

2026 Fare Strategy

Navigating the Next 10 Years of Fare Collection at LTC



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For The London Transit Commission



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Executive Summary



Purpose

London Transit Commission (LTC) undertook this Fare Strategy in the summer of 2026. The study had three primary aims:

- Develop a plan for the replacement of LTC's inventory of validating fareboxes, which are approaching end-of-life in the next couple years.
- Chart a course for the future of LTC's intelligent fare payment systems, including current and emergent fare technologies, such as smartcards, mobile e-ticketing, and contactless open payment.
- Establish a fare collection strategy for LTC's bus rapid transit (BRT) routes, launching in 2027.

Methodology

The project was guided by a structured methodology designed to develop a Fare Strategy that supports LTC's operational, customer experience, and financial objectives. Work began with an assessment of the current fare collection environment at LTC, including existing technologies, policies, operational practices, and planned initiatives. This review was supplemented by an examination of fare collection trends, emerging technologies, and industry practices among peer transit agencies to understand the broader direction of fare systems. Building on this foundation, a range of future fare collection technology and BRT fare strategy scenarios were developed and evaluated against qualitative criteria and cost assessments. Evaluation results informed selection of a recommended fare collection technology and BRT fare strategy, which were subsequently supported by implementation planning and financial analysis to provide LTC with a clear roadmap for future investment and deployment.

Industry Trends

Through the Fare Strategy, a comprehensive review of LTC's current fare technologies and analysis of fare payments by LTC riders was undertaken. This activity was supplemented by a scan of current industry trends and interviews with representatives from three of LTC's peers: Grand River Transit, Brampton Transit, and Calgary Transit. Key findings include:

- Peer agencies are seeing a falling percentage of customers paying with cash and paper tickets and are moving towards use of gravity fareboxes to save capital cost.
- Many transit agencies have recently, or are actively moving toward, implementing open payment and mobile e-ticketing.
- Phased transitions to new fare collection technologies reduce implementation strain on transit agencies while enabling customers to transition at a slower pace.
- All-door boarding and off-board fare collection introduce challenges from a fare enforcement and customer experience perspective.

Scenario Evaluation

Building on findings from the industry trends review, two evaluation streams were developed to assess fare collection technologies and BRT fare strategies. Fare collection technology scenarios were assessed against qualitative criteria that included equity implications, customer experience, staffing changes, peer alignment, and implementation considerations. The cost assessment considered capital expenditures, operating and maintenance costs, and losses from partial fare payment. The BRT fare strategy scenarios were evaluated based on equity impacts, customer experience, LTC staffing changes, legislative requirements, alignment with peers, and implementation considerations. The cost assessment considered capital expenditures, operating and maintenance costs, losses due to fare evasion, fare enforcement staffing costs, and service operating costs. The evaluation results were then shared and discussed with LTC Staff to support development of a recommended fare collection technology and BRT fare strategy.

Recommendations

Fare collection technologies

Through the scenario evaluation process, it was determined that LTC should undertake a phased replacement of LTC's validating fareboxes with gravity fareboxes, implement an open payment and mobile e-ticketing system, and eventually consider transitioning away from the current smartcard system. This scenario integrates emergent technologies through a balanced approach and smooth transition that will minimize customer disruptions and challenges for LTC staff.

BRT fare collection strategy

Evaluation of three BRT fare collection scenarios concluded that LTC should continue to use of front-door boarding and on-board fare collection on the future BRT system. Front-door boarding is a reliable method of fare collection, requiring no legislative, staffing, infrastructural, or operational changes, while maintaining a consistent customer experience across LTC's fixed-route network.

Implementation Roadmap

Implementation of the recommendations made through this Fare Strategy are anticipated to commence in 2028 when LTC is expected to go to procurement for a mobile e-ticketing and open payment fare collection system. This project is anticipated to be a significant undertaking and therefore is not expected to be completed until 2029. When mobile e-ticketing is launched, LTC is recommended to remove paper tickets from service, encouraging riders to use mobile and bank card options. Removal of paper tickets will enable the replacement of validating fareboxes with newly procured gravity fareboxes. Once the mobile e-ticketing system is operationalized and has reached maturity, LTC staff can consider the timeline for sunsetting the current smartcard system. This approach supports a gradual approach to replacing existing fare collection technologies and

implementing emergent options that remains flexible and responsive to LTC and rider needs. The implementation roadmap is highlighted in Table 1.

Table 1. LTC Fare Strategy high-level implementation roadmap.

Fare collection technology	2027	2028	2029	2030	2031	2032+
Open payment and mobile e-ticketing procurement and implementation						
Existing smart farebox phased out						
Phased gravity farebox replacement						
Sunset current smartcard system						

Note: lighter-colored strikethrough cells indicate optional timelines.

Conclusion

The recommended strategy balances customer convenience, equity, financial sustainability, and implementation risk. It positions LTC to modernize fare collection systems and infrastructure while preserving flexibility to adapt to future technology, policy, and customer needs.

1. Introduction

This report is a summary of the London Transit Commission's (LTC) 2026 Fare Strategy. Through this project LTC charted a course for future fare payment systems, including the physical infrastructure needed to collect fares and high-level strategies on what fare payment options could look like. This summary document highlights work completed as part of the study and presents a recommended fare system strategy for the organization to enact in the coming years.

This document includes seven primary sections. **Section 1** introduces the project, including the project drivers for LTC, methodologies of the project, and key takeaways from peer interviews. **Section 2** summarizes the current state of fare collection technologies and customer payment at LTC, establishing a baseline for successive sections. **Section 3** introduces and evaluates the fare technology scenarios across both qualitative and cost assessments. **Section 4** walks through a similar evaluation process as section 3 with the BRT fare collection scenarios. **Section 5** explores the recommended fare system based on results of the qualitative and cost evaluations. **Section 6** presents a roadmap towards the recommended fare system through an implementation roadmap and financial plan. **Section 7** touches on some of the key takeaways from the project and offers concluding thoughts. **Appendix A** details the findings from peer interviews conducted with Calgary Transit, Brampton Transit, and Grand River Transit.

1.1 Study objectives

The 2026 Fare Strategy provides a plan for future fare collection technologies and practices and ensures that LTC's fare strategy is defined prior to the launch of the Bus Rapid Transit (BRT) system. This includes the following project objectives:

- **Understand current fare collection technologies and plan for future changes.**
Some of LTC's fare collection technologies, including fareboxes, are approaching

end of life, creating a decision point for the next generation of fare collection technologies. A key driver of this study is therefore to understand these systems today and to evaluate options for their replacement.

- **Evaluate modern fare payment architectures and analyze the best fit for LTC.**

Intelligent fare payment systems, including smartcards, open payment, and mobile e-ticketing are increasingly common across transit agencies in Canada; evaluating which combination of these fare payment technologies is best suited for LTC and their customers in the future is a primary objective of this study.

- **Assess the implications of transitioning to an all-door boarding model for LTC's BRT system.** Bus rapid transit systems around the world establish fare collection strategies based on their use of all-door boarding. A key objective of this study is therefore to understand and evaluate the requirements of implementing an all-door boarding fare strategy on LTC's forthcoming BRT system.

This report aims to support LTC staff in implementing a sustainable, industry-leading fare payment system over the next 10 years. Steps taken throughout the study are described in the following section.

1.2 Methodology

This study was guided by a methodology developed by the consultant team and LTC staff leveraging agency data and documentation, leading industry practice, qualitative and quantitative assessment, and staff insight and expertise to develop and analyze fare payment options. This process supported co-design of fare system scenarios that were evaluated and validated by LTC Staff, generating agreement at each step of the process before advancing into the next phase. The study was completed across four primary phases:

- A review of LTC **data and documentation** was undertaken to situate the consultant team in the landscape of fare payment at LTC, including fare payment options today,

finance, future strategies, use of fare payment options, and other data relevant to the study.

- An **industry scan and peer review** was conducted to improve our understanding of fare payment trends, emergent technologies, fare strategy considerations, and successes and takeaways from transit agencies navigating similar challenges as LTC.
- **Scenario development and evaluation** was undertaken to define the requirements of different fare system scenarios and to evaluate those scenarios across qualitative and quantitative criteria.
- Throughout the study, four **staff workshops** were held to share results of project tasks, confirm assumptions, discuss outstanding questions, and generate alignment before proceeding into the next phase of the project.

In the following subsections, the approach used to undertake this study is described.

1.2.1 Data and documentation review

Through an initial information request, the consultant team established the required data and documentation needed from LTC to complete this study. Information received from LTC staff was then categorized into the following six categories:

- **Fare payment and technology.** This category contains information about LTC's current fare payment system and supporting technologies. This includes financial data describing the capital and operating cost and unit counts of different fare systems, fare revenue and fare product usage data, and staff reports defining previous fare strategy and technology decisions.
- **Fare technology architecture.** This category incorporates a comprehensive suite of information detailing the current fare technology system, including standard operating procedures, fare technology equipment detail documentation, and service level agreements between LTC and fare system vendors.

- **Transit data.** This category includes automated passenger counter (APC) and on-time performance data describing passenger boardings, alightings, vehicle loads, and schedule adherence on LTC routes that will be served by the forthcoming Rapid Bus BRT system.
- **Strategic planning documents.** This category contains strategic planning documents and staff reports that provide context about the alignment, projected ridership, operational readiness, and outstanding work requirements for the launch of the Rapid Bus BRT.
- **Organizational policies.** This group of documents is comprised of the LTC operator standard operating procedures manual. The document highlights fare collection procedures, including how operators handle fare evasion and fraud, accepted fare media, and general operator responsibilities as pertaining to fare collection.
- **Financial data.** This final category includes data and documentation describing LTC's fare revenue, fare system operating and capital expenditures, and the 2026 annual budget.

1.2.2 Industry scan and peer review

To support and validate our understanding of the state of the industry in terms of fare payment technology and strategy, the consultant team conducted a desktop review of industry trends and recent fare system changes in the Canadian transit context. Then, leveraging LTRT's fare systems experience, three transit agencies navigating some of the same issues identified by LTC were identified and contacted to participate in peer interviews. Agencies sharing operating and contextual similarities were selected through discussion with LTC Staff, they include Brampton Transit, Grand River Transit, and Calgary Transit. A one-hour interview was then organized with peer agency staff in which the consultant team asked questions about current practice and future strategy regarding the objectives of this study. From these interviews, a few themes emerged that address LTC's core challenges, including the end-of-life of legacy fareboxes, strategizing around adoption of emergent fare collection systems, and the operational realities of launching a BRT

system. Key takeaways were validated with LTC Staff to ensure alignment and a common understanding of industry trends and peer experience prior to development of future fare system scenarios.

1.2.3 Scenario development and evaluation

Evaluation of multiple fare system scenarios was undertaken to ensure the recommended fare system best meets LTC and customer needs. Development of scenarios was informed by review of data and documentation and peer review and guided by LTC staff at the second workshop. It was determined through this process that scenarios would respond to two separate objectives of the study, described below.

- **Fare collection technology scenarios.** This group of four scenarios address LTC's future fare technology system, including options for replacing aging fareboxes, managing the smartcard, and adopting emerging technologies like open payment and mobile e-ticketing.
- **BRT fare collection strategy scenarios.** This group of three scenarios compare potential BRT fare collection scenarios, including front-door boarding, all-door boarding with on-board fare collection, and all-door boarding with off-board fare collection.

Scenarios were separated to ensure consistency in evaluation between scenarios, recognizing that a selected fare technology system should not determine fare strategy on BRT services, and vice versa.

Following description of the scenarios and their various requirements, evaluation was undertaken including both qualitative criteria and cost assessments to ensure a holistic understanding of the strengths and weaknesses of each scenario. Results of the scenario evaluation were used to inform selection of the recommended fare system and are described in greater detail in sections 3 and 4.

1.2.4 Staff workshops

Throughout the study, a total of four (4) workshops were held with LTC staff at key points in the project timeline. These workshops provided an opportunity for the consultant team to share results of completed work and receive input from LTC staff on upcoming work.

- **Review of fare payment options kickoff.** At this first “kickoff” workshop, the consultant team confirmed our understanding of project objectives back to LTC staff, discussed project timelines, outlined the data and documentation request, and agreed on the list of peer agencies for review.
- **Fare payment systems and options review.** At the second workshop, the results of the current state review were shared, fare payment options were introduced, and alignment was generated regarding the fare system scenarios and evaluation criteria.
- **Fare option scenario evaluation.** At the third workshop the consultant team detailed the results of the scenario evaluation and received feedback from LTC staff to inform refinement and finalization of a recommended fare system scenario.
- **Scenario recommendation and implementation.** At the fourth and final workshop results of the refined fare system scenario evaluation were shared, leading to selection of a preferred fare system scenario and implementation timeline. This workshop provided the consultant team with required information to develop the final report and associated roadmaps and financial planning.

The following section introduces the current state of fare collection technologies and fare payment at LTC.

2. Current State Review

Through the current state review, the consultant team leveraged data and documentation to understand fare payment at LTC now and into the future. Review was initiated with an inventory of fare technologies, including the count, cost, lifespan, and expected replacement timelines of devices in use today. Building off the fare technology inventory, the fare payment review investigated use of different fare products on LTC vehicles over time. Taken together these pieces can inform how LTC's future fare technology strategy can support customer needs while remaining responsive to shifting use of fare products over time.

2.1 Fare technology inventory

LTC's inventory of fare collection technologies is introduced in Table 2 and described in further detail in the following section.

Table 2. Inventory of LTC fare collection devices.

Device Name	Count	Lifespan ¹	End-of-life ¹	Unit cost ¹
Garival CENTSaBILL fareboxes	255	18	2027	\$ 35,000
On-board validators (OV41)	255	10	2036	\$ 7,000
Handheld terminals	100	7.5	2032	\$ 4,000
Toshiba point-of-sale terminals	11	11	2026	--

¹ Estimates provided by LTC reporting.

Garival CENTSaBILL fareboxes

LTC's inventory of "smart" validating fareboxes consists of roughly 255 Garival CENTSaBILL fareboxes. These devices accept and electronically process cash and paper tickets. It was noted through discussion with LTC staff that these devices are at the end of their useful life, many devices are refurbished or are otherwise cobbled together from spare parts. Staff anticipate increasing challenges in ordering and receiving spare parts for these fareboxes, forcing LTC to decide in the short term about how to proceed when these devices reach end of life.

On-board validators

LTC first implemented on-board validators in 2015 to support the launch of the agency's Scheidt & Bachmann smartcard system. These validators remained in use until summer 2026, when LTC implemented a refreshed inventory of 255 Scheidt & Bachmann on-board validators. The new devices accept smartcard fare payments and automatically deduct fare value when tapped on board LTC buses. They also validate student cards, enabling eligible Western University and Fanshawe College students to access transit service, although their fares are collected through student tuition. The validators are cEMV contactless payment-capable, meaning LTC could use them to implement open payment and allow riders to pay by tapping a credit or debit card.

Handheld terminals

LTC's inventory of 100 handheld terminals (HHTs) are used to accept smartcard fare payments on London Transit's specialized transit service. These devices were procured in 2024 and are anticipated to have a lifespan of 7.5 years. However, LTC Staff informed the consultant team that only 70 of the HHTs are in use today, leaving 30 spares for growth, replacement, or refurbishment as those in use begin to age. The high count of spares means the lifespan of LTC's HHTs can likely be extended beyond the initial 7.5 years. HHTs also have the capability to be used by fare enforcement officers as fare inspection devices, if fare inspection is implemented at LTC in the future.

Point-of-sale terminals

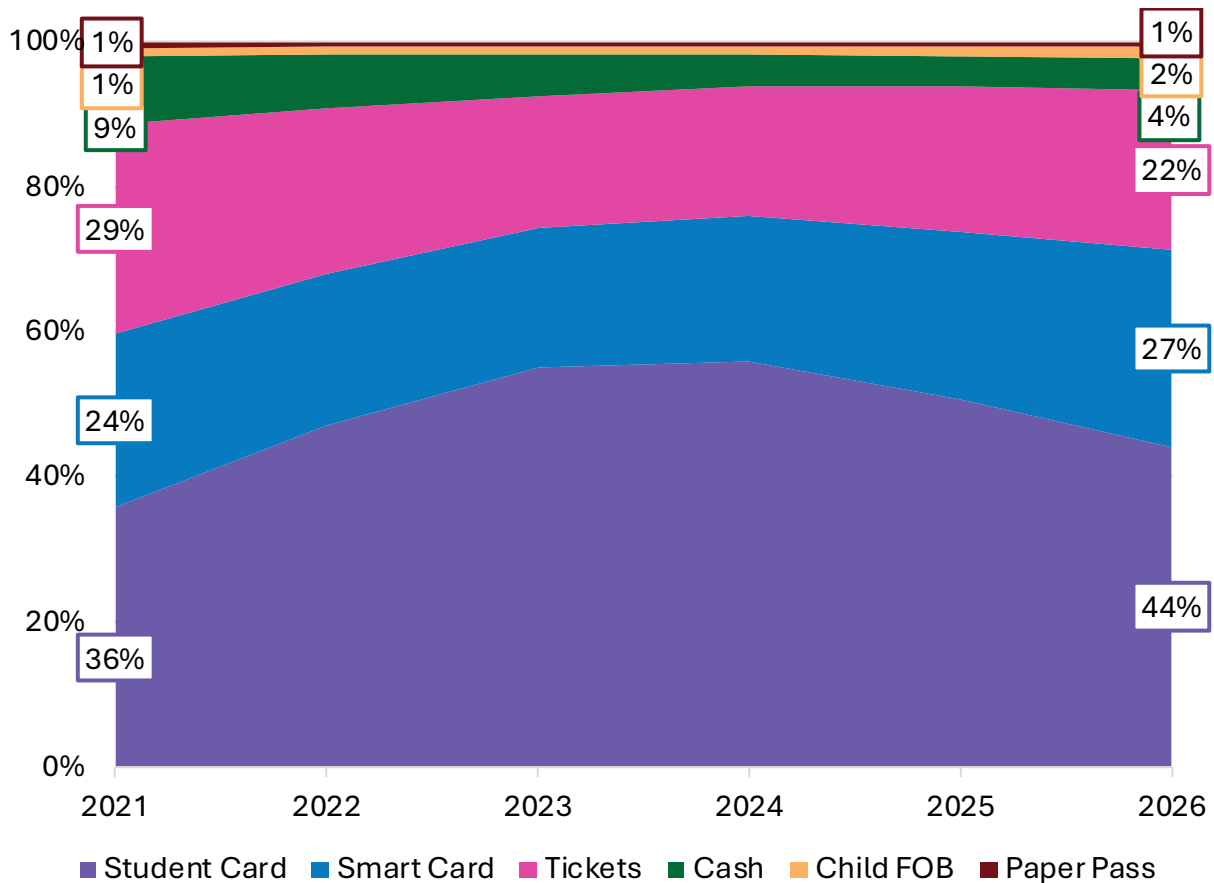
LTC's inventory of Toshiba point-of-sale terminals consists of eleven terminals through which riders may purchase smartcards loaded with passes or stored value. It was noted through discussion with LTC Staff that these devices are nearing end of life with limited spare units available. Riders who would like to purchase, reload, or replace a smartcard are able to do so online through the Smartcard web portal.

The following section explores how LTC riders interact with fare collection devices through discussion of available fare payment options and their use across LTC services.

2.2 Fare payment review

LTC customers pay transit fares through six forms of fare media. The proportion of LTC's total ridership paying with each form of fare payment is highlighted in Figure 1.

Figure 1. LTC fare payment by fare media 2021 – Q2 2026.



Student cards

Representing 44% of fare payments through the first half of 2026, student cards are, by a wide margin, the most common form of fare payment on LTC services. This is owed to the significant proportion of post-secondary students in London. In each of the past five years student cards have been the most commonly used form of fare payment, peaking at nearly 56% in 2024. Student card fare payments have declined following this high watermark due to decreases in international student enrolment in London. Student card fares are collected through tapping a valid student ID card at an on-board validator.

Smartcards

The most common form of fare payment for non-students is through LTC's Smartcard, accounting for 27% of fare payments through the first half of 2026. Over the previous five

years use of Smartcards remained around 20%, increasing to 23% in 2025 and reaching a high of 27% in the first half of 2026. Use of Smartcards enables London Transit riders to load fares online or at LTC and City of London locations throughout the City, access concession fares, and replace a lost or damaged card. In the Fall of 2026, the price for a single-ride adult fare with a Smartcard was \$2.65, tied with paper tickets for the lowest fare concession. Smartcards may also be loaded with monthly passes, which enable unlimited trips within the city through a calendar month. The price for a Citipass (adult, unlimited monthly pass) was \$112 at the time of writing, while an income-related monthly pass was priced at \$72.

When boarding a conventional transit vehicle, Smartcard users tap on-board validators to pay their fare. Alongside student cards and child FOBs, 73% of LTC riders pay fares through tapping at the OBVs. On London Transit specialized services, Smartcard users can pay through the handheld terminals. The trend of increased uptake of intelligent and digital fare products aligns with fare payment trends reported by LTC's peers.

Paper tickets

The third most popular form of fare payment on LTC services is paper tickets, representing 22% of fare payments in the first half of 2026. In the five years highlighted by the chart, use of paper tickets fell by roughly a quarter, decreasing from 29% in 2021 to 18% in 2024 and then jumping back up to 22% in 2026. The price for a pack of five adult single-ride tickets was \$13.25, \$2.65 per trip, in the Fall of 2026. Paper tickets are available at LTC service point locations and at hundreds of retail locations throughout the city. It was noted by LTC Staff that they would like to move away from paper tickets in the future, due to the administrative effort required to administer the program. Paper tickets, alongside cash fare, are accepted through LTC's smart fareboxes.

Cash fare

Representing 4% of fare payments in 2025 and the first half of 2026, cash payment is the fare media which has seen the most significant change in use over the previous five years. Beginning at more than 9% in 2021, the proportion of cash payments has fallen each year

to an all-time low of 4% in 2026. This trend is consistent with LTC's peers, who have also seen a decrease in use of cash payment over time. Customers paying with cash cannot access concession fares and must pay in exact change; the price for a single-ride adult cash fare in the Fall of 2026 was \$3.50. Cash payments are accepted and recorded through LTC's smart fareboxes. Alongside paper tickets, some 26% of LTC riders pay for the service through fareboxes.

Child FOB

Representing 2% of fare payments in 2026, use of the child FOB has grown substantially since 2021, when they amounted to less than 1% of fare use. Children aged 5 to 12 ride free on LTC services, and this fare product allows LTC to track ridership among this age group. When boarding a vehicle, children will tap their FOB at the on-board validator to record their trip. FOBs are available, and provided free of charge, at LTC's two service point locations. Children under the age of 5 do not require a FOB to ride LTC services for free.

Paper passes

The least commonly used fare payment type for LTC services are paper passes, accounting for less than 1% of total fare payments in each of the past five years. This category of fare products includes different types of passes that are, as of Fall 2026, available exclusively in paper format, including CNIB passes, "get on board" passes that enable specialized riders to ride free on LTC conventional services and convention passes. These passes are not accepted by fareboxes and are shown to drivers for visual validation, operators then record fare payments through the farebox.

3. Fare Technology Scenario Evaluation

Four fare technology scenarios were developed alongside LTC Staff. Scenarios aim to address the decisions LTC faces over the next several years: how to replace fareboxes approaching end of life, how to proceed with the smartcard system, and how to introduce open payment and other emerging fare technologies. Each scenario combined options in these three areas, as summarized in Table 3. Open payment was included in every scenario, reflecting its continued adoption by peer agencies and requests from LTC customer for this fare payment option. Understanding these priorities, LTC staff have articulated that open payment is a priority to be pursued through the study. The scenarios are described below.

Table 3. Fare technology scenarios.

Fare technology	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Farebox options	Replace with new smart fareboxes		Shift to gravity fareboxes	
Smartcard options	Renew S&B smartcard	Shift to account-based smartcard		Phase out smartcards
Emergent options	Implement S&B open payment	Introduce new open payment system		Open payment & e-ticketing

- Scenario 1: Business as usual with open payment.** Under this scenario LTC replaces its GFI fareboxes with a new generation of integrated smart fareboxes that continue to accept and validate cash and paper tickets, print transfers and record boardings; extends and further invests in its smartcard contract with Scheidt & Bachmann; and implements open payment on the existing cEMV-capable on-board validators. The fare system riders use today is preserved in its current form, with

contactless bank card payment added. This is the smallest change from current practice of the four scenarios and serves as the reference point for the other three.

- **Scenario 2: BAU + new smartcard system.** Under this scenario LTC replaces its fareboxes with new smart fareboxes, as in Scenario 1, but goes to market for a new account-based smartcard system in place of the current stored-value platform. In an account-based system, fare value and products are held in a rider's account in the back office rather than on the card itself. A new suite of on-board fare validators and open payment would be implemented alongside the new smartcard system. This scenario changes the back office and the customer-facing smartcard while leaving the farebox approach unchanged.
- **Scenario 3: Gravity fareboxes and new smartcard system.** Under this scenario LTC replaces its fareboxes with gravity fareboxes rather than smart fareboxes. A gravity farebox accepts cash but does not count or validate it, print transfers, or record boardings; those functions would need to be handled another way, for example through the operator console, and the treatment of paper tickets would need to be settled or the tickets cancelled. As with scenario 2, LTC would procure a new account-based smartcard system, on-board validators, and open payment.
- **Scenario 4: Gravity fareboxes and mobile e-ticketing.** Under this scenario LTC installs gravity fareboxes, retains the smartcard system, and implements a mobile e-ticketing platform that includes open payment. This scenario enables riders to pay by tapping a bank card or phone, presenting a ticket in a mobile app, or with cash. Once the mobile e-ticketing and open payment system is operational, LTC can begin transitioning away from paper tickets and fare products tied to the existing smartcard system, including student cards, concessions, and income-related passes, to delivery through the mobile platform. Concessions-related passes should have the option to be offered through account-based smartcards associated with the mobile e-ticketing system to ensure riders without smartphones can access concession fares. Following this transition, LTC can consider sunsetting the smartcard system.

Each scenario was evaluated against the qualitative criteria described in Section 3.1 and the cost criteria described in Section 3.2. The results are presented together in Section 3.3.

3.1 Qualitative evaluation

Qualitative evaluation captures non-monetary considerations associated with each fare collection scenario, including how each scenario impacts equity-deserving riders, how it feels to pay a fare, what each scenario requires of LTC Staff, whether it moves with or against the direction of the industry, and the level of effort associated with implementation. Each of the four fare technology scenarios was assessed against five criteria:

- **Equity impact assessment.** This category represents the effect of each scenario on riders who depend on cash, concession fares and agency-distributed fare products, and on riders who are unbanked or underbanked, do not carry a data-enabled smartphone, or are less comfortable with digital payment.
- **Customer experience.** Customer experience encompasses the convenience, speed, and clarity of paying a fare, including the effort required to obtain fare media, load value, recover a lost balance and understand which payment options apply.
- **LTC staffing requirements.** This criterion accounts for the ongoing effort required of LTC Staff to operate and maintain the fare system, including on-vehicle asset maintenance, cash handling, back-office administration, vendor management and customer service.
- **Peer alignment.** This category accounts for the degree to which a scenario is consistent with the direction taken by comparable Canadian transit agencies, as established through the peer interviews and industry scan.
- **Implementation considerations.** This assessment includes the procurement effort, capital project complexity, transition risk and political sensitivity associated with delivering the scenario, including its fit with the BRT Timeline.

Each scenario was scored from 1 to 5 against each criterion, where 1 represents the least favourable outcome and 5 the most favourable outcome relative to the other scenarios under consideration. The consultant team developed the scores based on the evidence presented in the preceding sections and reviewed and refined them with LTC staff during workshops. The following subsections discuss the scores qualitatively, and Section 3.3 consolidates them alongside the cost assessment.

The scores are comparative rather than absolute. A score of 3 places a scenario in the middle of this set, not at an adequate level of performance in any general sense. They are reasoned judgements informed by evidence rather than measurements. The criteria are not weighted. Quantitative weighting of judgement-based scores would imply a precision these ratings do not support, potentially producing a ranking that reflects the weights chosen more than the evidence behind them.

All four scenarios introduce open payment: the ability to pay a fare by tapping a contactless bank card or a payment-enabled phone at a validator. LTC does not offer this today. Debit and credit cards are accepted at LTC sales locations for purchasing fare products but not on the bus as a fare medium. Open payment is an important fare product that reduces barriers to using transit, but because it is common to all four scenarios it does not distinguish one from another. The ratings below focus on differences between the options including fareboxes, the smartcard system, and adoption of mobile e-ticketing.

3.1.1 Equity impact assessment

Fare technology shapes who can pay easily and who cannot. The equity assessment therefore focuses on the riders for whom a change in fare media is not a matter of preference: riders who pay in cash because they have no bank account or no card that works on a validator, riders who receive concession or subsidised fare products through a social service agency, riders without a smartphone or an affordable data plan, and riders for whom a new digital process is a barrier in itself.

The main difference between the scenarios is what happens to the smartcard. Scenarios 1, 2 and 3 all maintain some form of transit smartcard. The current system enables replacement of lost cards and recovery of the stored value on them. An account-based system is therefore not expected to make a noticeable difference for riders who use smartcards. Scenario 4 retains smartcards until the mobile e-ticketing system is operationalized and can absorb concessions passes from the smartcard system.

Table 4. Equity impact assessment of fare technology scenarios.

Scenario	Rating	Rationale
1	3	Cash and the existing stored-value smartcard continue as today, so riders who rely on them are no worse off. Open payment is added, as in every scenario, but it does not reach the riders without a bank card, a smartphone or comfort with digital payment. The scenario neither improves on the current smartcard, as scenarios 2 and 3 do, nor removes it, as scenario 4 does, and so sits between them.
2	3	Riders keep a smartcard, so the equity impact is expected to be the same as scenario 1. An account-based system could make lost-card recovery simpler. However, LTC can already replace lost cards and recover their value, leaving the rider experience unchanged.
3	3	Similar rationale as scenario 2. Cash continues to be accepted through a gravity farebox, so the rider-facing cash experience is unchanged even though the device behind it is simpler.
4	3	In the medium term, continued use of cash and the smartcard system alongside introduction of open payment and mobile e-ticketing make this the scenario with the most fare payment options. In the longer term, phasing out the smartcard system may leave Riders who do not carry a data-enabled phone or are not comfortable with an app without a concession-based option. However, it is noted that some mobile e-ticketing systems do offer smartcards to provide an option in these cases.

3.1.2 Customer experience

Customer experience was considered across the whole fare journey rather than at the moment of tapping alone: obtaining fare media, adding value, having that value available when it is needed, paying quickly at the door, and knowing which of the available options applies. Open payment improves the first and last of these for every scenario since occasional riders and visitors no longer need fare media at all. Beyond that shared gain, the scenarios differ mainly in how the smartcard behaves and, to a lesser degree, in the farebox.

The current stored-value card has a weakness: value loaded online is not usable until the card has been presented to a device that has received the updated list, and that update could be slow. An account-based system is expected to remove that delay, let riders manage their account online, and apply policies such as fare capping automatically. Mobile ticketing, where peers have introduced it, has been well received. However, taking the smartcard away may remove the simplest option available to some riders and leaves a mix of methods that is harder to explain.

Table 5. Customer experience assessment of fare technology scenarios.

Scenario	Rating	Rationale
1	4	Open payment improves convenience. The stored-value smartcard otherwise works as it does today, including the delay before loaded value becomes usable.
2	5	Open payment improves convenience. The account-based system is more streamlined for customers (faster processing times for loading funds), supports online account management and fare capping, and can be carried on media other than a plastic card, such as a virtual card in a phone wallet or a registered mobile app.
3	5	Similar score as scenario 2. A gravity farebox is marginally quicker for cash boardings than a validating farebox, but the difference is unlikely to be noticed by most riders.

Scenario	Rating	Rationale
4	4	Introduction of open payment and mobile ticketing in the medium term add convenient options for riders. Transitioning away from the smartcard system in the longer term is phased to reduce disruption for customers.

3.1.3 LTC staffing requirements

This criterion looks at the ongoing effort each scenario would require of LTC staff once it is in service. The effort of getting there is addressed under implementation in Section 3.1.5.

Four activities were considered: maintaining fare collection assets, handling and processing cash, administering the back office and the fare products it supports, and managing vendors and customer service.

Two changes drive the differences in evaluation scoring. Replacing validating fareboxes with gravity fareboxes removes the bill and coin validation mechanisms, and reader that make an integrated farebox expensive and prone to failure. Removing the smartcard altogether takes away card stock, distribution, card-related customer service and the current back office. Against these, every scenario adds a new open payment responsibility including settlement, reconciliation, chargebacks and disputed transactions. Also, an account-based system is likely to shift effort toward account management and customer service rather than reducing it.

Table 6: LTC staffing assessment of fare technology scenarios.

Scenario	Rating	Rationale
1	3	Farebox servicing, cash processing and smartcard administration continue as today. Open payment adds settlement, reconciliation and dispute handling.
2	3	Similar overall effort but different in kind: less card inventory and device-level configuration, more account management,

Scenario	Rating	Rationale
		customer service and policy administration than LTC performs today because of the shift to account-based Smartcard.
3	4	Gravity fareboxes have fewer components to fail and are expected to require less servicing, otherwise similar to scenario 2.
4	5	Likely the lowest ongoing effort of the four scenarios. Gravity fareboxes require reduced staff effort, while mobile e-ticketing and open payment would be largely hosted and operated by the vendor. Phased transition away from the smartcard system reduces the number of internal projects occurring simultaneously.

3.1.4 Peer alignment

Peer alignment is not a measure of quality in itself as an agency can be right to diverge from its peers, but it reduces risk. A technology that peers have already adopted is more likely to have been proven at a similar scale and to be supported by vendors. It also offers lessons that LTC can draw on. The interviews and industry scan point consistently away from integrated validating fareboxes and toward simple cash fareboxes paired with standalone validators. Peers are also moving towards in account-based mobile e-ticketing systems and toward implementation of open payment.

Measured against peer direction, scenario 1 moves in the direction of peers to an extent but continued use of validating fareboxes and the legacy smartcard system result in a score below the current state. Scenario 2 is consistent in terms of smart fareboxes but through introduction of a new smartcard system and open payment, performs better than today. Scenario 3 performs the best due to similarity with scenario 2 and implementation of gravity fareboxes. Scenario 4 is nearly the same as 3, though inclusion of mobile e-ticketing and eventual removal of the smartcard system is somewhat inconsistent with the direction of some peers.

Table 7: Peer alignment assessment of fare technology scenarios.

Scenario	Rating	Rationale
1	2	Procuring new validating fareboxes is somewhat inconsistent with the direction suggested by peer agencies interviewed. Open payment itself is aligned with the industry.
2	4	Procuring new validating fareboxes is somewhat inconsistent with the direction suggested by peer agencies interviewed. Account-based ticketing and open payment are aligned with the direction peers are taking.
3	5	Combines the industry trends: a gravity box with a separate standalone validator, account-based smartcard system and open payment.
4	4	Fareboxes, open payment and mobile ticketing are all aligned. Removing the smartcard altogether is somewhat uncommon.

3.1.5 Implementation considerations

Implementation considers what each scenario asks of LTC to deliver: the number and size of the procurements required, the complexity of installing and commissioning new assets, the risk carried through the transition, and the political sensitivity of the changes involved. Timing matters as well. LTC's existing fareboxes are approaching end of life and spare parts are becoming harder to obtain. While LTC recently renewed its inventory of on-board validators, a replacement strategy for farebox functions will be required before the existing fareboxes are retired. Also, fare technology decisions need to be settled ahead of the Rapid Bus BRT launch.

The scenarios span a wide range here. Renewing with the incumbent vendor (scenario 1) is the least effort of the four, though it extends a dependency on a single vendor. Scenario 2 involves two major capital projects, the smartcard system and the fareboxes, and a back-office migration. Scenario 3 has the same back-office migration but a simpler farebox programme. Scenario 4 is light on assets but carries the transition and political risk of withdrawing the smartcard.

Table 8: Implementation assessment of fare technology scenarios.

Scenario	Rating	Rationale
1	4	Renews the existing vendor relationship, avoids a competitive smartcard procurement and reuses installed validators.
2	1	Implementing new validating fareboxes and an account-based smartcard system would involve two major capital projects, fleet-wide installation and a challenging transition.
3	2	The same back-office transition as scenario 2 but a simpler farebox programme. Gravity fareboxes generally need no power or data connection and are expected to be quicker to install and commission.
4	4	Likely the least asset-intensive of the change scenarios, requiring gravity fareboxes, new validators and a vendor-hosted ticketing platform. Sunsetting the smartcard in the longer term may be politically contentious. It would also require a migration path for existing cardholders and a new channel for concession and income-related passes.

3.2 Cost assessment

Key to the evaluation of each scenario is the cost associated with purchasing and maintaining the equipment, software, and other pieces required to maintain the fare system. In this section, a cost estimate for each scenario is provided, enabling comparison between the scenarios. Cost assessment is broken into three distinct categories:

- **Capital costs.** Capital costs include the hardware, equipment, and contract costs associated with the fare payment system. Capital costs are the upfront costs to purchase fare collection technologies including fareboxes, validators, and technology systems. These costs are reported both in terms of total cost and annualized costs.
- **Operating and maintenance costs.** Operating and maintenance (O&M) costs include the ongoing software, maintenance, processing, and operational costs

associated with keeping the fare payment system functional. Operations and maintenance costs are annual.

- **Partial fare payment costs.** Partial fare payment represents the lost fare revenue due to passengers paying partial fares or avoiding payment altogether. Rates of partial fare payment are anticipated to vary between scenarios based on the presence of a smart. validating farebox; this cost category accounts for annualized fare revenue losses due to partial or non-payment.

Fare technologies already implemented on LTC services were not accounted for through the cost analysis. All costs represent additional costs needed to implement and maintain the fare technology system.

3.2.1 Capital cost

Each of the scenarios requires a unique suite of fare collection technologies to support fare payment. Fare technology capital costs associated with each of the four scenarios include the following:

- **Validating (smart) fareboxes.** These devices, currently in-use and approaching end of life on LTC vehicles, automatically count and validate cash and paper tickets on LTC vehicles. Smart fareboxes cost roughly \$35,000 per unit and have a lifespan of 18 years.
- **Gravity fareboxes.** Gravity fareboxes are similar in function to smart fareboxes, but do not automatically count or validate cash and tickets. Rather, these devices serve as a drop box for customers paying cash, requiring the driver to visually validate the correct fare has been paid. These devices have a unit cost of approximately \$8,000 and a lifespan of up to 30 years.
- **New smartcard system.** Smartcard systems, similar to the system LTC operates today, enable payment through a stored value or account-based card. A new smartcard system would be anticipated to cost roughly \$5.5 million, accounting for implementation, cards, open payment capability, and capital equipment, including

new validators. LTC implemented a new set of these devices in the Summer of 2026. Smartcard systems tend to have a lifespan of around 10 years.

- **Mobile e-ticketing system.** Mobile e-ticketing systems enable customers to load and pay fares through a mobile application and often have open payment integrations to enable contactless bank card payments. Implementation of a mobile e-ticketing and open system is anticipated to cost rough \$3.9 million, accounting for project management, integration, implementation, and capital equipment including new on-board validators. As with a new smartcard system, mobile e-ticketing systems generally have a lifespan of around 10 years.
- **System upgrades.** An upgrade to LTC’s existing fare payment system to enable open payment is anticipated to carry a project cost of \$1.0 million. This cost does not include any hardware, it accounts for the project management, integration, and implementation costs associated with enabling open payment on LTC’s current inventory of on-board validators.

These cost categories come together to create the capital cost projections for each scenario. Table 9 summarizes which fare collection capital costs are included to support each scenario.

Table 9. Fare technology scenario system requirements.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Smart fareboxes	Included	Included		
Gravity fareboxes			Included	Included
New smartcard system		Included	Included	
Mobile e-ticketing and open payment				Included
System upgrades	Included			

Unit costs are then multiplied by the anticipated unit counts to determine the total cost of each fare collection scenario, as captured in Table 10.

Table 10. Total fare technology scenario capital costs.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Smart fareboxes	\$ 9.1 M	\$ 9.1 M	-	-
Gravity fareboxes	-	-	\$ 2.1 M	\$ 2.1 M
New smartcard system	-	\$ 5.5 M	\$ 5.5 M	-
Mobile e-ticketing system	-	-	-	\$ 3.9 M
System upgrades	\$ 1.0 M	-	-	-
Total capital costs	\$10.1 M	\$ 14.6 M	\$ 7.6 M	\$ 6.0 M

The most impactful category of fare collection technology are the smart fareboxes, representing a cost of \$9.1 million for a new suite of validating fareboxes. Gravity fareboxes, in contrast, are estimated to cost \$2.1 million, a significantly reduced total cost compared to smart fareboxes. Gravity fareboxes also have a 30-year lifespan, driving down the annualized cost when compared to the 18-year lifespan of smart fareboxes. The high cost of smart fareboxes is the primary driver for the elevated costs of scenarios 1 and 2.

Technology requirements associated with the smartcard system, including new on-board validators, a new smartcard system, and website upgrade drive differences in cost between the scenarios. Under scenario 1, previous investments made into the smartcard system and associated collection technology results in minimal capital cost. Scenarios 2 and 3 require procurement of a new smartcard system, including on-board validators and open payment capability, carrying a significant project cost of \$5.5 million. Scenario 4 involves moving away from smartcards, but new on-board validators and the mobile e-ticketing and open payment systems drive a cost estimate of \$3.9 million.

Capital costs required to support open payment are applied evenly across all four scenarios, requiring \$1.0 million in total cost to implement cEMV open payment. Open payment costs are part of System upgrades for scenario 1. In scenarios 2 and 3 open payment costs are rolled into the \$5.5 M cost of the new smartcard system. The same approach is taken for scenario 4, as the \$3.9 million mobile e-ticketing system cost includes open payment.

Taken together these categories are summed to determine the overall capital cost requirements of each scenario. Scenario 2 carries the greatest capital cost at \$14.6 million, owing to a procurement of both smart fareboxes and a new smartcard system. Scenario 1 is the second most expensive, with a cost estimate of \$10.1 million driven by smart farebox procurement. Scenario 3 follows scenario 1, owing significant cost savings to gravity fare boxes, resulting in a total capital cost of \$7.6 million. Scenario 4 requires the least capital investment, \$6.0 million, due to gravity fareboxes and lack of a smartcard system.

Capital costs can be annualized by dividing the total capital project or technology cost by the anticipated lifespan of the investment, deriving annualized capital costs for each scenario and collection technology. These annualized are summarized in Table 11.

Table 11. Annualized fare technology scenario capital costs.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Smart fareboxes	\$ 0.5 M	\$ 0.5 M	-	-
Gravity fareboxes	-	-	\$ 0.1 M	\$ 0.1 M
New smartcard system	-	\$ 0.6 M	\$ 0.6 M	-
Mobile e-ticketing system	-	-	-	\$ 0.4 M
System upgrades	\$ 0.1 M	-	-	-
Total annualized capital costs	\$ 0.6 M	\$ 1.1 M	\$ 0.7 M	\$ 0.5 M

Annualizing capital costs has a minimal impact on the overall capital cost ranking associated with each of the scenarios. Scenario 2 remains the most expensive, carrying an annualized cost of \$1.1 million. Scenarios 1, 3, and 4 are similar in terms of annualized capital cost. Scenario 3 is the most costly at \$700,000, primarily due to the new smartcard and open payment systems. The high costs of smart farebox and system upgrades in scenario 1 drive an annualized cost of \$600,000. The most cost-effective scenario is 4, carrying an annual cost of \$500,000 representing the lower costs of gravity fareboxes and the mobile e-ticketing and open payment system.

3.2.2 Operating and maintenance costs

Operating and maintenance costs are the annual costs necessary to keep fare collection technologies running in working order. Fare technology operating costs pertaining to each of the four scenarios are described below:

- **Smart farebox O&M costs.** These costs include the software, cleaning, and maintenance costs associated with operating LTC's inventory of smart fareboxes. This results in an annual operating cost of roughly \$65,000.
- **Fare processing costs.** Fare processing costs account for the staff time, coin vault, cashing counting, and other operating requirements to collect and deposit cash fares. The annual cost associated with fare processing is approximately \$150,000.
- **Current smartcard system costs.** Current smartcard system operations and maintenance costs account for the various product maintenance, software, pass systems, and testing costs associated with maintaining the current smartcard system and on-board validators. These costs sum to an annual O&M cost of \$640,000.
- **Open payment costs.** The costs associated with maintaining an open payment system on LTC's existing inventory cEMV capable on-board validators include product support, payment charges, network fees, and equipment maintenance. These costs sum to an annual estimate of \$300,000 in O&M costs.

- **New smartcard system costs.** The operations and maintenance costs of a new smartcard system include similar inputs as the current smartcard system, including software as a service, product maintenance, and testing costs. A new smartcard system would also contain costs associated with the open payment system including product support, payment charges, network fees, and equipment maintenance. For a new open payment-capable smartcard system, these costs are estimated to total roughly \$1.15 million annually.
- **Mobile e-ticketing costs.** Annual costs required to operate a mobile e-ticketing system are similar to the smartcard system, including product support, payment charges, mobile application fees, network fees, and equipment maintenance. Open payment system costs are included as well, representing product support, payment charges, network fees, and equipment maintenance. Operating and maintenance costs necessary to upkeep this system are estimated at \$600,000 annually.

Table 12. Fare technology scenario operating requirements.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Smart farebox O&M costs	Included	Included		
Fare processing costs	Included	Included	Included	Included
Current smartcard system costs	Included			Included
Open payment O&M costs	Included			
New smartcard system costs		Included	Included	
Mobile e-ticketing O&M costs				Included

Unit costs are then multiplied by the anticipated unit counts to determine the total operating and maintenance cost of each fare collection scenario. These costs are summarized in Table 13.

Table 13. Fare technology scenario operating costs.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Smart farebox O&M costs	\$ 0.07 M	\$ 0.07 M	-	-
Fare processing costs	\$ 0.15 M	\$ 0.15 M	\$ 0.15 M	\$ 0.15 M
Current smartcard system costs	\$ 0.64 M	-	-	\$ 0.64 M
Open payment O&M costs	\$ 0.3 M	-	-	-
New smartcard system costs	-	\$ 1.15 M	\$ 1.15 M	-
Mobile e-ticketing O&M costs	-	-	-	\$ 0.6 M
Total annualized O&M costs	\$ 1.2 M	\$ 1.4 M	\$ 1.3 M	\$ 1.4 M

Unlike capital costs, costs associated with operating and maintaining fareboxes are relatively minor. Scenarios 1 and 2 carry a smart farebox software operating cost of \$70,000, while gravity fareboxes supported by scenarios 3 and 4 have no such operating cost. All four scenarios require roughly \$150,000 to process and handle cash fares collected through the fareboxes.

Operating and maintenance costs stemming from the smartcard system represent a significant cost category, representing a cost of \$640,000 to maintain the various software, operating, product, and hardware costs of the current smartcard system and on-board validators. Scenarios 2 and 3 include a marginally more expensive smartcard system cost based on review of recent industry contracts and inclusion of open payment, each

scenario has an annual smartcard system cost of \$1.15 million. Scenario 4 retains the cost of operating and maintaining the current S&B smartcard system, though this cost will no longer apply when the system is phased out in the future.

Scenario 4 is the only scenario featuring implementation of a mobile e-ticketing system, alongside open payment capability, this system is estimated to carry an annual operations and maintenance cost of roughly \$600,000.

Summing these costs together, scenarios 2, 3, and 4 carry similar annual operations and maintenance costs, owing to significant costs associated with the open payment-capable smartcard and mobile e-ticketing systems featured in the scenarios. Scenario 3 is marginally less expensive with an annual O&M cost projection of \$1.3 million, compared to a cost of \$1.4 million for scenarios 2 and 4. Scenario 1 is the least costly from an operations and maintenance cost perspective, with similar requirements as scenario 2, though with a less costly smartcard system. Estimated annual O&M cost for scenario 1 is \$1.2 million.

3.2.3 Partial fare payment

Partial fare payment revenue losses are a result of LTC riders paying an incomplete cash fare when boarding a vehicle. At present, it is estimated that 3 – 5% of riders evade fare payment, through either complete non-payment or partial payment. In the future, continued use of smart fareboxes or adoption of gravity fareboxes is expected to have an impact on partial fare payment. An internal study by the TTC in 2023 uncovered that 13.5% of fare revenue losses on vehicles with gravity fareboxes was due to partial fare payment. In the LTC context, this would result in additional annual fare revenue losses of roughly \$80,000 for scenarios incorporating gravity fareboxes. Table 14 summarizes lost revenue due to partial fare payment, representing losses to LTC as annualized costs for scenarios 3 and 4.

Table 14. Partial fare payment costs.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Partial fare payment losses	-	-	\$ 0.08 M	\$ 0.08 M

3.3 Fare technology scenario evaluation results

Qualitative assessment results

Results of the qualitative fare technology scenario assessment are summarized in Table 15.

Table 15. Fare collection technology qualitative assessment results.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Equity impact assessment	3	3	3	3
Customer experience	4	5	5	4
LTC Staffing requirements	3	3	4	5
Peer alignment	2	4	5	4
Implementation considerations	4	1	2	4
Average Score	3.2	3.2	3.8	4.0

Results of the qualitative assessment suggest that from a qualitative perspective, scenario 4 provides the best result. This reflects scenario 4's performance across customer experience, LTC staff requirements, peer alignment, and implementation considerations. The only qualitative criteria that scenario 4 did not demonstrate improvement on is equity impact, owing to the lack of equity benefits or disbenefits associated with this scenario. Scenario 3 is the second highest scoring with strong customer and peer alignment scoring,

though this scenario scores poorly in terms of implementation considerations. Scenarios 1 and 2 are tied for the least favorable in this evaluation, owing to poor ratings in peer alignment and implementation.

Cost assessment results

Results of the fare collection technology cost assessment are summarized in Table 16.

Table 16. Fare collection technology cost assessment results.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Annualized capital costs	\$ 0.6 M	\$ 1.1 M	\$ 0.7 M	\$ 0.5 M
Operating and maintenance costs	\$ 1.2 M	\$ 1.4 M	\$ 1.3 M	\$ 1.4 M
Partial fare payment costs	-	-	\$ 0.1 M	\$ 0.1 M
Total Annual Cost	\$ 1.8 M	\$ 2.5 M	\$ 2.1 M	\$ 2.0 M

Results of the cost assessment highlight that scenario 1 carries the least cost impact, with an annual total of roughly \$1.8 million. This scenario requires the least annualized capital and operating costs. Following scenario 1, scenario 4 is the second least costly, with an annualized cost of \$2.0 million. Scenarios 2 and 3 are the most expensive, carrying annualized costs of \$2.5 and \$2.1 million, respectively.

4. BRT Fare Collection Strategy Scenario Evaluation

LTC’s Rapid Bus BRT will operate on street-level corridors and share stops with conventional routes. Fare collection on BRT services therefore needs to be considered alongside the conventional network rather than in isolation: whatever is asked of a BRT rider will be experienced at the same stop, and compared with, the boarding process on the conventional bus that arrives before or after. Three BRT fare collection scenarios were developed with LTC staff, distinguished by where riders board and where fares are collected. They are independent of the fare technology scenarios in Section 3Any of the three could be delivered with any of the fare technology options.

Table 17. BRT fare collection strategy scenarios.

Fare Strategy	Scenario A	Scenario B	Scenario C
BRT Fare Collection	Maintain front door boarding	Introduce all door boarding	Introduce off-board fare collection and all-door boarding

- **Scenario A: Maintain front-door boarding.** Under this scenario BRT vehicles operate as conventional LTC buses do today. Riders board at the front door and pay at the farebox or tap at the on-board validator, in view of the operator. Riders are encouraged to alight through the middle and rear doors. No proof-of-payment framework or fare inspection is required.
- **Scenario B: Introduce all-door boarding.** Under this scenario riders may board BRT vehicles through any door, tapping at validators installed at the rear doors as well as the front. Because the operator can no longer observe every fare payment, BRT vehicles would be designated proof-of-payment areas and LTC would establish a fare inspection function to check fares on board. Riders paying with cash or paper tickets (if not cancelled) would continue to board at the front door.

- **Scenario C: Introduce off-board fare collection and all-door boarding.** Under this scenario riders pay before boarding, at validators installed at BRT stops, and board through any door without tapping on the vehicle. BRT vehicles would be designated proof-of-payment areas, with fare inspection as in Scenario B. This is the model commonly used by BRT and light rail services operating in their own right-of-way.

Each scenario was evaluated against the qualitative criteria described in Section 4.1 and the cost criteria described in Section 4.2. The results are presented together in Section 4.3.

4.1 Qualitative evaluation

The BRT fare collection scenarios were assessed against six qualitative criteria. Five are the criteria used for the fare technology scenarios, applied here to the boarding and fare collection arrangement rather than to fare media. The sixth, legislative requirements, is specific to this evaluation because two of the three scenarios depend on a proof-of-payment framework that does not exist at LTC today.

- **Equity implications.** This criterion refers to the effect of each scenario on riders who are most exposed to a change in how fares are collected and enforced, including riders with mobility devices or strollers and riders for whom a fare inspection or penalty is a significant burden.
- **Customer experience.** This criterion considers how clear, consistent and quick the boarding and payment process is for BRT riders, and for riders who use both BRT and conventional services at the same stops.
- **LTC Staffing requirements.** This criterion refers to the ongoing effort required of LTC staff once the scenario is in service, including any fare inspection function, rider education and the maintenance of additional fare collection assets.

- **Legislative requirements.** This criterion refers to the by-law, policy or other authorizations LTC would need in place before the scenario could operate, including the designation of proof-of-payment areas and the authority of fare inspectors.
- **Peer alignment.** This criterion considers whether the scenario is consistent with the approach taken by comparable agencies, based on the peer interviews and industry scan.
- **Implementation considerations.** This criterion refers to the assets, procurement, transition and political effort involved in delivering the scenario, and its fit with the BRT design and launch timeline.

Two features of the scenarios shape the assessment throughout. First, scenarios B and C both depend on proof-of-payment and fare inspection, which would be a new function for LTC. Second, because BRT and conventional services share bus stops, the scenarios are assessed not only on how well they work for BRT riders but on how they sit alongside the conventional boarding process at the same curb.

4.1.1 Equity implications

All-door boarding may offer a modest benefit to riders with mobility devices, strollers or other items to manage boarding through a wider rear door, without the sense of holding up the queue at the front, is likely to be a more comfortable experience for some riders. This benefit applies to scenarios B and C alike.

Against it, both scenarios introduce fare inspection, which is the more significant equity consideration. Inspection places riders in direct interaction with enforcement staff, and that interaction carries a risk of conflict. How LTC designs the inspection function, including the balance between education and penalties, the level of fines, and the training and role of inspectors, would affect the size of this risk, but is unlikely to remove it entirely. Scenario A avoids the question entirely by leaving fare collection as it is today.

Table 18. Equity implications of BRT fare collection strategy scenarios.

Scenario	Rating	Rationale
A	3	No change from today. Fare collection remains in view of the operator, and no inspection function is introduced.
B	1	All-door boarding may be a modest improvement for riders with mobility devices or strollers, because they might not feel like they are slowing down boarding process. However, this is overwhelmed by introduction of fare enforcement as negative equity implication. It creates new interactions between riders and enforcement staff, with the associated risk of conflict falling most heavily on riders who are already vulnerable.
C	1	Similar equity considerations as scenario B. Off-board collection is not expected to change the equity assessment in either direction.

4.1.2 Customer experience

The customer experience assessment turns on a trade-off between speed and consistency. All-door boarding and off-board collection are expected to reduce the time a BRT vehicle spends at each stop. Shorter dwell times mean shorter trips for riders. Dwell time per boarding is estimated at about 3.6 seconds under scenario A, 2.0 seconds under scenario B and 1.8 seconds under scenario C. Therefore, for an individual rider, the average BRT trip is expected to be about 37 seconds shorter under scenario B and 41 seconds shorter under scenario C.

The offsetting concern is consistency. At LTC's BRT stops, conventional buses will continue to serve the same curb. A rider waiting at a shared stop would face one boarding procedure if a BRT vehicle arrives and another if a conventional bus arrives first. The peer agencies that operate BRT at shared street-level stops, Brampton Transit and Calgary Transit, both cited this as the reason they retained front-door boarding. Scenario C adds a further layer, since riders would need to know that payment happens at the stop rather than on the vehicle.

The ratings below reflect our assessment that, for a network in which the majority of boardings will remain on conventional services, consistency of the boarding process outweighs the time saving on BRT from the perspective of customer experience.

Table 19. Customer experience assessment of BRT fare collection strategy scenarios.

Scenario	Rating	Rationale
A	3	Consistent with other conventional service experience. However, boarding can be slow when many riders board or alight at a single stop.
B	3	Faster boarding for BRT riders, but a different procedure from the conventional buses serving the same stops. Inconsistent rider experience and ongoing rider education campaigns required outweigh the time savings, resulting in a score of 3.
C	2	Faster boarding, as with scenario B, with the additional need for riders to understand that payment takes place at the stop. The interaction with conventional services at shared stops is unresolved and could be a source of ongoing confusion. These issues more than outweigh the time savings, resulting in a score of 2.

4.1.3 LTC Staffing requirements

Scenario A requires no change to how LTC is staffed. Scenarios B and C both require LTC to establish a fare inspection function that does not exist today: a team of inspectors, along with their training, supervision, scheduling and the handling of disputes and complaints. The number of inspectors implied by each scenario is estimated in Section 4.2.4. Both scenarios would also require a rider education campaign at launch and ongoing effort to maintain awareness of the different approach to fare payment on BRT lines. Each scenario also includes additional fare collection assets; validators at the rear doors of BRT vehicles in scenario B, and off-board validators at BRT stops in scenario C. Off-board equipment is exposed to weather and vandalism in a way that on-vehicle equipment is not and is likely to carry a higher maintenance burden.

The additional effort may be partly offset by LTC's spare handheld terminals. These could serve as inspection devices, so the equipment cost of inspection is likely to be modest.

Table 20. LTC Staffing assessment of BRT fare collection strategy scenarios.

Scenario	Rating	Rationale
A	3	No change from today.
B	1	Requires a new fare inspection function, a rider education campaign, and a small increase in validator maintenance and administration.
C	1	Requires the same inspection function and education effort as scenario B, plus the maintenance and management of off-board fare collection assets at every BRT stop.

4.1.4 Legislative requirements

Scenario A operates within LTC's existing fare rules. Scenarios B and C both depend on a proof-of-payment framework: BRT vehicles would need to be designated as areas in which a rider must hold a valid fare, and LTC would need the authority to inspect fares and issue penalties. This would likely be established through a City of London by-law, and it may involve conferring special constable or similar status on inspectors; the specific instruments and the process for adopting them should be discussed with the City. Ontario agencies that operate proof-of-payment services, including Grand River Transit on ION and York Region Transit on Viva, provide precedents LTC could draw on, although the process would take time.

Table 21. Legislative requirements of BRT fare collection strategy scenarios.

Scenario	Rating	Rationale
A	3	No changes required.
B	1	A by-law establishing BRT vehicles as proof-of-payment areas and authorizing fare inspection would be required. Ontario

		precedents exist but the process would need to be completed before launch.
C	1	A by-law establishing BRT vehicles and station platforms as proof-of-payment areas and authorizing fare inspection would be required. Ontario precedents exist but the process would need to be completed before launch.

4.1.5 Peer alignment

One key finding from the peer interviews on this question is that agencies operating BRT at shared, street-level stops have kept front-door boarding. All-door boarding with on-board validation on street-running buses appears to be less common among Canadian agencies. TransLink's RapidBus routes were identified through the industry scan as an example. Off-board fare collection is more common, but generally on services with their own right-of-way. York Region Transit's Viva is the nearest Ontario example.

Table 22. Peer alignment of BRT fare collection strategy scenarios.

Scenario	Rating	Rationale
A	5	The approach taken by every interviewed peer that operates BRT at shared street-level stops.
B	2	Appears to be uncommon on street-running buses among Canadian agencies. TransLink's RapidBus is an example identified through the industry scan.
C	3	More common than scenario B, but generally on services with their own right-of-way. York Region Transit's Viva is the nearest Ontario example.

4.1.6 Implementation considerations

Scenario A would require no changes to implement. Scenarios B and C both require a funded fare inspection function and a rider education campaign. Securing support for fare enforcement may be challenging.

Beyond those shared requirements, the two scenarios differ in the assets involved and in level of risk carried through the transition. Scenario B requires additional validators on the BRT fleet. This is a contained procurement, and the transition risk for riders is limited: a rider who is unaware of the change and boards at the front door as usual is not disadvantaged.

Scenario C requires validators at every BRT stop. This is a larger asset programme, and the equipment is more exposed than on-vehicle equipment. The cost and disruption could be reduced if the validators were built into the BRT stop design rather than added afterward, which would depend on the BRT design timeline. Two questions would also need to be resolved before launch: how riders paying with cash or paper tickets would pay, and how a rider who validates at a shared stop and then boards a conventional bus would be treated.

Table 23. Implementation assessment of BRT fare collection strategy scenarios.

Scenario	Rating	Rationale
A	3	No changes needed.
B	2	Requires a fare inspection function, a rider education campaign, and validators on BRT vehicles. Transition risk for riders exists but is relatively limited. Introducing fare enforcement may be contentious.
C	1	Requires similar implementation as scenario B, with the inclusion of off-board validators at every BRT stop. The treatment of cash and paper ticket riders, and the interaction with conventional services at shared stops, would need to be resolved before launch.

4.2 Cost assessment

The cost assessment compares what each BRT fare collection scenario would cost LTC to operate each year. Costs are reported as annual amounts relative to scenario A, which reflects LTC's practice today. A positive figure is an additional cost; a figure in parentheses is a saving. Five cost categories were considered:

- **Capital cost.** Capital costs include the additional fare collection equipment each scenario would require, such as validators at the rear doors of BRT vehicles or validators at BRT stops. Capital costs are reported as total cost and as annualized cost over the life of the equipment.
- **Operating and maintenance (O&M) cost.** O&M costs include the annual software, maintenance and support costs of the additional equipment.
- **Fare evasion cost.** Fare evasion cost is the fare revenue LTC would be expected to lose on BRT corridors under each boarding arrangement, relative to front-door boarding.
- **Fare enforcement staff cost.** Fare enforcement staff cost is the annual cost of the fare inspectors needed to operate a proof-of-payment system on BRT services.
- **Service operating cost.** This reflects how each boarding arrangement affects dwell time, and how the change in dwell time affects the service hours needed to run the BRT schedule.

An additional two inputs are shared across the fare evasion, fare enforcement and service operating cost estimates. The first is a 2026 base year, built by annualizing LTC's January to June 2026 fare data using the 2025 seasonal pattern. This gives roughly 15.2 million conventional boardings and \$39.2 million in conventional fare revenue. The second is the share of conventional boardings expected on the BRT corridors, assumed at 25 percent based on the 2017 Shift business case. This gives roughly 3.8 million BRT boardings a year.

4.2.1 Capital cost

Scenario A requires no additional fare collection equipment. Scenarios B and C each add one type of equipment:

- **Rear-door on-board validators (scenario B).** All-door boarding requires validators at the rear doors of BRT vehicles. The estimate assumes 60-foot vehicles with two additional validators each, a BRT fleet of nine vehicles on the east leg and six on the south leg, a 25 percent vehicle spare ratio and a 10 percent validator spare ratio.

This gives 42 additional validators. A unit cost of roughly \$7,000 and a 10-year lifespan are assumed, based on the cost of the on-board validators LTC procured in 2026.

- **Off-board validators (scenario C).** Off-board fare collection requires validators at each BRT stop. The estimate assumes two validators per stop in each direction at nine stops on the east leg and ten on the south leg, plus five one-way stops downtown, with a 10 percent spare ratio. This gives 95 off-board validators. The unit cost of \$35,000 covers equipment, installation and testing. A 10-year lifespan is assumed. No credit is taken for on-board validators that could be removed from BRT vehicles under this scenario.

Table 24 summarizes the resulting capital costs.

Table 24. BRT fare collection scenario capital costs.

	Scenario A	Scenario B	Scenario C
Rear-door on-board validators (42 units)	-	\$ 0.30 M	-
Off-board validators (95 units)	-	-	\$ 3.33 M
Total capital expenditure	-	\$ 0.30 M	\$ 3.33 M
Total annualized capital costs	-	\$ 0.03 M	\$ 0.33 M

The annual additional O&M costs for scenario A are \$0, representing no change from today. While the difference in cost between scenarios B and C is significant. Off-board validators cost more per unit than on-board validators, and scenario C needs more of them. Annualized over ten years, scenario B adds roughly \$30,000 a year in capital cost and scenario C roughly \$330,000.

4.2.2 Operating cost

Operating and maintenance costs follow the same equipment:

- **Rear-door on-board validators (scenario B).** The 42 additional validators increase the on-board validator fleet by about 14 percent. The estimate applies the same increase to LTC's current on-board validator maintenance, product and testing costs, which total roughly \$350,000 a year. This gives an additional O&M cost of about \$50,000 a year.
- **Off-board validators (scenario C).** Annual O&M for off-board validators is assumed at 8 percent of capital cost per unit, or about \$2,800 per validator. Across 95 validators this gives roughly \$270,000 a year. The figure reflects the exposure of street-level equipment to weather and vandalism in addition to regular product, software, and service operations and maintenance costs.

Table 25. BRT fare collection scenario operating costs.

	Scenario A	Scenario B	Scenario C
Rear-door on-board validator O&M costs	-	\$ 0.05 M	-
Off-board validator O&M costs	-	-	\$ 0.27 M
Total annual O&M costs	-	\$ 0.05 M	\$ 0.27M

As with capital costs, O&M costs for scenario A are \$0, representing no change from today. Scenario B carries a cost of \$50,000 each year to maintain an additional 42 on-board fare validators at the middle and rear door of LTC buses operating on BRT routes. While scenario C has the greatest annual O&M cost, roughly \$270,000 each year to account for the operating and maintenance needs of off-board fare validators at BRT stations.

4.2.3 Fare evasion cost

Fare evasion only affects revenue that would otherwise be paid trip by trip. A rider with a monthly pass or a tuition pass who does not tap costs LTC nothing, because that revenue has already been collected. The estimate therefore starts by separating pay-per-use revenue from prepaid revenue. Cash, paper tickets and smartcard stored value made up about 37.5% of conventional fare revenue in 2025. Applied to the 2026 base year, this is roughly \$14.7 million, which gives about \$3.7 million projected revenue on the BRT corridors. The rate of fare evasion under each scenario is then applied to that exposed BRT fare revenue. The front-door boarding baseline rate of fare evasion is set to 3 – 5%, an assumed value that sits within the range of peer and industry standards.

For scenarios B and C, the evasion rate is expressed as a range. The low case is 5.1 percent; the rate observed on a comparable BRT service. The high case is 8 percent; twice the median value of the range of evasion rates used in scenario A. This is an assumed upper bound rather than a peer observation, included to show how sensitive the result is to the rate of fare evasion. The same range is applied to both scenarios to derive a range of projected fare losses relative to the median value described by scenario A.

Table 26. BRT fare collection scenario fare evasion costs.

	Scenario A	Scenario B	Scenario C
BRT corridor evasion rate (low – high)	3.0% – 5%	5.1% – 8.0%	5.1% – 8.0%
Annual BRT fare revenue loss	\$ 0.15 M	\$ 0.19 M – \$ 0.30 M	\$ 0.19 M – \$ 0.30 M
Fare evasion cost relative to Scenario A	-	\$ 0.04 M – \$ 0.15 M	\$ 0.04 M – \$ 0.15 M

4.2.4 Fare enforcement staff cost

Scenarios B and C both require fare inspection on BRT services. The size of the inspection team is estimated from a peer inspection rate. Comparable Ontario BRT services inspect

about 2 percent of boardings a year. Applied to 3.8 million BRT boardings, this implies roughly 79,600 inspections a year. At an assumed 8,000 inspections per officer per year, that is about ten full-time inspectors.

The annualized salary and benefit cost per inspector is based on typical starting pay for fare inspection staff at Ontario transit agencies, about \$74,500 a year, plus 35 percent for benefits. This gives roughly \$100,000 per inspector and about \$1.0 million a year for the team. The requirement is the same under scenarios B and C, since both depend on on-board inspection of the same boardings.

Table 27. BRT fare collection scenario fare enforcement staff costs.

	Scenario A	Scenario B	Scenario C
Inspections required per year	0	79,600	79,600
Implied fare inspection staff (FTE)	0	10	10
Annual fare enforcement staff cost	-	\$ 1.0 M	\$ 1.0 M

Fare enforcement is the largest single cost item in the BRT cost evaluation, representing a cost of roughly \$1.0 million each year for scenarios B and C.

4.2.5 Service operating cost

The boarding arrangement affects how long a BRT vehicle spends at each stop. Front-door boarding funnels every rider through one door and requires each rider to pay on board. All-door boarding spreads riders across the doors. Off-board fare collection removes the payment step from the vehicle altogether. Dwell time per boarding was estimated for each scenario from the three components below. Each estimate was then applied to the projected 3.8 million boardings LTC's BRT system is anticipated to reach at full maturity. Service operating cost savings would therefore not be reached in full until several years

after the launch of both the south and east BRT corridors. Components of the dwell time cost assessment include the following:

- **Base dwell time.** A base dwell time of 2.02 seconds per boarding was measured on a comparable BRT service.
- **Front-door funnelling.** Under front-door boarding, riders who would otherwise use a rear door must queue at the front. A penalty of 1.61 seconds per boarding is applied to these riders, based on a measurement on a comparable BRT service. A Montreal all-door boarding pilot found that 59% of riders use a rear door when permitted, so the penalty applies to that share of boardings under scenario A and to none under scenarios B and C.
- **All-door and off-board savings.** The same Montreal study found that boarding through a rear door is about 0.68 seconds faster per rider than the front door, and that boarding without a payment step is about 0.89 seconds faster. These savings are applied to scenarios B and C respectively.

The resulting dwell time per boarding is about 3.6 seconds under scenario A, 2.0 seconds under scenario B and 1.8 seconds under scenario C. Scenario C is the fastest, so the other two are measured against it. Across the projected 3.8 million BRT boardings a year, scenario A accumulates about 1,950 more dwell hours than scenario C, and scenario B about 225 more. Each dwell hour is valued at \$150 reflecting the cost of operating one hour of LTC service.

Table 28. BRT fare collection scenario service operating costs.

	Scenario A	Scenario B	Scenario C
Average dwell time per boarding	3.6 sec	2.0 sec	1.8 sec
Annual additional dwell hours	1,950	225	--

	Scenario A	Scenario B	Scenario C
Service hour cost relative to scenario A	-	(\$ 0.26 M)	(\$ 0.29 M)

Relative to front-door boarding, scenarios B and C are expected to reduce service operating cost by roughly \$260,000 and \$290,000 a year respectively. These savings come from shorter end-to-end run times on BRT lines, which reduce the service hours needed.

4.3 BRT fare collection scenario evaluation results

This section brings together the results of the qualitative evaluation in Section 4.1 and the cost assessment in Section 4.2. The two are presented side by side rather than combined into a single score, so that the trade-offs between them remain visible.

Qualitative assessment results

Table 29 summarizes the ratings for each of the six qualitative criteria. The rationale behind each rating is set out in Section 4.1.

Table 29. BRT fare collection qualitative assessment results.

	Scenario A	Scenario B	Scenario C
Equity implications	3	1	1
Customer experience	3	3	2
LTC Staffing requirements	3	1	1
Legislative requirements	3	1	1
Peer alignment	5	2	3
Implementation considerations	3	2	1
Average Score	3.3	1.7	1.5

Scenario A is rated equal to or higher than scenarios B and C on every criterion. It is rated 3 on five criteria, reflecting no change from current practice, and 5 on peer alignment, since it matches the approach of the peers interviewed.

Scenarios B and C are rated lower on most criteria, and for largely the same reason. Both depend on proof-of-payment, and a fare inspection function that LTC does not have today. That single change accounts for most of the gap on equity, staffing, legislative requirements and implementation. The two scenarios differ mainly in three places. Scenario C is rated slightly higher on peer alignment, since off-board fare collection is more common among peers than all-door boarding with on-board validation. It is rated lower on customer experience and implementation, because paying at the stop is a larger departure from how riders board conventional services at the same curb, and because it requires validators at every BRT stop.

Cost assessment results

Table 30 summarizes the annual cost of each scenario relative to scenario A.

Table 30. BRT fare collection cost assessment results.

	Scenario A	Scenario B	Scenario C
Annualized capital costs	-	\$ 0.03 M	\$ 0.33 M
Operating and maintenance costs	-	\$ 0.05 M	\$ 0.27M
Fare evasion cost (low – high)	-	\$ 0.04 M – \$ 0.15 M	\$ 0.04 M – \$ 0.15 M
Fare enforcement staff cost	-	\$ 1.0 M	\$ 1.0 M
Service operating cost	-	(\$ 0.26 M)	(\$ 0.29 M)
Total annual cost (low – high)	-	\$ 0.86 M – \$ 0.97 M	\$ 1.35 M – \$ 1.46 M

Under the assumptions used in this study, both scenarios B and C would add to LTC's annual costs. Scenario B would cost roughly \$860,000 to \$970,000 a year more than front-door boarding, and scenario C roughly \$1.35 million to \$1.46 million. The fare enforcement team is the largest item in both scenarios, at about \$1.0 million a year. Once BRT ridership reaches its projected level at full maturity, savings in service operating cost would offset part of this. These savings are unlikely to be fully realized in the first years of operation. Most of the difference between scenarios B and C comes from the off-board validators, which add roughly \$530,000 a year to scenario C. The fare evasion estimate is the least certain of the cost items, but it is also one of the smaller ones, so the overall comparison is relatively insensitive to it.

On the measures used in this study, scenario A is rated most favourably on the qualitative criteria and has the lowest cost to LTC. Scenarios B and C would shorten trips for BRT riders, but at an added annual cost of roughly \$860,000 to \$1.46 million, and with the equity, staffing, legislative and implementation requirements that come with introducing fare inspection. These results inform the recommended fare system described in Section 5

5. Recommended Fare System

5.1 Fare collection technology

Through the evaluation of fare collection technology scenarios, it was determined that the recommended fare system for LTC is to implement **scenario 4: gravity fareboxes and mobile e-ticketing**. This scenario includes the following core elements:

- Replacement of LTC's current inventory of CENTSaBILL smart fareboxes with a new set of gravity fareboxes.
- Procurement and implementation of a mobile e-ticketing and open payment fare collection system to enable app-based and contactless fare payment.
- Eventual sunset of LTC's current smartcard system as emergent fare payment technologies are operationalized and mature.

Scenario 4 was the highest performing scenario in the qualitative evaluation with an average score of 4.0. It scored a 3 in the equity impact assessment, on par with other scenarios in terms of accessibility of fare payment options to riders. In terms of customer experience this scenario scored a 4 due to the addition of open payment and mobile e-ticketing. Scenario 4 was the highest scoring in its assessment of staffing requirements, representing a lower overall level of effort required to maintain the fare collection system. In terms of peer alignment, the scenario scored a bit better than current state, reflecting industry trends toward mobile e-ticketing and open payment with a slow transition away from legacy collection technologies. Evaluation of implementation considerations suggested that this scenario could be implemented in phases, decreasing the level of challenge and risk for LTC and their customers. This phased approach also enables LTC to make greater use of the recently refreshed on-board validators, through continuing to support the smartcard system while open payment and mobile e-ticketing reach maturity. Overall, this scenario delivers a high level of customer experience in alignment with

industry trends without overburdening LTC staff or disrupting existing fare collection systems.

Scenario 4 represented the second lowest total annualized cost estimate of the options, owed primarily to the lack of investment in a new inventory of smart fareboxes or a new smartcard system. In terms of total and annualized capital cost, scenario 4 was the best performer of the scenarios, at \$6.0 million and \$500,000, respectively. The decision to go with gravity fareboxes represents an estimated cost savings of \$7.0 million, while a mobile e-ticketing and open payment system is anticipated to cost \$1.6 million less than a new smartcard system. Operating and maintenance costs associated with this scenario include the costs to process fares, which are common across all scenarios, and operating and maintenance costs associated with mobile e-ticketing, open payment, and the current smartcard system. Together these total an estimated \$1.4 million annually. When the existing smartcard system is sunset in the future, annual O&M costs will decrease by roughly \$600,000. Finally in terms of partial fare payment, scenarios 3 and 4 both carry an annual cost of \$80,000 from partial fare payments due to gravity fareboxes. Overall, scenario 4 is the second lowest cost fare collection technology scenario, with a projected annual cost of \$2.0 million.

5.2 BRT fare collection strategy

Through the evaluation of BRT fare collection scenarios, the recommended approach for LTC's BRT services is **scenario A: maintain front-door boarding and on-board fare collection**. Under this scenario:

- Riders board BRT vehicles at the front door and pay at the farebox or tap their smartcard, bank card, or mobile device at the on-board validator, in view of the operator.
- Riders are encouraged to alight through the middle and rear doors.

- Boarding and fare payment on BRT work the same way as on LTC's conventional services. No proof-of-payment framework or fare inspection is required.

Scenario A was the highest performing scenario in the qualitative evaluation. It was rated equal to or higher than scenarios B and C on all six criteria. It received a rating of 3 for equity, compared with 1 for scenarios B and C, because it does not introduce fare inspection and the risk of conflict between riders and enforcement staff that comes with it. For customer experience, scenarios B and C would shorten BRT trips, but riders would need to board BRT and conventional buses differently at the same stops. Scenario A also received the highest rating for peer alignment, as peer agencies whose BRT routes share stops with conventional buses have kept front-door boarding. It was also rated higher for staffing, legislative requirements, and implementation. It does not require a fare inspection team, a by-law to support fare inspection, or additional fare collection equipment.

Scenario A also has the lowest estimated annual cost. Compared with scenario A, scenario B is estimated to cost about \$860,000 to \$970,000 more per year, and scenario C about \$1.35 million to \$1.46 million more. The costs are shown as ranges because the precise rate of fare evasion under all-door boarding is uncertain. In scenarios B and C, the largest added cost is fare inspection staff, reflecting a cost of roughly \$1.0 million per year. Faster boarding under scenarios B and C would offset part of this through lower service operating costs, but not all of it. These savings are unlikely to be fully realized in the first years of operation, as they are based on projected BRT ridership at full maturity.

As scenario A is consistent with fare collection on LTC's conventional services, a separate implementation or financial plan is not required to enact this strategy. The following section therefore focuses on implementing the recommended fare technology scenario.

6. Implementation Plan

This section outlines the approach for implementation of the recommended solution, including a roadmap that highlights project timelines, key implementation considerations, and the financial projections for achieving the solution. The implementation approach is tailored to LTC's context and funding realities. It is a practical way forward to modernizing its fare collection system.

6.1 Implementation roadmap

The implementation roadmap outlines the timelines for the various new technologies and systems, as well as key project activities. This was developed based through discussion with LTC staff, including consideration for LTC funding cycles and anticipated staff capacity.

Funding decisions made by city council in March 2028 will outline LTC budgets for 2028 through 2031. Therefore, funding for the implementation of the fare recommendation will be available starting in April 2028 at the earliest. The implementation roadmap (Table 31) shows activities starting in 2028, but this is anticipated to take place in the latter half of 2028 with more significant activity projected through 2029.

The implementation roadmap identifies that all three elements of the new fare collection systems; open payment, mobile e-ticketing, and gravity fareboxes; will be procured and implemented in 2028-2029. Optionally, the gravity fareboxes may be installed across the fleet over a longer timeframe (up to the end of 2031). The existing smartcard system is then projected to be phased out in 2030 or later.

Table 31. Fare strategy implementation roadmap.

Fare collection technology	2027	2028	2029	2030	2031	2032+
Open payment and mobile e-ticketing procurement and implementation						
Existing smart farebox phased out						
Phased gravity farebox replacement						
Sunset current smartcard system						

Note: Lighter-colored strikethrough cells indicate optional timelines.

The implementation roadmap outlines activities over the next six years until 2032. Both open payment and mobile e-ticketing are anticipated to have a 10-year lifespan, and gravity fareboxes are anticipated to have a 30-year lifespan. These solutions, implemented in 2028 to 2029, are anticipated to support LTC for the next 10 years, and beyond. Fare technology may evolve further and LTC should engage in another fare collection review nearing the end of the lifespan of open payment and mobile e-ticketing (around 2037).

The implementation roadmap identifies the alignment of three key technology changes:

- Introduction of open payment technology.
- Introduction of mobile e-ticketing.
- Phase out of existing smart fareboxes.

The alignment of these three activities is critical for a smooth transition and successful implementation of the new fare collection system. This approach also mitigates negative impacts on customers, especially those that currently use paper tickets. Paper tickets still

account for about 20 percent of fares and is an important tool to collect ridership counts. A smart farebox is required to easily collect this data.

Introducing open payment and mobile e-ticketing provide additional fare media options to riders, and reliance on paper tickets and smartcards are likely to decline organically². Once smart fareboxes are phased out, paper tickets may also be phased out³.

6.1.1 Farebox replacement approach

While smart fareboxes are recommended to be phased out in the 2028-2029 timeframe, there is an option to augment how long the process will take. This is an option if the timeframe for the procurement and installation of gravity fareboxes is delayed or extended. Smart fareboxes can be put into “bypass mode”, meaning it does not perform fare validation. In this mode, smart fareboxes are functionally similar to gravity fareboxes. If LTC is constrained by available funds or otherwise decides to gradually phase in gravity fareboxes, existing smart fareboxes could be put into “bypass mode” in the interim. One risk related to this approach is potential customer confusion, especially if paper tickets are phased out, but the smart farebox is seemingly still in use.

Similarly, LTC may choose to extend the timeframe for installing gravity fareboxes. The procurement and purchase agreement could be completed in the 2028-2029 timeframe, then actual purchase and installation could occur gradually. The main benefit of this approach is spreading out the capital costs of the gravity fareboxes and the logistics of replacing fareboxes. A risk, in addition to potential customer confusion mentioned above, is that the vendor may add a price escalation for units ordered in later years. The

² This is supported by findings from peer interviews and industry research.

³ Paper tickets could be maintained as fare media, but there would be a loss of ridership data without smart fareboxes. If they are a small percentage of overall fare media products, LTC may consider keeping them, though the administration costs may outweigh the benefits.

recommended timeframe is to replace the fareboxes over a period of four years, 2028 to 2031. The financial projections in Section 6.2 are built around this four-year timeframe.

6.1.2 Sunset existing smartcard

The last element of the implementation roadmap is sunsetting the existing smartcard in 2030 or later. This timeline provides two to three years of overlap between the existing smartcard technology and the new fare systems like open payment and mobile ticketing. During this time, LTC can transition key smartcard user groups to the other technologies and encourage the broader public to adopt the new fare options. The UPass and concessions passes, for example, could be transitioned to the mobile e-ticketing solution when it is launched. This may include use of account-based smartcards to enable riders without smartphones to access concessions fares.

By phasing out the existing smartcard later in the implementation roadmap, there will be fewer smartcard users and ample time for them to transition to other fare payment options. LTC should monitor the use of smartcards to support decision-making about when exactly to sunset the fare media. Once the decision is made, LTC will need to engage and support the remaining smartcard users transitioning to other fare media types. This will ensure the transition is as smooth as possible and will reduce customer experience impacts and equity concerns.

Another important factor in deciding when to phase out smartcards is the ongoing operating and maintenance costs associated with maintaining the smartcards. For the years that mobile e-ticketing, open payment, and the smartcards are available to use, LTC will be responsible of operating and maintaining each system. This period of overlap will

also likely include double the validators on vehicles (i.e., one for the smartcard and one for open payment/mobile e-ticketing⁴), which could be a source of confusion for some riders.

At a minimum, LTC should consider an overlap of one year between the smartcard and open payment/mobile e-ticketing solution. This could be extended to two or three years, based on smartcard use and LTC decision-making. For the purposes of the financial projections, the sunseting of the existing smartcard is slated for 2031.

6.1.3 Procurement considerations

The mobile e-ticketing and open payment technology space is relatively established but still considered emergent with different vendors and technology configurations available. For this reason, it is recommended that LTC move forward with open procurement processes for both technologies. This approach will ensure that the selected technologies best align with LTC current and future needs.

However, as mentioned previously, there is a potential opportunity to leverage the existing on-board validators (i.e., smartcard validators) for open payment through additional agreements and cost with the current vendor. This option would leverage the existing investment and align with the lifespan of the current assets. This approach would need to be reconciled with the phase out of smartcards and any new on-board validators associated with the mobile e-ticketing solution.

⁴ The current on-board validators can be enabled to accept open payment through additional agreement and costs with the current vendor. If the current validators are used for implementing open payment, and if the selected mobile e-ticketing solution does not require a validator, there may not be duplicate validators on-board vehicles. However, an open procurement is recommended to ensure LTC retains the most appropriate solution and so the exact configuration of the solutions are unknown.

6.2 Financial outlook

Based on the implementation timelines set out in the previous section, the financial projections are presented in Table 32. This table outlines the anticipated capital and operating costs from 2028 to 2032, based on the understanding that available funding will only be available starting in mid-to-late 2028.

The majority of fare technology changes are slated for 2028-2029, and this aligns with the majority of capital costs of about \$ 1.82 million in 2028 and \$ 3.12 million in 2029. This assumes that approximately one third of the implementation costs for open payment and mobile e-ticketing are incurred in 2028 and two-thirds in 2029. The gradual implementation of gravity fareboxes distributes the capital costs across four years and leads to capital costs of half a million in 2030 and 2031.

The operating costs for 2028 are based on the current fare collection system at \$ 0.79 million and increase to about \$ 1.39 million in 2029 and 2030. The operating costs then decrease to less than a million (\$ 0.75 million) in subsequent years. The decrease in operating costs is directly linked to the sunset of smartcards. If smartcards are phased out earlier or later than 2031, this will directly impact operating costs.

The anticipated lifespans of the gravity fareboxes and the open payment/mobile e-ticketing technology are 30 years and 10 years, respectively. Therefore, the stabilized annual operating costs of \$ 0.75 million are anticipated to remain approximately the same until 2037, or until additional changes are made to LTC's fare collection technologies.

Table 32. Financial projections 2028 - 2032⁵.

	2028	2029	2030	2031	2032
Capital costs					
Mobile e-ticketing, open payment and validators ⁶	\$ 1.3 M ⁷	\$ 2.6 M ⁷	-	-	-
Gravity farebox	\$ 0.52 M ⁸	\$ 0.52 M	\$ 0.52 M	\$ 0.52 M	-
Capital cost subtotal	\$ 1.82 M	\$ 3.12 M	\$ 0.52 M	\$ 0.52 M	-
Operating costs					
Open payment	-	\$ 0.30 M	\$ 0.30 M	\$ 0.30 M	\$ 0.30 M
Mobile e-ticketing	-	\$ 0.30 M	\$ 0.30 M	\$ 0.30 M	\$ 0.30 M
Existing smartcard system ⁹	\$ 0.64 M	\$ 0.64 M	\$ 0.64 M	-	-
Fare processing	\$ 0.15 M	\$ 0.15 M	\$ 0.15 M	\$ 0.15 M	\$ 0.15 M
Operating costs subtotal	\$ 0.79 M	\$ 1.39 M	\$ 1.39 M	\$ 0.75 M	\$ 0.75 M
Total annual costs (Capital and Operating)	\$ 2.61 M	\$ 4.51 M	\$ 1.91 M	\$ 1.27 M	\$ 0.75 M

⁵ All projections are provided in 2026 CAD. Adjustments may be required for inflation.

⁶ While the recommended approach is to go to open procurement for open payment technology, the current on-board validators are capable of open payment. However, enabling the functionality will incur both one-time and operating costs. For the purposes of conservative budgeting, new validators are assumed.

⁷ Procurement and installation are anticipated to start late 2028 and extend into 2029. For budgeting purposes, 33 percent of anticipated capital costs are allocated to 2028, and 67 percent is allocated to 2029.

⁸ Gravity farebox procurement and installation can be phased. For budgeting purposes, anticipated capital costs are spread evenly across four years from 2028 to 2031.

⁹ Cost estimates related to the existing smartcard system assume phasing out starting in 2031. Should this be earlier or later, the recurring costs would not occur or extend further into the future.

7. Conclusion

LTC undertook the 2026 Fare Strategy to evaluate and plan for future fare collection technologies and to make key decisions about fare collection on the new BRT system. Analysis considered customer experience, peer alignment, equity impacts, organizational changes, implementation requirements, and lifecycle costs associated with different fare strategy scenarios. Multiple scenarios were developed and then scored against these criteria, with results used to select a preferred fare strategy for LTC to take forward in the coming years.

The recommended fare collection technology strategy is to procure a mobile e-ticketing and open payment fare system, to phase out LTC's validating fareboxes as they reach end of life, and to retain the smartcard system in the short-term. This approach balances an elevated customer experience, equity, and alignment industry trends with low operational and implementation risks.

The recommended BRT fare collection strategy is to retain front-door boarding and on-board fare collection with the launch of LTC's first two bus rapid transit corridors. This strategy was selected as it delivers a consistent customer experience, peer alignment, and operational simplicity at a substantially lower annual cost than alternative strategies.

The fare strategy recommendation made through this document provides London Transit with a practical, flexible path to modernize fare collection systems while preserving an elevated customer experience, accessible payment options, and supporting future service growth. Through the phased approach to implementation, LTC can progressively adapt to evolving technology options, customer needs, and operational realities while minimizing disruptions to riders and the organization as a whole.

Appendix A peer review findings

Calgary Transit

Calgary Transit (CT) operates a hybrid fare collection system featuring a highly successful mobile ticketing app alongside legacy S&B and Conduent hardware.

Following challenges encountered during the implementation of a bespoke fare system in 2011, CT adopted a lower-risk, phased approach focused on commercial off-the-shelf solutions. They currently partner with Masabi for mobile ticketing. A key takeaway for LTC is CT's contract structure: while CT signed a 10-year agreement with Masabi, the contract includes two-year performance review milestones, requiring the vendor to demonstrate continued success before proceeding to subsequent renewal periods. CT also conducts monthly check-ins, annual business reviews, and includes warranty provisions and revenue protection measures within its contracts. During our discussion, CT strongly advised LTC to allocate sufficient time for contract negotiations, noting that municipal review processes can significantly extend project timelines.

Calgary Transit, like LTC, is currently navigating a fare system transition. Its existing Conduent validators have reached the end of their service life. To address near-term needs, CT has extended its Masabi contract to 2028 to implement Account-Based Ticketing (ABT) and support open payments (credit and debit cards). The agency plans to begin deploying new cEMV-capable validators in 2026, with implementation targeted for completion by mid-2027. CT had previously been considering a broader procurement for a fully integrated next-generation fare system; however, following direction from City Council, that work was paused pending a comprehensive fare strategy review. In the interim, CT has been directed to continue advancing open payment implementation through its existing roadmap.

CT is also examining the potential for a substantially cash-reduced or cashless fare system over the next five to ten years. This discussion is being driven by declining cash usage, which currently accounts for approximately 6% of transactions, as well as infrastructure considerations. The planned relocation of CT's cash processing facility has prompted the agency to evaluate the long-term costs of maintaining cash collection infrastructure relative to the operational benefits associated with further reducing cash handling requirements.

CT does not currently utilize all-door boarding on its conventional bus network, including the MAX BRT service, meaning that passengers continue to board through the front door. Fare enforcement is administered by a separate municipal business unit rather than by CT directly. CT noted that recent investments in fare enforcement have contributed to improvements in fare compliance, with fare revenue growth outpacing ridership growth in recent years, suggesting a greater proportion of fare transactions are being successfully captured.

Brampton Transit

Brampton Transit (BT) is a PRESTO-integrated agency managing aging cash farebox infrastructure while planning for the integration of new transit modes.

Brampton Transit's Züm BRT network faces a challenge similar to that currently being considered by LTC, as BRT buses share street-level stops with conventional local bus services. BT made the strategic decision 16 years ago to maintain front-door boarding on Züm services to provide a consistent customer experience at shared stops. Under this approach, riders board through the front door and pay upon entry, regardless of whether a Züm bus or a local bus arrives first. BT noted that the introduction of PRESTO improved boarding efficiency sufficiently to address many operational concerns related to passenger throughput, while higher passenger volumes are accommodated through schedule and

recovery time adjustments. Based on their experience, BT views all-door boarding and off-board payment as most beneficial in corridors with dedicated rights-of-way.

Like LTC, Brampton Transit is also evaluating options related to farebox replacement as its existing equipment approaches the end of its lifecycle. While cash usage has declined to approximately 3% of boardings, BT indicated that maintaining a cash payment option remains important to ensure accessibility for all riders. At the same time, replacing existing smart fareboxes on a one-for-one basis presents significant capital and maintenance costs. As a result, BT is exploring the use of simpler gravity-drop cash boxes combined with alternative methods for tracking fare categories and non-revenue boardings. One option under consideration is using upgraded CAD/AVL operator interfaces to record fare information that would traditionally be captured by smart farebox technology.

Because BT continues to rely on front-door boarding, fare evasion remains relatively low, currently estimated at between 1% and 2%. Fare evasion is monitored through operator reporting functions integrated with the fare collection system. BT does not currently employ dedicated fare inspectors. For the upcoming Hazel McCallion LRT, which will feature off-board payment and all-door boarding, BT indicated that fare enforcement services will be provided through an existing arrangement with MiWay and Metrolinx rather than through the creation of an in-house enforcement unit.

BT has also adopted a distinct approach to open payments. Currently, approximately 6% to 7% of rides are paid using open payment methods, primarily by occasional riders. BT has chosen to align its open payment fare with its cash fare, while reserving discounted fares for PRESTO users. This approach encourages regular riders to use the PRESTO system, which supports the administration of concession fares, fare capping programs, and customer data collection initiatives.

BT also highlighted ongoing discussions regarding regional fare integration, including potential implications of Bill 98. As Brampton Transit maintains comparatively higher average fares than some neighbouring agencies, BT noted that future regional fare

harmonization initiatives could have financial implications depending on how any standardized fare policies are ultimately structured and implemented.

Grand River Transit

Grand River Transit (GRT) operates a Scheidt & Bachmann (S&B) smart card system alongside a successful standalone mobile ticketing application.

GRT is particularly relevant to this study because, like LTC, it operates a fare system built around Scheidt & Bachmann technology. Discussions with GRT highlighted a number of operational and maintenance challenges associated with the agency's current fare collection environment, including system stability, lengthy processing times for certain updates, and the complexity of implementing fare policy changes. While GRT's contract with S&B extends until June 30, 2029, and the agency is currently focused on sustaining its existing system, staff indicated that they have begun exploring future fare collection alternatives and developing business cases to support longer-term decision-making.

To complement its existing fare collection environment and accelerate the introduction of new customer-facing functionality, GRT procured Masabi to deliver a standalone mobile ticketing application. The initiative has been well received by customers, with mobile ticketing now generating more revenue than cash fares. GRT reported that approximately 24% of app users were first-time riders, while 60% reported riding more frequently because of the convenience provided by the application. A key factor in the project's success was maintaining a relatively simple implementation approach based on visual validation, without requiring extensive integration with the existing S&B environment.

GRT also discussed its approach to farebox replacement and cash handling. While cash usage continues to decline and staff expressed interest in reducing reliance on cash collection over time, GRT acknowledged that community expectations and equity considerations make the complete removal of cash unlikely in the near term. One of GRT's key recommendations to LTC was to carefully consider the benefits and risks associated

with highly integrated fare collection devices. GRT noted that separating cash collection equipment from electronic fare validation equipment can reduce system complexity and provide greater flexibility when upgrading or replacing individual components. As a result, the agency sees potential value in pairing simple cash collection devices with standalone validators that support smart card and open payment transactions.

Because both LTC and GRT are evaluating long-term fare technology options beyond their current S&B environments, discussions also included observations regarding alternative delivery models and vendors.

- **PRESTO:** GRT noted that PRESTO's current priorities include significant back-office modernization initiatives and contract activities with existing clients. Based on recent discussions, GRT's understanding is that onboarding additional municipal agencies may be challenging in the near term.
- **Fare as a Service (FaaS):** GRT is monitoring an upcoming initiative in the City of Guelph, where open-payment validators are expected to be deployed through an alternative procurement and revenue-sharing model. Rather than purchasing the hardware directly, the model relies on a private-sector partner that participates in fare revenue collection. GRT indicated that this approach may provide useful lessons for mid-sized agencies seeking to introduce modern payment options while minimizing upfront capital investment.

GRT currently utilizes all-door boarding on the ION LRT, supported by a dedicated fare inspection and security program. However, front-door boarding remains the standard practice across the conventional bus network. GRT noted that expanding all-door boarding to buses would require an accompanying investment in fare inspection resources to maintain fare compliance. While funding for a bus-based inspection program has not been approved to date, GRT has taken steps to preserve future flexibility by requiring new buses to be pre-wired for rear-door validators, allowing additional validation equipment to be installed more easily should operational priorities change in the future.

