Fare Collection Technologies: Trends, Opportunities, and Coordination

The National Center for Applied Transit Technology (N-CATT)

Missouri Public Transit Association | September 4, 2024

About N-CATT

Launched in late 2019

Operated by the Community Transportation Association of America (CTAA) through a cooperative agreement with the Federal Transit Administration (FTA).

Mission: provide provide small-urban, rural, and tribal transit agencies with practical, replicable solutions and innovations.

Work includes:

Hosting hands-on workshops on topics such as GTFS, GIS, and Data Management.

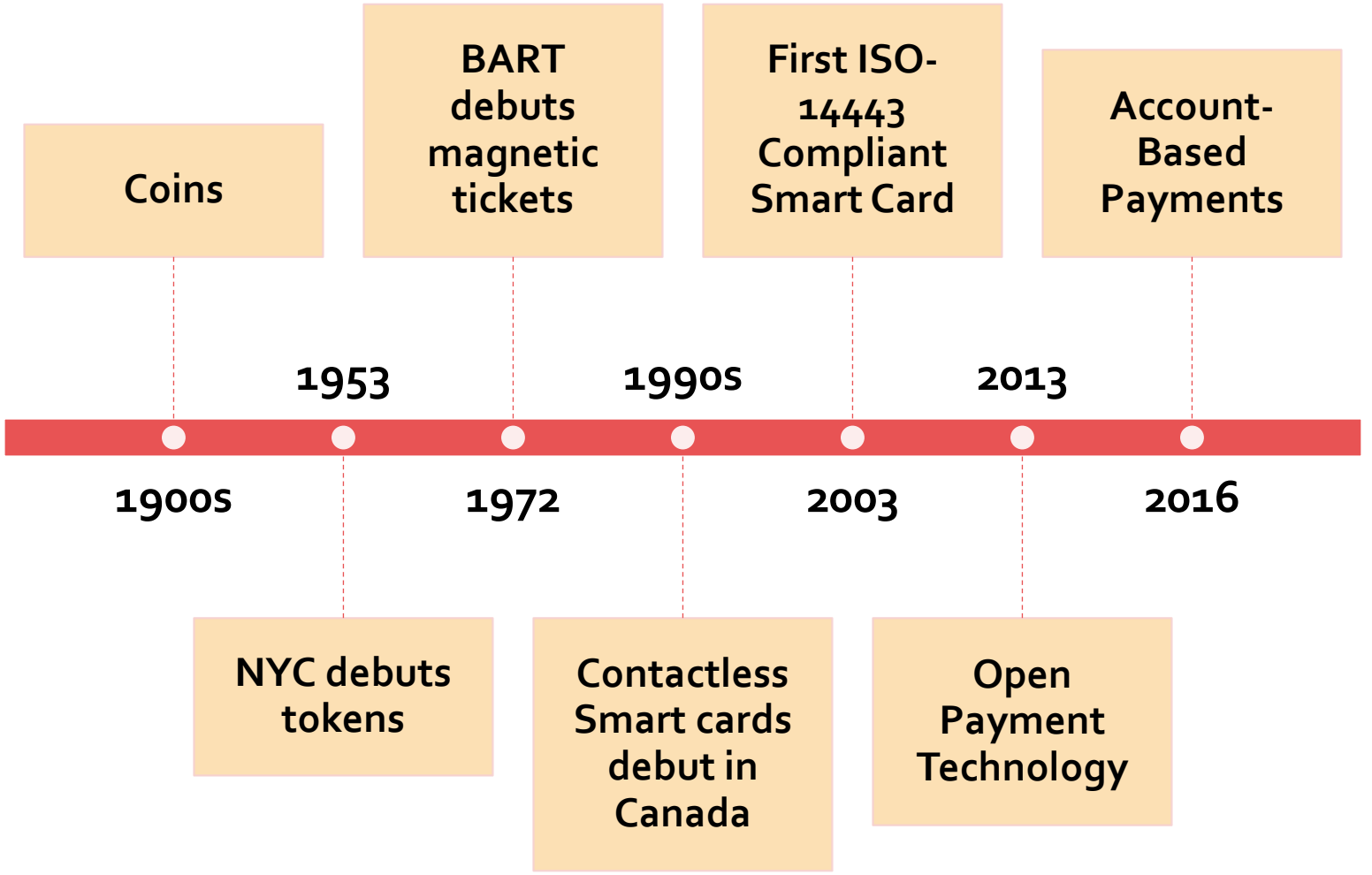
Direct technical assistance through our Strategic Technology Technical Assistance Teams (STTATs).

Producing resources on adopting emerging technologies, such as zero-emission vehicles and choosing new software for transit operations.

STTATs

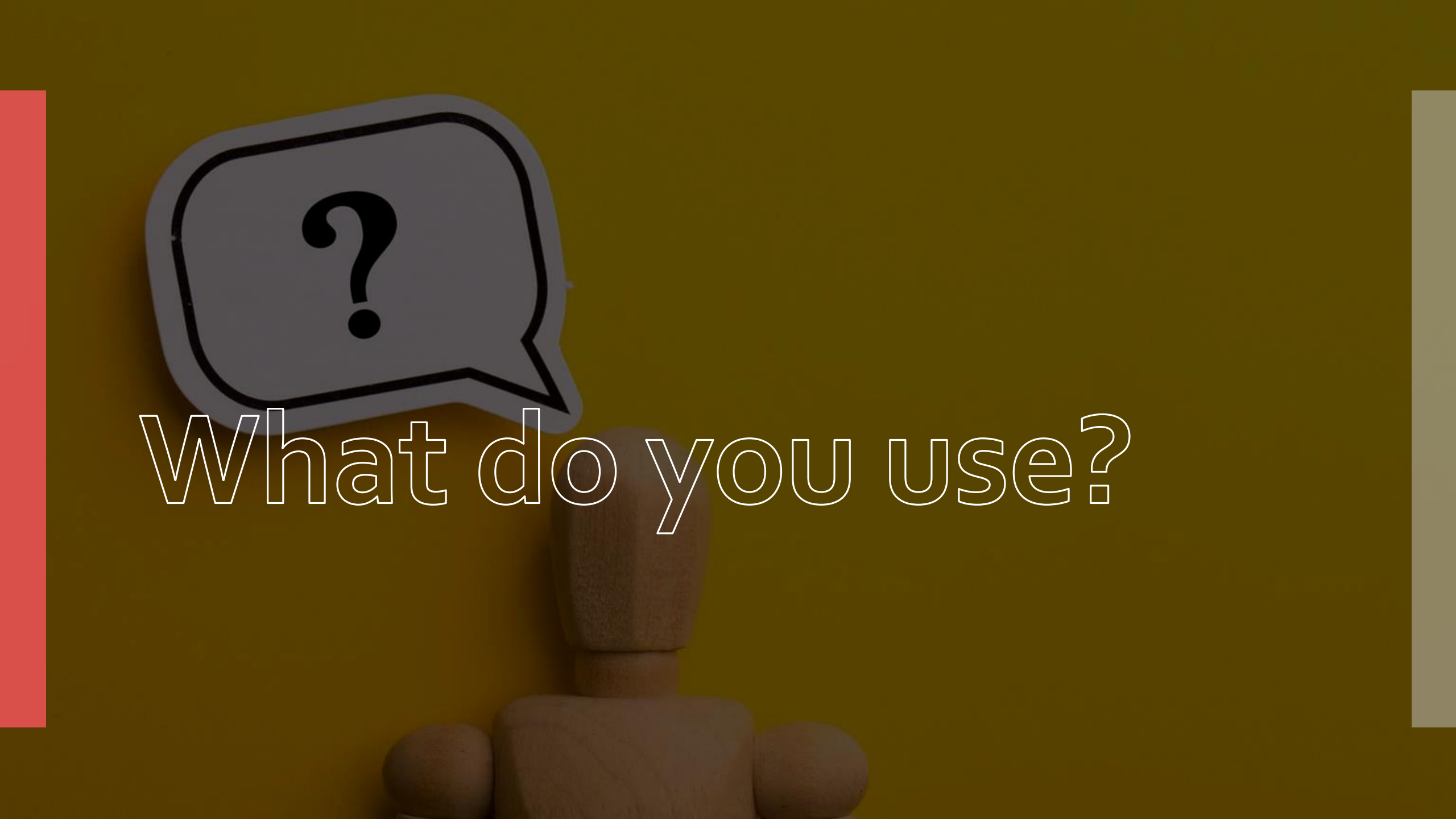
- One-on-one technical assistance with N-CATT staff and consultants.
- Support in identifying and making progress on technology goals.
  - Assess current processes and tech opportunities for improvement.
  - Develop roadmaps for achieving tech goals, alternatives assessments, tech specifications, procurement strategies.
  - Provide support for implementation plans and procurements.
- These have led to:
  - AV Feasibility Study
  - Microtransit Deployment Strategies
  - Alternatives analyses and technical specifications for upgrading fare payment systems.

Evolution of Fare Payment



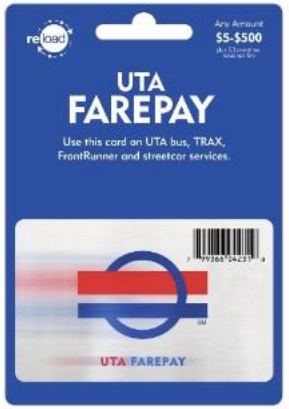
Payment Industry Trends

- Industry continues to evolve
- A shift to mobile applications
  - 85% reported agencies aim to end paper payment by 2023
  - Dramatic rise in use of mobile ticketing apps
- Contactless EMV Chip
  - 300 million contactless cards in circulation in US
  - 69% of all US card-present transactions occur at contactless readers
- Open architecture
- Open payments



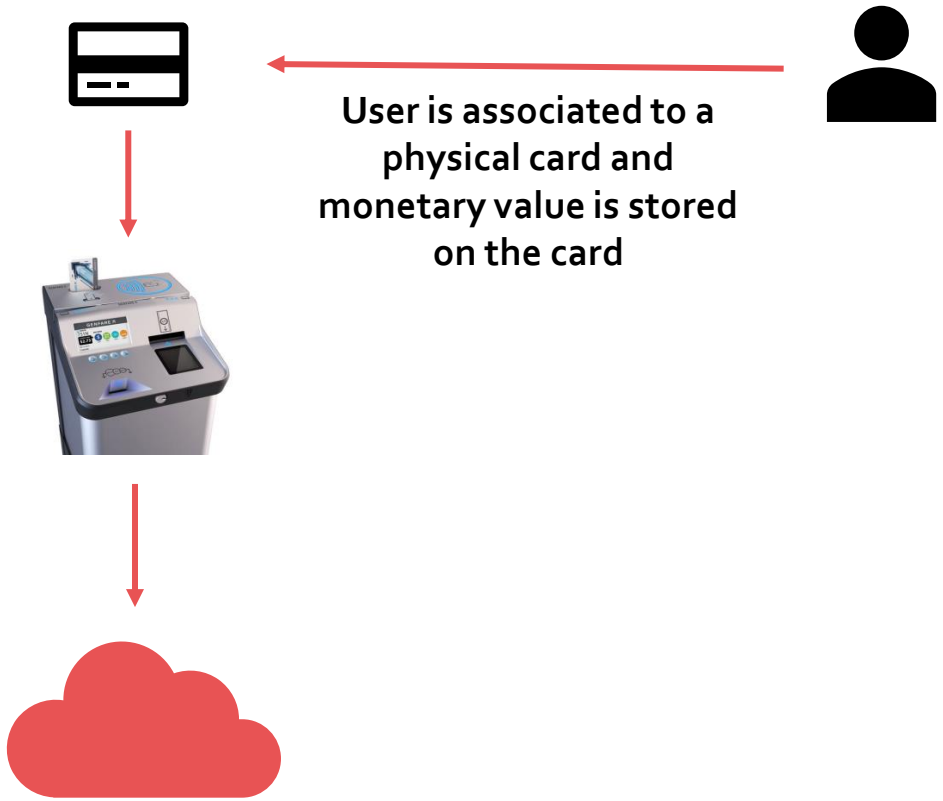
What do you use?

What's out there?

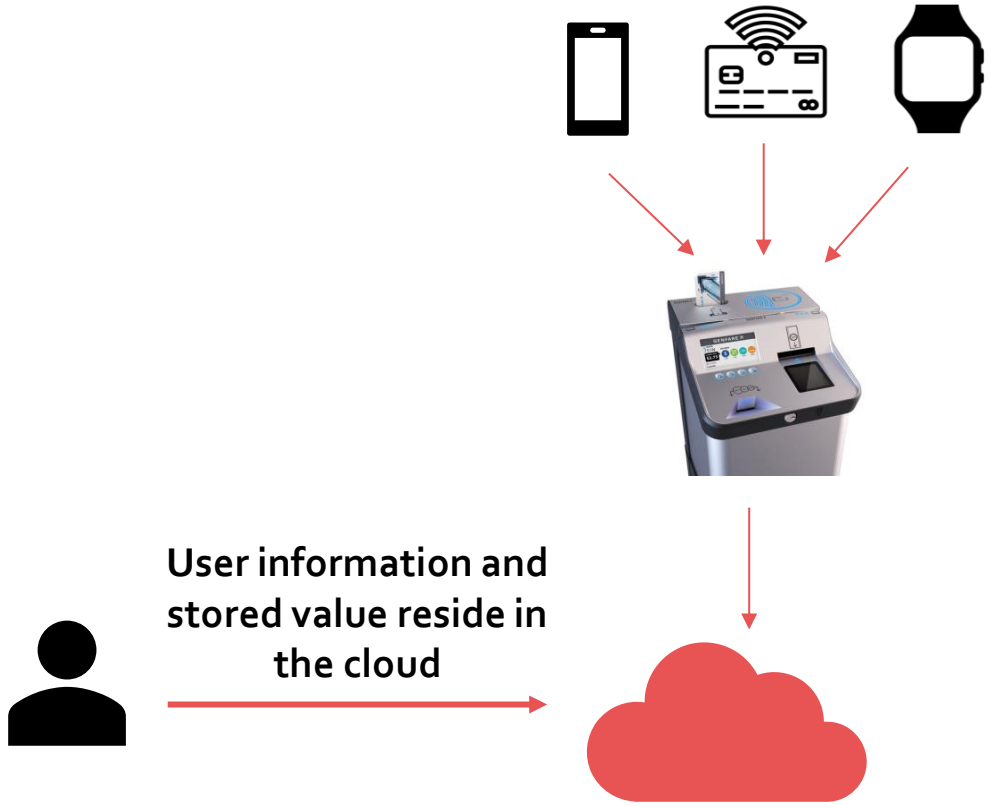


Systems

Card-Based System

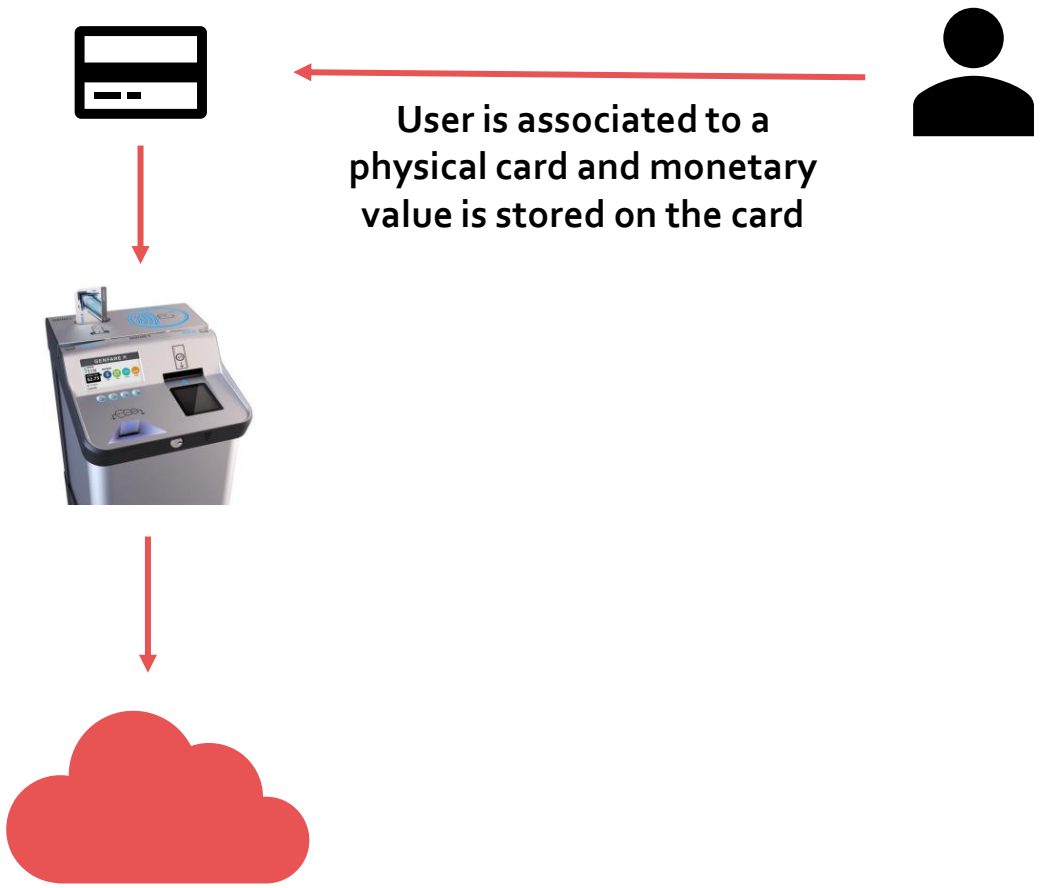


Account-Based System



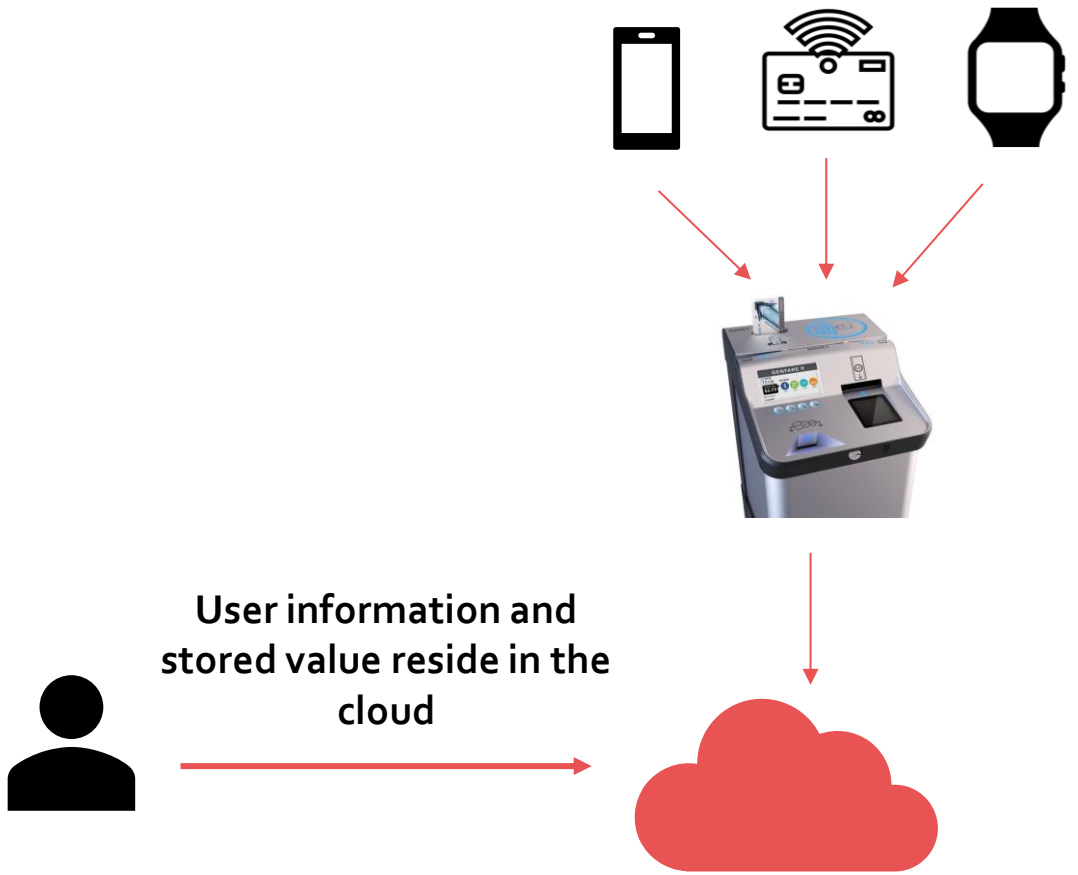
Card-Based System

- Equipment: vending machines, smart cards, terminals, back-end servers
- Funds, proof of entitlement and primary records of travel are held directly by the card
- Majority of the larger US agencies use Card-Based Systems



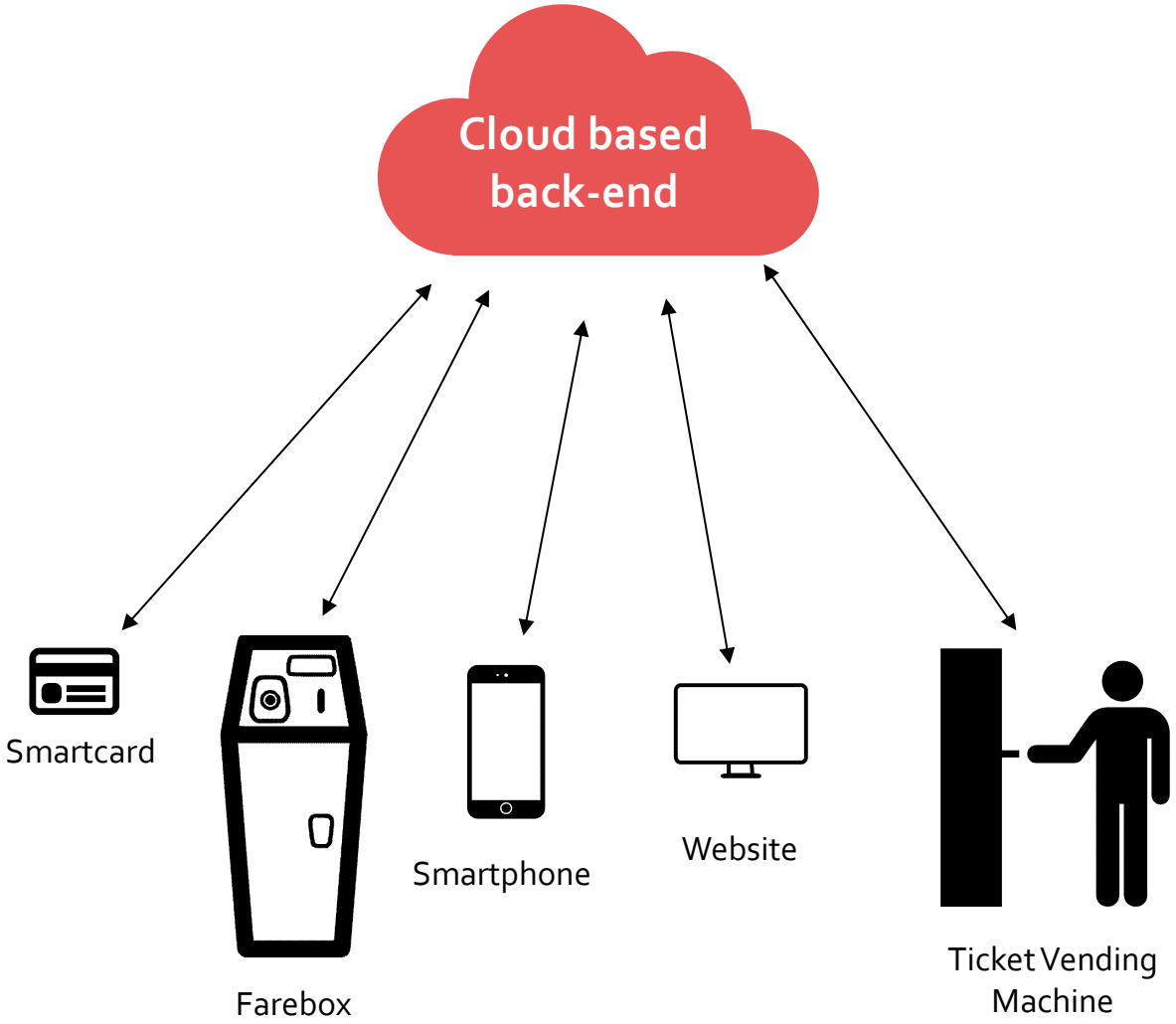
Account-Based System

- Back-office system to apply business rules, determine fare and settle transaction
- Right to travel is managed by back-end office and ticket acts as token
- Gives riders flexibility to use any fare media associated with their account
- Reduce complexity in fare structure and provide fare capping
- Major vendors, such as Genfare, Masabi, Bytemark, Umo, and Init, offer, almost exclusively, account-based ticketing now



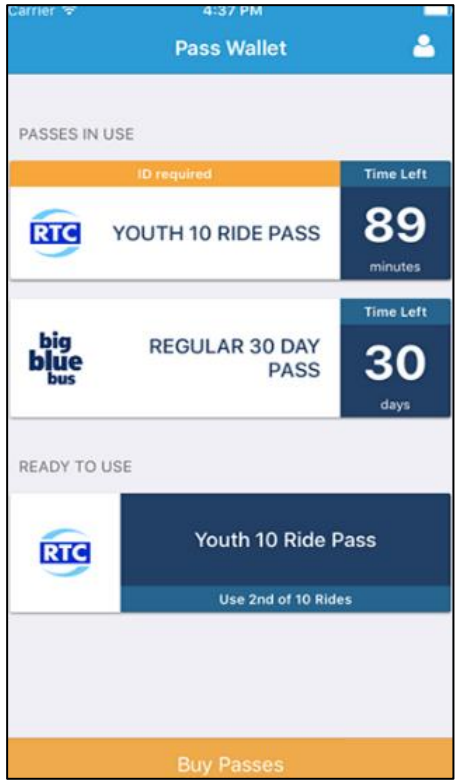
Back-End Systems

- Support intermodal transfers and provide integrated reporting from third- party systems like mobile ticketing, TNCs and other mobility providers.
- Expand partnerships with educational institutions and businesses for discounted fares.
- Larger transit agencies (1,000+ vehicles): are procuring or designing account-based systems.
- Small/Mid size transit agencies: Consider conventional fare collection system vendors for account-based systems.



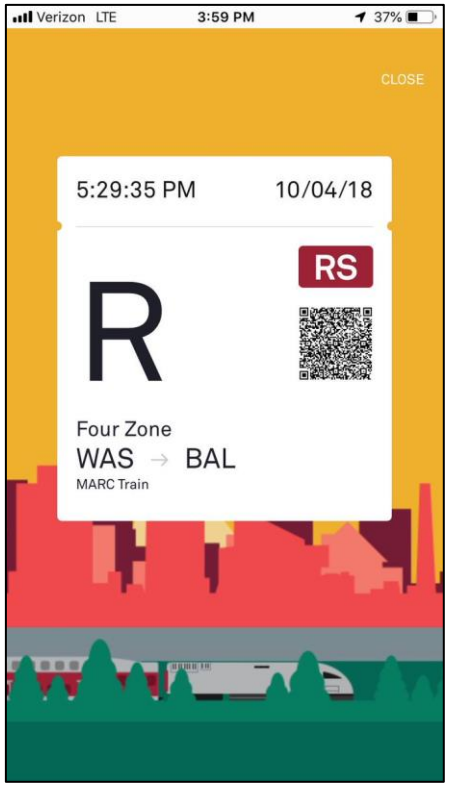
Fare Payment Models

Mobile Ticketing Models



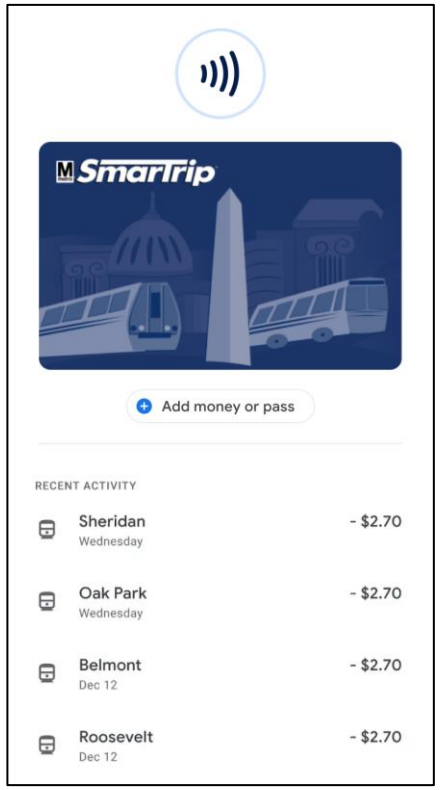
Vendor Branded App

Vendors: Token Transit, UMO



White Label App

Vendors: Masabi, moovel, Bytemark, Flowbird, Genfare



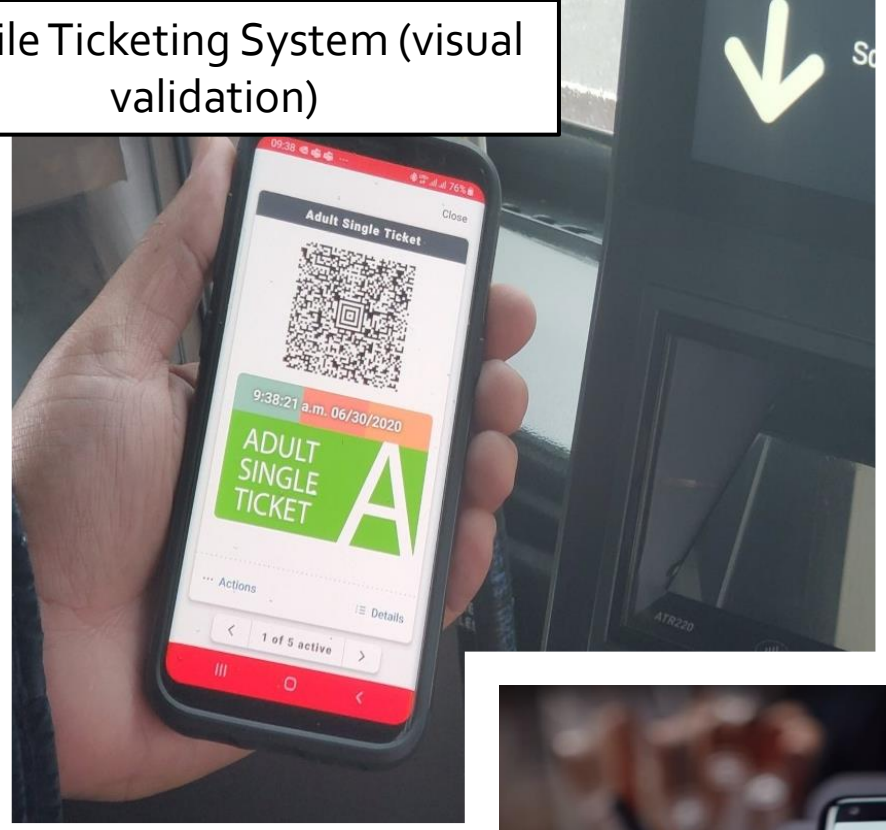
Custom App

Vendors: Cubic, INIT

Mobile Ticketing

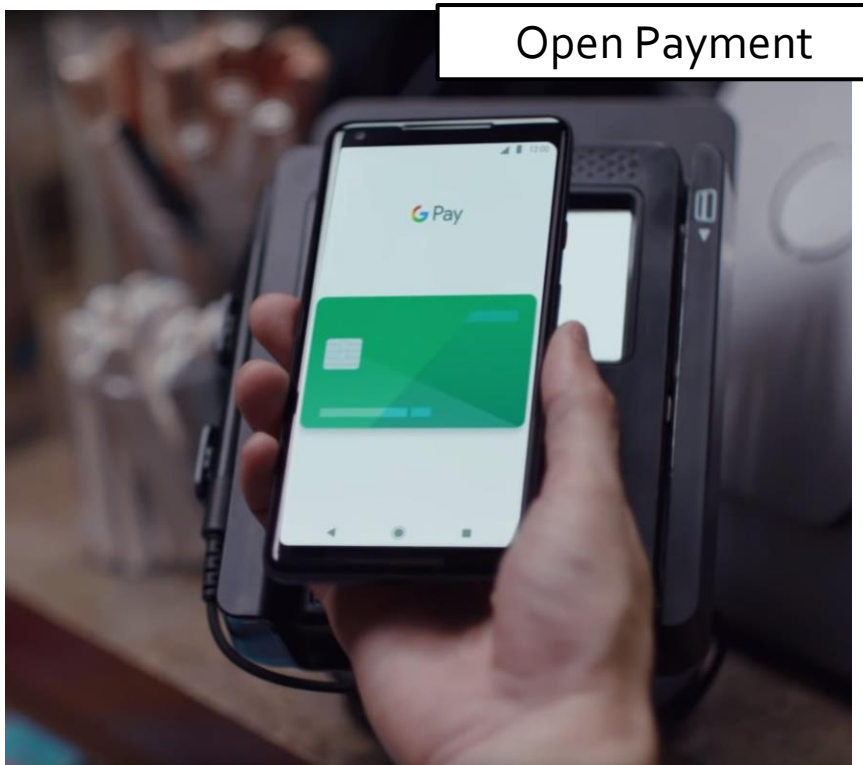
- Increasing across the industry
- Visual validation is the dominant form of validation
- Vendors also use Bluetooth and NFC technology-based validation
- Offer agency-branded mobile ticketing
- Provide integration with trip planners like Transit and Moovit using GTFS-RT data

Mobile Ticketing System (visual validation)



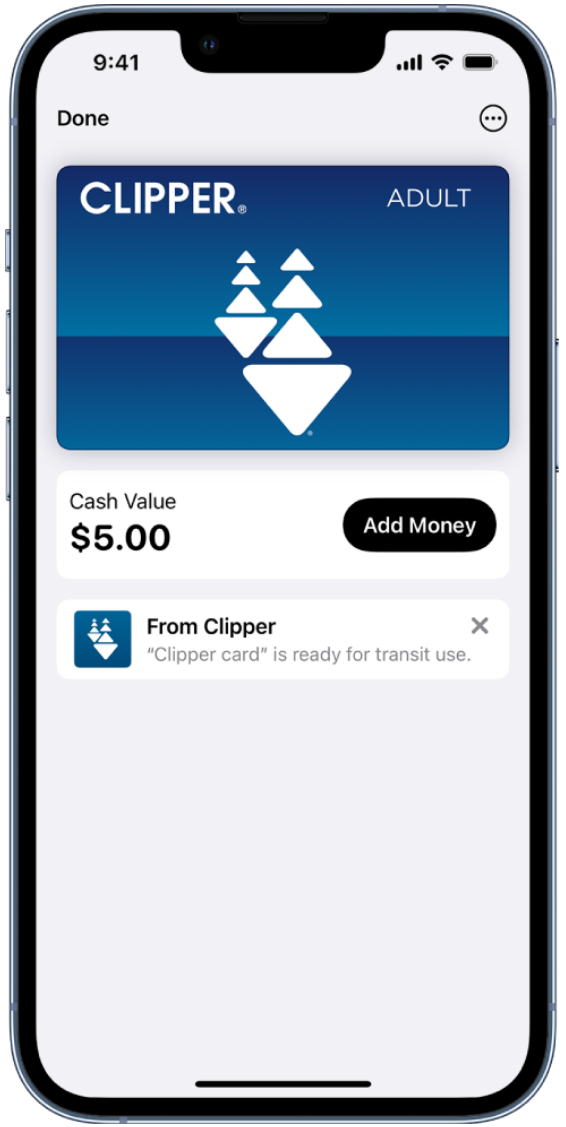
Mobile Wallet

Open Payment



Virtual Cards and Mobile Wallet

- Payment via smartphone through preloaded and closed payment cards for fares using stored value
- Give riders greater convenience when buying fares and can decrease capital costs for agencies
- Vendors are moving to mobile wallets to enable fare capping
- Major vendors, including Umo, Init, Masabi, Bytemark, and Genfare, all support payments from leading mobile wallets



Account-Based Farebox System

Fare Collection Equipment: Farebox

- Fareboxes remain the dominant mode of fare collection
- Farebox vendors have started offering account-based solutions
- Validating fareboxes offer both capabilities of fareboxes and validators
- Traditional fareboxes are still offered but also are being integrated with bar code and NFC readers
- Cost/unit: $12,000 - $20,000

Fare Collection Equipment: Validators

- Agencies preferring standalone validators for ease of maintenance and lower costs
- Some vendors offer validator-based technologies that integrate barcode and NFC validation (in addition to an existing farebox)
- Cost/unit: $500 - $3,000

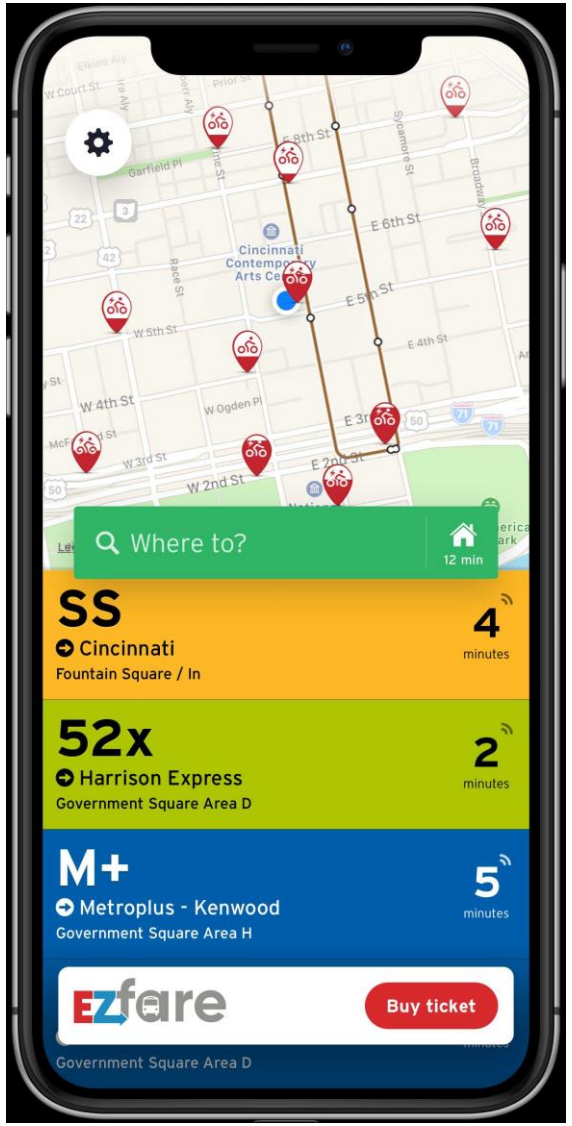
Open Payments

- Allow customers to use existing payment methods (credit cards/ smartphone pay) without buying tickets
- Offered by major vendors, typically by larger agencies
- Agencies procuring validators or fareboxes should consider Europay, Mastercard, and Visa (EMV) certified equipment for open payments

Farebox Integration

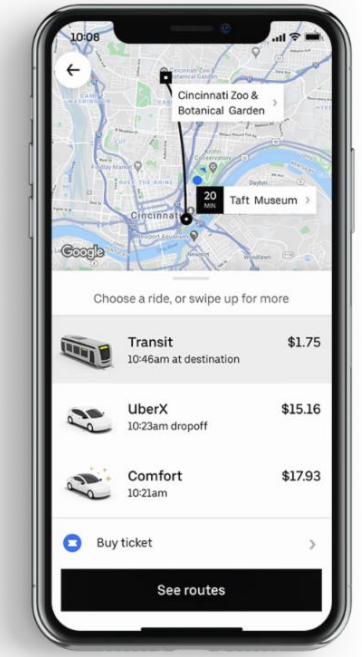
Trip Planning

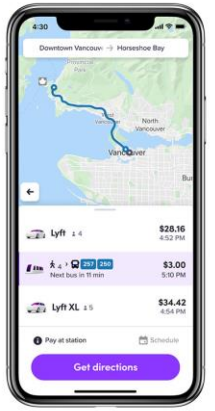
- Allow users to plan their trip from start to end.
- Offer integrated trip planning and payment methods.
- Common trip planning platforms include Transit App and Google Maps.

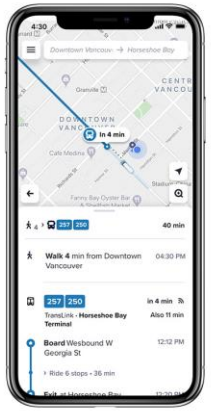


Mobility Platforms

- Mobility providers are integrating with mobile ticketing vendors to provide a one-stop solution for multi-modal trips.
- Utilizes real-time GTFS feed from CAD/AVL systems for trip planning.
- Integrations provide riders additional channels to plan & pay for transit.
- Integrations are helpful for visitors who are unaware of a local transit app or do not want to purchase a smart card.
- Mobility platforms offer an additional channel for marketing and promoting transit options.







CAD/AVL

Allow dispatchers to communicate directly with vehicles and manage routes and offer real-time location and status of in-service vehicles.

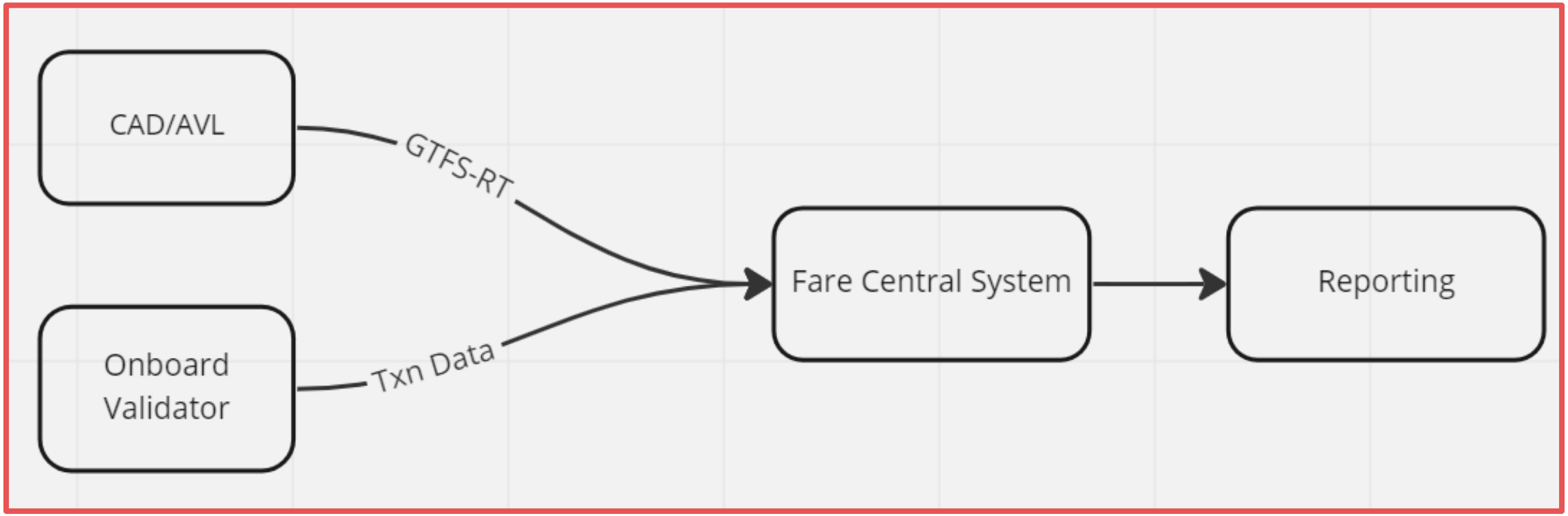
Newer systems offer single sign-on, in which operators can remotely log on to all onboard systems, including the fare collection system, through a single sign-on.

Major fare collection vendors offer single sign-on integration with CAD/AVL.

Farebox and validator systems are typically configured with J1708 interface to other onboard systems.

GTFS

- After an on-board transaction, the validator/ farebox records the transaction via bus location/ coordinates and compares this to GTFS- RT feed.
- This allows for trip and stop level fare collection data, as well as integration for trip planner apps.



POP QUIZ!

1. Can you name this technology?
2. What payment types are accepted?

POP QUIZ!

1. Account-based, validating farebox
2. Cash and coins;

   Visual validation;

   Smart-Card;

   Open Payments (i.e. debit/credit;

   Bluetooth & NFC Virtual Card & Mobile Wallet

A Statewide Example: California

California Integrated Travel Project (Cal-ITP)

- **Challenge:** Hundreds of public transit agencies with no coordinated system to collect fares, verify identify, and share up-to-date system information. Lack of uniformity created complications and barriers.
- **2019-2020:** California State Transportation Agency (CalSTA) conducted marketing analysis to determine standards, barriers, feasibility for the project.
- **Goals:**
  - Improve customer experience
  - Increase transit ridership
  - Lower cost for transit providers and riders
  - Reduce greenhouse gas emissions
  - Promote equitable access to transportation across state transit providers
    - Simpler discount eligibility process
    - Fare Capping

Cal-ITP: Where is it now?

- **Cal-ITP:** agreement between Monterey-Salinas Transit and Visa to demonstrate how transit providers who traditionally use cash and agency specific cards can accept contactless bank card payments.
- **Benefits:** Electronically verifies identity for specific rider discounts; Older adults, youth, veterans, people with disabilities.
- Set a California minimum GTFS guidelines for participating agencies, and GTFS-Realtime
- California Department of General Services (GDS) conducted an RFP to establish a Master Service Agreement (MSAs) to allow public transit providers to procure contactless payment hardware/software directly from vendors without competitive bidding.

Cal-ITP: Findings

Real-time GTFS changes passenger perception of time and shows transit is reliable.

Contactless payment makes transit easier and boosts satisfaction.

Universal fare payment grew ridership.

Digital payments are less expensive to accept (10 cents / $1 in cash versus 4 cents in cards).

Machine maintenance is decreasing.

What are your goals?

Pain Points

What are some pain points you have when accepting/processing fares?

What feedback do you most commonly get back from passengers?

What factors lie underneath these issues?

What first steps do we need to take on these pain points?

Newsletter

LinkedIn

STTATs

Questions?

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