# MOBILITY ON DEMAND (MOD) PROGRAM

## Mobility Marketplace: Integrated Electronic Payment Systems

## Payment Systems as Part of MOD Marketplace

### Relation to Mobility Marketplace

A Mobility Marketplace is a digital platform that integrates multimodal supply for personal mobility and goods delivery services into a trusted venue for consumers to plan, reserve, and purchase services that meet their current needs. Implementing a Mobility

Marketplace with an IEPS allows a traveler to pay for an entire trip generated by the Mobility Marketplace's trip planning engine, encompassing multiple modes and payment methods. At its core, the IEPS relies on subsystems that integrate end-to-end trip planning, booking, electronic ticketing, and payment services across all modes of transportation, public or private.

### Connection to MOD Vision

The use of electronic transactions allows for flexibility in delivering goods and services to reach the maximum number of users, while the integration of these services into a single payment platform minimizes friction for consumers whose journeys may encompass multiple modes, service providers, and payment media in a dynamic travel environment. By providing travelers with an easy and trustworthy means of choosing and paying for an entire multimodal trip chain with a single click, the IEPS forms a central element of the Mobility Marketplace. It also is key to fulfilling the U.S. Department of Transportation's MOD vision—to leverage innovative technologies and public-private partnerships to provide safe, reliable, and seamless mobility and goods delivery for all users.

## Electronic Payment Systems

The transportation industry employs a variety of electronic payment systems across various transportation services, such as tolling, transit, and parking. In the early 2000s, transit agencies began adopting electronic fare payment systems where riders could wave a "smart" pass or smartphone app in front of an electronic validator before boarding transit vehicles. These fare payment systems can enable common payment instruments across a region for services when coordinated among different transit service providers. Agencies have also begun adopting cashless solutions and electronic payment systems for transportation services such as parking and tolling. Similarly, private mobility service providers, such as dockless micromobility and transportation network companies, rely mainly on electronic transactions and ticketing to process booking and payments through mobile apps.

## Integrated Electronic Payment Systems (IEPS)

Emerging fare payment technologies using mobile devices and third-party contactless media and e-ticketing solutions provide opportunities to integrate payment methods into a single solution. An IEPS allows a traveler to pay for an entire trip generated by the multimodal planning tool, encompassing multiple modes and payment methods. The IEPS could be embedded within a mobile app or made accessible through an application programming interface (API) or from a kiosk in a transit station.
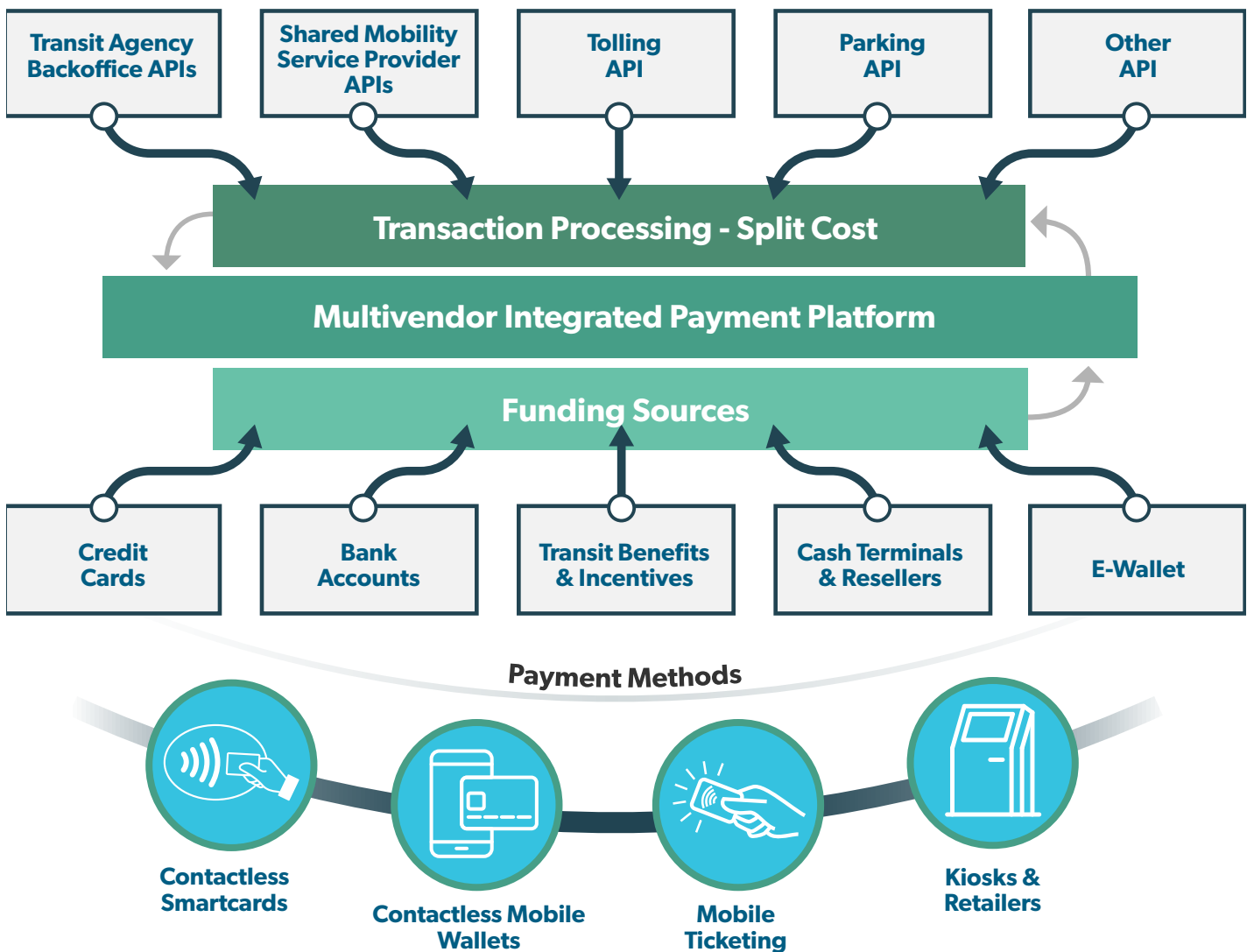
## Technical Considerations

An IEPS begins with the multimodal trip planning engine's integration of functionality to calculate fare(s) based on a user's trip parameters, where the cost for each mobility provider and each leg of the journey is calculated. When the user selects the desired trip option and opts to pay for their trip, the payment request (utilizing the user's desired method of payment) is sent through the secure multivendor integrated payment platform, as shown in Figure 1.

**Figure 1**: MOD Marketplace IPES High-Level Architecture (Source: U.S. DOT)

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As multiple vendors can potentially be included in a journey, the secure payment platform has the capability of communicating with payment APIs from various shared mobility service providers, transit agencies, tolling agencies, parking providers, and any additional providers participating in the Mobility Marketplace to ensure processing of secure, encrypted payment transactions. The IEPS should be agnostic to a user's selected method of payment, whether the method is a credit, debit, or stored transit value card or the use of transit benefits, cash value loading, e-wallet, or other method. The app notifies the user of the success or failure of the transaction so that they may act, as necessary. The transaction can then be split among the various providers so that proper payment can be applied for the user's journey. Lastly, an added benefit for public agencies of this architecture is the system's ability to monitor modal utilization and conduct later analysis and systems optimization. For additional details on these technical considerations, see Section 5.2.8 of the Mobility Marketplace Concept of Operations (FHWA-JPO-20-822).

## Challenges and Opportunities

IEPS implementation faces several challenges including issues related to implementation, such as economic, financial, or social considerations, and to technical deployment. In many cases, there are clear opportunities to meet such challenges. For example, any service that includes unbanked and underbanked users would require alternate methods of payment for mobility services, as payment via credit or debit card may not be an option for these consumers. To address this, the system may offer cash-reloadable cards or accounts, which may be filled at retailers or curbside kiosks. Similarly, for services that require end users to use a smartphone to plan or pay for MOD services, consumers who either cannot afford or do not wish to have a smartphone would have limited access. To meet this challenge, the service could provide accessible kiosks, websites, and web apps, as well as integrated call centers, to allow planning and payment options for users who do not have access to smartphones.


Photo Source: U.S. DOT

# MARKETPLACE: INTEGRATED ELECTRONIC PAYMENT SYSTEMS


Photo Source: U.S. DOT

Other challenges may depend on the specific architecture of an IEPS implementation. For example, a true, multimodal trip planner engine is still at the early stages of technology maturity and would require further advancements to cover all mobility options in a trip chain. However, while complete and accurate trip chain options are crucial in structuring fare payment in pay-as-you-go models, they are substantially less critical for subscription-based services. As available technologies are developed and refined, new solutions and opportunities may emerge to meet existing challenges.

For more information about this initiative visit https://www.its.dot.gov/research_archives/mod/index.htm, or contact:

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