RTD PASS PROGRAM WORKING GROUP

RTDFare Capping & RTD's Current Fare Collection Technology

Several working group members inquired about where fare capping was in the options sent out on August 18, 2017. We did not include fare capping specifically in any of the options. There are several challenges for fare capping using RTD's current smart card system and planned mobile ticketing app that limit the feasibility of introducing fare capping in the immediate future. That said, thinking long-term (7-10 years), the PPWG could recommend that RTD consider fare capping in the future. Envisioning a future for fare collection technology is just as important as understanding the capabilities of RTD's current fare collection system. One of the biggest challenges with fare collection though is trying to predict the future of fare collection technology. The media that we use to pay for things is evolving quickly, and not only in transit. Therefore, in making a longer term technology recommendation, PPWG should think about the products used to pay fares (e.g., stored value, pass, fare capping, etc.) and not focus on the media used to pay (e.g., smart card, mobile ticketing, etc.).

What is Fare Capping?

Fare capping enables a rider to pay towards a pass in single trip increments. For example, in Houston, METRO has a day pass accumulator for its local service. METRO's local single trip fare is $1.25 and the day pass costs $3:

<div align="center">

1st boarding: $1.25 charged
2nd boarding: $1.25 charged
3rd boarding: $0.50 charged
Total fare collected for the day: $3.00
Additional travel for that day: free

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A similar approach can be used to pay for a weekly or monthly pass, over the course of a week or a month.

Major benefits of fare capping:
- Increased affordability of passes - ability to pay towards a pass in installments
- Increased fare equity - access to pass discounts for riders who are unable to afford the upfront cost of a pass
- Increased simplicity - ability to pay as you go with fare capped for the day, week, or month to provide rider with the best value for travel pattern

Fare capping requires the use of an electronic fare collection system that is capable of tracking paid trips. In systems with multiple service types (e.g., Local and Regional), it can be difficult to implement a fare cap due to complex fare calculations required to track the different fares on the different service types. In addition to complex fare calculations, it can be difficult to communicate and explain to riders the progress that they are making in accumulating fare payments towards a weekly or monthly pass.

Another significant challenge with fare capping is the potential for revenue loss for a transit agency due to providing the rider with the best value. The potential for revenue loss is greater for 7-day and monthly passes as there is more variability and difficulty in predicting the number of trips that a rider may make over an extended period of time. Meanwhile, for a day pass, many riders know at the beginning of the day whether purchasing a day pass would provide them with the best value given their trip making plans for the day. As a result, the risk of revenue loss is lower for day pass accumulators than 7-day and monthly pass accumulators.

The revenue loss stems mostly from riders who no longer make the incorrect decisions they make today. Riders may be making their fare payment decision from a variety of flexibility, affordability, or convenience perspectives, and not necessarily from a best value perspective. For example, a rider who uses transit frequently and previously paid using single trips or day passes may now reach a monthly fare cap, resulting in a revenue loss for the trips made after the fare cap is reached. Conversely, a rider who previously purchased a monthly pass for convenience or received one through a 3rd party may not reach the fare cap as they may not reach the fare cap and the revenue collected from single trips may be less than the revenue collected from a monthly pass. While it remains to be studied, it is also possible that there may be changes in ridership behavior that may impact the revenue collected by a transit agency. For example, some riders who are currently paying for single trips may be encouraged to ride more as they know they will always receive the best value. Meanwhile, other riders who are currently purchasing a monthly may decide to take fewer trips since they are able to make the decision on a trip-by-trip basis instead of viewing a monthly pass as a sunk cost.

The figures to the right show generalized distribution of the number of trips made by riders compared to the breakeven point for the monthly pass, which for RTD is 38 trips, since the monthly pass is priced at 38 times the one-way fare. The figures also show the potential revenue loss due to fare capping for monthly pass and riders paying for one-way fares using stored value. Cash rider travel behaviors are similar to stored value. However, since fare capping requires riders to pay their fares with stored value on electronic fare media, the revenue loss for these riders would be limited only to riders who transition to electronic fare media. Depending on access and privacy

Distribution of Unique Customers by Count of Monthly Trips using Monthly Passes
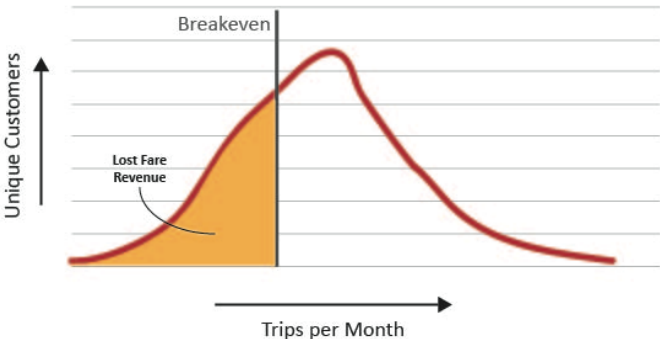
Distribution of Unique Customers by Count of Monthly Trips using Stored Value
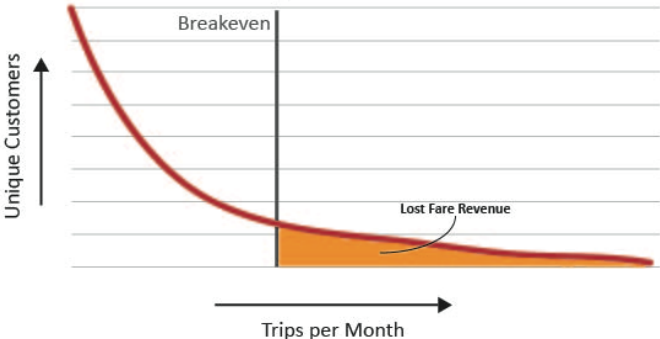
concerns, some cash riders can't or won't use electronic fare media.

While there are potential revenue losses, there can be major benefits for transit agencies in regards to the distribution of fare media and electronic fare collection adoption. With fare capping, transit agencies do not need to distribute passes, which can simplify the retail distribution. However, most of the gains for streamlined retail distribution are for newer fare collection systems that have a different retail distribution method than RTD. Fare capping can also simplify fare payment onboard the vehicle. Instead of needing to sell day passes onboard buses using cash or stored value, riders can use electronic fare payment to accrue towards a day pass, which greatly simplifies the rider-operator transaction.

Fare Capping with Card-Based Smart Card System

RTD has a card-based smart card system. Instead of calculating fares on in the back office like an account-based smart card system, the fare calculations are done at the card reader -- the reader reads the card to see if there are any applicable passes or transfers and based on the fare, whether there is sufficient stored value. If there is sufficient stored value, the reader will write back to the card the new stored value balance and a new transfer if applicable. If there is not sufficient stored value, the reader declines the card.

Understanding this process for a card-based system is important since it impacts how and whether fare capping can work. While fare capping is possible on a card-based, the limited data capacity of a card greatly restricts the ability to complete complex calculations since limited data is stored on the card compared to what could be stored in the back office of an account-based system. Conducting these fare calculations would require not only a software change for the card readers but also changes to the format and data stored on the card. To do fare capping, the card needs to have a counter to track the number of paid boardings (or the value paid) and the type of service used if multiple service types (e.g., Local, Airport, and Regional) are offered.

Several transit agencies (e.g., Houston and several operators in the SF Bay Area) have implemented day pass accumulators on card-based systems; additionally, a few transit agencies in Toronto have been able to implement a longer term pass accumulators on a card-based system (one of which has reverted back to a standard monthly pass). (Note: neither TriMet Hop Fastpass or TfL Oyster, which both offer fare capping, are applicable as they are both account-based systems.)

While fare capping is feasible, implementation is not always what was envisioned and not all vendors have the same capabilities. One of the biggest challenges has been the ability to track multiple service types. Santa Clara VTA in SF South Bay is one of the few transit agencies that offers day pass accumulators for both its Local and Express service. Once an adult rider spends $6 using stored value, their fares are capped for Local service, and once they spend $12 using stored value, their fares are capped for Express service. What would likely be more realistic for RTD is to use the approach that Houston METRO and AC Transit in SF East Bay used to rolled out their day pass accumulators, which are available only for Local service. The main reason for this is that Cubic, who is the vendor for Clipper in

the Bay Area, has done the most extensive implementations in fare capping; whereas, Conduent, formerly ACS and Xerox, has only implemented fare capping in Houston.

Another big challenge is the implementation timeline for RTD. RTD's immediate roadmap for electronic fare collection is focused on implementing additional security improvements, introducing a subscription service to enable autoload of stored value, and developing a new administrative portal to implement a monthly pass on MyRide and launching day passes via mobile ticketing. Implementation of these improvements and enhancements is dependent on available funding. This is important to understand since 1) a day pass accumulator would not likely be implemented in the near term as the priority for implementation is not as high as other investments and 2) as the system continues to age and RTD begins planning for its next generation system, additional investments may not be cost effective.

It should also be noted that in order to increase convenience of MyRide (and viability of day pass accumulators), introducing autoload will be critical as it enables riders to no longer focus on making sure they have sufficient balance since with autoload, riders can set up their card to replenish using a credit card on file once their cards dip below a set value threshold. As a card-based fare collection system, stored value and pass loads can take up to 72 hours. This long lag time is due to the fact that stored value and passes are stored on the card instead of the back office. When the buses return to the yard, the card readers must connect to the back office for the action item list with the new balances to be written onto cards when they are tapped again.

Fare Capping with Mobile Ticketing System

One untested approach for fare capping is implementation on mobile ticketing. Since fare calculations, as in an account-based smart card system, are done in the back office, more complex fare calculations are feasible.

The big challenge with fare capping with mobile ticketing is how to handle one-way fares in a proof of payment (POP) environment on rail. When riders board buses, they must show the driver an active ticket. As a result, the number of activations of single trip tickets corresponds to the number of trips paid. On rail, today, a rider must prepay before boarding the rail vehicle since TVMs, paper validators, and smart card readers are at the station. As a result, today, when a fare inspector asks riders for proof of payment, it is easy to determine whether they have a valid fare.

This gets complicated when riders can purchase their fare onboard the rail vehicle and may activate their tickets only when they see a fare inspector. While the fare inspector would be able to look to see when the ticket was activated, this process can be onerous and lead to confrontation. Another option, which is less ideal, is to build in a lag in activation. This would not be acceptable in the bus environment as riders trying board may hold up boarding as they wait for the ticket to activate. Another option used in Portland is to include not only the time remaining for a ticket but a counter that shows how long since the ticket was activated.

To address this challenge, RTD currently plans to introduce a day pass first on mobile ticketing. The thought is that at least once during a rider's trip, the rider would have their fare inspected, forcing the rider to purchase a day pass or receive a citation.

As RTD looks at ways to introduce one-way fares on mobile ticketing, they will need to identify strategies to minimize the potential for fare evasion as a result of a rider waiting to activate the ticket until the rider sees fare enforcement. RTD will also need to consider changes in its fare policies to address potential inequities in transfer restrictions. Currently, RTD offers one-way fares with 3 hour transfers that prohibit roundtripping. Introducing one-way fares on mobile ticketing would likely require transitioning from one-way fares with directional restrictions to time-based pass. This transition could result in a revenue loss as riders today are not allowed to make return trip on the same route.

Value of a Day Pass Accumulator

Another big consideration is trying to determine what problem you are trying to solve. A day pass accumulator can be valuable for a rider if otherwise they would have to pre-purchase day passes. It can also address one of the ongoing challenges with how passes are prioritized and checked for on a smart card. For example, typically, upon tapping, the system will look for an organizational pass (e.g., EcoPass) then monthly pass then day pass then lastly stored value. For a rider who uses day passes for some travel days and stored value for other days, this can be frustrating as the system would automatically activate a day pass. The day pass accumulator does help address this issue as riders would have the flexibility since they would no longer need to predetermine their trip for the day.

However, the bigger question is whether there is a need that would be met by a day pass accumulator. RTD sells day passes onboard the bus and at rail TVMs. Also, the price of the day passes at two times the cash fare limits the likelihood that a rider would use a day pass on some travel days and not others. While a monthly pass accumulator may provide additional convenience to the rider, the gains for a day pass accumulator may be more limited.

An alternative to a day pass accumulator that has been implemented by transit agencies has been the ability to purchase a day pass with stored value. This process requires not only rider-operator interaction but also necessitates a series of sequential actions:

1. Rider informs bus operator that they would like to purchase a day pass
2. Bus operator selects a key to change fare to day pass
3. Rider inserts cash or taps card to use stored value
4. Rider taps card to load day pass

The process would cause dwell time impacts on the first boardings of each day, however, reduces dwell times for subsequent boardings. There is also potential for a 'tear' in the data if the rider does not hold the card to the reader long enough for the day pass to be written to the card.

RTD's TVMs, which are manufactured and maintained by Scheidt & Bachmann, are not integrated with MyRide and integration would require significant infrastructure investments. As a result and without

integration, rail riders would still need to purchase paper day passes at TVMs or through mobile ticketing app.