA should conduct an industry survey of vendors. The key goals of the request for information (RFI) process should be to determine:

- Vendor capabilities in providing an open API-based and flexible account-based payment platform that supports integration with third party systems and services
- Vendor experience with payment in a multi-modal system which can include bikeshare, fixed route, paratransit, microtransit, parking solutions, third party providers and demand response service environment
- Vendor capabilities in reducing dwell time through innovative and faster on-board validation
- Flexibility in procurement methods and pricing, and support for concept such as paymentas-a-service
- Vendor experience in helping agencies achieve reduced cash payment targets

While the objective of the RFI should be understand vendor capabilities and not vendor selection, RTA may choose to launch a pilot program with one or more of the respondents. Potential for a pilot program as an outcome generally enhance the chances of getting a better response to an RFI. Also, such approach can reduce the time it can take to get a vendor selected through an RFP process. If RTA intends to engage with any vendor for pilot program(s), functional and performance requirements, evaluation criteria for RFI evaluation and terms and conditions for the pilot program should be included in the RFI scope.

4.2 Request for Proposal

Once the comprehensive definition of functional and performance requirements of a payment solution is complete, RTA may issue a request for proposal (RFP) to select a vendor. The RFP should follow typical procurement process as established by RTA for technology procurements. Contract terms and conditions should be determined and included such that while provisions mandated by funding entities (FTA, state or local entities are included), there are incentives for a wider range of vendors to respond to the RFP. RTA should conduct a careful due diligence of proposed systems per at least the following criteria:

- Technical capabilities of the proposed solution to meet project goals and objectives
- Product life cycle, expandability, reliability, maintainability
- Vendor and proposed team qualifications and experience
- Time required to implement the system and terms and conditions for vendor support and maintenance
- Total cost of ownership

Once responses are received, RTA should conduct technical and financial review of proposals and shortlist vendors for interviews. RTA should also talk to other agencies using proposed systems/solutions and, if necessary, should conduct site visits to understand system capabilities and limitations. Based on the results of the proposal evaluation, interviews, reference checks and request for best and final offer, RTA should negotiate contract with a vendor. RTA should define service level agreements (SLAs) to incentivize or penalize the vendor during the operations and maintenance phase of the contract.

5 Implementation Strategy

5.1 Implementation Plan

While payment solution implementation should follow system engineering process, the project team should adopt a more agile approach given the nature of this deployment that involves supporting a MaaS platform, which itself is currently under development. The following subsections provide a high-level overview of the process to be followed:

- Iterative Design: As stated earlier, while functional and performance requirements can be determined other details cannot be definitive given the MaaS platform will continue to be developed as payment solution procurement is underway. Thus, an iterative approach should be adopted where selected payment solution vendor works closely with TransLoc and/or other third party service providers to finalize the technical design per individual needs of third party systems. Once all technical details have been determined, the payment solution vendor will have to develop and demonstrate proof of concept before the design is finalized.
- **Development/Configuration and Factory Test:** Once the design and proof of concept is approved by RTA, the payment solution vendor should proceed with configuring system to RTA needs. Once the system is configured the payment solution vendor should demonstrate system functionalities on a test bench in a controlled environment, either at the vendor lab or at RTA offices, as determined by RTA. Before payment solution vendor can proceed with installation, RTA should approve the demonstration in the controlled factory test environment.
- Installation, Testing and Acceptance: Once factory test demonstration is successful, payment solution vendor should install central system and limited units of on-board validator hardware to demonstrate end-to-end functionality. RTA can choose its staff to test the system for a defined period of time (e.g., 2-4 weeks). Also, any third party interfaces (bikeshare and parking) should be tested.

Based on the results of the testing, validator installation should be rolled out to rest of the fleet. Once the full rollout is complete, all functional and performance requirements should be verified. Once successful demonstration is complete, RTA should grant the system acceptance.

- **Go-Live:** Initial go-live should be planned with a limited set customers and community representatives and any issues should be addressed before launching the system for all customers. Go-live should be planned with Customer and Business Development departments to ensure customers understand all the features at the launch and are able to use the system as intended.
- **Operations and Maintenance (O&M):** O&M is the most critical phase of the system. As stated earlier, the Vendor performance should be monitored based on pre-defined SLAs. Roles and responsibilities for system operation and maintenance should also be defined in an O&M plan to ensure RTA staff and vendors are able to perform required functions as necessary to keep the system operational while maintaining desired standards for reliability, availability and maintainability.

5.2 Phasing and Schedule

New payments solution will be a multi-year implementation. The following phasing should be followed for the deployment:

- Phase 1 (FY 2019)
 - Installation of validators and account-based back-end on fixed-route and demand response vehicles
 - Launch of contactless smartcards, mobile tickets, wallet based media (Apple Pay, Samsung Pay, Google Pay etc.)
 - Launch of public fare portal
 - o Integration with on-demand systems (TransLoc and Pass) and MaaS platform
 - o Integration with financial institutions (current, Fifth Third Bank and First Data)
 - o Back-office integrations with finance and accounting systems
 - Limited use of farebox
- Phase 2 (FY 2020)
 - Integration with third party payment systems
 - Integrations with third party service providers and service operators from other counties
 - o Implementation of institutional and discounts/benefits portals
 - Cashless strategy implementation
 - Policy revisions
 - Implementation at market segment-level (e.g., approaching universities, human service agencies and large employers)
 - Farebox 100% phased out
 - Retail reload network
 - Implementation of central datastore and BI

Some implementations may go beyond FY 2020. A detailed schedule will be developed after requirements for individual system components are well established.

At high-level the following schedule will be followed for Phase 1 deployment in the context of release of RFI and RFP:

- Release of RFI: March 2018
- Response from vendors: May 2018
- Presentations from RFI respondents: June 2018
- RFP released for new payments solution: September 2018
- Award payments solution contract December 2018
- Payment system installations June 2019
- Initial payments solution phase completed: December 2019

6 References

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