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Item No. 11.1.8
Halifax Regional Council
July 21, 2020

TO: Mayor Savage and Members of Halifax Regional Council

SUBMITTED BY: Original Signed

Dave Reage, MCIP, LPP, Director Halifax Transit

Original Signed by

Jacques Dubé, Chief Administrative Officer

DATE: June 2, 2020

SUBJECT: **Halifax Transit Fare Management Phase 2 Strategy**

ORIGIN

This report originates from the Halifax Transit Technology Roadmap and the Approved 2020/21 Capital Budget.

LEGISLATIVE AUTHORITY

Halifax Regional Municipality Charter, R.S.N,S. 2008, subsection 69(1) enables the Municipality to provide a public transportation service.

RECOMMENDATION

It is recommended that Halifax Regional Council direct the Chief Administrative Officer to procure an electronic fare solution for Halifax Transit in accordance with the phased strategy described in the discussion section of this report, beginning with the procurement of a mobile ticketing application.

BACKGROUND

In December of 2012, Halifax Transit, in partnership with the Finance, Information, Communications and Technology (FICT) business unit, completed the Halifax Transit Technology Program (HTTP) Roadmap identifying all technology-enabled business initiatives required to support Halifax Transit's key business drivers. The HTTP Roadmap recommended the sequence of projects over a multi-year period and estimated cost to develop and implement best practice business processes through sector-leading technology solutions.

After the Halifax Transit Technology Program Office was established in February 2014, the HTTP Roadmap of 33 projects was organized into 9 streams of activity, one of which is a fare management project.

The first phase of the fare management project began in early 2017. Phase one of the project, focusing on farebox replacement, has been cancelled in an effort to develop a more comprehensive electronic fare-payment program which was set to roll out under phase two of the original fare management strategy.

The existing farebox replacement contract with Trapeze Software has been mutually terminated by both parties. Our municipality is growing and changing faster than ever and Halifax Transit is committed to modernizing transit services to meet new demand. The rapid advancements in technology require a strategy that not only meets the needs of customers today but is future focused on meeting the needs of customers well into the future.

The future focused strategy is outlined in this staff report.

DISCUSSION

The following technologies were considered as possible future electronic fare media options for Halifax Transit:

1. Plastic reloadable smart card:

   A plastic card, similar in size, shape, and appearance to a debit or credit card that utilizes an account-based system enabling a user to load funds as required. (e.g. Presto, OPUS, Compass, etc.)

2. Limited-use pre-loaded smart card:

   A thin plastic or thick paper card that is pre-loaded with a set number of fares which is disposed of once all fares have been used.

3. Mobile ticketing application:

   An application installed on a mobile device that utilizes an account-based system enabling a user to load funds as required.

4. EMV contactless bank card:

   Debit or credit cards with contactless payment functionality enabled.

Magnetic stripe cards were not included in this evaluation as they are rapidly becoming obsolete.

Plastic Reloadable Smart Card:

Pros	Cons
1. Increase transit mode share and overall ridership 2. Improve payment validation	1. Probable impediments to rapid introduction of new, innovative features and products reflecting the industry's latest best practices

Pros	Cons
3. Reduce potential for fare evasion 4. Provide accurate revenue collection reporting data for improved management decision-making and service planning 5. Enable convenient use of fare products 6. Enable providing customers the best value through account-based solution 7. Minimize Operator / electronic fare system interactions 8. Minimize boarding time 9. Enable secure purchase and use of fare products 10. Reduce the use of cash and tickets 11. Streamline revenue collection, handling and validation functions 12. Enable flexibility to meet future fare policy requirements 13. Facilitate introduction of future paratransit and conventional electronic fare integration 14.	a. Long project durations due to: i. Scope of process changes ii. Logistics across varied stakeholder groups iii. Potentially multiple procurement streams, e.g. Account-based system, Ticket vending machines (TVMs), “stand-beside” validators, etc. 2. Potential inconveniences purchasing fare products, e.g. TVM lineups 3. Though more advanced than cash, tickets and flash-passes, not perceived as modern / state-of-the-art 4. Increases fare management operational costs, including for potential implementation of: a. Point-of-Sale (POS) terminals at retail b. TVMs 5. Does not minimize capital investments, instead an “infrastructure-heavy” approach 6. Does not future-proof electronic fare solution decisions and avoid technology obsolescence, instead locks into technology based on sunk capital costs on proprietary solutions 7. Does not facilitate introduction of future Mobility-as-a-Service (MaaS) integrations

Limited Use Pre-Loaded Smart Card:

Pros	Cons
1. Increase transit mode share and overall ridership 2. Improve payment validation 3. Reduce potential for fare evasion 4. Provide accurate fare product reporting data 5. Enable convenient use of fare products a. Potential special events, tourist, etc. product promotion opportunities 6. Minimize operator / electronic fare system interactions 7. Minimize boarding time 8. Enable secure purchase and use of fare products	1. Does not collect customer reporting data for improved management decision-making and service planning, i.e. anonymous cards, no enhanced decision data 2. Probable impediments to rapid introduction of new, innovative features and products reflecting the industry's latest best practices a. Long project durations due to: i. Scope of process changes ii. Logistics across varied stakeholder groups iii. Potentially multiple procurement streams, e.g. Account-based

Pros	Cons
9. Reduce the use of cash and tickets 10. Streamline revenue collection, handling and validation functions 11. Facilitate introduction of future paratransit and conventional electronic fare integration 12. Possibly leverage existing capital assets, Potentially compatible with new fareboxes	system, TVMs, "stand-beside" validators, etc. 3. Potential inconveniences purchasing fare products, e.g. TVM lineups 4. Though more advanced than cash, tickets and flash-passes, not perceived as modern / state-of-the-art 5. Increases fare management operational costs, including for potential implementation of: a. Point-of-Sale (POS) terminals at retail b. Ticket vending machines (TVM) 6. Requires capital investments with an "infrastructure-heavy" approach i.e. POS & TVM 8. Does not future-proof electronic fare solution decisions and avoid technology obsolescence, instead locks into technology based on sunk capital costs on proprietary solutions 7. Does not facilitate introduction of future Mobility-as-a-Service (MaaS) integrations 8. Does not minimize environmental impacts, i.e., disposable products environmentally unfriendly

Mobile Ticketing Application:

Pros	Cons
1. Increase transit mode share and overall ridership 2. Improve payment validation 3. Reduce potential for fare evasion 4. Provide accurate revenue collection reporting data for improved management decision-making and service planning 5. Enable convenient purchase and use of fare products (prevalence of smartphones) a. In 2019, 85% of Canadians owned smartphones, 78% for Atlantic Canada b. Potential special events, tourist, etc. product promotion opportunities 6. Enable rapid introduction of new, innovative features and products reflecting the industry's latest best practices a. Roll out projects in short phases, mitigate risks and provide quick wins to customers and Council	1. Potential challenges to ensure future-proof electronic fare solution decisions and avoid technology obsolescence, i.e. multiple smartphone payment options; further evaluation required a. Mobile EMV / Apple pay / Android pay b. Mobile barcode c. Mobile NFC 2. Not all riders have access to a smartphone that will support the smartphone solution 3. Because not all riders have access to a smartphone, existing fare payment options (tickets, passes, etc.) must remain available.

Pros	Cons
7. Enable providing customers the best value through account-based solution 8. Minimize operator / electronic fare system interactions 9. Minimize boarding time 10. Enable secure purchase and use of fare products 11. Perceived as modern / state-of-the-art 12. Reduce the use of cash and tickets 13. Streamline revenue collection, handling and validation functions 14. Reduce fare management operational costs 15. Enable flexibility to meet future fare policy requirements 16. Minimize capital investments where applicable through an "infrastructure-light" approach 17. Future-proof electronic fare solution decisions and avoid technology obsolescence 18. Minimize environmental impacts 19. Facilitate introduction of future paratransit and conventional electronic fare integration 20. Facilitate introduction of future Mobility-as-a-Service (MaaS) integrations 21. Halifax Transit fare media to be 100% contactless and cashless by 2025	

EMV Contactless Bank Card:

Pros	Cons
1. Increase transit mode share and overall ridership 2. Improve payment validation 3. Reduce potential for fare evasion 4. Enable convenient use of fare products a. Particularly for tourists and infrequent Transit customers 5. Minimize operator / electronic fare system interactions 6. Minimize boarding time 7. Enable secure purchase and use of fare products 8. Perceived as modern / state-of-the-art 9. Reduce the use of cash and tickets 10. Streamline revenue collection, handling and validation functions 11. Reduce fare management operational costs	1. Does not collect customer reporting data for improved management decision-making and service planning, i.e. anonymous cards, no enhanced decision data 2. Does not calculate the best value for customers, not account based. 3. Does not enable rapid introduction of new, innovative features and products reflecting the industry's latest best practices, i.e. a. Only a small part of a larger fare strategy as option to cash b. Not to replace account-based electronic fare products 4. Does not facilitate introduction of future Mobility-as-a-Service (MaaS) integrations

Pros	Cons
12. Minimize capital investments where applicable through an "infrastructure-light" approach 13. Future-proof electronic fare solution decisions and avoid technology obsolescence 14. Minimize environmental impacts 15.	

Summary: Electronic fare media by business objectives:

Business Objectives	Plastic Reloadable Smart Card	Limited Use Pre-Loaded Smart Card	Mobile Ticketing Application	EMV Contactless Bank Card
Increase transit mode share and overall ridership	✓	✓	✓	✓
Improve payment validation	✓	✓	✓	✓
Reduce potential for fare evasion	✓	✓	✓	✓
Provide accurate revenue collection reporting data for improved management decision-making and service planning	✓	+/-	✓	×
Enable convenient purchase and use of fare products for all riders, including occasional and first-time riders	+/-	+/-	+/-	+/-
Enable rapid introduction of new, innovative features and products reflecting the industry's latest best practices	×	×	✓	×
Provide customers the best value	✓	×	✓	×
Minimize operator/electronic-fare system interactions	✓	✓	✓	✓
Minimize boarding time	✓	✓	✓	✓
Enable secure purchase and use of fare products	✓	✓	✓	✓
Perceived as modern / state-of-the-art	×	×	✓	✓
Reduce the use of cash and tickets	✓	✓	✓	✓
Streamline revenue collection, handling and validation functions	✓	✓	✓	✓
Reduce fare management operational costs	×	×	✓	✓
Enable flexibility to meet future fare policy requirements	✓	×	✓	N/A
Minimize capital investments where applicable through an "infrastructure-light" approach	×	+/-	✓	✓
Leverage existing capital assets to the greatest extent possible	✓	✓	✓	✓
Future-proof electronic fare solution decisions and avoid technology obsolescence	×	×	+/-	✓
Minimize environmental impacts	+/-	×	✓	✓
Facilitate introduction of future paratransit and conventional electronic fare integration	✓	✓	✓	✓
Facilitate introduction of future Mobility-as-a-Service (MaaS) integrations	+/-	×	✓	×

Cost estimates

The following table outlines cost estimates associated with each potential option. As the procurement process has not yet begun, these estimates are based solely on market research.

	Mobile ticketing application (visual validation)	Mobile ticketing application (automated validation)	Limited use pre-loaded smart card	Plastic reloadable smart card	EMV contactless bank card
Capital					
Hardware validators	N/A	$400,000	$400,000	$400,000	$400,000
Media	N/A	N/A	100,000	50,000	N/A
Media distribution	N/A	N/A	25,000	25,000	N/A
Ticket vending machines	N/A	N/A	500,000	1,000,000	N/A
Total	$0	$400,000	$1,025,000	$1,475,000	$400,000
Operating					
Vendor fees	TBD (see below)	TBD (see below)	N/A	N/A	TBD
Media	N/A	N/A	100,000	50,000	N/A
Media distribution	N/A	N/A	25,000	25,000	N/A

Regarding potential operating costs to Halifax Transit associated with a mobile ticketing application, there are two typical approaches from vendors:

- A pricing model based on total ridership. Under this model, the usage of the application would have no bearing on the fees paid, only Halifax Transit's overall ridership.
- A pricing model is based on only tickets sold. Under this model, a portion of the cost of each ticket sold would be paid to the vendor. As the adoption rate of the solution increases so would the fees paid by Halifax Transit.

Under either scenario, the operating cost to Halifax Transit is expected to be in the $250,000 - $500,000 range. More specifc details will be provided in a subsequent report following the procurement process.

Summary

Halifax Transit recommends the following phased approach for introducing alternative fare payment options:

1. A mobile ticketing application (utilizing visual validation)
2. Hardware validators that will enable automated validation of the mobile ticketing application
3. A plastic reloadable smart card (that can be utilized by the general public or limited to specific programs)
4. EMV contactless bank cards

While all options evaluated by Halifax Transit offer considerable advantages to both Halifax Transit and the public, a mobile (smartphone) ticketing application is the first electronic fare media recommended for implementation.

The key advantages of a mobile ticketing application over the other considered options are:

- The lowest expected capital costs required for implementation compared to the other considered options

  A mobile ticketing application could be implemented with no hardware requirements initially. Visual validation by operators would be utilized at launch with automated (hardware) validation

implemented gradually later. This flexibility would give HRM, Halifax Transit, and the public ample time to evaluate and grow accustomed to the solution before committing to hardware installations.

While the capital costs of a mobile ticketing application are less than those of the other considered options, it it important to note that the initial capital savings will correlate with operating costs of the solution. The fees associated with mobile ticketing applications will impact Halifax Transit's operating costs; however, all other considered options would also impact Halifax Transit's operating costs while also requiring significant capital costs.

- The least time required for implementation

  Mobile ticketing application vendors have solutions developed and ready for deployment. Some preparation work is required to launch a mobile ticketing application, specifically infrastructure, privacy assessment, and security planning; however, the time required would still be significantly less than any of the other considered options.

- The lack of back-end systems and infrastructure to maintain

  The majority of mobile ticketing applications are hosted, supported, and maintained by the vendor. This would save HRM and Halifax Transit from having to procure hardware; install, configure, and maintain the back-end system; and provide support for the solution.

To minimize risk to HRM, the implementation of a mobile ticketing application would be completed in a phased approach. The first phase of a mobile ticketing application would rely solely on visual validation by operators. If the implementation is successful, a second phase would be planned to implement automated (hardware) validation. During the second phase, Halifax Transit would seek hardware validators that are compatible with smart cards and EMV contactless bank cards negating the need for additional hardware in future phases. All phases of this plan would be included in the initial RFP with an emphasis placed on vendors with the ability to deliver all phases, reducing the risk of compatibility issues to HRM.

Regarding timelines, various vendors of mobile ticketing applications have advertised rollouts completed in weeks; however, requirements gathering from stakeholders, the procurement process, and project planning are all required prior to implementation. Barring any major obstacles, the first phase of the recommended approach could be in place by late 2020/early 2021.

One of the primary concerns with a mobile ticketing application is the members of the public that do not own a smartphone. However, Consumer Technology Association's 4th Annual Consumer Technology Ownership and Market Potential Study: Canada indicates that 85% of Canadians, and 78% of Atlantic Canadians, currently own a smartphone[1] . Although up to 22% of the public would not be able to utilize this fare payment method, subsequent phases of the project would focus on people most likely to not own/utilize smartphones. Also, for the percentage of the public that does not own a smartphone, the current fare payment options will still exist.

After the successful implementation of hardware validators, future phases would then be planned to allow for the usage of smart cards and subsequently EMV contactless bank cards. An evaluation of the success of the implementation of the mobile payment application would be conducted and considerable planning would be required before proceeding with either of these options.

FINANCIAL IMPLICATIONS

If Regional Council approves the recommendation of this report, the procurement process will begin for the recommended technology solution.

The capital costs associated with the first phase of this implementation are estimated to be less than $500,000 (+/- 25% including project resource requirements) and would be funded from CM180005.

[1] From Wireless Earbuds to 5G: Canadians Are Enthusiastic About Today's and Tomorrow's Tech, Says CTA - https://www.cta.tech/Resources/Newsroom/Media-Releases/2020/January/From-Wireless-Earbuds-to-5G-Canadians-Are-Enth-(1)

As mentioned above, there is potential that the first phase of this implementation could impact Halifax Transit's operating costs as many vendors of mobile ticketing applications charge a flat rate on each ticket sold or an annual rate based on ridership This rate would be negotiated with vendors during the procurement process. Specifics of these impacts would be provided in a subsequent report following the procurement process.

RISK CONSIDERATION

There are no significant risks associated with the recommendations of this report. The risks considered rate low.

Risks considered include lengthy implementation and low adoption rate, neither of which rate higher than low risk.

COMMUNITY ENGAGEMENT

The March 2019 edition of Halifax Transit's Talk Transit survey focused on transit technology. One question included in the survey was *"Which of the following payment methods would you like to see in the future?"* and offered the following options:

- Mobile App (e.g. on smartphones)
- Smart Card (e.g. Presto, Opus, Compass, etc.)
- Debit/Credit Card Tap
- Other

392 responses offered the following results:

- Mobile App 73 (18.6%)
- Smart Card 175 (44.6%)
- Debit/Credit Card Tap 98 (25.0%)
- Other 46 (11.7%)

While a majority of the public would prefer a Smart Card solution, many of the written responses included with the 'Other' option indicated a preference for all three options or both a Smart Card solution and a Mobile App.

ENVIRONMENTAL IMPLICATIONS

There were no environmental implications identified associated with this report.

ALTERNATIVES

1. Regional Council may choose to direct the CAO to proceed with an alternate strategy for phase 2 of the fare management project.

2. Regional Council may choose to direct the CAO to not proceed with any alternative fare payment technologies.

ATTACHMENTS

None

A copy of this report can be obtained online at halifax.ca or by contacting the Office of the Municipal Clerk at 902.490.4210.

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