

Automated Fare Payment Technology and Fare Pricing

Current Fare Pricing

FARE PRODUCT	FULL FARE	REDUCED FARE	STUDENT FARE	CHILDREN < 5
One Trip (Cash)	\$1.50	\$0.75	\$1.00	Free (up to 2 children)
Single Trip Ticket	\$1.50	\$0.75	x	x
Day Pass	\$5.00	x	x	x
10 Ride Ticket	\$13.50	\$6.75	x	x
Monthly Pass	\$45.00	x	x	x

Current Pricing/Policy Issues

- Cash and paper based system
- Fare Media Availability – Metro Pulse, Hannafords/Shaws, some city facilities.
- Transfers – Complex policy, subject to abuse, source of conflict with bus operators.
- Reduced Fare – Available on single ride and 10 Ride tickets only.
- Day Pass – Overpriced.
- Fare Reciprocity – transfers honored with South Portland and Shuttlebus-Zoom; some fare media cross honored with South Portland.
- Last fare increase was in 2010-11.

Peer Review

- Green Mountain Transit – Burlington, VT.
- Manchester Transit Authority (MTA) – Manchester, NH.
- Portsmouth Transit – Portsmouth, NH.
- Massachusetts Bay Transportation Authority (MBTA) – Boston, MA.
- Worcester Regional Transit Authority (WRTA) – Worcester, MA.
- Merrimack Valley Transit Authority (MVTA) – Haverhill-Lawrence, MA.
- Pioneer Valley Transit Authority (PVTA) – Springfield, MA.
- Greater Bridgeport Transit – Bridgeport, CT.
- Rhode Island Public Transit Authority (RIPTA) – Providence, RI.

Peer Review

	Local Fare Prices				Peer Averages			
	Full	Reduced	Youth	2 Ch <5	Full	Reduced	Youth	Child < 5
One-way	\$ 1.50	\$ 0.75	\$ 1.00	Free	\$ 1.67	\$ 0.81	\$ 1.17	Free
Day Pass	\$ 5.00	x	x	x	\$ 5.43	\$ 2.25	\$ 2.92	x
3 Day Pass	x	x	x	x	\$ 7.50	\$ 3.75	#DIV/0!	x
7 Day Pass	x	x	x	x	\$ 19.75	\$ 10.47	\$ 10.00	x
Ten Ride Ticket	\$ 13.50	\$ 6.75	x	x	\$ 14.67	\$ 7.33	\$ 6.00	x
15 Ride Ticket	x	x	x	x	\$ 20.00	\$ 10.00	\$ 20.00	x
Monthly Pass (Regular)	\$ 45.00	x	x	x	\$ 55.33	\$ 27.56	\$ 37.58	x

Conclusions:

- \$1.50 single ride cash fare is below average; several systems have gone to \$2.00
- Transfers: most systems continue to offer transfers for cash payers, but technology is allowing smart card/mobile users to receive a 1-2 hour pass with each boarding.
- Day Pass Multiple: value of day pass equals 3-4 cash boardings.
- Reduced Fare – All systems, except ours, offer a reduced fare monthly pass.
- Monthly Pass Multiple – peer breakeven point for monthly pass equals 33 boardings. Metro's current multiple is 30; 2018 data indicates average actual use is 35-40.

Fare Policy Goals

- Ensure fare revenue exceeds 25% of total operating expenses.
- Improve the simplicity and convenience of fare payment.
- Improve equity and affordability in passenger's cost of using transit.
- Speed up the passenger boarding process.
- Reduce conflicts between passengers and bus operators.
- Grow ridership and revenue.

Survey Findings

- Metro staff conducted online and field intercept surveys over 2 week period in late January and early February.
- Over 500 responses - not statistically valid, but generally representative of ridership.
- Major Findings:
 - 89% of respondents have smart phone.
 - 86% of respondents have access to banking.
 - 5% of respondents have neither smart phone nor banking.
 - 69% favorable to using smart phone/cards to pay fares (15% neutral/blank and 16% unfavorable).
 - Data on transit use by fare media type helped forecast fare revenue.

Survey Findings

Favorability to using smart phone or smart card to pay fares by income level:

	Favorable	Unfavorable	Neutral or Blank	Total
Less than \$25,000 (Less than \$2,084 per month)	62%	17%	22%	100%
\$25,000 to \$49,999 (\$2,084 to \$4,166 per month)	71%	15%	14%	100%
\$50,000 to \$74,999 (\$4,167 to \$6,249 per month)	81%	10%	9%	100%
\$75,000 or more (\$6,250 per month or more)	88%	6%	5%	100%
(blank)	39%	38%	23%	100%
Grand Total	69%	16%	15%	100%

Survey Findings

Favorability to using smart phone or smart card to pay fares by race:

	Favorable	Unfavorable	Neutral or Blank	Sum
White	71%	15%	14%	100%
Non-White	66%	12%	22%	100%

Survey Findings

Favorability to using smart phone or smart card to pay fares by age:

	Favorable	Unfavorable	Neutral	Sum
Under 18	50%	0%	50%	100%
18-25	67%	15%	18%	100%
26-44	74%	12%	13%	100%
45-64	67%	18%	16%	100%
65+	56%	28%	17%	100%

Alternative Complexity

	User Experience	Operations	Retail Network	System Design	Infrastructure	Website
A - Simple & Quick	Light Blue	Dark Teal	Light Blue	Light Blue	Light Blue	Light Blue
B - Public Smart Card	Light Blue	Dark Teal	Light Blue	Medium Teal	Light Blue	Medium Teal
C - All Electronic	Dark Teal	Light Blue	Medium Teal	Dark Teal	Light Blue	Dark Teal
D - Merged Mobile & Smart Card	Dark Teal	Light Blue	Medium Teal	Dark Teal	Dark Teal	Dark Teal
E - Capping	Light Blue	Light Blue	Dark Teal	Dark Teal	Dark Teal	Dark Teal

*Option E, any additional agencies would not be able to have passes (capping only)



Option A – Mobile App and Smart Cards for Institutions

Fare Policy

- Raise fares from \$1.50 to \$1.75-\$2.00 with associated pass increases.
- Retain paper based period passes
- Introduce reduced fare monthly pass.
- Introduce mobile app that allows purchases of all period passes.
- Roll out smart cards for institutional programs only.
- 6-7% ridership loss due to fare increase.
- 11-17% increase in fare revenue.

This is a low cost and efficient option to introduce passengers to mobile ticketing while maintaining existing period passes, but adoption would be slow and there are no equity improvements.

Option A – Mobile App and Smart Cards for Institutions

Technology

- Vendor to supply mobile app for fare payment.
- Install solid state validators to accept smart cards/smart phones.
- Replace current fareboxes with similar model to accept cash.

Costs

- Vendor design/engineering - \$25,000-\$50,000
- Equipment cost/bus: \$1,500-2,000
- Vendor fees 6-10% per transaction (<25% adoption on smart phone use).
- Ongoing operating cost: Up to 15% of equipment cost following warranty.

This is a low cost and low risk option to introduce passengers to mobile ticketing while maintaining existing period passes, but adoption would be slow and there are no equity improvements.

What is Fare Capping?

- Passengers using smart cards/smart phones never pay over certain dollar amounts on daily, weekly or monthly intervals.
 - Example: if daily cap is \$6.00, then once a passenger takes 3 trips and spends \$6.00 in a day, each trip thereafter is free.
- Accounts can be linked to bank accounts, credit cards, pre-paid debit cards or e-wallets (e.g. Apple Pay).
- For unbanked, cash can be loaded onto smart cards at retail outlets
- Committing to fare capping requires a strong POS network.

<https://vimeo.com/254685338>

Fare Capping Benefits

- **Improves equity in the cost of using transit** – allows all riders equal access to discounts based on transit use, not dollars invested.

Example:

- Today, a low income cash rider who rides 2 x times a day, 5 days a week, all year would pay \$780. The higher income rider who can afford to make the up front monthly investment of \$45 ends up paying \$520.
- Under fare capping with a \$2.00 base fare, the both riders would pay the same \$720.
- **Optimizes cost with use** – a pay as you go system means riders never overpay or underpay.
- **Simplifies the fare structure** – non-riders often cite the complexity of fare structures as a barrier to using transit.
- **Should improve ridership** – combination of improvements in equity, technology and simplification may build ridership/revenue.

Fare Capping Downsides/Risks?

- **Possible revenue loss** – Flip side of equity and optimization of cost/usage is some revenue loss – Metro has modelled up to 5% loss on tickets/passes and up to 10% on cash users.
- **Communications challenge** – though simpler, a shift to fare capping is a major change to a fare pricing model in place nationally for decades.
- **Risks of new technology and financial backend** – software and financial management systems are relatively new:
 - Only a handful of US transit agencies have or are moving in this direction (Tri-Met (Portland, OR) Toronto, Canada; DART (Dallas TX) and MTA in New York is moving in this direction.
 - Many European transit agencies have already adopted.
- **Regional cooperation** – ideally fare capping should be adopted simultaneously by bus transit agencies.

Option B – Fare Capping w/ Mobile App and Smart Cards

Fare Policy

- Base fare set at \$2.00 with reduced fare set at \$1.00.
- Eliminate all paper/visual validation based period passes.
- Eliminate transfers for cash fares.
- Roll out smart cards for institutional programs and business programs.
- Fare capping for smart card/smart phone individual users:
 - \$2.00 fare buys a 1-2 hour pass (no need for transfers, no restrictions).
 - Daily cap set at \$6.00 – every ride after hitting cap is free.
 - Monthly cap set at \$60.00 – every ride after hitting cap is free.
 - Possible weekly cap – TBD (tech may be too complex and costly).

Option B – Fare Capping w/ Mobile App and Smart Cards

Technology and Business Model

- Vendor to supply mobile app for fare payment.
- Install solid state validators to accept smart cards/smart phones.
- Replace current fareboxes with similar model to accept cash.
- Smart cards for institutions and businesses.
- Smart cards for Individuals:
 - Individuals can create accounts and link to bank/credit accounts or pre-paid debit cards.
 - Unbanked can load cash at retail outlet.

Option B – Fare Capping w/ Mobile App and Smart Cards

Impacts

- Fare capping revenue impact (-2 to 5% for tickets/passes; up to -10% for cash).
- 5% ridership loss due to fare increase.
- 12% increase in fare revenue due to fare increase.

Option B – Fare Capping w/ Mobile App and Smart Cards

Costs

- Vendor Design/Engineering - \$150,000-\$250,000.
- Equipment Cost/bus: \$1,500-2,000.
- Vendor fees 6-10% per transaction (<50% adoption on smart card/phone use).
- Ongoing operating cost: Up to 15% of equipment cost following warranty.
- Distribution cost: cost of card stock and internal/outsourced card distribution.

Option B – Fare Capping w/ Mobile App and Smart Cards

Proposed Funding Approach:

- Metro has \$600k grant funded project for fare collection replacement.
- Willing to share federal funding if agencies can provide local match.

Cost Categories	COST ESTIMATES		FUNDING		
	Low	High	Federal	Local	
Consultant Asst.	\$ 187,000	\$ 187,000	\$ 149,600	\$ 37,400	Metro
Vendor Design-Eng	\$ 150,000	\$ 250,000	\$ 200,000	\$ 50,000	Metro
Equipment (Metro)	\$ 45,000	\$ 70,000	\$ 56,000	\$ 14,000	Metro
Equipment (SP)	\$ 6,136	\$ 9,545	\$ 7,636	\$ 1,909	SP
Equipment (Shuttlebus)	\$ 20,455	\$ 31,818	\$ 25,455	\$ 6,364	Shuttlebus
Equipment (RTP)	\$ 1,023	\$ 1,591	\$ 1,273	\$ 318	RTP
Replacement Cash Boxes	\$ 66,000	\$ 66,000	\$ 52,800	\$ 13,200	Metro
Acqisition Costs	\$ 475,614	\$ 615,955	\$ 492,764	\$ 123,191	

Process and Implementation

- Regional Discussions: Feb-Apr
- Public Input Process: Mar-Apr
- Procurement and Vendor Selection: May-Jun
- Phase 1 Implementation (Fare Increase with Mobile App rollout): Aug-Sep
- Phase 2 Implementation (Fare Capping): Early 2020

Alternatives

A. Simple and Quick

- Smart Cards for institutional and business accounts only
- Mobile for individuals
- Continue paper passes in retail

B. Public Smart Card

- Option A plus:
 - Smart Cards available for all passes, including institutional, business, and individual

C. All Electronic

- Option B plus:
 - All passes have to be on smart cards or mobile
 - Retail only for adding cash

D. Merged Mobile and Smart Card

- Option C plus:
 - One account across Mobile and Smart Card
 - Purse is also available on smart card

E. Capping

- Option D plus:
 - No individual passes, only capping

Alternatives Compared

	A - Simple and Quick	B - Public Smart Card	C - All Electronic	D - Merged Mobile & Smart Card	E - Capping
Institutional Passes	Smart Card Only	Smart Card Only	Smart Card Only	Smart Card Only	Smart Card Only
Individual Passes	Paper Passes or Mobile	Paper, Mobile, or Smart Card	Mobile or Smart Card	Mobile or Smart Card	Fare Capping
Individual Fares	Cash or Mobile	Cash or Mobile	Cash or Mobile	Cash, Mobile, or Smart Card	Cash, Mobile, or Smart Card
Retail	Paper Passes, TenRides	Paper Passes, TenRides	Add Cash only	Add Cash only	Add Cash only

Cash	Paper	Mobile	Smart Card
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Rough Cost Comparison

	Non Recurring Engineering	Equipment Costs	Operations & Maintenance	Transactional	Fare Revenue
A - Simple & Quick	<p>\$25k - \$50k for institutional import and web interface</p>	<p>\$45k - \$70k</p> <p>Validator (44 buses) + DDU + Garage WiFi</p>	<p>Maintenance fees to vendor ~15% of equipment annually + Negligible internal costs for front line maintenance + Customer Service time</p>	<p>~10% of Fares collected</p>	<p>No Change</p>
E - Capping	<p>\$150k - \$250k including:</p> <ul style="list-style-type: none"> ○ institutional import and web interface ○ individual web interface ○ fare capping ○ near real time validator updates 	<p>\$45k - \$70k</p> <p>Validator (44 buses) + DDU + Garage WiFi</p>	<p>Maintenance fees to vendor ~15% of equipment annually + Negligible internal costs for front line maintenance + Customer Service time + Card inventory handling costs</p>	<p>~10% of Fares collected</p>	<p>~20% loss of monthly pass revenue (heavily dependent on ridership distribution and breakeven)</p>

Fare Policy - Alternatives A & E

		Smart Card	Mobile	Paper (retail)	Simplicity	Equity	Operator Interaction	Reduce Cash	Maximize Revenue	System Complexity
A	i	<u>Institutional Passes</u>	Tickets + 1-Day + 7-Day + 30-Day Calendar	1-Day + TenRide + 30-Day Calendar	neutral/supports	neutral/supports	neutral/supports	neutral/supports	neutral/supports	neutral/supports
	ii		Tickets + 1-Day + 7-Day + 30-Day Rolling	1-Day + TenRide + 30-Day Calendar	does not support	neutral/supports	neutral/supports	neutral/supports	neutral/supports	neutral/supports
E		<u>Institutional Passes</u> <u>Fare Capping Stored Value + Calendar Cap</u>	<u>Fare Capping Tickets + Calendar Cap</u>	Not available	strongly supports	strongly supports	strongly supports	strongly supports	does not support	does not support

does not support
neutral/supports
strongly supports