

The background of the slide is composed of several overlapping geometric shapes. A large light blue triangle points from the top right towards the center. A medium blue triangle points from the top left towards the center. A dark grey triangle points from the bottom left towards the center. These shapes overlap to create a dynamic, abstract composition.

The Missing Link in Interoperable Transit Payments: Scalable Price- Adjusted Transfers

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1. Executive Summary

This paper summarizes research findings on approaches to enabling price-adjusted transfers between two transit agencies using contactless open-loop payment systems. These approaches enable customers paying their fare by tapping bank cards (credit or debit cards) or mobile wallets on a validator/Point of Sale Terminal to tap the same bank card at another agency and receive a discounted or free trip, without downloading an app or pre-purchasing a ticket.

2. Context, Problem Definition and Opportunity

Three years ago, the California Integrated Travel Project (Cal-ITP) through the Department of General Services (DGS) made available Master Services Agreements (MSAs) for contactless payment validators, transit processing software responsible for back-office fare calculation and acquiring services to allow any transit agency in the United States to accept contactless payments. Cal-ITP focused on contactless payments to provide a consistent customer experience across different transit agencies across California, without requiring separate dedicated apps or agency-specific payment cards. Since launching in 2021, contactless payments have quickly become a widely adopted payment method in the United States not just for transit payments, but for all types of transactions.

Many transit and rail agencies in California offer price-adjusted transfers. Price-adjusted transfers can include agreements between agencies that allow riders to transfer to a second service for free or at a reduced fare (e.g. \$2 off). These agreements have traditionally been honored through visual validation of tickets bought from either agency, or when both agencies share the same transit processor who provide a custom solution to facilitate these products, as has been the case traditionally in large regionally integrated fare networks.

Identifying approaches to offering price-adjusted transfer is a key piece to fulfilling Cal-ITP's vision of seamless, interoperable fare payments across California. The goal is to enable travelers who use contactless payments to move across services provided by different transit agencies and receive price-adjusted transfers, including regional fare caps. We distinguish these price-adjusted transfers from discounted fares, which are typically offered to eligible rider groups such as seniors.

This paper outlines different approaches to price-adjusted transfers and highlights considerations for agencies and suppliers implementing this capability. It does not recommend a single specific path, as different use cases may call for different approaches.

3. Methodology

This research was informed by a series of interviews conducted in late 2024 and again in early 2026. Interviews were held with a sample of fare collection suppliers and broader transit payment ecosystem parties that are (1) providing services in California, or (2) have expressed interest in offering these services at industry forums. The interviews were designed to capture a range of technical, operational, and commercial perspectives on enabling price-adjusted transfers in an increasingly modular contactless payment environment.

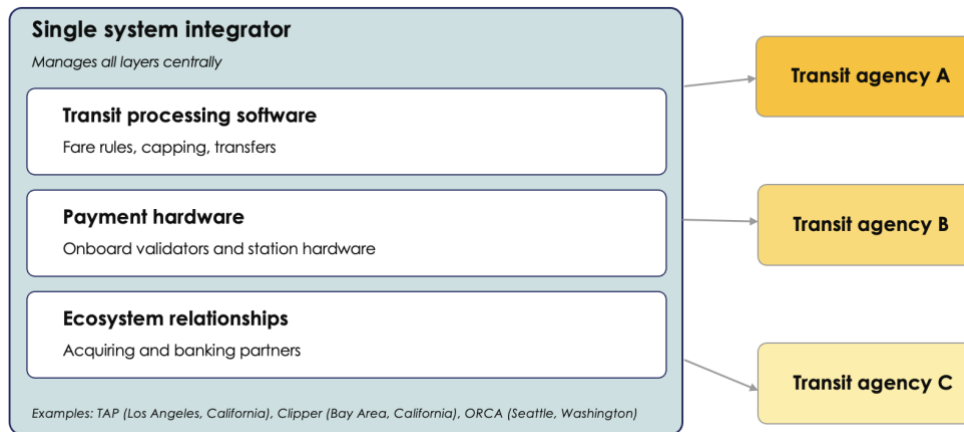
The effort was initiated following discussions with multiple transit agencies in California who expressed a strong interest in enabling free or price-adjusted transfers with their regional peer agencies. These requests to Cal-ITP highlighted the demand for this fare product offering and the desire to address some of the existing gaps in the contactless payment acceptance market. As a result, this white paper reflects a synthesis of industry expertise and agency-driven requirements, with the goal of identifying viable approaches to achieving interoperable transfer capabilities across disparate systems.

4. Evolution of Modularity

4.1 Integrated Regional Fare Systems

Traditionally, fare collection suppliers have enabled features such as free or discounted transfers, fare capping, and discounted fares within the confines of a single, proprietary and bespoke back-office system. This model can be seen in larger regional fare systems such as TAP in Los Angeles County, Clipper in the Bay Area, and ORCA in the Seattle region. In each of these examples, a single system integrator is responsible for implementing and managing the transit processing software, the payment validators, and other ecosystem relationships (e.g.: acquiring) required to enable fare products across multiple transit agencies.

Figure 1 - System Integrator Managing a Regional Fare System



4.2 Hardware Diversification with a Shared Back-Office

In large part due to the efforts of Cal-ITP, some transit agencies are moving to a more modular approach to fare collection. More multi-tenant software solutions have started appearing and have gained momentum in the market, encouraging more standardized requirements at the agency level and making the cost of procuring fare collection systems cheaper overall.

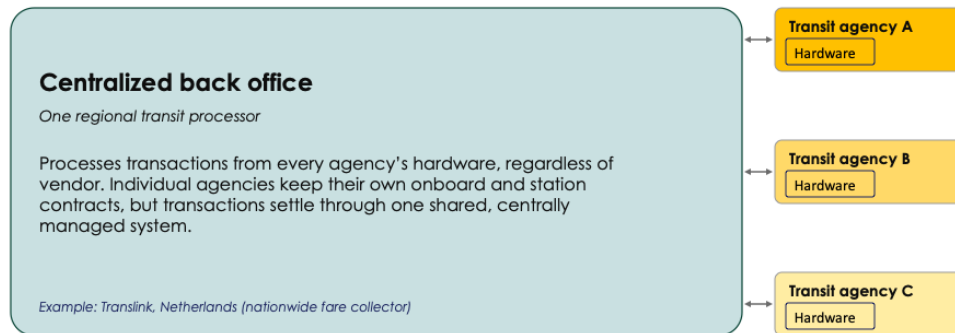
Within a single region, a common scenario is multiple transit agencies employing different hardware providers that are integrated with one regional transit processor. Because these systems are typically managed at a central level, participating transit operators can procure hardware from a variety of suppliers based on shared requirements and include integration with the system integrator in their contracts. An example of this model is Translink (the nationwide fare collector) in the Netherlands. Individual transit agencies have their own contracts for hardware onboard vehicles and in stations, but transactions are processed through a centralized back office.

This model also applies to agencies that maintain separate contracts with the same transit processor supplier. In this case, it would be agreed at the regional level that the same transit processor will provide fare calculation and business logic capabilities to the agencies separately, but their selection as a supplier comes with the contingency that they can provide price-adjusted transfer capabilities across agencies.

Figure 2 - Central Back-office with Multiple Hardware Providers

Hardware diversification with a shared back office

Agencies choose their own hardware vendors; one shared back office processes every transaction.



4.3 Coming Next: Different Back-Offices

The previous examples highlight how agencies could achieve price-adjusted transfers amongst themselves, but they depend on a single supplier for transit payment processing. Today, we are seeing a shift towards modularization, including the ability for price-adjusted transfers across transit agencies that do not have the same transit processor. Suppliers are increasingly specializing in either hardware (e.g. fare validators, kiosks) or software components, and new entrants are joining the market. There is a consequent opportunity for innovation to foster a 'best-of-breed' approach that allows agencies to create joint fare products that encourage ridership and improve accessibility, even when agencies do not share a back-office.

This paper outlines a path towards this next stage of modularity by presenting ways to connect different transit agency back-offices and provide customers with price-adjusted transfers when using contactless open-loop payments. In this scenario, transit processors share tokenized transaction information in a way that allows customers traveling across two or more public transit operators within a regional transfer scheme. Customers who meet pre-set criteria such as using a partner transit agency within a specified time may receive a free or discounted transfer.

The following sections explore potential approaches to do this.

5. Presenting different price-adjusted transfer models

The primary challenge with enabling price-adjusted transfers is the need to share transaction data across one or more transit payment when a customer taps their bank card at each transit agency. Agencies accepting contactless payments need to meet data security requirements governed by the Payment Card Industry Data Security

Standards (PCI DSS), which is designed to ensure that payments made with credit or debit cards occur in a secure environment that protects cardholder data.

All entities involved in the payment ecosystem have a role to play in complying with PCI DSS. Back-office providers commonly meet compliance through tokenization, by replacing sensitive data with a non-sensitive token. Different suppliers typically implement these protections through proprietary token management architecture and controls, and do not share their underlying methodology to protect both their system security and intellectual property. Therefore, establishing a way to exchange customer payment information without exposing proprietary methods is a key challenge in enabling price-adjusted transfers across agencies with different transit processors.

In addition to the technical arrangements required to facilitate secure payment information exchange, a range of operational and governance considerations need to be considered. These include defining customer care responsibilities during transferred trips, establishing processes for fare reconciliation, customer transaction disputes, fraud and abuse prevention resulting from cross-operator disputes, and allocating commercial responsibilities among participating agencies and their suppliers.

Cal-ITP identified two viable paths for managing these technical and commercial considerations.

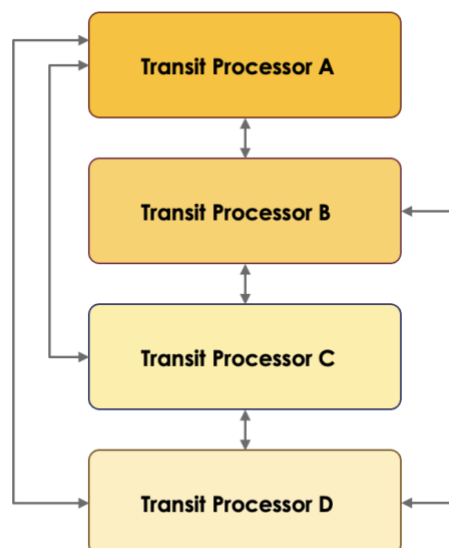
5.1 Option 1: Direct connection between back-office suppliers

In this scenario, transit processors agree on a mechanism to identify eligible transfers across their respective systems. This typically requires a shared data exchange environment, such as a joint database where transaction events are logged and evaluated against predefined transfer rules. Transfer rules may include factors such as the transfer time window, travel modes used, and transfer sequence (e.g.: operator A to operator B triggers a free transfer, but not the other way around). This shared database is periodically matched against the transfer rules to identify eligible customers and apply any fare adjustments as necessary. Implementing this approach requires agreement on database setup and access responsibilities, data-sharing agreements and protocols, as well as other commercial arrangements.

This approach requires a degree of coordination between suppliers on data structure, data exchange timing, interpreting the different tokens across systems, and most importantly commercial arrangements on implementation and fare adjustment application. Beyond development and implementation, this may involve near real-time data exchange, or a shared agreement to end of day price-adjustments via batch processing and aggregation. Each of these options comes with its set of customer experience impacts and system complexity.

This scenario is best suited for regions with a small number of operators and transit processors, where the complexity of multilateral arrangements is manageable. As additional transit processors or agencies are introduced, the model becomes progressively more complex due to the additional integration pathways and coordination needed, ultimately posing financial risk for operators and vendor-lock in.

Figure 3 - Direct Integrations Between Multiple Transit Processors



5.2 Option 2: Central Management Service

The Central Management Service (CMS) refers to a middle-layer that connects to multiple transit agencies' transit payment processor across different suppliers. It functions as a control center that ingests tap transaction data from multiple suppliers and provides the necessary outputs to apply a price adjustment.

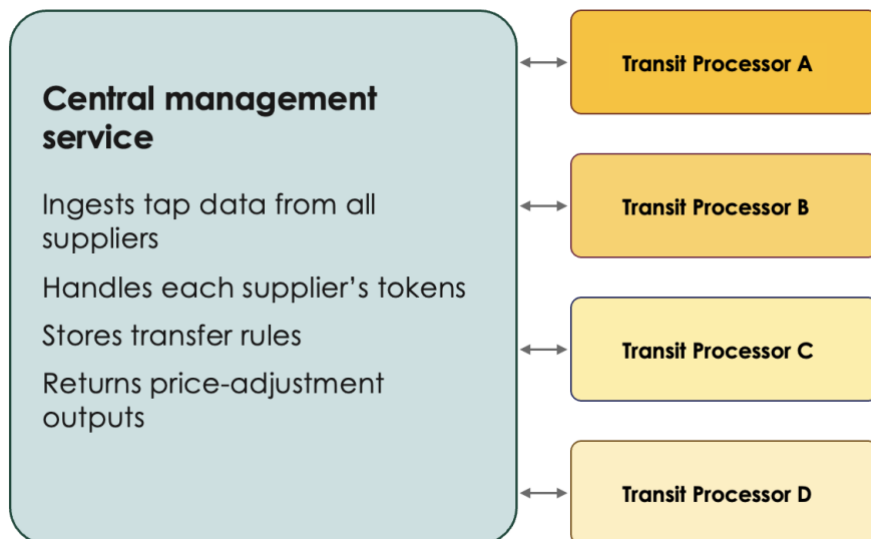
In a multi-vendor ecosystem, especially one that includes more than two transit payment processors, this model reduces complexity in scenarios where transfers between different operators are happening on a many-to-many basis. Rather than requiring direct integrations between each pair of suppliers, the suppliers integrate once with the CMS rather than with each other. This architecture streamlines onboarding of new participants, supports wider scalability in regions with multiple operators and suppliers and encourages innovation by right sizing the number of solutions a vendor must specialize in.

Functionally, the CMS must be able to handle tokens from multiple suppliers, store transfer criteria or rules, and communicate with the back-offices to enable them to apply a price adjustment. Similar to the direct integration option, it may operate in near real-time or do so through aggregated transactions that charge customers at the end of a set period (e.g.: one day).

From an ecosystem perspective, this model introduces a new role responsible for managing this central service. For example, Littlepay was recently selected [to develop a 'Central Broker' platform](#) that connects multiple operators in the West Midlands, UK. The platform is set to be implemented in 2027. Procuring it as a separate service reduces commercial conflict between suppliers when first deploying price-adjusted transfers and ensures you can switch transit processors (e.g.: when a system

modernization effort takes place) without requiring further direct integrations between the different transit processors or impacting the broker function.

Figure 4 - Using a Central Management Service to Share Data Between Multiple Transit Processors



5.3 Comparing both options

Table 1 - Comparing the Direct Supplier Integration and Central Management Service Approaches

Consideration	Direct Supplier Integration	Central Management Service
Architecture	Direct integrations between participating transit processors	Single integration between each processor and the CMS
Number of Integrations	Multiplies with each additional transit payment processor or operator (especially in many-to-many integrations)	Each participant integrates once with the CMS
Onboarding New Participants	Requires additional integrations and commercial agreements upon new agency entrants	New participants connect through existing CMS framework
Commercial Complexity	Negotiation required between each participating supplier on roles	Centralized commercial framework possible
Technical Complexity	Lower initial complexity for small deployments	Higher initial complexity to establish CMS
Long-Term Flexibility	Processor changes may require new integrations	Easier to replace processors without impacting others
Best Fit and Scalability	Best for small ecosystems with minimal future growth	Better suited for regional multi-operator ecosystems

6. Implementation Considerations for Price-Adjusted Transfers

Enabling transfers across different transit processors will require significant effort to connect suppliers with each other, especially for first movers who haven't achieved this integration previously. Before agencies consider embarking on this endeavor, a transfer ridership analysis should be done to determine the baseline size of this demand. This data can be used to design and right-size the technical and commercial terms to local ridership needs and planned expansions.

Where agencies are interested in providing their joint customers with price-adjusted transfers there are several key areas that need to be defined:

6.1 Policy

Agencies looking to implement price adjusted transfers on contactless payments should first start with their transfer policy:

- Is there a policy already in place for transfers with other regional agencies?
- Is there a regional goal for offering free or discounted transfers?
- Do customers in this region commonly use multiple transit systems to complete their journeys?
- Do customers understand the discount benefits they can receive when using multiple transit systems that have transfer agreements?

Many transfer arrangements were introduced long ago, and the circumstances that created them may have changed. In a digital economy, opportunities to reevaluate these policies should be pursued. Further, implementation should prioritize the uptake of discounts so that agencies can track the effectiveness of their offerings and more easily reconcile transfer revenue.

A successful regional transfer program begins with a shared understanding of the outcomes agencies are seeking to achieve, such as increased ridership, improved fare affordability, longer distances on transit, and timed transfers. Given the complexity and potential cost of implementation, agencies should be confident that the program will meaningfully advance these objectives before proceeding. Analyzing the business case by quantifying the potential costs and benefits of implementing a regional transfer program allows agencies to assess the overall value proposition of the project. For more information about evaluating the need for transfers and general fare practices, please view the [Cal-ITP Statewide Fare Guidelines Toolkit](#).

6.2 Business and Operational Processes

An important factor in deciding whether to pursue implementation of price-adjusted transfers on contactless payments lies in the impacts on daily operations. We consider the following key areas:

1. Data sharing mechanisms and agreements

Since the transfer agreement will occur between two independent agencies, a data sharing agreement must be drafted to govern the sharing of transaction data for the purpose of enabling transfers. During the scoping phase, agencies will need to work with their transit payment processing suppliers to clarify which data must be shared to support this capability. The scope of data shared should be limited to the minimum necessary for enabling transfers and financial reconciliation, and the mechanism for data exchange and security should be defined from the outset.

2. Fare calculation, reconciliation and reporting

Since there are two or more transit payment processing suppliers involved in this use case, it is important to establish rules that dictate the responsibilities of fare calculation, revenue reconciliation, and reporting.

- Which of the suppliers is responsible for carrying out the fare calculation that leads to a price-adjusted transfer?
- What kind of responsibilities do suppliers have to implement to assure operators that the calculation has been done correctly?
- How will transfers be reflected in regular reporting?
- What kind of data will be provided to support reconciliation across agencies and how are responsibilities distributed to ensure that each agency is receiving their agreed split of the revenue?

3. Customer experience and delivery mechanism (how is the customer charged)

The involvement of multiple suppliers in delivering a price-adjusted transfer also results in impacts to the customer experience. Agencies must understand these impacts to ensure that they communicate them to their customers. Agencies will need to work together to determine how the customer will experience the transfers, what customer service will be provided to customers transferring between services, and how responsibilities on vendor management and revenue will be distributed. Depending on the transfer mechanism, the following impacts need to be considered:

- How a charge appears on the customer's bank statement
- How customer support will be provided to transfer trips
- When the customer will be charged
- How customers are notified of each of these policies.

6.3 System Costs

It is also important that the commercial incentives are aligned for both transit agencies and suppliers. Ultimately, the service needs to be viable for both operators and suppliers

in terms of the benefits it provides compared to the overall cost of implementation and operations.

Total cost of the system will include multiple components such as:

1. Implementation costs

As with most technology projects, there will likely be an implementation fee associated with enabling this functionality. Since this capability isn't yet widespread in terms of utilization, first-mover agencies may incur higher initial capital costs to establish the initial integrations between transit processors. Some development may be needed to accommodate the new functionality by transit processors involved. Regardless of the implementation model, transit agencies are advised to request quotations from their suppliers and potential CMS vendors to understand the full lifecycle cost including testing, design and implementation.

In the case of a CMS, transit operators will have to factor in the possibility of procuring this service from a third-party provider who will need their own implementation costs and incentive structure.

2. System scalability & expansion

Implementation costs will differ depending on the size of the system and both planned and unplanned growth. For example, if transfers are only envisioned between two agencies, a direct integration between back-office suppliers may be sufficient but will limit the scalability of the system if new point-to-point integrations are desired beyond that point.

Additionally, as more transit operators think about multi-modal systems and establishing complete transport networks that involve other modes such as shared bikes, price adjustments offered through this functionality may be expanded beyond regional transit to include other modes.

3. Transaction fees and supplier incentives

Fare collection operations typically compensate suppliers through transaction fees. Advanced fare products such as free transfers may incur an additional fee from involved transit processors. Detecting whether a transfer has occurred requires additional logic and processing, which may carry additional fees. This will result in reduced revenue for operators to pay for the service. For agencies who have procured off the Cal-ITP MSAs, transaction fees have been pre-negotiated for advanced fare calculation scenarios, which transfers belong under, providing a useful industry baseline. It is worth noting, however, that the prices do not factor in any additional fees that connecting suppliers may impose in the multi-supplier transfer scenario we contemplate in this paper.

When determining whether to procure these services, agencies are encouraged to analyze the total cost of the system to determine whether the perceived benefit outweighs one-time and ongoing capital and operating costs.

7. Looking Ahead

Transit agencies have options for how to enable price-adjusted transfers with contactless open-loop payments. However, there are tradeoffs to different approaches along with implementation considerations. The introduction of a Central Management Service in the ecosystem offers more flexibility and scalability in delivering price-adjusted transfers across multiple transit systems. However, since this role and updated architecture are new, its technical feasibility, commercial viability, and governance arrangements will need to be validated before widespread adoption takes place.

Since there are not any known live implementations of multiple transit processors implementing price adjusted transfers in an open-loop environment, agencies should begin with a clearly defined problem statement and vision. This should be followed by market engagement to better understand available solutions and approaches. Agencies should then consider an outcome-based procurement to allow suppliers to propose innovative and effective solutions that meet agency requirements.

Looking beyond transit-to-transit transfers, the back-office communication capabilities discussed in this paper could also support integrations with other mobility providers. As regions continue to pursue more integrated transportation networks, similar approaches could enable transfer benefits and fare incentives across transit, rail, transportation network companies (TNCs), and shared micromobility options such as bikeshare. Two interesting examples are:

- The California Air Resources board, in partnership with Cal-ITP, is supporting a UC Davis pilot project with the Capitol Corridor Joint Powers Authority (CCJPA) to evaluate the effectiveness of a transfer discount between CCJPA's rail service and SPIN, a shared micromobility provider. Transit rewards supplier [Velocia](#) is providing technical integration, the rider engagement platform and analytics capabilities for the pilot, which will allow CCJPA Tap2Ride customers to receive a discount when they transfer to or from a SPIN bike or scooter within a fixed transfer window and within a geofenced radius of the Davis, CA rail station. The pilot is expected to run in fall 2026 / winter 2027.
- Announced in September 2026, Waymo will launch a [Transit Rewards Program](#) in partnership with Visa that incentivizes riders to use their service as a connection to and from transit. Waymo riders will link their preferred Visa debit or credit card in the Waymo app to enroll in the program. When a rider takes a Waymo and a trip on transit within two hours (paying with the same debit/credit card), they will receive \$2.85 credit in their Waymo wallet - the same price as a Muni bus fare in San Francisco. This is a first-of-its-kind program that leverages open loop payments to verify the trips taken and incentivize multi-modal travel. The program is set to launch first in the San Francisco Bay Area, but the program's design allows for it to be seamlessly replicated in cities worldwide where open loop payments are accepted across the transportation network.

While such applications are still nascent, establishing common approaches and testing can help create a foundation for broader interoperability across the mobility ecosystem.

Cal-ITP encourages transit agencies and suppliers who are considering or are interested in open-loop transfer capabilities to contact us. Continued collaboration between agencies and suppliers will be essential to moving this capability from concept to implementation and ultimately to develop standards for interoperability for the entire industry.

Please contact us at hello@calitp.org