



Review of Toronto Transit Commission's Revenue Operations

Phase Two - PRESTO/TTC Fare Equipment and PRESTO Revenue

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Table of Contents

Executive Summary	1
Background	19
Audit Results	25
A. PRESTO Fare Equipment Less Available Than Reported	25
A. 1. PRESTO Card Reader Availability Rate	25
Figure 2: How PRESTO Card Reader Availability Rate is Calculated	28
A. 2. PRESTO Vending Machines on New Streetcars - Availability Rate	39
B. Improvement Needed in Identifying and Resolving Defective PRESTO Fare Equipment	44
B. 1. PRESTO Card Reader Incident Management Process	44
B. 2. PRESTO Vending Machines on New Streetcars - Incident Management Process	54
C. Metrolinx and TTC Need to Work Together Better	55
C. 1. Governance Gap Between TTC and Metrolinx	55
Figure 6: Contractual and Governance Relationships of TTC, Metrolinx, Vendors, Sub-vendors and Other Stakeholders	59
C. 2. Many Contractual Requirements Delayed or Not Met by Metrolinx	62
C. 3. Service Level Agreement Still Not Agreed to and Finalized	66
C. 4. Metrolinx Has Not Paid TTC's Revenue Loss Claim for Fare Equipment Issues	68
C. 5. Stronger Controls Needed for Metrolinx Withdrawals from TTC's Revenue Bank Account	70
D. Further Improvement Needed on TTC Fare Gates	71
D. 1. Fare Gate Availability Calculation	71
D. 2. Limitations with Current Version of FareGo Software	76
D. 3. Vendor Exceeding Target Timeline for Second Line Maintenance	77
E. Ensuring TTC Receives All the Revenue It Should	79
E. 1. TTC Needs More Assurance from PRESTO on their Controls	79
Figure 10: Transaction and Event Flow From Device to PRESTO's Systems	80
E. 2. Audit Scope Limitation, Device Level Data Not Provided by PRESTO to TTC	86
E. 3. TTC Needs to Further Improve its Analysis and Monitoring	88
E. 4. TTC Monthly Passes and Single Use Tickets – Including Retailer Network Controls	91
Conclusion	93
Audit Objectives, Scope and Methodology	94
Appendix 1: Management's Response to the Auditor General's Report Entitled: "Review of Toronto Transit Commission's Revenue Operations: Phase Two – PRESTO/TTC Fare Equipment and PRESTO Revenue"	97

Executive Summary

There are risks other than fare evasion causing loss of passenger revenue to the Toronto Transit Commission (TTC). These include fare equipment not functioning properly and fare transactions not being correctly captured and deposited into TTC's bank account. These risks may also impact customer convenience, as do the types of fare payment methods made available to the customer (e.g. there is no open payment system that would allow customers to pay with their phone or debit/credit card).

Phase 1 of the Auditor General's audit of TTC's revenue operations focused on fare evasion and the estimated loss of passenger revenue.

Phase 2 Audit focuses on whether TTC is receiving all the PRESTO revenue it should

This report on our Phase 2 audit focuses on whether TTC is receiving all the PRESTO revenue it should, including a review of the following:

- Functionality of fare equipment (PRESTO card readers, TTC subway fare gates, and PRESTO vending machines on new streetcars)
- TTC's contract with Metrolinx
- Capturing all PRESTO revenue transactions on TTC through PRESTO's back-end systems

TTC's ridership has been decreasing since 2016

TTC's total conventional passenger revenue (excluding Wheel Trans) for 2018 was \$1.162 billion, down \$1 million from \$1.163 billion in 2017. Since 2016, TTC's ridership has declined from 538 million trips in 2016 to 521 million passenger trips in 2018.

Possible that declining calculated ridership numbers are affected by functionality of fare equipment

It is important to note that TTC's yearly ridership is a calculated number based on revenue collected, which is affected by not only fare evasion, but also the functionality of fare equipment and the fare transactions being properly captured and deposited.

A summary of our more detailed audit findings is included in this Executive Summary further below. Our focus was on issues that impact potential loss of passenger revenue to the TTC. We have also identified strategies to help Metrolinx and TTC to move forward together as they address these issues.

We recognize that transforming a transit payment system is a huge undertaking and a lot of great work has been done

Service Level Agreements and portions of governance framework not operationalized

We recognize that transforming a transit payment system is a huge undertaking and while there has been a lot of great work done and many previous system issues have been and are being resolved. Still, seven years after the Master E-Fare Collection Outsourcing Agreement (Master Agreement) has been signed:

- Service Level Agreements (SLAs) have not yet been defined, agreed upon, and set up
- Portions of the governance framework have not been operationalized
- Some key deliverables are not yet fully met or not met - the key items include:
 - making open payment available to customers, and
 - providing large PRESTO data sets (e.g. device level data) to TTC to fill an information gap and assist with their monitoring and analysis
- There are inconsistent views on important matters, including:
 - the number of outstanding contracted deliverables that will be delivered during the contract and which deliverables will be dropped from the contract
 - the level of PRESTO uptake and
 - the PRESTO card reader availability rate.

To move forward together in a more effective way, important actions in three broad categories (pillars) need addressing:

1. Foresight – an opportunity for executives to try other options to bring the arrangement to the next level, including how and when it will complete strategic deliverables, including open payment

- (i) **Foresight** –the information in this report provides an opportunity for the executives to try other options to bring the arrangement to the next level, including how and when it will complete strategic deliverables, such as open payment:
 - a. For Metrolinx, as it renews contracts with its vendors it should use this report and further analyses to envision and inform the deliverables it needs from its own vendors to meet key expectations of its clients – TTC being the biggest client. One example could be leveraging artificial intelligence techniques to identify trends and patterns that need addressing.
 - b. For TTC, this arrangement is almost 60 per cent fulfilled - it needs to consider what it visualises for the citizens of Toronto, define what is important, and then determine the information and the service levels it needs to achieve these goals for Torontonians.

In our view, there must be a strategic refocusing at the top by both TTC and Metrolinx – with the focus to improve customer experience and maximize revenue

2. Insight – the right level of information must be analyzed using the right data – issues need to be diagnosed and root causes identified to resolve issues together

Overall, and in our view, there must be a strategic refocussing at the top by both TTC and Metrolinx to tackle what matters most – the shared outcomes of customer experience and maximizing revenue. For this to work, both parties also need to:

- Define clear, agreed upon, and formalized outcomes and SLA targets
- Seek a win/win for both parties, but acknowledge individual and shared accountabilities and responsibilities in this arrangement– several examples of which are outlined in this report.

- (ii) **Insight** – to solve problems you need insight into the root cause. To gain such insight, the right level of information must be analyzed using the right data. Without that, you are solving what you *think* might be wrong without the evidentiary support to confirm you are addressing the true cause(s) and actual issue(s). Once the issues are diagnosed and root causes identified, the systemic issues can be resolved to everyone's benefit. Some of the information gaps we noticed were fundamental:
- a. SLAs are not in place – Normally deals of this size have SLAs defined, benchmarked, and set, so that each party can rely on the other to uphold their end of the bargain. The SLAs for the deal have not been set – seven years after signing the deal.
 - b. Data sets are missing – Key information that TTC needs to rely on is either encrypted and/or purged in a short time-frame and contrary to the terms of the Master Agreement (e.g. device level data purged after 7 days, PRESTO card reader monitoring software tool information purged after 60 days).

c. Issues /limitations with the current analysis, including:

- PRESTO card readers: e.g. continuing to address and resolve root causes for frozen PRESTO card readers, issues with the device monitoring software tool, weekly back-up for the availability rate, and improving the availability calculation, etc.
- PRESTO vending machines on the new streetcars: e.g. out-of-service machines that should be included in the availability calculation and are not, and how to ensure coin collection occurs regularly and as needed
- TTC fare gates: e.g. addressing the current manual process of identifying out of service fare gates

3. Oversight – the governance gap needs to be closed by reinstating the Joint Executive Committee and operationalizing the Expert Panel to help set up SLAs when needed

(iii) **Oversight** – the governance gap needs closing by implementing the governance called for in the Master Agreement - including reconstituting the Joint Executive Committee and operationalizing the Expert Panel, already envisaged in the agreement, to help set up SLAs when the Joint Executive Committee reaches an impasse. There will always be matters that arise and differences of opinion – leveraging the governance framework in a constructive and effective way should help resolve outstanding issues.

Also need to improve the oversight of the system as a whole – with TTC, PRESTO and all vendors working together as one and focusing on achieving the desired outcomes

In addition to closing the governance gap, there needs to be the following to improve oversight of the system as a whole:

- a. TTC, PRESTO and all vendors working together as one, sharing information, and diagnosing and solving problems together (e.g. coin collection issue on new streetcar vending machines needs to be resolved together despite all vendors staying within their defined responsibilities)
- b. Focusing, measuring and monitoring the desired outcomes
- c. Controls over PRESTO revenue and assurance provided by PRESTO needs strengthening, including retailer network controls

Each of the above three pillars are discussed in the report – in different ways. The report dives deeper into the issues identified to unpack them – but these are only some starting examples of the kind of information that needs to be gathered and analysed by the parties and possibly the Expert Panel to define the problems, SLAs, and information gaps.

Refocusing efforts to build on the above three pillars of foresight, insight and oversight set the foundation for TTC, PRESTO, and customers to win

By refocusing efforts and building on the three pillars above of foresight, insight, and oversight, it sets the foundation for TTC, PRESTO, and customers to win. It all starts with aligning the vision, having mutual respect, obtaining the right information to diagnose issues, seeking the root cause, and having the governance in place to help set fair expectations and resolve impasses. **Overall, there is a huge opportunity for both parties to bring transit to the next level for citizens.**

Executive Leadership Teams of both TTC and Metrolinx conveyed their support for this audit and have shared a renewed commitment to achieving the vision contemplated in the business arrangement

The Executive Leadership Teams of both TTC and Metrolinx conveyed their support for this audit and found that it brought new insight and perspectives. They have shared a renewed commitment to achieving the vision contemplated in the business arrangement for the benefit of citizens and to putting the pillars in place to make this happen. We wish to thank them and their teams for their support for this audit. We would also like to thank the bus drivers who took the time to participate in the audit.

The remainder of the Executive Summary and report provide a:

1. **Checklist by Fare Equipment/Area (pages 6-10)**, summarizing our audit findings by type of fare equipment and subject area, and cross-referenced to the area of the report where more details are found.
2. The Executive Summary then includes a **Summary of Detailed Audit Findings (pages 11-18)** before the rest of the report.
3. The remainder of the report provides a background section followed by an in-depth analysis of each audit finding in our **Audit Results (starting at page 25)**.

PRESTO Card Readers



Roles and Responsibilities:

- Devices are owned by PRESTO
- PRESTO bought them from Scheidt & Bachmann (S&B)
- Maintenance is done by PRESTO
- Monitoring of out-of-service instances are done by PRESTO's vendor's offshore team
- Revenue transactions are recorded in PDS subsystem
- Out-of-service instances are recorded in the device monitoring software tool

CHECKLIST OF ISSUES BY FARE EQUIPMENT/AREA

Availability Calculation of PRESTO Card Readers (Buses, Streetcars):

- **How it is calculated:** Using device out-of-service statuses in the device monitoring software tool
- **Who calculates the availability?** Accenture
- **Availability Calculation Issues Include:**
 - Availability calculation is only provided for Monday to Friday between 6 AM and 10 PM (A.1.1)
 - Frozen card readers may be captured as "in-service" rather than "out-of-service" in the availability calculation (A.1.1)
 - Vehicles that are in-service but not recorded in NextBus GPS application system (due to a number of different reasons) are excluded from the availability calculation (A.1.2)
 - Vehicles that are improperly included in TTC's maintenance list and are actually in-service are excluded from the availability calculation (A.1.2)
 - Not all out-of-service device statuses occurring between the 15 minute pings are captured in the availability calculation (A.1.3)
 - Due to issues with the device monitoring software tool during our audit, some devices were not included in the availability calculation and some devices were captured with an incorrect status such as "in-service" rather than "out-of-service" (A.1.4)
 - PRESTO's vendor appears to be able to make adjustments to the device statuses for the availability calculation. The analysis and support for the weekly rate, including any adjustments made, is not provided to TTC (A.1.4)
 - TTC does not get a daily availability calculation spreadsheet for holidays in India/Canada and weekends in Canada (Note: Daily availability spreadsheet is now provided to TTC for holidays in India) (A.1.5)
 - For daily spreadsheet not provided during holidays in India, PRESTO staff were not aware of the issue and back-up could not be provided to confirm that these days were included in the weekly rate (data purged after 60 days, when it is required to be kept for 7 years per contract) (A.1.5)

Incident Management Issues Include:

- Monitoring for out-of-service instances is done by PRESTO's vendor's offshore monitoring team 24/7

- Monitoring team did not always open a service ticket in the incident management system (called ServiceNow) for out-of-service devices (B.1.1)
- Device monitoring software tool used by PRESTO's vendor does not have reporting/extracting capability available for the TTC and the data in the device monitoring software tool is purged after 60 days (B.1.2)
- PRESTO does not maintain a running log of swapped devices, contrary to the Master Agreement (B.1.3)
- TTC staff need to improve the accuracy of the bus maintenance list provided to PRESTO (B.1.4)
- TTC staff did not always report and raise service tickets in PRESTO's incident management system for malfunctioning devices (B.1.5)

PRESTO Vending Machines on the New Streetcars



Availability Calculation of PRESTO Vending Machines on New Streetcars:

- **How it is calculated:** Based on repair time (calculated from the time the issue was raised in the incident management system to the time it was fixed)
- **Who calculates the availability?** Scheidt & Bachmann (S&B)
- **Availability Calculation Issues Include:**
 - Out-of-service machines as a result of "coin box full" are excluded from the availability calculation because it is technically not broken so it is not the vendor's responsibility (A.2)
 - Out-of-service machines as a result of network connectivity issues are excluded from the availability calculation because connectivity is the responsibility of another vendor (A.2)
 - Prior to July 2019, PRESTO was responsible for the first line maintenance but this repair time was not included in the availability calculation (A.2)
 - Not all out-of-service machines were included in the availability calculation as being "not available" but should have been, according to the definition between PRESTO and its vendor (A.2)

Roles and Responsibilities:

- Machines are owned by PRESTO
- PRESTO bought them from S&B
- Maintenance is done by S&B
- Monitoring of out-of-service instances are done by S&B
- Revenue transactions and out-of-service instances are recorded in FareGo subsystem

Incident Management Process:

- S&B staff monitor the out-of-service instances in their back-end system (FareGo)
- TTC also raises out-of-service incidents to PRESTO's incident management system
- S&B is responsible to fix hardware and software issues, Garda is responsible for coin collection, and Telus is responsible for network connectivity issues

Parkeon Vending Machines on the New Streetcars



Roles and Responsibilities:

- Machines are owned by PRESTO
- PRESTO bought them from Precise ParkLink
- Maintenance is done by Accenture and Precise ParkLink
- Monitoring of out-of-service instances are done by Accenture
- Revenue transactions are recorded in the Precise ParkLink subsystem
- Out-of-service instances are recorded in the monitoring tool owned by Precise ParkLink

Availability Calculation of Parkeon Vending Machines on New Streetcars:

- **How it is calculated:** Based on repair time (calculated from the time the issue was raised in the incident management system to the time it was fixed)
- **Who calculates the availability?** Precise ParkLink
- **Availability Calculation Issues Include:**
 - Out-of-service machines as a result of "coin box full" are excluded from the availability calculation because it is not technically not broken so it is not the vendor's responsibility (A.2)
 - Out-of-service machines as a result of network connectivity issues are excluded from the availability calculation because connectivity is the responsibility of another vendor (A.2)
 - Not all out-of-service machines were included in the availability calculation as being "not available" but should have been, according to the definition between PRESTO and its vendor, such as coin jam issues (A.2)

Incident Management Process:

- Accenture staff monitor the out-of-service instances in the monitoring tool owned by Precise ParkLink
- TTC staff also raise out-of-service incidents to PRESTO's incident management system
- Precise ParkLink is responsible to fix hardware and software issues, Garda is responsible for coin collection, and Telus is responsible for network connectivity issues

TTC Subway Fare Gates



Roles and Responsibilities:

- Fare Gates are owned by TTC
- TTC bought them from S&B
- Maintenance is done by TTC and S&B
- Manual identification of out-of-service instances are done by TTC
- Revenue transactions are recorded in FareGo subsystem

Availability Calculation of TTC Subway Fare Gates:

- **How it is calculated:** Using fare gate out-of-service status in the FareGo subsystem
- **Who calculates the availability?** TTC
- **Availability Calculation Issues Include:**
 - Partially available gates (e.g. only exit side works and not the entry side) are excluded from the availability calculation (D.1)

Incident Management Process Issues Include:

- Not all out-of-service gates that are stuck in an open position are barricaded to prevent customers from passing through, which could result in revenue loss to TTC (D.1)
- TTC does not receive automatic alerts from the current FareGo subsystem when the fare gate goes out of service (D.2)
- TTC staff currently have to manually identify the out-of-service gates (D.2)
- At the automatic entrances where there is no TTC Staff presence, the gate could potentially stay out of service for a long time (D.2)
- Escalated issues to TTC's vendor to fix fare gates were not completed within the targeted timeline as per the SLA (D.3)
- TTC gets compensated up to a maximum of 25 per cent of the service charge if the availability and maintenance targets are not met by its vendor (D.3)

TTC and Metrolinx Contract Management



TTC and PRESTO signed the Master Agreement in November 2012

TTC and Metrolinx Need to Work Together to Resolve Issues Better, including the Following:

- The lack of a governance committee (Joint Executive Committee) for TTC and Metrolinx to address contractual and operational issues directly together represents a governance gap and is impacting the arrangement. SLAs have not been set and the Expert Panel to help set service levels has not been operationalized (C.1)
- At least 40 per cent of contracted deliverables remain outstanding, according to TTC. Metrolinx has indicated that in

its view, almost half of them "don't have public value or cost benefit, or the requirements are not considered relevant" and are not formally planning to deliver them, while TTC does not agree - so further clarity is needed. (C.2)

- SLAs have not yet been signed by both parties after 7 years into the agreement (C.3)
- Metrolinx has not yet paid TTC's \$7.5M revenue loss claim for PRESTO fare equipment issues, stating "it is a result of TTC not providing sufficient data and support on their revenue loss claim". However, much of the information needed by TTC has not been provided by Metrolinx, e.g. device level data (C.4)
- It appears that Metrolinx has withdrawn funds from TTC's revenue bank account for items other than its commissions - control improvements are needed (C.5)

TTC Should Receive All Its PRESTO Revenue



There is no reconciliation between the device level (where the transaction starts) and the subsystems and PRESTO's central system

TTC Needs More Assurance from PRESTO on their Controls:

- A manual reconciliation is done by PRESTO staff, but only between the subsystem and PRESTO's central system. The manual reconciliation identifies transactions missing in PRESTO's central system from the subsystem, but could be prone to human error and may not identify all items (E.1)
- There is no reconciliation between the device level (where the transaction starts) and the subsystems and PRESTO's central system. This creates a higher risk if there are any missing transactions from the device level to the subsystems and to PRESTO's central system, as they may not be identified and pushed through (E.1)
- TTC has not been provided with device level data from PRESTO (data is encrypted and purged after seven days) (E.2)
- PRESTO is not provided with a cash and debit/credit card reconciliation from PRESTO's third party retailer network for sales transactions of TTC's monthly passes and single-use tickets (E.4)
- TTC is not compensated for sales of TTC's monthly passes and single-use tickets that do not get into PRESTO's central system (E.4)

SUMMARY OF DETAILED AUDIT FINDINGS

PRESTO Card Reader Availability Rate

PRESTO card reader availability target of > 99.99%

PRESTO card readers need to be available greater than 99.99 per cent as per the service level identified in the Master Agreement between TTC and Metrolinx. Given SLAs have not been set up, what goes into the calculation of the service level has not yet been defined or agreed upon. Metrolinx staff have advised us that "they do not have an agreement with TTC on the device service level commitment calculations, nor the consequences for non-performance".

TTC and PRESTO report that the device availability rate has improved for PRESTO card readers over the past few years, remaining above 98 per cent since October 2018. Their reported availability rate for June 2019 was 98.8 per cent. However, we have identified a number of matters in this report that could significantly affect the availability and should be factored into the calculation.

Over 100 TTC bus operators from seven garages noted 330 PRESTO issues over two days

In reviewing the functionality of PRESTO fare equipment, we conducted a bus device audit for two days in June 2019. Over 100 TTC operators representing all seven bus garages drove 168 buses and noted any PRESTO issues during their shift. Of the 330 PRESTO issues noted, nearly 300 (91 per cent) of them were frozen PRESTO card readers.

A frozen PRESTO card reader is when a passenger taps their PRESTO card but the reader is stuck and does not always accept the tap. Not only does this result in revenue loss if the passenger doesn't tap on another reader successfully, but the device may be captured as "in-service" rather than "out-of-service" in the availability calculation and the availability rate could be overstated for this issue.

TTC's own estimates do not appear overstated for malfunctioning PRESTO fare equipment:

- **2-3% overstated PRESTO card reader availability**
- **\$3.4 million revenue loss in 2018**

We prepared calculations to estimate a range for the overstatement of the PRESTO card reader availability rate and annual revenue loss. Based on the work performed with the information we could obtain, it is our view that TTC's own estimate of 2-3 per cent for overstated PRESTO card reader availability rate is conservative. Although, it should be noted that the availability rate does not necessarily translate into a 1:1 relationship with revenue loss. It is also our view that TTC's estimate of \$3.4 million in revenue loss for 2018 due to malfunctioning PRESTO fare equipment does not appear to be overstated. TTC's availability estimates may even be understated given the issues we identified in this report with availability of PRESTO card readers. We are not including revenue loss calculations in this report. It is our view that the information and data gaps identified at this time make it difficult to provide these important numbers with the required level of audit assurance.

We have the ability to issue a supplemental report or management letter in the future if needed.

Additional limitations noted where information is not captured in PRESTO card reader availability calculation

Some limitations that impact the availability rate calculation of PRESTO card readers, including the following scenarios where information is not captured in the calculation include:

- Availability calculation is only provided for Monday to Friday between 6 AM and 10 PM (A.1.1)
- Frozen card readers may be captured as "in-service" rather than "out-of-service" in the availability calculation (A.1.1)
- Vehicles that are in-service but not included in NextBus GPS application system (due to a number of different reasons) are excluded from the availability calculation (A.1.2)
- Vehicles that are improperly included in TTC's maintenance list are excluded from the availability calculation (A.1.2)
- Not all out-of-service device statuses occurring between the 15 minute pings are captured in the availability calculation (A.1.3)
- Due to issues with the device monitoring software tool during our audit, some devices were not included in the availability calculation and some devices were captured with an incorrect status such as "in-service" rather than "out-of-service" (A.1.4)
- PRESTO's vendor appears to be able to make adjustments to the device statuses for the availability calculation. The analysis and support for the weekly rate, including any adjustments made, is not provided to TTC (A.1.4)
- TTC does not get a daily availability calculation spreadsheet for holidays in India/Canada and weekends in Canada(A.1.5) (Note: Daily availability spreadsheet is now provided to TTC for holidays in India, PRESTO staff were not aware of the issue and back-up could not be provided to confirm that these days were included in the weekly rate (data purged after 60 days) (A.1.5)

PRESTO staff have advised us that "they acknowledge the need to improve and enhance how they calculate and report on PRESTO device availability".

Availability Rate of PRESTO Vending Machines on New Streetcars

Issues with out-of-service instances not being included in the availability calculation for PRESTO vending machines on new streetcars

There are also issues with how the availability rate is calculated for both types of PRESTO vending machines on the new streetcars. Certain out-of-service instances are not included as out-of-service in the availability calculation, such as downtime for first line maintenance (prior to July 2019) and when the coin box is full. It appears the reason is that the vendor responsible for the calculation is not responsible for these activities, and therefore excludes them from their calculation of availability.

As a result, the availability rate for vending machines on new streetcars is overstated, meaning that machines are less available than reported. If customers planned to pay using a vending machine and are not able to and do not pay at the second vending machine onboard (if available) or elsewhere, this results in revenue loss to the TTC. Also, an overstated availability rate does not alert TTC or Metrolinx that there may be an issue with the functionality of these machines that needs to be addressed.

Identifying and Repairing Defective Fare Equipment

If issues with PRESTO card readers are not identified and resolved on a timely basis, it will also impact PRESTO card reader availability and revenue loss

PRESTO Card Readers

If issues are not all identified and resolved in a timely manner for PRESTO fare equipment, this will affect the downtime and availability of the PRESTO card readers and can impact revenue loss. It should be noted that TTC is responsible to ensure all vehicles identified as requiring repair are made available to PRESTO repair staff at night, as PRESTO staff are not able to repair the vehicle until that point in time. We identified a number of improvements that are needed to the incident management processes to ensure that all issues are being identified, with service tickets raised in PRESTO's incident management system for each issue, and the resolution, including any swapping of devices, is properly tracked and supported, with information and reporting made available to the TTC for analysis.

Credit and debit card functionality was removed from PRESTO vending machines on new streetcars in December 2018

PRESTO Vending Machines on New Streetcars

The credit and debit card functionality on one of the two types of PRESTO vending machines on new streetcars (called Single Ride Vending Machines) was removed by Metrolinx, in consultation with TTC, in December 2018 due to issues with the availability of the machines that were not easily resolved without removing this functionality. Given customers can no longer currently pay with credit/debit card and open payment technology is not yet available, the only two current payment methods on the new streetcar machines are coins or tokens.

Neither TTC, PRESTO, nor the vendors are currently ensuring the coin box is emptied on a regular basis for all vending machines on new streetcars

From our audit work, it appears that neither TTC, PRESTO, nor its vendors are currently ensuring that the coin box is emptied on a regular basis for all PRESTO vending machines on new streetcars, although Metrolinx's vendor collects coins/tokens for all streetcars made available to them by TTC on a nightly basis. It is important for TTC to ensure that the streetcars with "coin box full" warning signs are made available each night for coin collection. In the event this is not always possible in order to meet operational needs for night service, other options should be explored to ensure that coin boxes do not remain full and cause the vending machines to be unavailable on the new streetcars, as this can result in lost revenue to the TTC.

It is important to restore functionality for customers to pay their fares by debit or credit card on the new streetcars

PRESTO is the predominant form of payment on TTC starting in 2019

According to TTC - PRESTO adoption rate of 81% at end of July 2019

In addition, it will be helpful to restore the credit/debit card functionality in the future. Metrolinx advised us that the change to remove the functionality was permanent, and TTC advised us that they did not agree for it to be permanent and want it restored in the future. TTC is negotiating with Metrolinx to restore this important functionality for customers to pay their fares.

Contract with Metrolinx

Over the last seven years, Metrolinx and TTC have made progress in implementing the PRESTO system on the TTC. Starting in 2019, PRESTO has become the predominant form of fare payment, according to TTC staff. According to TTC, the PRESTO adoption rate at the end of July 2019 was 81 per cent, up from 45.5 per cent at the end of December 2018.

Metrolinx owns and controls the PRESTO card readers, PRESTO cards, and PRESTO vending machines on the new streetcars.



TTC owns and controls the fare gates at its subway stations.



It is critical that TTC's service needs be met under the contract for the benefit of Torontonians

Given that TTC has contracted out much of its fare operations to Metrolinx and with PRESTO now being the predominant fare payment method on the TTC, it is critical that that TTC's service needs be met under the contract for the benefit of Torontonians. An effectively functioning governance framework will help the parties to identify and unpack operational issues and make decisions that move the parties forward towards the successful fulfilment of accountabilities under the Master Agreement.

Governance gap between the TTC and Metrolinx needs to be addressed for TTC's contractual and operational issues

We have identified a governance gap between the TTC and Metrolinx. The Joint Executive Committee needs to be reinstated and continue once the parties enter the operational phase so that there is an executive level table where TTC and Metrolinx can deal directly together on contractual and ongoing operational issues. The SLAs need to be set up to help ensure the service levels contracted for are delivered. If the parties cannot set the SLAs themselves, they need to access the Expert Panel already defined in the Master Agreement as part of the governance framework. From our perspective, these governance gaps need closing to help both parties move forward on the contractual and operational issues identified in this report.

Metrolinx staff have advised us that they "agree there is an opportunity to formalize and improve contract governance as it relates to operation and continuous improvement".

According to TTC, at least 40% of TTC's contractual business requirements not yet met by Metrolinx

In terms of contractual issues, TTC has indicated that at least 40 per cent of its contractual business requirements have not yet been delivered by Metrolinx, including key priority items such as open payment. Open payment represents almost half of these outstanding deliverables. Despite a TTC/PRESTO joint working group attempting to reach an agreement on the remaining contracted deliverables at the end of 2018, Metrolinx advised that it is not formally planning to deliver almost half of the remaining deliverables, stating "they don't have public value or cost benefit, or the requirements are not considered relevant any longer". Some of the items on Metrolinx's list include:

- visual distinction for PRESTO concession cards (i.e. child, youth, post-secondary student, senior)
- PRESTO card reader device management and monitoring
- single-use tickets for concession fares
- ability to purchase single-use tickets on surface vehicles
- recording of denied PRESTO taps

The parties have not reached common ground on what remains deliverable. TTC needs clarity on exactly what is outstanding - what will be delivered and when, what Metrolinx intends to drop, and the impact and value of those items to the overall deal need to be assessed. Changes should be done through a formal change-order process.

To make the contract successful and move forward - the parties need to diagnose the issues to solve the operational and contractual problems together

The parties need to diagnose the issues if they wish to move forward to solve the operational and contractual matters. This can only be done by identifying and obtaining the information and data needed, understanding the underlying root cause, agreeing where possible, then leveraging the governance framework to resolve impasses.

Metrolinx is reliant on its vendors and sub-vendors – this adds to the complexity and challenge in ensuring TTC's contractual needs are met

While we recognize that Metrolinx is reliant on many of its vendors and sub-vendors to ensure its contracted deliverables are met, it contracted with TTC to deliver and TTC is Metrolinx's biggest client. If there is a deliverable already included in the 2012 Master Agreement between TTC and Metrolinx, TTC should not be billed an additional amount to receive the information supporting the deliverable. For example, device level data is included as a contractual deliverable – TTC and Metrolinx need the device level data to address the risk that not all transactions may be properly captured from the device to the subsystem level.

It is critical that both parties work together to identify the information needed and that the information be provided and used to better measure deliverables while they negotiate targets. It is also important that there be shared accountabilities. For example, TTC needs to ensure that all vehicles requiring repair or coin collection are made available each night because that can impact fare operations. PRESTO needs to acknowledge such things as fare evasion and that working together with its transit agencies to improve front-end controls is partly their responsibility.

TTC Fare Gates

Fare Gate availability target of 99.5%

April 2019 fare gate availability rate of 98.15%

TTC owns its subway fare gates and has been working with its vendor to make improvements to the availability of these gates. As per the SLA, the fare gate availability target is 99.5 per cent. TTC reported the April 2019 availability rate at 98.15 per cent and that it has improved and remained above 97 per cent since July 2018. However, we identified factors that should be included in the availability calculation to provide a truer reflection of the availability rate.

Various improvements made to address defect issues with fare gates by TTC working together with its vendor

TTC staff advised that the availability of the fare gates has improved due to working with its vendor on defect issues for hardware, software updates, increasing TTC staffing for first line maintenance, and increased diligence in TTC's preventive maintenance process for fare gates.

Continual improvement needed on fare gates

We identified some areas for TTC to continually improve on its fare gates including:

TTC staff expect that new FareGo version 3.9 will resolve a number of the current limitations

- ensuring partially available gates are included in the availability calculation
- expediting the implementation to upgrade its FareGo software to version 3.9 to resolve the issues with manual identification and with data concentrators
- holding its vendor accountable to improve and achieve its resolution time targets for second line maintenance, and to receive back-up documentation for their service credit calculation.

Ensuring TTC is Receiving All the PRESTO Revenue it Should

Both Metrolinx and TTC have controls in place related to PRESTO revenue. Metrolinx provides an audited CSAE 3416 report (3416 report) to its transit agencies to provide assurance over its controls and it is important that key controls on PRESTO revenue are included.

The 3416 report is also one of TTC's business requirements in its contractual arrangement with Metrolinx, which specifies that this report:

"must address all key controls necessary to ensure that customers are properly charged and that revenue allocated to TTC, and unearned revenue is properly calculated, complete (i.e. including any 'exception' transactions), and remitted to TTC within the settlement time frame outlined in the Agreement."

12 control gaps out of 35 were identified through a gap assessment of PRESTO's 3416 report

Gaps to address include ensuring all revenue transactions are captured between the device and subsystem levels and retailer network reconciliation controls

Given risks and potential control gaps we identified through our audit work, we augmented our team with experienced professionals from an external audit firm to perform a gap assessment of the 3416 report. We found some key controls were not included in the 3416 report; 12 out of 35 controls were either not implemented, not included in the 3416 report, or in one case, insufficient information was available to conclude on the gap. The main issue highlighted was that gaps exist in ensuring all revenue transactions are captured between the fare equipment (devices) and the subsystems. There were also no reconciliation controls (cash, debit/credit) of its retailer network included in the 3416 report regarding the sale of PRESTO cards.

Conclusion

This Phase 2 audit focused on whether TTC is receiving all the PRESTO revenue it should, including the functionality of fare equipment (PRESTO card readers, PRESTO vending machines on new streetcars, and TTC subway fare gates), TTC's contract with Metrolinx, and PRESTO revenue transactions on TTC captured through PRESTO's back-end systems.

We have concluded that TTC's PRESTO revenue may not be complete. We will not be providing an estimate of lost revenue because of information gaps and control weaknesses. It is our view that TTC and PRESTO need to focus on tracking the right things in a complete and accurate manner – while retaining supporting evidence for further analysis. Undertaking this exercise will assist the parties in resolving issues through its governance framework (once fully operationalized) to improve the completeness of revenue.

34 recommendations to help TTC and Metrolinx address issues with functionality of fare equipment and ensure TTC receives all the PRESTO revenue it should

Implementing the 34 recommendations will help both TTC and Metrolinx address issues with the functionality of the PRESTO fare equipment and the incident management process, and improve the accuracy and completeness of the availability calculation of PRESTO card readers, as well as provide TTC with required information and data to monitor and address its risks related to completeness of PRESTO revenue.

We hope that this report will help both parties to move forward together to ensure the contractual needs and business requirements of TTC are met to benefit all Torontonians, and that this will be done in an efficient and effective manner through the contractual arrangement.

It will also help TTC to continue to improve on areas it is accountable for that also affect revenue calculations, including the functionality of its fare gates and contract management practices with its vendor.

It will help both TTC and Metrolinx to ensure that sufficient assurance is being provided on controls related to completeness of PRESTO revenue.

Finally, the governance structure contemplated in the contract needs to be put in place to support the resolution of the issues highlighted in this report, the outstanding contractual deliverables, and any new issues that arise over the remainder of the contract term.

Background

Phase 2 audit focuses on whether TTC is receiving all the PRESTO revenue it should

Phase 1 of the Auditor General's audit of TTC's revenue operations focused on fare evasion and the estimated loss of passenger revenue.

This second phase focuses on whether TTC is receiving all the PRESTO revenue it should, including a review of the following:

- Functionality of fare equipment (PRESTO card readers, PRESTO vending machines on new streetcars, TTC subway fare gates)
- TTC's contract with Metrolinx
- Capturing all PRESTO revenue transactions on TTC through PRESTO's back-end systems

TTC Revenue and Ridership Trend

TTC has 3,394 vehicles in its revenue fleet as of December 31, 2018:

- 2,010 buses (59.2 per cent)
- 848 subway rail cars (25 per cent)
- 245 streetcars (7.2 per cent)
- 263 Wheel-Trans buses (7.7 per cent)
- 28 Scarborough Rapid Transit cars (0.9 per cent)

95% of TTC's total operating revenue was from passenger revenue

TTC's total conventional passenger revenue (excluding Wheel Trans) for the year 2018 was \$1.162 billion, down \$1 million from \$1.163 billion in 2017. Passenger revenue represented 95 per cent of TTC's total operating revenue in 2018. The basic adult fare was \$3.00 in 2017 and 2018 (for token/PRESTO; cash fare is \$3.25), which increased by \$0.10 from the \$2.90 fare in 2016.

Figure 1 below shows that from 2013 to 2017, revenue (depicted by the orange line) continued to rise, likely due to annual fare increases. The increasing trend in revenue stopped in 2018 – the only recent year when there was no fare increase.

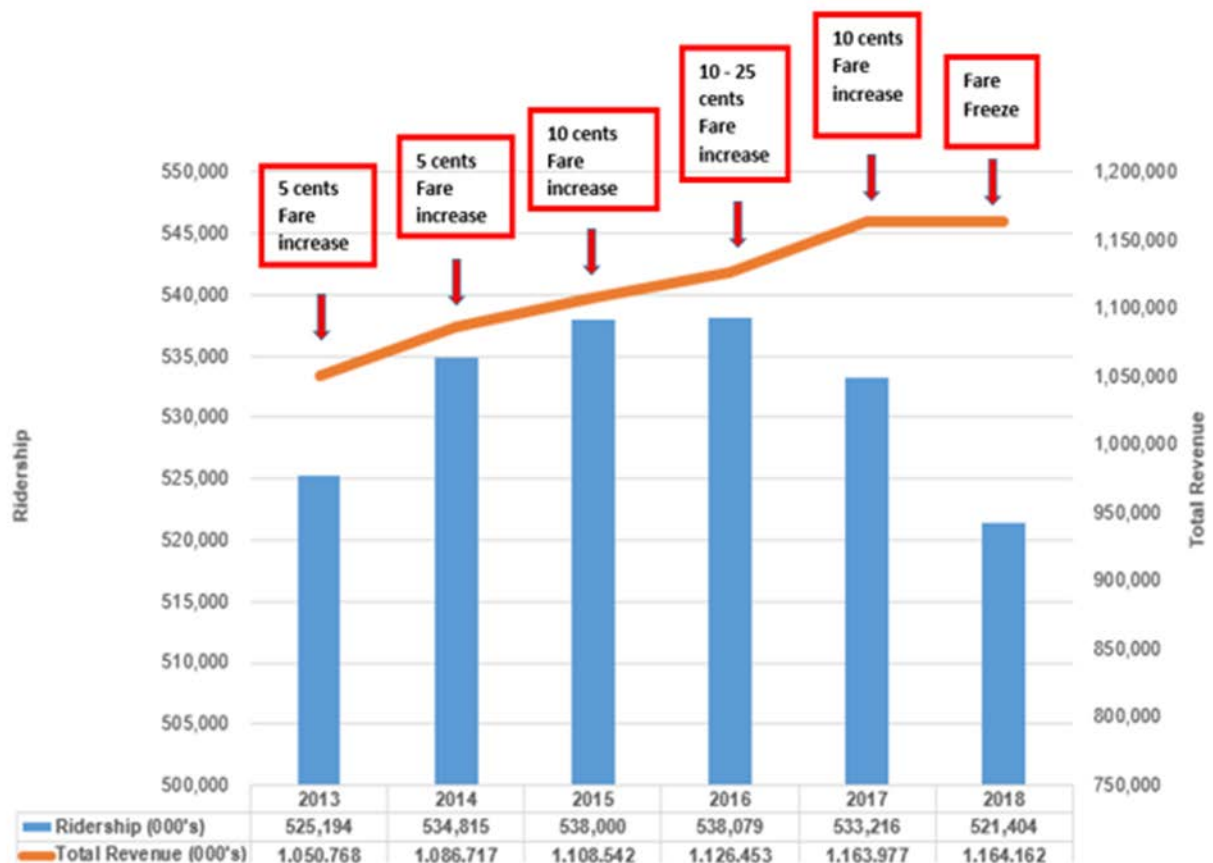
TTC's ridership has decreased since 2016

Figure 1 also shows that TTC's ridership numbers (shown with the blue bars) grew steadily from 2013 to 2015, but starting in 2016 there has been a reversed trend in ridership growth. Since 2016, ridership has declined from 538 million passenger trips in 2016 to 521 million passenger trips in 2018.

Only paying passengers are counted in the ridership and revenue numbers – functionality of fare equipment can affect ability to pay

It is important to note that TTC's yearly ridership is a **calculated number based on revenue collected** (see Phase One audit report – Fare Evasion and Fare Inspection). That means that only paying passengers are included in the ridership and revenue calculations. For those passengers paying by using their PRESTO card, that means they have successfully tapped their card on functional fare equipment on TTC's network, and that those transactions have been successfully uploaded into PRESTO's systems and deposited by Metrolinx into TTC's bank account.

Figure 1: TTC's Ridership and Revenue Trend (excluding Wheel Trans) from 2013 to 2018



PRESTO and Other Fare Payment Methods

TTC contracted with Metrolinx in 2012 to integrate and operate the PRESTO fare card system

In November 2012, TTC contracted with Metrolinx to integrate and operate the PRESTO fare card on its transit network for 15 years, plus options for renewal. As of the end of 2016, PRESTO could be accepted for fare payment across the entire TTC network.

PRESTO is a division of Metrolinx – the names may be used interchangeably throughout this report

The Master E-Fare Collection Outsourcing Agreement (Master Agreement) stipulates that Metrolinx manage all PRESTO equipment on TTC's properties, on board TTC vehicles, and where necessary on the street. This includes the design of the hardware and software, and the installation and maintenance of the machines. In return, Metrolinx is compensated with 5.25 per cent, inclusive of HST, of the gross revenue collected through the PRESTO system on TTC.

It should be noted that PRESTO is a division of Metrolinx, and Metrolinx/PRESTO may be used interchangeably at times throughout this report, but it still refers to the same organization.

Passengers on TTC can pay their fares with PRESTO cards, tokens, tickets, passes or cash. TTC's monthly Metropasses were discontinued after December 31, 2018. PRESTO cards can be loaded with money or a monthly pass. When loaded with money, a single fare is deducted when the card is tapped on a PRESTO card reader.

Single-use PRESTO tickets were available for sale at all subway stations and Metrolinx's retailer network in July 2019, and TTC has made monthly passes available on PRESTO cards.

According to TTC, the PRESTO adoption rate has increased to 81% at the end of July 2019

TTC staff advised us that the PRESTO adoption rate at the end of July 2019 was approximately 81 per cent¹, up from 45.5 per cent at the end of December 2018.

PRESTO and TTC Fare Equipment

Metrolinx controls all of the PRESTO cards, PRESTO card readers, and the PRESTO vending machines to purchase single-use tickets on the new streetcars. TTC controls the fare gates at its subway entrances.

Proper functioning of fare equipment is critical for TTC to receive all the revenue it is entitled to

It is critical for the fare equipment to function properly in order for TTC to receive all the revenue it is entitled to receive.

¹ Metrolinx reports a lower PRESTO adoption rate of 66 per cent in June 2019. TTC staff have advised us that this is due to differences of what is included by Metrolinx and TTC in the numerator – Metrolinx does not include monthly pass riders or two-hour rides in its numerator, although these are reflected in the ridership numbers of the denominator. TTC wrote a letter to Metrolinx in April 2019 explaining why they should revise their calculation. However, the parties do not have consistent calculation methodology for the adoption rate, and Metrolinx continues to report a rate that differs, with a difference of approximately 15 per cent in June 2019.

PRESTO Card Readers

TTC receives its PRESTO revenue in three ways, when a customer:

1. taps their PRESTO card on a card reader and are charged for an individual trip.
2. buys a TTC monthly pass for their PRESTO card.
3. buys a PRESTO single-use ticket for use on the TTC network.

An unsuccessful PRESTO tap by a passenger means lost fare revenue to TTC unless the passenger taps successfully elsewhere

If fare equipment is not functioning properly, the customer's tap is not successful. Unless the customer had purchased a TTC monthly pass, an unsuccessful tap means that fare revenue is then lost unless the passenger taps successfully elsewhere during that same trip.

For example, if the PRESTO card reader at the front doors of a bus (or legacy streetcar) is not working, the customer is generally instructed by the operator to tap their card on the card reader at the back of the bus. However, if the customer chooses not to do so, it is too congested for the customer to make it to that reader, or if the back reader is also not working, the result is lost fare revenue to the TTC.

On the new streetcars, there are six PRESTO card readers, so there may be greater opportunity for the customer to make up their tap on another card reader if the first one is unsuccessful. However, there is no interaction with the operator (which we noted in our Phase 1 audit report as a factor that may increase fare evasion) on these streetcars and the vehicle can often be very congested during rush hour, so there is still a risk the customer may not make up the tap, resulting in lost fare revenue to the TTC.

Vending Machines on New Streetcars

PRESTO Vending Machines

Another factor that increases the risk of lost fare revenue on new streetcars are malfunctioning PRESTO vending machines (called Single Ride Vending Machines). If the customer planned to use this method to pay their fare and the machine is not working, this may result in lost revenue to the TTC if the customer does not pay at the second vending machine onboard (if available). Customers also cannot currently use debit or credit cards to purchase fares on these machines. Metrolinx, in consultation with TTC, removed this payment method in December 2018 in order to address issues with functionality that could not otherwise be easily resolved.

Credit and debit card payment is currently not available on the vending machines on new streetcars

If passengers plan to use the vending machine to pay their fare on the new streetcars and they aren't working – that means lost fare revenue to TTC unless the passenger pays elsewhere

Another type of vending machine (called Parkeon vending machines purchased by Metrolinx from Precise ParkLink) is also available on new streetcars and only accepts coins and tokens. These vending machines never had the capability to accept debit or credit card payment. These machines were included on new streetcars as there was an insufficient number of the other PRESTO vending machines ordered by Metrolinx at the time when additional streetcars were deployed into service by TTC.

TTC Subway Fare Gates

If the subway fare gates are stuck in the open position and not barricaded, the risk of fare evasion increases, which can result in lost fare revenue to TTC

Another risk to lost fare revenue are malfunctioning TTC subway fare gates — particularly when they are stuck in the open position (and not barricaded in some manner). The risk is higher at automatic entrances where there is no TTC staff presence. Although there is always more than one fare gate available for customers to tap and enter, a gate stuck in the open position increases the risk that a customer will go through without paying, resulting in lost revenue to the TTC.

Ensuring TTC is Receiving All the PRESTO Revenue it Should

Other factors impact TTC receiving all the PRESTO revenue it should – including successful uploading to Metrolinx's back-end systems

In addition to properly functioning fare equipment, there are other factors that impact whether TTC is receiving all of the PRESTO revenue it is entitled to receive. It is also necessary for all of the customer tap transactions to be successfully uploaded from the PRESTO card readers (including those on the fare gates) to the back-end systems of Metrolinx, and for all of TTC's revenue to be deposited by Metrolinx into TTC's bank account. This requires a number of controls at Metrolinx, TTC and their vendors to be designed and operating effectively for this to occur.

Metrolinx provides an audited service provider report (CSAE 3416) to all of its transit agencies to provide assurance on its controls for revenue

Metrolinx provides assurance over their controls related to PRESTO revenue to all of its transit agencies, including TTC, in an audited service provider report, called 'CSAE 3416 Type II report' ("3416 report"). The 3416 audit report provides assurance for the external financial statement auditors of its transit agencies, including TTC, that Metrolinx maintained effective and efficient internal controls related to financial reporting of PRESTO revenue. In other words, all the PRESTO transactions for each transit agency were captured properly and deposited into the bank account of the transit agency appropriately. It is important that all controls that TTC needs assurance over are included in this audited report, or that some other mechanism addresses these. For some of the controls, it is TTC's responsibility, and likewise it is important that these controls also be designed and operating effectively, not only for TTC, but for PRESTO as well.

TTC's Contract with Metrolinx

It is critical that there be agreement on roles and responsibilities, contracted deliverables, and targets, and that required information be provided to TTC

Given the complexity of the arrangement between TTC and Metrolinx, as well as with Metrolinx and its vendors and sub-vendors, it is critical that there be agreement on roles and responsibilities, contracted deliverables and targets, with required data, information and reporting provided regularly to TTC that allows them to monitor and address all relevant risks.

Audit Results

This section of the report contains the findings from our audit work followed by specific recommendations.

A. PRESTO Fare Equipment Less Available Than Reported

A. 1. PRESTO Card Reader Availability Rate

**PRESTO Card Reader
Target of > 99.99%
availability**

Background

Per the Master Agreement signed between TTC and Metrolinx on November 28, 2012, PRESTO card readers need to be available² for TTC customers to tap more than 99.99 per cent of the time.

**PRESTO's vendor
calculates and reports
PRESTO card reader
availability**

PRESTO's vendor uses its offshore team in India to calculate PRESTO card reader availability. This calculation includes PRESTO card readers on TTC buses, legacy streetcars, and new streetcars.

**Only vehicles on the road
and collecting fares are
included in the availability
calculation**

The calculation includes only vehicles that are on the road and collecting fares, referred to as in-service vehicles. Metrolinx currently uses the NextBus GPS application, with information provided by TTC to NextBus, to identify which TTC vehicles are in-service.

**PRESTO card reader
device is pinged for its
status every 15 minutes
for the availability
calculation
(weekdays 6 AM – 10 PM)**

The PRESTO card readers (devices) send information on their status (known as "pinging") every 15 minutes for the availability calculation. The availability calculation captures device statuses between 6 AM and 10 PM, Monday to Friday. Weekends and holidays are excluded as per the definition agreed upon between PRESTO and its vendor, but appears to be contrary to the Master Agreement between the TTC and Metrolinx.

At the ping, the status of the PRESTO device is captured through PRESTO's device monitoring software tool.

The PRESTO card reader availability spreadsheet will categorize each device status and include or exclude from the calculation depending on its status:

² Metrolinx has two definitions of availability in its consolidated device dashboard document – when this audit report refers to availability, we are referring to card reader availability:

1. Card reader availability – The total percentage of PRESTO card readers that are in working order in all in-service vehicles
 2. Service availability - The total percentage of in-service vehicles that have at least one working PRESTO card reader in the vehicle
-

Availability calculation excludes:

- **Devices in scheduled maintenance**
- **Vehicles not in-service (determined from NextBus GPS application)**
- **Devices still booting up**

Included in Availability Calculation - Device is:

- working
- set to not collect fares (e.g. New Year's Eve)
- in error state
- in transition state (while bus is in-service, e.g. system update)
- offline

Excluded from Availability Calculation:

- Device is in scheduled maintenance
- Vehicle is not in NextBus (GPS application system with TTC information on scheduled vehicles, used by Metrolinx to determine whether vehicle is in-service or not)
- Device is in the process of booting up upon vehicle start up (PRESTO staff advised this should not generally take longer than 5 minutes, therefore excluded)

To generate the card reader availability spreadsheet, the device status captured in the device monitoring software tool is used. All device statuses other than the three noted above are included in the availability calculation.

Devices in scheduled maintenance are excluded from the availability calculation.

The status for "not in NextBus" means that the vehicle should not be in-service (determined by Metrolinx from NextBus GPS application, with information on scheduled vehicles provided by TTC), i.e. not on the road collecting fares and therefore device availability should be a low priority.

The status for booting up means that the vehicle has just been started and the device is still booting up, and PRESTO staff advised that this should generally not take longer than five minutes. During our audit work, we noted that some devices took at least 15 minutes to boot up on an audit day. Although the issue does not appear extensive, it does appear that booting up can sometimes take longer, and consideration should be given as to whether this is an appropriate status to exclude and whether this issue requires further investigation by TTC and PRESTO.

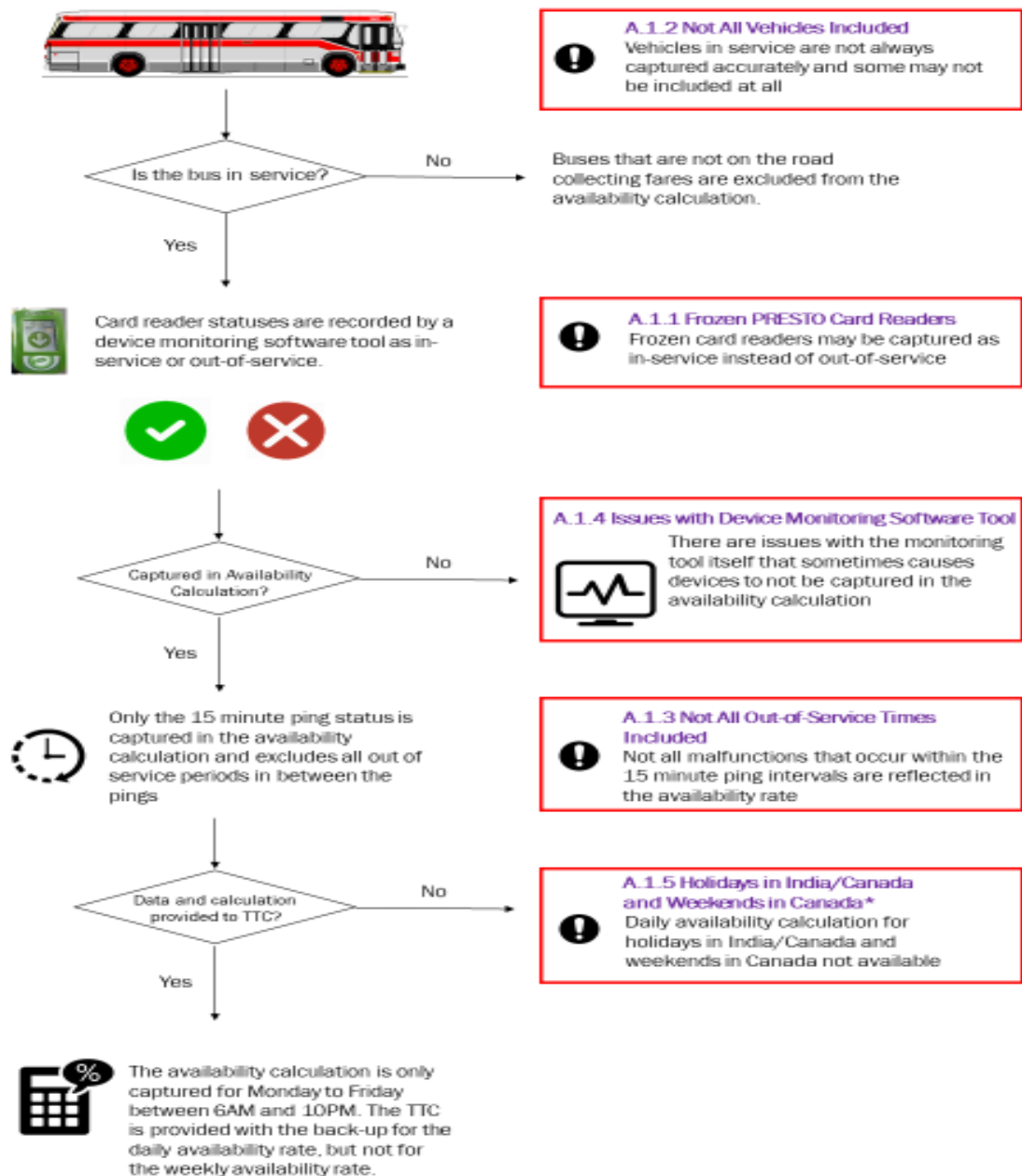
The data for the availability calculation is sent from PRESTO to TTC in an excel file and contains the calculations and support for daily availability rates.

It should be noted that there is an important distinction between the calculation of the availability rate and the monitoring of incident management issues. PRESTO provides 24/7³ monitoring through its vendor and is not limited to the 15 minute ping intervals for monitoring. Also, although a lower availability rate of fare equipment generally has an impact on revenue loss, it is not always a 1:1 relationship. PRESTO card readers are designed to still capture revenue transactions while offline and to upload those transactions once reconnected.

Figure 2 summarizes how the PRESTO card reader availability is calculated and also references the issues we identified with the calculation to the various subsections in this report.

³ PRESTO staff advised us several times that monitoring is 24/7 and provided an email from their vendor confirming this. However, we also received some potentially conflicting information. When we inquired further with PRESTO staff, no further documentation was made available to us.

Figure 2: How PRESTO Card Reader Availability Rate is Calculated



*Per PRESTO's vendor's staff, holidays in India were originally not included in the daily availability reporting, but were reflected as part of the weekly rate. However, we did not receive the back-up of the weekly rate for these days to verify if they were added back.

Approach to Bus Device Audit – over 100 bus operators participated representing all 7 TTC bus garages who drove 168 buses, for 2 days

As part of this audit, we had assistance from over 100 TTC bus operators representing all seven bus garages who drove 168 buses, to observe and write down any PRESTO issues on an audit form during their shifts on two days in June 2019. We used this approach, as there are over 2000 buses and we would not otherwise have been able to achieve a sufficient number of observations during our timeframe. We received the completed audit forms from the operators at the end of the two days. We then compared the observations to the device monitoring software tool for the device status that was captured, and to PRESTO's incident management system for whether a service ticket was created or not.

Limitations Impacting PRESTO Card Reader Availability Rate:

There are a number of factors that negatively impact the completeness and accuracy of the PRESTO card reader availability calculation

We found that there are a number of factors that negatively impact the completeness and the accuracy of the calculation used for the availability rate of the PRESTO card readers.

These include the following scenarios where information is not captured in the reported PRESTO card reader availability calculation:

- Availability calculation is only provided for Monday to Friday 6 AM and 10 PM (A.1.1)
- Frozen card readers may be captured as "in-service" rather than "out-of-service" in the availability calculation (A.1.1)
- Vehicles that are in-service but not recorded in NextBus GPS application system (due to a number of different reasons) are excluded from the availability calculation (A.1.2)
- Vehicles that are improperly included in TTC's maintenance list are excluded from the availability calculation (A.1.2)
- Not all out-of-service device statuses occurring between the 15 minute pings are captured in the availability calculation (A.1.3)
- Due to issues with the device monitoring software tool during the audit, some devices were not included in the availability calculation and some devices were captured with an incorrect status such as "in-service" rather than "out-of-service" (A.1.4)
- PRESTO's vendor appears to be able to make adjustments to the device statuses for the availability calculation. The analysis and support for the weekly rate, including any adjustments made, is not provided to TTC (A.1.4)
- TTC did not receive a daily availability calculation spreadsheet for holidays in India/Canada and weekends in Canada (Note: Daily availability spreadsheet is now provided to TTC for holidays in India) (A.1.5). PRESTO staff were not aware of the issue and back-up documentation could not be provided to confirm that these days were included in the weekly rate (because data is purged after 60 days) (A.1.5)

These limitations and the impact are described below. It should be noted that PRESTO staff have advised us that "they acknowledge the need to improve and enhance how they calculate and report on PRESTO device availability". PRESTO, its vendors, and TTC, need to diagnose these issues and resolve them together.

A.1.1 Frozen PRESTO Card Readers

Frozen PRESTO card readers appear to be in-service but cannot accept a customer's tap successfully

A PRESTO card reader is frozen when a customer taps their card, but the screen is stuck and unable to accept the customer's tap, even though the reader appears to be still in-service (see pictures below – in-service and frozen reader). The passenger's tap is then not recorded. A functioning reader's screen, on the other hand, changes and makes a noise when the transaction is accepted. We observed that when readers become frozen, they may then stay frozen for the next several customers.



In-service and ready for tap Frozen PRESTO Card Reader

Availability rate of PRESTO card readers is overstated due to any frozen PRESTO card readers not included as out-of-service

We are concerned that the device monitoring software tool does not recognize when a device is frozen and instead shows it as in-service, in which case the correct status for frozen readers are not included in the PRESTO card reader availability rate. Our conclusion is that the availability rate is overstated as a result of any frozen readers incorrectly not included as out-of-service.

Nearly 300 (91%) of the total 330 issues identified during our bus device audit were due to frozen PRESTO readers

Our audit work shows that of the issues identified during our bus device audit, nearly 300 (91 per cent) of the total 330 issues identified over a period of two days on 168 buses were due to frozen PRESTO card readers.

We selected 20 per cent of the instances of frozen readers and found that they were all counted as being in-service in the device monitoring software tool and in the card reader availability calculation. This suggests that the availability of these frozen readers is being overstated.

PRESTO staff advised us that frozen readers will only be "momentary lapses" and are "isolated incidents". At the time of audit fieldwork PRESTO staff advised us that frozen readers would show as in-service in the device monitoring software tool. Then while reviewing drafts of this report, PRESTO staff advised us the device status of frozen readers will be corrected overnight for the weekly availability report. However, we were not able to confirm this is the case. The weekly report we reviewed raised additional questions on the reliability of this information and we could not verify whether these issues were later corrected or not.

TTC also conducted its own internal device audits in 2019. TTC concluded that the daily card reader availability numbers don't take into account periods when devices are frozen or intermittent, and that the reported numbers may be inflated. TTC also prepared some recommendations to PRESTO, including asking them to investigate and provide a technical resolution to resolve frozen and intermittent devices, and to review the rules to calculate the daily availability numbers to consider times when devices are frozen or intermittent.

TTC's own estimates do not appear overstated for malfunctioning PRESTO fare equipment:

- **2-3% overstated PRESTO card reader availability**
- **\$3.4 million revenue loss in 2018**

We prepared calculations to estimate a range for the overstatement of the PRESTO card reader availability rate and annual revenue loss. Based on the information we were able to obtain, TTC's own estimates of 2-3 per cent for overstated PRESTO card reader availability rate are conservative. TTC's estimated \$3.4 million for 2018 in revenue loss due to malfunctioning PRESTO fare equipment does not appear overstated. TTC's estimates may even be understated given the issues we identified in this report with availability of PRESTO card readers. We are not including revenue loss calculations in this report. It is our view that the information and data gaps identified at this time make it difficult to provide these important numbers with the required level of audit assurance.

We have the ability to issue a supplemental report or management letter in the future if needed.

TTC and PRESTO are aware of the issue of frozen card readers and are working together with PRESTO's vendors to address it

PRESTO advised us that they are aware of the frozen reader issue and have been working with their vendors and TTC to address it. The vendor responsible for the PRESTO card reader hardware, completed an analysis in August 2019 (during our audit) to determine why the frozen readers are not being identified. We were advised that maintenance patches were deployed to remediate some of the issues when devices are momentarily frozen. However, there continues to be some issues, and a dedicated team consisting of staff from the TTC, PRESTO, and PRESTO's vendors was formed in July 2019 and are meeting weekly to address the outstanding related issues.

A.1.2 Not All Vehicles Included

The accuracy of the information used to determine in-service vehicles is important, as only in-service vehicles are included in the availability calculation for PRESTO card readers. If vehicles are in-service but the information used by Metrolinx states otherwise, the vehicles will not be included in the calculation and the availability rate will not be accurate.

TTC uses the NextBus GPS application to provide customers with real time information on where vehicles are on each route

TTC uses the NextBus GPS application to provide its customers with real time information on where buses and streetcars are on each route. TTC provides electronic files on a monthly basis to NextBus of its scheduled vehicles by route. The information does not include vehicles that are in-service but have not been scheduled, e.g. shuttle buses due to service outage on portion of subway.

Metrolinx uses TTC's data in NextBus to determine whether vehicles are in-service or not for the card reader availability calculation

Metrolinx also uses TTC's data in NextBus – to determine whether the vehicle is in-service or not for the PRESTO card reader availability calculation. Metrolinx uses an automated tool to obtain this data. Only the in-service vehicles reflected in the NextBus data are included in the PRESTO card reader availability calculation. However, due to various technical and other limitations, Metrolinx may not be receiving complete and accurate information for all TTC in-service vehicles. It is important to note that NextBus was not designed to be used for purposes extending beyond informing customers of the location of its buses and streetcars (i.e. when they can catch their "next bus" using this GPS application).

NextBus was not designed to be used for purposes extending beyond informing customers of their "next bus"

If the information provided by TTC to NextBus is incorrect or missing, it may skew the PRESTO card reader availability rate, as vehicles that are not in NextBus are excluded from the availability calculation. The missing information could result in either overstating or understating the availability rate, depending on whether the devices on the missing vehicles are functioning or not.

17 of the 61 vehicles were on the road collecting fares, but did NOT show up in NextBus and were not included in the card reader availability calculation

We noted 61 vehicles that reported revenue but were not included in the card reader availability spreadsheet for one day tested. 17 of the 61 vehicles did not show up in NextBus even though they were in-service, which means they were not captured in the availability calculation. The cause of these incidents is not clear. Some may be because buses were not scheduled by TTC to be in-service, such as shuttle buses used for subway closures, as these would not be included in the monthly schedule list provided to NextBus by TTC. Also, the vehicle will only show in NextBus when the TTC operator logs into, not only their Vision CAD/AVL system, but also logs into scheduled work. It is possible that drivers do not always log into scheduled work, since the bus can still function properly without completing this step.

44 of the 61 vehicles reported revenue and were in NextBus but still not included in card reader availability calculation

The remaining 44 of the 61 vehicles showed up properly in NextBus but still were not included in the card reader availability spreadsheet. Metrolinx staff advised us that those vehicles were included in the long term maintenance list provided by TTC and as a result were excluded from the card reader availability spreadsheet. However, we noted some vehicles that were not on the long term maintenance list but showed up in NextBus were still excluded from the card reader availability spreadsheet. Metrolinx Staff advised us that this was due to a defect with the device monitoring software tool.

From time to time there may be connectivity issues that sometimes impact the information used to identify in-service vehicles

Per discussion with NextBus staff, from time to time, NextBus may experience outages for a number of reasons, such as connectivity issues with the cellular network. On one of the days we reviewed, NextBus showed that no TTC vehicles were in-service for almost two hours. We inquired with TTC to see whether the vehicles really were all out-of-service for that period, or whether it was a system error. TTC confirmed the vehicles were in-service during that period. However, given the vehicles did not show up in NextBus for that period, they were not included by Metrolinx in the card reader availability calculation for that time.

Given there are issues with the completeness and accuracy of the data being used to determine in-service vehicles for device availability, it should be explored as to whether there is a more reliable source to meet the intended purpose. TTC, Metrolinx, and the other vendors need to work together to assess whether the current method can meet their needs, or re-evaluate whether they should use another method(s) to determine whether vehicles are in-service or not.

TTC and PRESTO should consider whether TTC's Vision system or another option could be used for the availability calculation

Another option for TTC and Metrolinx to capture the in-service vehicle information for buses is for Metrolinx to pull the information from TTC's system directly. TTC uses Vision CAD/AVL software as its operating console system on its buses now and all TTC operators must log into Vision for the bus to function properly. The information from Vision includes all TTC in-service vehicles, both scheduled and not scheduled. TTC and PRESTO should consider whether Vision could be used instead of the current method for the purpose of the card reader availability calculation. We were advised by TTC staff that discussion is underway with Metrolinx to explore this option and potential other data sources. Another method would still need to be used for the streetcars, as all but one (pilot for Vision system) do not currently have the Vision system.

A.1.3 Not All Out-of-Service Times Included

Up until late 2017, the availability rate for PRESTO card readers was calculated using one daily ping snap shot at 7 AM. This provided a very limited view of the true availability of the devices. Currently, more frequent pinging has been implemented, with 65 pings each day, at 15 minute intervals, between 6:00 AM and 10:00 PM.

Device status not captured outside of exact 15 minute intervals – an issue especially at rush hour

While 65 pings a day is a better measure of the availability rate than just one ping a day, it can still be improved because a device can go through multiple states (working, error, offline, etc.) within that 15 minute window. This is an issue, especially at rush hour, because even if the reader goes out for a few minutes, the impact is much more significant because a larger volume of passengers could be unable to pay, and this would not be reflected in the availability rate.

Over 50% of the issues reported in our bus device audit did not occur exactly at a 15 minute interval – these outages would not be reflected in the availability rate

From the over 330 issues identified from our bus device audit work, the majority of the issues reported did not occur exactly at a 15 minute interval. For example, some operators noted the device went out of service and came back within a minute (e.g. 7:03 PM) while other operators noted issues that lasted for a few minutes (e.g. 9:51 AM – 9:56 AM). In both cases, because the issues occurred within the 15 minute ping interval, the outages were not reflected in the availability rate.

The entire length of the outage is not captured as out-of-service

We also found that many of the reported outages were for periods extending beyond the time of the ping. However, given the status is only captured at the ping, the entire length of the outage was not captured. For example, one reader was out of service from 6:37 AM to 6:50 AM. The device was pinged at 6:45 AM, and was registered as being out. However, that ping, and therefore the availability rate calculation, did not capture that the outage started before and continued for several minutes after 6:45 AM.

Device monitoring software tool takes the latest known device status as the status for the 15 minute interval

In addition, the device monitoring software tool takes the latest known status for the device and uses it as the status for that interval. For example, one observation noted the front reader was out of service for 11 minutes from 6:03 to 6:14 AM. However, two seconds later, the device came back into service, just prior to 6:15 AM. Since the "in-service" status was the latest event captured closest to the 15 minute mark, this is what was captured in the availability spreadsheet, even though the device was out of service for the majority of the 15 minute interval. By capturing the latest event, it does not reflect the true functionality of the device during the 15 minute interval.

Our results were consistent with TTC's own device results in this area as well. The TTC found that the availability rate would vary if more frequent pinging was used.

Based on our audit results, it is evident that by only capturing the device status at four pings per hour, the availability calculation is not a complete reflection of the true availability.

Current interval timing is under discussion between TTC and Metrolinx

TTC staff have advised us that the ping interval rate is under discussion with Metrolinx. Per Metrolinx staff, current interval timing is considered standard industry practice and the decision to have more frequent pinging would require further analysis. With more frequent pinging it could potentially take longer for customers' taps to register successfully, if they need to hold their PRESTO card slightly longer to register a successful tap. Metrolinx staff advised us there are additional considerations, such as potential for additional load and space required on the IT infrastructure and application, possible impact on system performance, as well as consideration of the costs vs. benefits.

More frequent pinging requires further analysis regarding feasibility and potential impact on the customer, system and costs

On the other hand, the pinging occurs more frequently than 15 minutes for monitoring purposes and includes all major events according to PRESTO staff. It may be possible to leverage this existing data. Also, it's important to note that this additional pinging for monitoring purposes does not appear to cause performance issues with the device, so it may be possible to leverage this data for the calculation of the availability rate.

A.1.4 Issues with Device Monitoring Software Tool

23 vehicles were missing at least one device in the availability spreadsheet

Our analysis of the PRESTO card reader availability spreadsheet, which Metrolinx provides daily to TTC, revealed that some card reader device status information was missing. In particular, we identified 23 vehicles where either the front or rear reader did not show up on the spreadsheet on one of the days tested.

PRESTO staff advised that there was an issue with the device monitoring software tool

PRESTO staff advised us that due to communication issues with the device monitoring software tool, a few devices from time-to-time appear to be missing in the monitoring tool. As a result, the missing devices are not included as part of the daily card reader availability calculation. However, PRESTO staff advised us that during the nightly reboot, the devices should be added back in the device monitoring software tool. We were advised by PRESTO staff that this is a known issue and is currently under investigation by them.

These devices should therefore be included in the weekly rate calculation if they were added in. However, we were not able to verify whether this was the case for our sample, as the weekly rate is provided to TTC in a PowerPoint presentation without supporting back-up information. Support is only provided for the daily rate. There is generally a difference between the weekly rate and the sum of the daily rates for the week, so it is important to receive support for the weekly rate. We inquired to receive the back-up for the weekly rate but were told by PRESTO staff that it is not available.

We were not provided with the support for the weekly availability rate for our audit testing day

When we later presented the issue at our fact clearing meeting with PRESTO, they advised they would ask their vendor to get the back-up for the weekly rate to us specifically for our audit. However, given it was past the 60 day limit for purging the data, they could not provide us with the week required for our audit testing. This is despite our initial request that noted the deadline required to be able to receive it before the 60 day limit. Therefore the back-up for a different week's availability rate was made available to us specifically for our audit. PRESTO staff view the 60 day limit for record keeping as appropriate given the information is used for operational purposes. Our view is that this information is critical to keep available, as demonstrated by this example.

However, even though we could see that some of the missing devices were added back to the weekly rate, the incorrect device status was reflected. When we inquired, PRESTO and its vendor's staff advised us that the incorrect status was reflected due to issues with the monitoring tool. In addition, the status of other devices differed significantly between the daily availability rate spreadsheet and the back-up provided for the weekly rate. PRESTO and its vendor's staff advised us that "sometimes these statuses will be adjusted in the weekly rate after the review of tap transaction reports". We checked the tap transaction reports and there were no taps, so there should have been no adjustments required. In addition, PRESTO's vendor appears to be able to make adjustments to the device statuses for the availability calculation, and we have not been provided with a clear audit trail of these adjustments. These issues reduced our ability to rely on the weekly availability rate calculation. Again, this analysis and support for the weekly rate, including any adjustments made, is not provided to TTC.

TTC does not receive back-up documentation for the weekly availability rate calculation for the card reader and these weekly rates are used to publicly report TTC's monthly statistic in the CEO's report

We reviewed the daily rates vs. the weekly rates provided by PRESTO for the month of April 2019 and found that the weekly rates were always slightly higher than the daily rates. Without receiving any back-up to show how the weekly rate is calculated, TTC is unable to verify whether all devices that were "missing" were added back. Since TTC uses the average of the weekly availability rates to calculate the card reader availability rate for the CEO's report, it is important to understand how it's derived to ensure it is accurate and that there is a clear audit trail of any adjustments.

We also noted situations where the device monitoring software tool showed that the card reader was out-of-service, but in the card reader availability spreadsheet it stated the device was in-service. PRESTO's vendor's staff advised us that the device monitoring software tool event logs had expired, as it was after the 60 day retention period, and as a result they were not able to determine the root cause of the issue. They advised us that the device monitoring software tool developer started a project management process to investigate the issue further. These issues reduced our ability to rely on the information being used in the availability rate calculation.

A.1.5 Holidays in India (PRESTO's Vendor's Offshore Team) and Holidays/Weekends in Canada Not Included

At the time of our audit fieldwork, PRESTO's vendor did not prepare the daily card reader availability spreadsheet when there were holidays in India

PRESTO's vendor's staff advised us that this issue has been corrected now

TTC staff have requested that weekends and holidays in Canada be included in the availability rate as they are currently not

At the time of our audit fieldwork, TTC was not provided with the PRESTO card reader availability spreadsheets for the days when there were holidays in India. PRESTO's vendor uses an offshore team located in India to prepare the card reader availability spreadsheet for TTC. When we reviewed the spreadsheets for March and April 2019, we noted that the April 17, 18, and 30, 2019, daily spreadsheets were not included for these holidays. This was brought to PRESTO's attention by TTC recently and in our view, if PRESTO staff were monitoring the daily spreadsheets, they should have been aware of the missing days. PRESTO staff advised us that these reports are available but were simply not generated for these days. They also advised that the weekly rates would still reflect these days, however the back-up for the weekly rate was not made available to us, so we were unable to confirm that the days were included. PRESTO's vendor's staff have advised us that this issue has been corrected and that going forward, daily reports will be issued for the holidays in India on the following business day.

TTC does not receive the card reader availability spreadsheet from PRESTO for weekends and holidays in Canada. TTC staff advised us that they have been requesting PRESTO to provide the card reader availability spreadsheets for weekends and holidays in Canada, as they are service days for TTC and TTC should know the card reader functionality rate for those days. We are informed by TTC that PRESTO has not fulfilled this request.

Recommendations:

- 1. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx and its vendors to:**
 - a. identify the root cause for frozen and intermittent PRESTO card readers;**
 - b. develop a method to detect above issues in the device monitoring software tool; and**
 - c. ensure frozen and intermittent readers are included in the PRESTO card reader availability calculation.**
- 2. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to determine the best method to capture complete and accurate information on in-service vehicles for the PRESTO card reader availability calculation, including assessing TTC's Vision system for this purpose.**
- 3. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:**
 - a. explore ability to have more frequent pinging while ensuring impact on device performance and customer experience is minimized; and**
 - b. discuss using the most frequent device status during an interval instead of the latest event for the availability rate calculation.**
- 4. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:**
 - a. ensure missed devices in the device monitoring software tool are identified by PRESTO and communicated to TTC;**
 - b. determine and address the underlying issue for missed devices in the device monitoring software tool; and**
 - c. obtain back-up for the weekly card reader availability rate calculations.**

5. The Board request the Chief Executive Officer, Toronto Transit Commission, to continue discussions with Metrolinx to:
 - a. obtain the daily PRESTO card reader availability spreadsheet for all seven days of the week, including weekends and holidays in Canada; and
 - b. ensure that TTC's availability calculation includes holidays in the country of PRESTO's vendor.

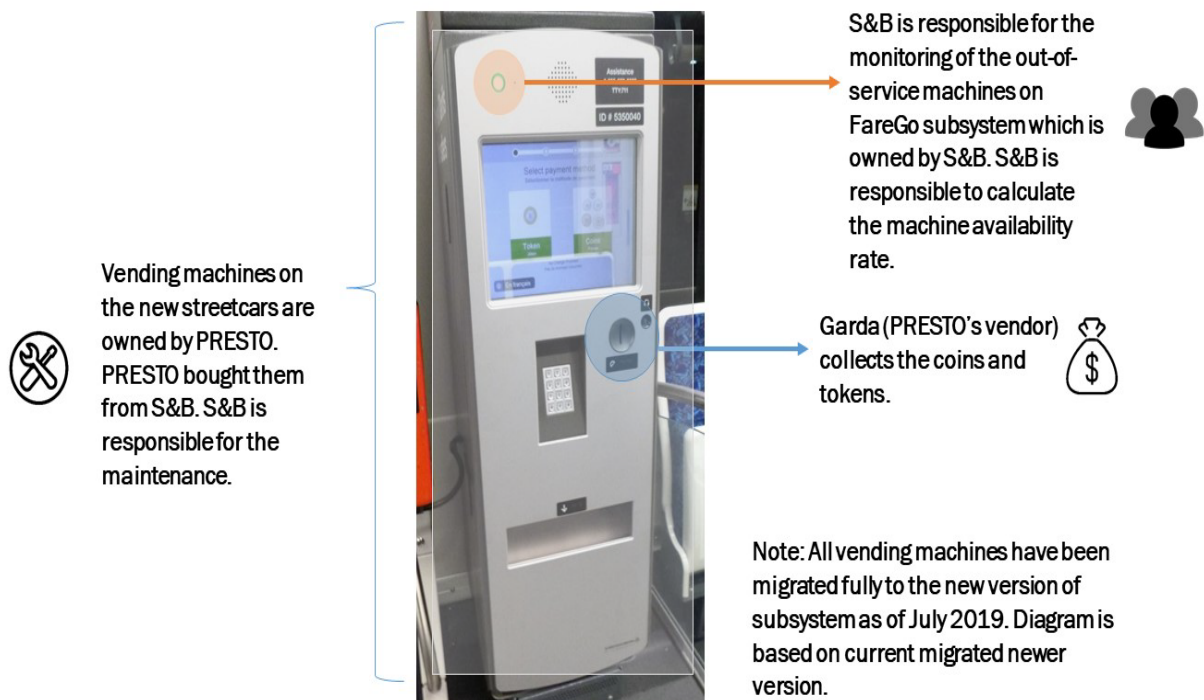
A. 2. PRESTO Vending Machines on New Streetcars - Availability Rate

Credit and debit card functionality was removed from the PRESTO vending machines on new streetcars in December 2018 to address functionality issues

PRESTO vending machines (called Single Ride Vending Machines, shown in Figure 3 below) are located on new streetcars and certain streetcar stops, and are one method of payment used by customers to pay fares on the new streetcar. The credit and debit card functionality was removed by Metrolinx, in consultation with TTC, in December 2018 due to issues with the availability of the machines that were not easily resolved without removing this functionality.

Figure 3 outlines the roles and responsibilities of the various vendors associated with these PRESTO vending machines.

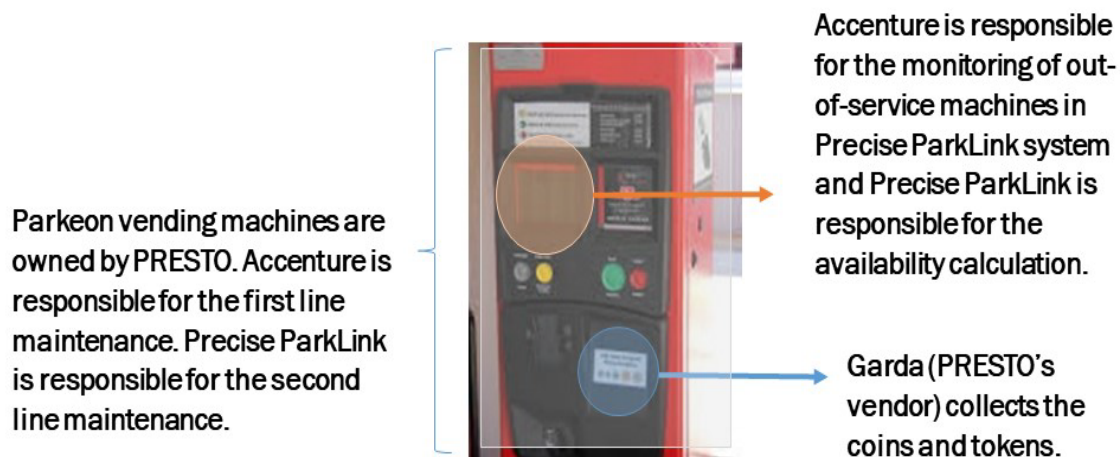
Figure 3: PRESTO Vending Machines – Roles and Responsibilities



A second type of vending machine on new streetcars also accepts coins and tokens for fare payment (called Parkeon machine)

A second type of vending machines (purchased by Metrolinx from vendor Precise ParkLink - called Parkeon vending machines) are located on new streetcars and are also a method of payment used by customers to pay fares with coins and tokens on the new streetcar. See Figure 4 below for the related roles and responsibilities of vendors for these machines.

Figure 4: Parkeon Vending Machines – Roles and Responsibilities



Given customers can no longer currently pay with credit/debit card and open payment technology is not yet available, the only two current payment methods on these machines are coins or tokens. Tokens have become less widely used and TTC plans to stop selling tokens in November 2019. The coins/tokens are collected from these machines every night by Metrolinx's vendor.

Currently, Metrolinx's vendor S&B is responsible for the maintenance of PRESTO vending machines and prior to July 2019 PRESTO was responsible for the first line maintenance and S&B was responsible for the second line maintenance. For the Parkeon vending machines, PRESTO's vendor Accenture is responsible for the first line maintenance and Accenture's sub-vendor Precise ParkLink is responsible for the second line maintenance.

PRESTO's vending machine availability calculation is done by S&B and the Parkeon vending machine availability calculation is done by Precise ParkLink.

PRESTO Vending Machine Availability Calculation

Prior to July 2019

Prior to July 2019, PRESTO vending machine availability was calculated based on the number of out-of-service incident tickets. Incidents were raised in PRESTO's incident management system based on out-of-service machine in the FareGo system which were monitored by PRESTO's vendor's staff, with some incidents raised by TTC staff through manual identification. Once the incidents were raised in PRESTO's incident management system, PRESTO was responsible to repair the machines (first line maintenance) and if they were not able to fix the machines, they would then escalate the issue for the second line maintenance.

Not all out-of-service instances are being included in the availability rate calculation for PRESTO vending machines on new streetcars

When reviewing the raw data for May 2019's availability calculation, we noted that the data only included downtime for the out-of-service vending machine incidents that were escalated to S&B for second line maintenance and did not include any for first line maintenance incident tickets performed by PRESTO staff. Also, the downtime included in the availability calculation was calculated from the time the work order was opened by PRESTO's vendor in their work order system, rather than from the time the out-of-service incident was raised in PRESTO's incident management system. PRESTO staff advised us that the first line maintenance downtime was excluded from the availability calculation of these vending machines as PRESTO has restricted access to vehicles from TTC and can only repair them during the night. However, these machines would be unavailable to customers during this downtime and this out-of-service time should be reflected in the availability calculation.

The responsibilities of PRESTO's vendor S&B performing the availability calculation impact which out-of-service incidents are included in the availability rate calculation

We also noted that there were out-of-service incidents that were shown as being in-service in the availability calculation. When we inquired with PRESTO and its vendor's staff, they advised us that only out-of-service incidents that were a result of a hardware or software problem would be included as out-of-service. Vending machines that are out-of-service as a result of a network problem or "coin box full" would not be captured as out-of-service in the availability calculation, as PRESTO's vendor is not responsible for network connectivity and coin collection.

During our observation work on streetcars in July 2019, we noted 10 vending machines on four different routes that were not functioning. When we checked the July 2019 raw data availability calculation spreadsheet, we noted the spreadsheet was incomplete as it only included incidents up until July 8, 2019 and eight of the 10 incidents that we noted were not captured as out-of-service. When we inquired with PRESTO's vendor's staff, they conveyed to us that July 2019 was the transition period of vending machines from FareGo 3.2 to FareGo 3.5 and all incidents for the month were not captured in the availability spreadsheet. As a result, we were not able to verify or obtain explanation on why these machines did not appear to be included in the availability calculation.

Post July 2019

When we reviewed the August 2019 availability calculation raw data, we noted the same issues persisted. We noted that there were out-of-service incidents that were counted as being in-service in the availability calculation. PRESTO staff advised us that they are working with their vendor to identify why certain out-of-service incidents were not counted as being out-of-service in the availability calculation.

PRESTO Vending Machines - Debit/Credit Card Functionality

TTC is in negotiation with Metrolinx to restore the debit and credit card functionality on the PRESTO vending machines on new streetcars

In TTC's June Board meeting, TTC staff were requested to follow up with Metrolinx on expected timing to restore the credit/debit card functionality of PRESTO vending machines. Metrolinx has informed TTC that it does not plan to restore the credit and debit card functionality and states that TTC agreed to this change being permanent. TTC advised us that the change was temporary and that they did not agree for it to be permanent. TTC is in negotiation with Metrolinx to restore this important functionality for customers to pay their fares.

Parkeon Vending Machine Availability Calculation

Similar issues found for Parkeon vending machines on new streetcars – not all out-of-service instances included in the availability calculation

If the coin box is full – it is not included as out-of-service in the availability calculation

TTC does not receive back-up documentation for the availability calculation of vending machines on new streetcars

The availability calculation for the Parkeon vending machines is calculated by Precise ParkLink. We reviewed the May 2019 raw data availability calculation and noted that there were out-of-service incidents that were counted as in-service in the availability calculation, and the availability was reported as 100 per cent for May 2019. When we inquired with PRESTO's vendor staff, they advised us that only out-of-service incidents that were a result of a hardware problem would be counted as out-of-service by Precise ParkLink. However, we noted incidents that were a result of a hardware or a software problem but still were counted as in-service in the availability calculation. For example, the machine was out-of-service as a result of a coin jam issue - this was counted as in-service in the availability calculation. Also, a machine out-of-service as a result of a coin box being full would not be counted as out-of-service by Precise ParkLink, as the problem is not related to hardware or software and Precise ParkLink is not responsible to empty the coin box.

In addition, the availability for Parkeon vending machines is provided to TTC by PRESTO, through its vendor, as a weekly percentage in a PowerPoint presentation with no additional back-up or detail. It is important for TTC to get the back-up documentation from PRESTO and verify the weekly availability calculation.

Recommendations:

- 6. The Board request the Chief Executive Officer, Toronto Transit Commission, to:**
 - a. ensure the availability calculation of PRESTO vending machines includes all out-of-service incidents, including the status when the coin box is full and the machine is not available for the customer to pay by coins; and**
 - b. provide TTC with the detailed back-up data/information that supports the weekly availability rate.**
- 7. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to restore the contracted deliverable of the credit and debit card fare payment method on the new streetcars, with estimated timing provided by Metrolinx.**

B. Improvement Needed in Identifying and Resolving Defective PRESTO Fare Equipment

B. 1. PRESTO Card Reader Incident Management Process

When an issue related to the functionality of a PRESTO device is identified, an incident ticket should be raised to notify Metrolinx that the issue needs to be reviewed and addressed. TTC, PRESTO, and PRESTO's vendor's monitoring team can raise incidents. Incidents are logged in PRESTO's incident management system and directed to the appropriate team. Generally, PRESTO staff repair devices at TTC garages overnight, between 9 PM to 5 AM. Incidents can be reported through PRESTO's web-based self-serve portal or by contacting the PRESTO Service Desk (email/call) with details of the incident.

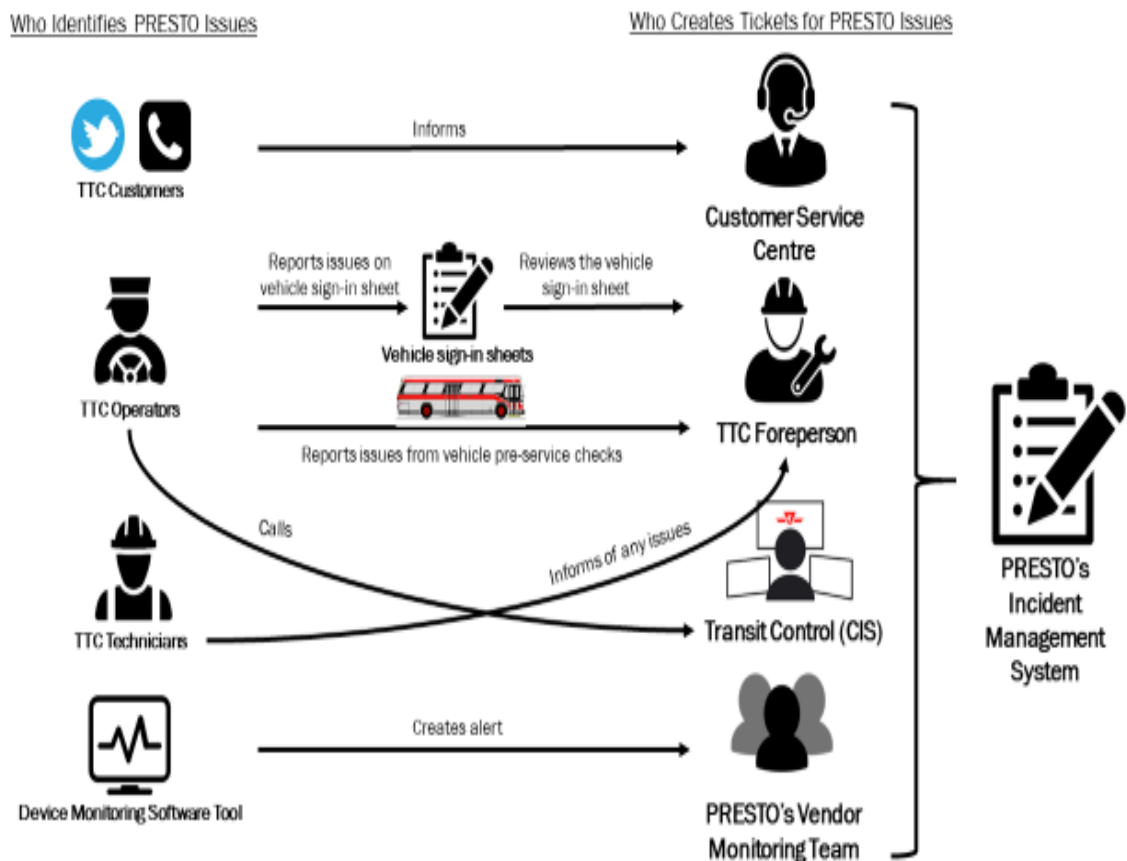
The creation of service tickets to address defective PRESTO card readers is manual

PRESTO's vendor's monitoring team observes the device monitoring software tool screen 24/7 for out-of-service devices

The service ticket creation process is a manual process, with no automatic creation of tickets. While TTC can open tickets in PRESTO's incident management system, the majority of tickets are opened by PRESTO's vendor. PRESTO's vendor's monitoring team observes the screen of the device monitoring software tool 24/7 to identify any large anomalies and will **only** open tickets for and troubleshoot devices that have triggered a critical alert under the "out-of-service" device status on an in-service vehicle.

Figure 5 shows how issues with PRESTO card readers are identified and who can log a ticket in PRESTO's incident management system for the issue to be addressed.

Figure 5: How Service Tickets Are Created in PRESTO's Incident Management System for PRESTO Card Reader Issues Identified



B.1.1 Number of Tickets Opened to Resolve Issues May Not Include All Defective Issues

PRESTO card readers have a self-recovering mechanism

If both self-recovery and remote recovery does not work, PRESTO's vendor will open a service ticket

PRESTO card readers have a self-recovering mechanism to attempt to bring the device back into service without any intervention. If this does not bring the device back into service, PRESTO's vendor's monitoring team will attempt to recover the device remotely. If this also does not bring the device back into service, PRESTO's vendor will open a service ticket for PRESTO staff to repair the device during the night. TTC is responsible to ensure the vehicles are made available in the garages for PRESTO staff to do their repairs at night.

The vendor's staff advised us that starting in late 2018, they decided to slowly work towards logging all remote recoveries as tickets in PRESTO's incident management system, regardless of whether or not the team was able to remotely recover the device or not. However, it was not clear from our audit work whether remote recovery is always logged as tickets, as we found instances where devices had an "out-of-service" device status but did not have a ticket opened in PRESTO's incident management system.

Without logging a ticket in PRESTO's incident management system, it is difficult to verify whether any action was taken or not to address the malfunction, and if taken, whether it was done in a timely manner.

Only those vehicles showing as in-service with an out-of-service status for the device are prioritized for repair

If there is inaccuracy with the information above, the PRESTO issues would only be addressed if raised by TTC staff

In addition, if a device appears in-service but is truly not available and the status is not reflected properly in the device monitoring software tool (e.g. frozen card readers), it appears that the defective issue may not be addressed unless raised by TTC staff. Also, only in-service vehicles are prioritized for remote recovery or creating a ticket in PRESTO's incident management system. Those buses identified by TTC as being in long-term maintenance (greater than seven days) will not be prioritized. If there is inaccuracy in this information, any PRESTO issues with those vehicles would only be addressed if raised by TTC staff.

To test whether all PRESTO issues identified by TTC staff are being raised as tickets in PRESTO's incident management system, we randomly selected four days and compared the PRESTO issues identified by TTC bus operator sign-in sheets to PRESTO's incident management system. TTC operators are required to report any PRESTO issues identified during their shift on the vehicle sign-in sheet at the end of their shift. TTC forepersons are required to create tickets in PRESTO's incident management system for these PRESTO issues identified in the sign-in sheets. It is critical that the TTC forepersons creates tickets for these issues, particularly for those where the device status did not show properly as out-of-service (e.g. frozen card readers), otherwise the issue may not be addressed.

No ticket was opened for over 40% of the 70+ PRESTO issues reported in TTC operator sign-in sheets over 4 days

We found that of the over 70 PRESTO issues reported in TTC operator sign-in sheets over four days, no ticket was opened for over 40 per cent of these. As mentioned above, it is possible that the device may have self-recovered automatically or PRESTO's vendor monitoring team may have remotely recovered them. However, since no ticket was raised, we are unable to verify if any action was taken.

TTC's Fare Card team also conducted internal device audits in February and June 2019. For both of these audits (with a limited sample size), TTC found that for the majority of the issues identified by TTC Operators and confirmed by PRESTO as being valid issues, there was no ticket opened in the incident management system.

PRESTO should ensure that its vendor's monitoring team is consistently opening tickets for all out-of-service card readers, including those that have been remotely recovered. TTC staff should also consistently be opening tickets for PRESTO issues they are made aware of through the operators' sign-in sheets.

B.1.2 Improvements Needed to Device Monitoring Software Tool

The ability to analyze the information is important and requires the ability to run reports and extract the data into a usable format

Manual observations can be less reliable due to the risk of human error. Given that the vendor's monitoring team is visually observing a screen in real time 24/7 to manually identify issues and create tickets and given the issues noted above, it is important that both PRESTO and TTC be able to analyze the information reported to them for completeness and accuracy. However, this requires the ability to extract data from the device monitoring software tool into a usable format and the ability to run reports.

Lack of Reporting/Extract Capability

There is currently no reporting or data extraction functionality with the device monitoring software tool for TTC

For TTC, there is no report extraction functionality and the information can only be displayed on the screen in real time. This makes it extremely difficult to perform data analytics or data intelligence. Studying the incident information will help resolve any systematic issues. Thus, it is important to have reporting capability so that analysis of the data is possible. Per TTC, this issue has been raised to PRESTO and a change request is currently being completed to formally request it.

This limitation also made it particularly challenging for our audit. As part of our audit, we requested data extracts from the device monitoring software tool for 60 days or at least a quote for this request. We were advised by PRESTO and PRESTO's vendor staff that it was not considered good practice to decrypt data in a live production environment as it may impact the live data. The vendor's sub-vendor confirmed by email that "our professional services team as per our policy do not write database scripts to access this information as this is not a best practice".

We did not receive either a quote or the requested data extract as a result. Our understanding from reviewing the Master Agreement is that this information is contractually required to be provided to TTC as outlined in the following contractual business requirement:

"Capture data in a manner that permits TTC, PRESTO, and an authorized independent auditor to reconstruct, track, and analyze all elements in the transaction process from initiation by a Customer through completion of the exchange of funds between a Customer, PRESTO and TTC."

PRESTO staff advised us that they are considering an upgrade to include the reporting/extraction capability in the future.

Data from device monitoring software tool for PRESTO card readers is purged and unavailable after 60 days

Data Purged After 60 Days

The incident management data that is stored in the device monitoring software tool is purged after 60 days and according to PRESTO's vendor staff, it is not stored elsewhere for easy retrieval.

If TTC needs to perform analysis or investigations to resolve either specific or systemic issues, it is not possible to do so if data from more than two months prior is required. This limitation also made it challenging for our audit. Per TTC staff, this issue has been raised to PRESTO and a change request is currently being completed to formally request it. Our understanding from a review of the Master Agreement is that this data and information is contractually required to be kept for a period of **seven years**⁴. Whether a customer's tap was successful or not can directly impact fare revenue - the device status is relevant information from a financial perspective.

B.1.3 PRESTO Card Reader Inventory Needs to Be Better Tracked

In order for TTC to efficiently verify the status of a PRESTO card reader (device) or perform analysis on the results of incident management effectively, PRESTO should be providing TTC with:

- an inventory log of all swapped PRESTO devices, including mapping of the original device and vehicle; and
- a running list of all PRESTO devices mapped by device IDs to the vehicle numbers.

PRESTO does not manage the inventory of PRESTO devices by maintaining a log - devices are swapped to different vehicles and it's important to track

PRESTO does not manage the inventory of PRESTO devices by maintaining a log or report when the devices are swapped to different vehicles. When a device on a vehicle is not working properly, that device may be swapped by PRESTO repair staff with another one that is working, and this can be a device from another vehicle. As a result, one device can manoeuvre through multiple vehicles over its lifetime.

⁴ According to the Master Agreement: *"During the Term and for a period of seven years thereafter, Metrolinx shall maintain all data, records, documents and other information relating to the Managed Services and in accordance with the TTC Business Requirements and as are customary to record the fare revenue collected, remitted and retained hereunder in accordance with generally accepted auditing standards and generally accepted accounting principles in Canada. After such period, the data, records, documents, and other information will be handled in accordance with applicable Ontario government policy."*

TTC's Master Agreement with Metrolinx also requires Metrolinx to have the following in place and it is currently not:

"For any maintenance activities, such as, device swap outs and repairs that involve removal of equipment, etc.:

That may affect the data collected at the device, PRESTO will ensure that the PRESTO system generates automated maintenance activity reports at least on a daily basis in order for TTC to maintain data integrity, audit process, and any data integration with either the PRESTO system or current system."

As part of TTC's monitoring and analysis, if they want to check the device logs for a particular vehicle and time, it is extremely difficult to do so. The device monitoring software tool will reflect the events of the new swapped device, rather than the original one. It is a very cumbersome manual process to determine which device was on the vehicle originally, although it is possible to do.

Since there is no mapping done and no running log of swapped devices maintained by PRESTO, the TTC could also potentially reach inaccurate conclusions if they do not realize a device was swapped.

It is also important for TTC to know whether the faulty devices will be re-used or not. If the devices will likely not be re-used or will require significant work, it is important to ensure the tap transactions from those devices are uploaded without further delay.

B.1.4 TTC Bus Garages Need to Improve Accuracy of Vehicle Long-Term Maintenance Spreadsheet

TTC's "buses out-of-service more than seven days" spreadsheet is used by PRESTO and its vendor for prioritization of repairing PRESTO devices

PRESTO uses the "buses out-of-service more than seven days" spreadsheet provided daily by TTC for the following:

- PRESTO considers buses that appear in this spreadsheet as being put into long-term maintenance by TTC. PRESTO moves these buses from in-service ("production") to long-term maintenance in the device monitoring software tool;
- Any issues that arise from devices of vehicles that are on the long-term maintenance list are not considered a priority for resolution. PRESTO's monitoring team does not create incident tickets in PRESTO's incident management system for these devices, as these buses are not expected to be available for night repair.

37 out of 125 buses were in-service and still included in spreadsheet as being in long-term maintenance

For one day that we tested, we identified 37 out of 125 in-service buses (30 per cent) that were listed on the "buses out-of-service more than seven days" spreadsheet, but were actually in-service, i.e. on the road and collecting fares. We also checked the following three days of spreadsheets in case these vehicles had been scheduled and repaired on the same day, however they were still listed in long-term maintenance. The spreadsheet provided by TTC to PRESTO showing the out-of-service buses is not always accurate.

Negative impact on availability of PRESTO card readers for these vehicles that are actually in-service – there will be no attempt for remote recovery and will result in repair delays

It is reasonable for PRESTO to identify long-term maintenance vehicles as a low priority. However, if PRESTO does not get accurate information from TTC regarding these vehicles, TTC will have the following impact:

- Repair delays, given PRESTO's monitoring team does not create incident tickets for these vehicles since they are not expected to be available for repair at night; and
- No attempt to remotely recover by PRESTO's monitoring team when issues arise on these vehicles that are on the road collecting fares, because they would think these buses are in long-term maintenance and therefore not considered a priority.

TTC staff acknowledged the need to improve the process and accuracy of these spreadsheets

TTC staff at the bus garages acknowledged that they need to improve the process and accuracy of these spreadsheets and are working to do so going forward.

B.1.5 TTC Staff Not Always Reporting PRESTO Issues

TTC Operators are required to note all PRESTO defects on their vehicle sign-in sheets at the end of their shift

TTC operators are required to record all PRESTO defects observed during their shift on their vehicle sign-in sheet at the end of their shift. However, in our device audit, we found that of the over 330 issues reported, very few of them were noted on the vehicle sign-in sheets. Management interviewed some operators and the most common reason given for not including PRESTO issues on their sign-in sheet was that the PRESTO issues occur so frequently each day, with readers going in and out of service and back in again.

Frozen PRESTO readers are not always captured as out-of-service, so these are particularly important for TTC staff to identify and open tickets to ensure they are addressed

Given that the majority of the PRESTO issues were not raised on the sign-in sheets, it increases the risk that not all PRESTO issues are identified and resolved. This is particularly an issue for the frozen readers that are not always captured as out-of-service in the device monitoring software tool. In our audit, nearly 300 of the over 330 issues identified were frozen readers. These would not be identified by PRESTO and its vendor's monitoring team since they do not appear to be captured with an out-of-service status in the device monitoring software tool. As a result, it is important for the operators to be signing in any and all PRESTO defects, including the frozen reader issues, to alert staff of PRESTO and its vendor's monitoring team to look into all PRESTO issues.

TTC operators are also encouraged to report any PRESTO defects during their shift to Transit Control. In addition, even if an operator calls in a PRESTO issue to Transit Control, they are still required to note all PRESTO defects on their vehicle sign-in sheet at the end of their shift. TTC forepersons should be creating tickets in PRESTO's incident management system for all the PRESTO defects identified in the vehicle sign-in sheets.

TTC operators are also required to perform vehicle pre-service checks (referred to as circle checks) before they leave the garage, and this includes identifying and reporting any PRESTO defects. If a front PRESTO card reader is found to be out of service during the vehicle pre-service check, TTC's policy is to change off that vehicle for another one, as long as there is sufficient supply of vehicles to meet operational needs. However, we noted the policy was not always consistently followed, particularly for the beginning of the early morning shift.

TTC maintenance technicians should also be reviewing the sign-in sheets. For PRESTO card reader issues, staff may attempt to re-set the device by restarting the vehicle, which can sometimes fix the issue. If the reset is successful, the forepersons do not escalate the issue to PRESTO and just log it in their internal work order system. However, work orders are currently only entered if they take 15 minutes or longer, and resetting the device generally takes less than 15 minutes. As a result, if a reset is successful, there may be no record in TTC's system to show that action was taken on that card reader, and that the action was successful. TTC technicians should be consistently logging this action, whether resolved or not.

B.1.6 Not All Buses Being Signed In

Per TTC policy, all vehicles are required to be signed-in upon their return to the garage, with a sign-in sheet completed by the operator. The sign-in sheet requires the operator to note down key details such as what time they returned to the garage and if they had any vehicle defects during their shift (e.g. brake lights), including any PRESTO defects.

It is important to note that the TTC has separate processes in place to ensure any safety critical vehicle defects (e.g. brakes) are remedied accordingly.

Buses all need to be signed in – the sign-in sheet is used to raise tickets for PRESTO issues by TTC forepersons

From our device audit, we could not find a sign-in sheet record for over 10 buses that were in-service during the day. Although we were able to work with TTC management to trace these vehicles through to ensure they were accounted for, we found that not all garages reconciled the buses that were in-service that day to the sign-in sheets. Instead, reliance is sometimes placed on the operator's due diligence to sign in the vehicle. In our view, this approach is not sufficient, as it is otherwise difficult to ensure that any PRESTO defects the operator encounters during their shift are identified and addressed on a timely basis.

Recommendations:

- 8. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:**
 - a. ensure that PRESTO's vendor's monitoring team is consistently logging tickets for all out-of-service card readers, even if able to successfully recover remotely; and**
 - b. regularly receive a log of devices that successfully re-boot.**
- 9. The Board request the Chief Executive Officer, Toronto Transit Commission, to:**
 - a. provide training and communication to TTC forepersons for them to log all tickets in PRESTO's incident management system (ServiceNow) for PRESTO issues identified by TTC staff, including TTC operator sign-in sheets; and**
 - b. require TTC technicians to maintain a log of PRESTO devices reset, including whether the reset was successful or not in resolving the PRESTO issue, and provide this to TTC forepersons and PRESTO repair staff.**

- 10. The Board request the Chief Executive Officer, Toronto Transit Commission, to discuss with Metrolinx:**

 - a. enabling data extraction from the device monitoring software tool in a usable format;**
 - b. consideration of updating to a new version of device monitoring software tool that includes reporting capability; and**
 - c. the ability to maintain and obtain data logs for greater than 60 days from the device monitoring software tool.**
- 11. The Board request the Chief Executive Officer, Toronto Transit Commission, to request Metrolinx to regularly provide a running list for all swapped devices, including the device IDs for both the original and swapped devices and mapping to the vehicle.**
- 12. The Board request the Chief Executive Officer, Toronto Transit Commission, to request Metrolinx to ensure that for all PRESTO card readers, an inventory log is regularly provided to TTC, including mapping by device IDs to the vehicle numbers.**
- 13. The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure the TTC Bus Transportation department:**

 - a. reiterates the importance to TTC Operators to sign in all PRESTO issues, even if they are a daily or intermittent occurrence;**
 - b. evaluates the need for additional communication and/or training for TTC Operators on the sign-in process; and**
 - c. implements a process that reconciles all vehicles to the sign-in sheets to ensure all are signed in, and for any not signed in, a separate list is maintained which includes the reason for not being signed in and whether there were any issues.**
- 14. The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure the TTC Bus Maintenance department provides an accurate listing of "bus out-of-service greater than seven days" to PRESTO.**

B. 2. PRESTO Vending Machines on New Streetcars - Incident Management Process

Functionality issues with PRESTO vending machines (called Single Ride Vending Machine) are either manually identified by TTC staff or noted by PRESTO's vendor's staff monitoring the events using the FareGo system.

56% of out-of-service incidents raised by TTC for PRESTO vending machines were for "coin box full"

When we reviewed August 2019 incident tickets in PRESTO's incident management system, we noted **about 56 per cent of the out-of-service incidents raised for PRESTO vending machines by TTC were all related to "coin box full"** as per vendor's resolution notes. At the time the ticket was raised by TTC, TTC did not know the vending machine was out-of-service as a result of the coin box being full.

One instance noted took 7 days to collect coins after the "coin box is full" warning sign – previous coin collection for that same streetcar was 14 days prior

We were informed by TTC and PRESTO staff that PRESTO's vendor is responsible to collect coins/tokens during every night on all streetcars that are made available to them in TTC's car house. We noted in one instance that it took seven days to collect coins/tokens after the machine issued the "coin box is full" warning sign. For the same streetcar, the last time the coin collection was done was 14 days prior. TTC staff have advised us that the vehicle was not made available for collection those nights due to the vehicle being in-service.

Six PRESTO vending machines out-of-service on average per day for August 2019 due to the coin box being full

We noted that for August 2019, the "coin box is full" sign was issued for 188 PRESTO vending machines. On average per day, approximately six PRESTO vending machines were out-of-service as a result of the coin box being full, the highest being 15 vending machines.

TTC staff have advised us that it is PRESTO's vendor's responsibility to raise incident tickets when there are "coin box full" threshold warning signs issued by FareGo, but we found no incidents were raised.

We noted in one instance, that TTC raised incident tickets six times in the incident management system for the same streetcar. The vendor's resolution for those incident tickets was that the coin box was full and they closed the incident on their end with no action, as coin collection is not their responsibility. PRESTO staff explained that the collection of coins/tokens on a nightly basis is dependent on TTC making vehicles available for coin collection.

Neither TTC, PRESTO, nor the vendors are currently ensuring the coin box is emptied on a regular basis for all vending machines on the new streetcars

TTC should ensure all streetcars are made available for nightly coin collection, particularly when there is a warning sign for the coin box being full or nearly full

From our audit work, it appears that neither TTC nor PRESTO, are ensuring that the coin box is emptied on a regular basis for all vending machines on new streetcars. It is important for TTC to not only run "coin box is full" warning sign reports on a daily basis, but also to ensure that the streetcars with these warning signs be made available to PRESTO's vendor during the night for coin collection. In the event that operational requirements make it difficult to use night service coin collection, other options should be explored, to ensure that coin boxes do not remain full and vending machines unavailable on the new streetcars, as this may result in lost fare revenue to the TTC. TTC should also evaluate with Metrolinx to see whether more frequent coin collection is needed for PRESTO vending machines.

Recommendations:

- 15. The Board request the Chief Executive Officer, Toronto Transit Commission, to run daily reporting on warnings for the coin box being full or 75 per cent full, and ensure those streetcars, at a minimum, are made available for the nightly coin collection.**
- 16. The Board request the Chief Executive Officer, Toronto Transit Commission, to work with Metrolinx to evaluate whether the coin collection needs to occur more frequently for new streetcar vending machines.**

C. Metrolinx and TTC Need to Work Together Better

C. 1. Governance Gap Between TTC and Metrolinx

TTC is the third largest transit agency in North America and the largest transit agency in Canada. TTC has contracted out much of its fare operations to Metrolinx and with PRESTO now being the predominant fare payment method on the TTC, it is critical that TTC's service needs be met under the contract for the benefit of Torontonians. An effectively functioning governance framework will help the parties to identify and unpack operational issues and make decisions that move the parties forward towards the successful fulfilment of accountabilities under the Master Agreement.

There is a governance gap for TTC and Metrolinx to address TTC's contractual and ongoing operational needs

We have identified a governance gap for TTC in being able to deal directly with Metrolinx on operational issues that relate to contract deliverables. In our view this governance gap led to, or contributed to, not resolving some of the matters identified in this report.

During earlier project implementation of PRESTO on the TTC transit network there were two governance frameworks for TTC and Metrolinx:

1. A governance framework called the **Joint Executive Committee** that allowed Metrolinx and TTC to work **directly together** on **operational issues related to contract deliverables**; and
2. A **broad** governance framework for all PRESTO transit agencies called the **Scheme Governance Committee** that addresses strategic issues and is a forward looking system-wide framework.

The governance framework includes a Joint Executive Committee for TTC and Metrolinx to address contractual and ongoing operational issues directly together

The **Joint Executive Committee** included executives from both organizations meeting regularly to address TTC's contractual needs and operational issues, as outlined in its Project Management Agreement and as referenced in Schedule 2.2 on the Expert Panel as part of the Operational Services Agreement. However, both the TTC and Metrolinx agreed to stop that committee in early 2018 in order to focus on project deliverables and timelines, and created bi-weekly **Integrated Schedule meetings**.

These Integrated Schedule meetings include the same attendees, who have met on a bi-weekly basis with the **focus on projects and their schedules (timelines)**. Although the meetings included the same executive members, the nature and purpose of these meetings are generally project focused. Operational issues are raised only insofar as it related to current issues in a project. Contracted deliverables yet to be delivered are not addressed.

Also, there is currently no plan in place to replace what was formerly known as the Joint Executive Committee. From our perspective, **the lack of a committee for TTC and Metrolinx to work directly together on contractual and operational issues represents a governance gap and is impacting the abilities of both parties to work together in the most effective way**. By TTC's calculation, at least 40 per cent of the contract deliverables have not been delivered – and ongoing operational issues governed under the contract need to continue to be addressed at the Joint Executive Committee table for the contract to be successful.

Further, the Operational Services Agreement that forms part of the Master Agreement contemplates the setting up of SLAs for key services that each party is depending on the other to deliver, the information used to measure, and the penalties for not meeting targets. The defining and revising of SLAs and setting of targets helps to ensure each party understands the service level targets the parties need to meet for the deal to be successful.

The governance framework included in Exhibit 1 to Schedule 2.2 Reference to **Expert Panel** requires “a Party to the Joint Executive Committee” to make a referral to the Expert Panel if the parties cannot agree on the expected service level. The members on the Expert Panel depends on the SLA being established, but the potential members need to be

“independent, impartial, neutral, qualified and experienced professionals, knowledgeable and experienced in the design and operational matters...pertaining to the Managed Services, (and) has either technical, legal, contractual or procedural skills and expertise....”

The Expert Panel is to be convened when necessary to help set up the Service Levels as part of the Operational Services Agreement. The defining and use of SLAs is key to clarifying expectations and resolving issues.

Referrals to the Expert Panel to get this started need to come from a party to the Joint Executive Committee. The Joint Executive Committee is not operating and the Expert Panel and SLA framework is not operational.

The TTC has written to Metrolinx to communicate their need to establish a governance process that succeeds the Joint Executive Committee, so that their contractual needs can still be addressed directly with Metrolinx through the contractual arrangement.

Metrolinx staff have advised us that "they agree there is an opportunity to formalize and improve contract governance as it relates to operation and continuous improvement".

In our view, the contractual governance framework already provided for in the Master Agreement and necessary for the successful delivery of promised services needs to be fully implemented. **The Joint Executive Committee needs to continue and the parties must start defining SLAs using the information outlined in this report. Any disagreement on SLAs should be resolved through the Expert Panel framework.**

There are five voting members on the Scheme Governance Committee – TTC, PRESTO, Ottawa, GO Train/UP Express and the 905 municipalities

Metrolinx's broader governance framework, called the **Scheme Governance Committee**, allows for strategic issues affecting all PRESTO agencies to be addressed together. Governance meetings are held with all PRESTO transit agencies on a quarterly basis as part of this committee, and its Operational Sub-Committee meets monthly. Any requested changes must be discussed together and consensus obtained through vote before proceeding with a requested change of one agency. There are five voting members, consisting of the TTC, OC Transpo (Ottawa), GO Train/UP Express, 905 transit municipalities, and PRESTO.

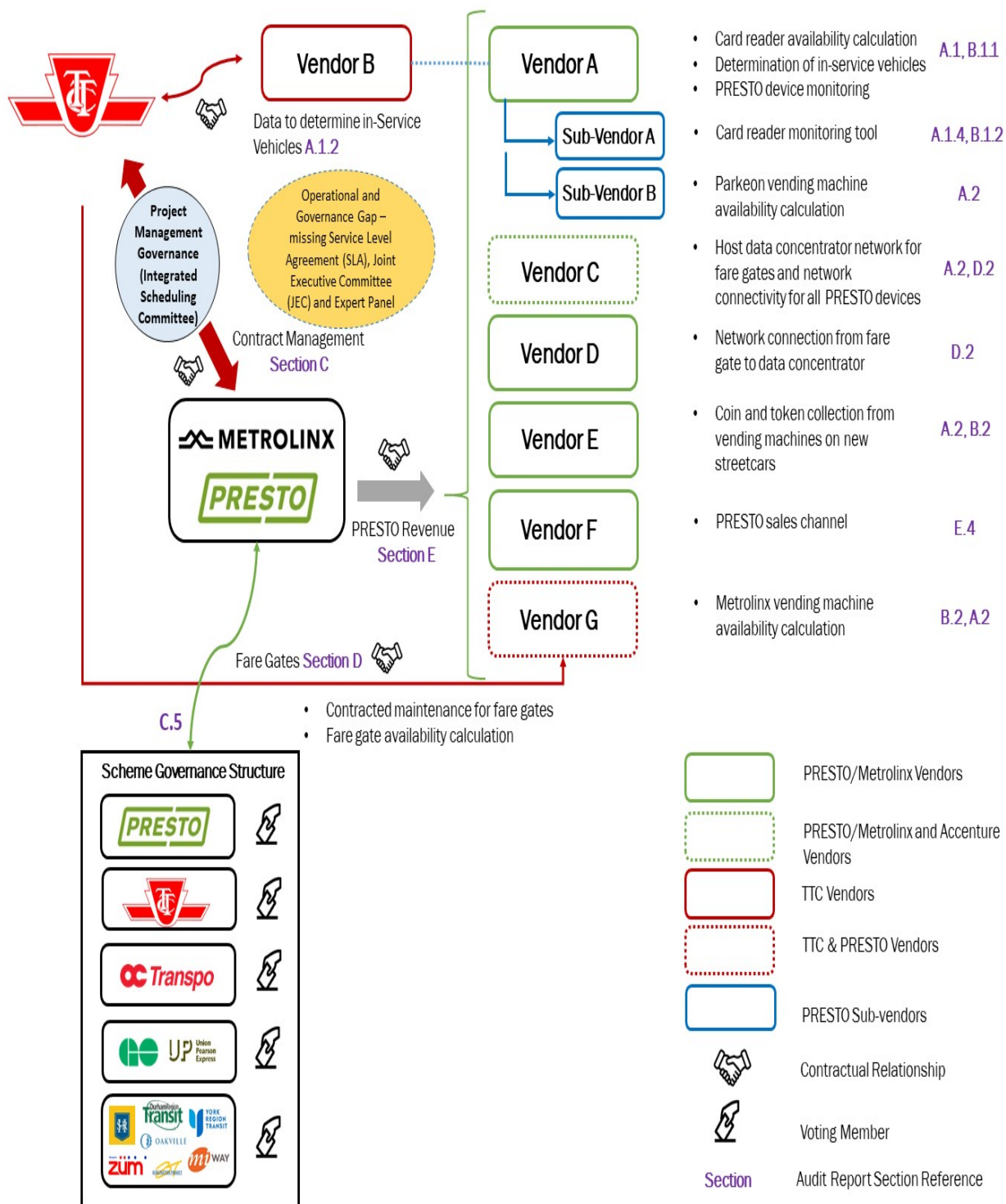
For clarity, the Scheme Governance Committee does not and should not replace the governance framework needed and guaranteed under the Master Agreement between TTC and Metrolinx.

TTC and Metrolinx need to obtain the necessary information and data to properly identify, diagnose, prioritize and resolve the operational issues, including those in this report

In addition, when resolving issues at the Joint Executive Committee (or a similar table) and as part of the SLA set-up, it is paramount that the parties have the right information to understand and diagnose the issues. We observed that both the TTC and Metrolinx have an information gap with regards to the areas we audited. Some of the information we requested for our audit was the first time this information was requested by Metrolinx of its vendors. Metrolinx staff advised us that our audit requests helped them to better realize the information that they should be regularly requesting and monitoring from its vendors, and then sharing with the TTC. The parties need to obtain the necessary information and data to properly identify, diagnose, prioritize, and resolve the various operational issues, including those identified in this audit report. Once the parties have been able to address both the information and governance gaps, our view is that the issues identified in this Phase 2 report can then be resolved by all the parties working together to do so.

Figure 6 shows Metrolinx's broader governance framework (bottom left) and the current governance gap for TTC related to its contractual and operational needs. The figure also shows the contractual relationships between TTC, Metrolinx, and the various vendors and sub-vendors involved in the areas of fare equipment and PRESTO revenue. Figure 6 also includes references to relevant sections in this report by area of responsibility for the various parties.

Figure 6: Contractual and Governance Relationships of TTC, Metrolinx, Vendors, Sub-vendors and Other Stakeholders



Metrolinx staff advised us that they agree to establishing a mechanism for operational "problem management" tables for each PRESTO transit agency

When the governance gap was raised during the audit, Metrolinx staff advised us that they also see the governance gap, the audit information queries have helped them to better understand the problems, and that the governance issue was recently raised at a Scheme Governance Committee meeting in September 2019. Metrolinx staff advised us that they are agreeable to establishing a mechanism for operational "problem management" tables, when an issue of one transit agency does not impact any of the other PRESTO transit agencies and to have these technical tables report to the Joint Executive Committee (once reinstated).

Many of our recommendations from our Phase 1 audit, for example, require TTC to work together with Metrolinx to achieve them, such as changes to improve front-end controls on concession (e.g. child) PRESTO cards and the sale of them. The current contractual arrangement (with the Joint Executive Committee continuing into the operational phase) between the two parties should be sufficient for the parties to be able to work together on many of the required changes to controls, etc. However, many of these recommendations have not yet been addressed, which may be due in part to TTC being limited by the requirement to go through the consensus based governance framework for all PRESTO transit agencies via the second governance committee, the Scheme Governance Committee. There also appears to be lack of clarity for both TTC and Metrolinx on which issues should come to which governance table and it would be helpful to define this.

Scheme Governance Committee

TTC staff provided an example of how Metrolinx's governance model can be effective – the reduction and harmonization of the minimum load amount on PRESTO cards

The Scheme Governance Committee was designed to manage PRESTO issues that are common to all PRESTO stakeholders, i.e. Metrolinx and its PRESTO transit agencies. TTC staff advised that for some PRESTO policies this has proven effective in managing and controlling changes. TTC staff pointed to an example: the recent agreement to reduce and harmonize the minimum load amount (currently \$10) for all PRESTO channels. Governance Scheme Committee members agreed this was a common pain point affecting all customers, with an agreed change being developed and targeted for implementation prior to year-end.

On the other hand, the Scheme Governance Committee table has also created concerns for TTC. Metrolinx is working together with all PRESTO transit agencies on planning the significant foundational changes required to further modernize PRESTO, including addressing obsolescence of field equipment and supporting and enabling future PRESTO features. However, the current draft plan lays out milestone dates for all PRESTO transit agencies other than for TTC.

TTC staff are concerned that the current draft plan does not include sufficient detail to address the remaining contractual deliverables that are included in the Master Agreement between TTC and Metrolinx. Further, the draft plan indicates TTC changes will be made after the implementation dates for the other PRESTO transit agencies, and these foundational changes will affect the features that become available for TTC customers in the future. Although we recognize the other PRESTO transit agencies need to have their aging equipment addressed, it is important to recognize that such a large transit agency as TTC is a key client who needs to be a significant contributor in PRESTO's roadmap for the future, particularly in the initial planning stages. TTC staff have advised us they are very concerned as the future of the PRESTO system changes are being designed for the needs of the other smaller transit networks, and may not be able to accommodate the needs of the most complex transit network (i.e. TTC).

TTC has different needs than the other PRESTO transit agencies:

- **Significantly higher financial impact**
- **Unique transit modes (subway, streetcar) and larger, more complex network**
- **Significantly higher population and volume of transactions.**

It is important to keep in mind that TTC has different needs than the other PRESTO transit agencies for the following reasons:

- Significantly higher budget and financial impact (PRESTO revenue expected to be \$1 billion for 2019, 5.25 per cent commission equates to approximately \$52.5 million);
- Unique transit modes (subway and streetcar in addition to bus) and larger, more complex transit network; and
- Significantly higher population and volume of transactions.

These factors also result in TTC having a higher public profile, with increased reputational risk (for both TTC and Metrolinx) when things do not go well or required changes are not implemented on a timely basis.

Recommendation:

- 17. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:**
 - a. establish a governance framework that addresses the governance gap, by re-starting and continuing the Joint Executive Committee as envisioned in the Operational Services Agreement; and**
 - b. formalize that TTC's contractual and operational issues are appropriate to address directly with Metrolinx at the Joint Executive Committee table, and includes regular status, service, and planning review meetings.**

C. 2. Many Contractual Requirements Delayed or Not Met by Metrolinx

The main contracted deliverable that TTC was seeking at the time of its arrangement with Metrolinx was to procure an open payment solution for its customers to be able to pay with mobile applications (i.e. cell phone, debit/credit card), as noted on the first page of its contract:

"TTC expressed an interest in using such PRESTO services provided that suitable funding arrangements could be made and the system could be modified to meet its (TTC's) business requirements.

To better meet such business requirements and the needs of the other (transit agencies)... who use the current PRESTO services, Metrolinx is in the process of modifying and enhancing that service to develop and implement a new generation fare collection solution, defined herein as PRESTO NG, that is based on an open architecture using industry standard tools, which will accommodate open loop financial cards, mobile applications and future technological innovations."

Open payment is an important customer service that also allows TTC and Metrolinx to benefit by making it easier for customers to pay for services that are part of their everyday lives.

If you can use your cellphone application to pay for a coffee or debit/credit card almost anywhere – most customers would expect one should be able to – as envisioned in the 2012 contract seven years ago – to tap your debit/credit card or cell phone to pay.

TTC predicts PRESTO revenue will be \$1 billion for 2019 and potentially rising to \$1.1 billion in 2020

In 2012, TTC and Metrolinx entered into the Master E-Fare Service Agreement (Master Agreement) whereby TTC would pay 5.25 per cent of TTC fare revenues processed through the PRESTO system to Metrolinx. The contract also contained approximately 4,000 business requirements, including open payment. The TTC predicts that PRESTO revenue is expected to be \$1 billion for 2019 (85 per cent of total fare revenue), potentially rising to \$1.1 billion in 2020 (93 per cent).

The contract also requires Metrolinx to provide key services, including:

- (i) obtaining and maintaining the functionality described in a mutually agreed set of business requirements;
- (ii) obtaining and maintaining the equipment, software and network capability necessary for the operation of the PRESTO NG service;
- (iii) the implementation, operation, service, maintenance and repair of same, and
- (iv) such other services required to be performed to meet the TTC Business Requirements, defined herein collectively as the Managed Services.

Metrolinx and TTC have made progress in implementing the PRESTO system on the TTC network

Over the years, Metrolinx and TTC have made progress in implementing the PRESTO system on the TTC. PRESTO staff also point out that they have delivered on some items not in the original contract, such as the support for installation of the subway fare gates. However many items from the original agreement are yet to be fulfilled by Metrolinx, seven years after the agreement was signed.

At the end of 2018, TTC and Metrolinx jointly reviewed the status of the 4,000 business requirements from the original agreement. While Metrolinx has agreed to a PRESTO rollout schedule to the end of 2019, they have not committed to delivering all of the remaining and unfulfilled contractual obligations.

TTC presented the top five categories of gaps in the business requirements that are yet to be delivered by Metrolinx

At its June 2019 board meeting, TTC presented its top five categories of gaps in key business requirements and functionality that are yet to be delivered. These remaining deliverables including key items such as open payment:

- **Open payment and account based technology** – delayed TTC's ability to offer its customers the convenience of paying by smartphone or using account based technology;
- **Flexible fare rules and policy** – limitations in what TTC has been able to implement on flexible fare rules (e.g. loyalty options, time of day products), as products and policy are constrained due to PRESTO technology;
- **System/device performance and functionality** – system performance has improved, however work is still in progress to close gaps in system/device performance and functionality;
- **Single-use tickets on surface vehicles** – a solution is still required for cash customers who start their journey on a surface vehicle; and

- **Retailer fare media network** – gaps exist in the retailer fare media network, particularly in North-West Toronto and Scarborough communities, impacting the ability for customers to purchase fares through that method.

In the June TTC Board report, additional deliverable gaps were also identified such as the fact that large PRESTO data sets are not shared with or made available to TTC and there are no current agreed plans or schedules to have this deficiency addressed.

According to TTC's calculations, at least 40% of TTC's contractual business requirements remain outstanding, including open payment

According to TTC's calculations, at least 40 per cent of TTC's contractual business requirements (of a 600 page listing) have not yet been delivered by Metrolinx, including key priority items such as open payment. Open payment represents almost half of these outstanding deliverables. Despite a TTC/PRESTO joint working group attempting to reach an agreement on the remaining contracted deliverables at the end of 2018, it is our understanding that no agreement was made. Further, Metrolinx is not formally planning to deliver almost half of the remaining deliverables as items, stating "they don't have public value or cost benefit, or the requirements are not considered relevant any longer", and essentially dropping the remaining deliverables to approximately 20 per cent. Some of the items on Metrolinx's list include:

- visual distinction for PRESTO concession cards (i.e. child, youth, post-secondary student, senior)
- PRESTO card reader device management and monitoring
- single-use tickets for concession fares
- ability to purchase single-use tickets on surface vehicles
- recording of denied PRESTO taps

The parties have not reached common ground on what remains deliverable. TTC needs clarity on exactly what is outstanding - what will be delivered and when, what Metrolinx intends to drop, and the impact and value of those items to the overall deal need to be assessed. Changes should be done through a formal change-order process.

Metrolinx is reliant on its vendors and sub-vendors – this adds to the complexity and challenge in ensuring TTC's contractual needs are met

Further, while we recognize that Metrolinx is reliant on many of its vendors and sub-vendors to ensure its contracted deliverables are met, TTC's contract is with Metrolinx. If there is a deliverable already included in the 2012 Master Agreement between TTC and Metrolinx, TTC should not be billed an additional amount to receive the information supporting the deliverable. For example, device level data is included as a contractual deliverable and access to data and a data warehouse (called data mart) are referenced several times in the contract:

"Provide a complete raw transaction history of all PRESTO System activity and fare payment transactions in the Data Mart. Reporting and Business Intelligence services using this Data Mart enables, among other things, Service Level reporting for all business functions required by TTC, including planning purposes, audits, generation of tax receipts, financial reconciliation, and ad hoc report generation for business and analytical purposes."

TTC and Metrolinx need to analyze the device level data to address the risk that not all transactions may be properly captured from the device to the subsystem level.

The length of time that data/records is kept is also important. Currently TTC is limited as the device level data is purged after seven days (and has not been made available to TTC) and information in the PRESTO card reader device monitoring software tool is purged after 60 days. The agreement states that:

*"During the Term and **for a period of seven years thereafter**, Metrolinx shall maintain all data, records, documents and other information relating to the Managed Services and in accordance with the TTC Business Requirements and as are customary to record the fare revenue collected, remitted and retained hereunder in accordance with generally accepted auditing standards and generally accepted accounting principles in Canada. After such period, the data, records, documents, and other information will be handled in accordance with applicable Ontario government policy."*

It is important for TTC to be able to access data and information beyond the current short time periods for analytical, monitoring, and audit purposes. We were limited in our audit scope as a result of these limitations on the length of time the data was kept by Metrolinx.

Progress continues to be made in delivering on TTC's contract, but the two parties need to clarify the list of outstanding contracted deliverables, identify timelines for their completion, as well as agree upon service targets - at least interim targets. This is important given the adoption rate for PRESTO is significant, reaching 81 per cent, according to TTC, in July 2019. While these contractual issues are being resolved, it is most important for the TTC and PRESTO operational teams to continue to meet regularly to identify system issues and unpack the root cause.

Recommendation:

- 18. The Board request the Chief Executive Officer, Toronto Transit Commission, to request a schedule and plan from Metrolinx for the remaining contracted deliverables of TTC.**

C. 3. Service Level Agreement Still Not Agreed to and Finalized

There is not yet an agreed upon signed Service Level Agreement seven years after Metrolinx and TTC signed their contract

While the Master Agreement was signed in 2012, there is yet to be a suite of SLAs signed between TTC and Metrolinx, seven years after the contract was signed. Other PRESTO transit agencies have a signed SLA with Metrolinx. However, per discussions with Metrolinx and TTC, it does not appear that the two parties are close to achieving an agreement on an SLA.

In our view, it is best that contracts are only signed **when an SLA is established**, otherwise, there is little leverage to obtain agreement and there needs to be agreement on key deliverables, targets and timelines.

However in the case of this deal, the design, hardware, software and details of PRESTO were not finalized at the time of execution so the Master Agreement included a governance framework (including the Expert Panel discussed earlier) to ensure future agreement on the Service Levels and Service Level Targets.

Setting up SLAs helps to clarify what's important to measure, how it will be measured, and the target and penalty for not meeting the target. SLAs make it easier to hold all parties accountable to deliver on expected service levels.

Although the Master Agreement requires a PRESTO card reader availability of greater than 99.99 per cent, as outlined in this report, there are other factors to consider in the calculations.

Both parties need to work together and start by agreeing upon overall desired outcomes for measurement and work on establishing interim targets

Until agreement on SLAs can be reached, both parties should work together to identify and agree upon overall desired outcomes for measurement, and then work on establishing interim targets so that these important areas will be monitored and measured. The focus is on doing what needs to be done to achieve the shared goals and outcomes. In the event that targets are not being met, the parties can diagnose why, so that problems can be addressed.

For example, for vending machines on the new streetcars, even though the availability of these machines was being measured, one of the root causes of the out-of-service vending machines being out of service – i.e. the coin box being full - did not fully come to light until we analysed why the issue was occurring.

By measuring availability and analysing why targets are not being met, issues can be addressed and performance will improve for the benefit of all stakeholders. Going forward, to ensure vending machines on new streetcars are available and to reduce service calls, the new SLA should be measuring if vending machines on TTC's new streetcars are being emptied of coins/tokens every night.

Other areas that are important to measure and monitor could include the following:

- customer is given the ability to pay (e.g. coins/tokens collected nightly from each streetcar, frozen PRESTO card reader issue resolved);
- risk for customers evading fare is minimized (e.g. bus drivers can view concession type, child card controls improved);
- customer experience is positive (e.g. fare gate availability improved, including when stuck in closed position); and
- revenue transactions are properly captured (e.g. controls improved between device level and subsystem) and deposited (e.g. retailer cash reconciliation controls strengthened).

These focus areas would benefit both Metrolinx and TTC, in terms of the reputation and branding of both organizations, as well as maximizing passenger revenue.

The current lack of agreement on the SLA contractual items should not prevent the parties from setting interim SLAs and successfully working together to measure and monitor the above areas, as well as working together to resolve any operational issues that need to be addressed. All of this information will be useful if the Expert Panel is invoked to determine the SLA.

It is also important that there be shared accountabilities. For example, TTC needs to ensure vehicles for repair or coin collection are made available each night because that can impact fare operations. PRESTO needs to acknowledge such things as fare evasion and that working together with its transit agencies to improve front-end controls is partly their responsibility. (e.g. visually distinct PRESTO cards for varying concession types (e.g. child, student, senior) – also one of the contracted business requirements in Master Agreement)

Formalizing a Service Level Agreement is a longer term action for these two parties, but an important and necessary one for their contractual relationship

Once TTC and Metrolinx have been able to work together to identify priority areas to monitor and targets to measure, the two parties should then proceed to work on formalizing the arrangement through an SLA. We recognize this may be a longer term action for these two parties, but we feel it is still an important and necessary one in any contractual relationship.

Recommendations:

- 19. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to identify and agree upon outcome areas and targets, and to measure and monitor those areas.**
- 20. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to agree upon and finalize the Service Level Agreement, and to utilize an Expert Panel as outlined in the Operational Services Agreement if needed.**

C. 4. Metrolinx Has Not Paid TTC's Revenue Loss Claim for Fare Equipment Issues

TTC has invoiced Metrolinx \$7.5 million for the 3 years ended December 31, 2018 for estimated revenue loss from functionality issues with PRESTO fare equipment

Since the implementation of Metrolinx's PRESTO fare equipment, TTC has invoiced Metrolinx \$7.5 million for the amount of estimated revenue loss for the three years ending December 31, 2018, as a result of PRESTO fare equipment (including PRESTO vending machines on new streetcars (called Single Ride Vending Machines) and PRESTO card readers) not working at agreed-upon levels. Metrolinx has not yet paid TTC for this lost revenue.

Metrolinx and TTC's Funding and Financial Reporting Agreement dated November 28, 2012 states that until the parties agree on an SLA and appropriate compensation, the parties should follow the compensation mechanism set out on Schedule 2.4(f) Interim Compensation for Lost Fare Revenue.

Schedule 2.4(f) Interim Compensation for Lost Fare Revenue states the following:

"If the TTC, acting reasonably, determines that:

- 1. The Gross Receipts during a specified monthly reporting period were at least \$30,000 less than the Gross Receipts that should reasonably have been collected during such period, and the shortfall was a direct result of a failure of the Managed Services or any part thereof; or*
- 2. The Gross Receipts during up to three consecutive monthly reporting periods were at least \$30,000 less than the Gross Receipts that should reasonably have been collected during such periods, and the shortfall was a direct result of the same failure of the Managed Services or any part thereof in each of those months;*

the TTC shall deliver a deficiency notice to Metrolinx together with evidence to support its determination."

The parties have not been able to come to an agreement on a methodology acceptable to both and need to work together to achieve this

TTC attempted to have discussions with and reach an agreement with Metrolinx regarding the methodology for the revenue loss calculation. However, the methodology suggested by Metrolinx was to compare the expected revenue taps to the prior year's actual taps, and this was not reasonable given the significant change in the PRESTO adoption rate. The parties were not able to come to an agreement on a methodology acceptable to both.

Metrolinx's view is that TTC has not provided adequate supporting information for their revenue loss claim. However, much of this information would be required from PRESTO for TTC's calculation and it has not been made available to them (e.g. device level data – is not kept beyond seven days).

Although there has been positive progress in improving the PRESTO card reader issues over the past few years with the implementation, it is clear that there have been and continue to be functionality issues with PRESTO fare equipment and that agreed upon targets for availability have not been achieved, which have negatively impacted TTC's PRESTO revenue.

Looking forward, the parties should define and set SLAs, at least interim SLAs, to provide better information for the parties to identify and fix the issues impacting availability and revenue.

Recommendations:

- 21. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to obtain the required information to refine their estimate of revenue loss due to malfunctioning PRESTO fare equipment.**
- 22. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to come to an agreement on a methodology for the revenue loss claim acceptable to both parties, and leverage its contractual governance framework of the Expert Panel if needed.**

C. 5. Stronger Controls Needed for Metrolinx Withdrawals from TTC's Revenue Bank Account

TTC's revenue bank account was set up to allow Metrolinx to withdraw their commission

TTC's revenue bank account was set up to allow Metrolinx to withdraw their commission, as was done by all other PRESTO transit agencies, as per section 2.3 of the Funding and Financial Reporting Agreement:

*Metrolinx shall take fees off the Revenues
(c) Each Business Day, Metrolinx shall, to the fullest extent possible, arrange for the transfer of all Gross Receipts of the previous day (or, where the previous day is not a Business Day, all Gross Receipts of the previous Business Day and the intervening non-Business Day(s)), net of the Metrolinx Fee amount, to an agreed upon TTC account at the TTC Bank of Record for the sole and exclusive benefit of TTC in accordance with TTC Business Requirements.*

Although TTC's revenue bank account was set up in this manner, no other amounts should be withdrawn by Metrolinx from TTC's revenue bank account without TTC permission.

Section 5.1 of the Master Agreement states that:

"except as expressly stated in the Funding and Financial Reporting Agreement (outlined above), or as expressly agreed to by the Parties in writing, there will be no other fees or charges payable by TTC to Metrolinx in respect of the Managed Services."

There should always be proper sign-offs before any funds are withdrawn from a bank account

From a control perspective, it is important to ensure there are always proper sign-offs from both organizations before any funds are withdrawn from a bank account.

Proper sign-offs should be required on TTC's revenue bank account

While the agreement clearly states that Metrolinx can only take out funds related to their commissions, proper sign-offs should be required on TTC's revenue bank account before any withdrawals occur, and improving this control should be addressed by the TTC in the short term.

Recommendation:

23. The Board request the Chief Executive Officer, Toronto Transit Commission, to make necessary changes to require proper approval sign-off by TTC for Metrolinx to be able to withdraw amounts from TTC's revenue bank account.

D. Further Improvement Needed on TTC Fare Gates

D. 1. Fare Gate Availability Calculation

Background

TTC purchased its subway fare gates as part of a contract signed in December 2015

Fare gates were purchased by TTC from S&B. As part of the contract signed in December 2015, S&B is responsible for the design, build, test, deployment, installation, functionality and second line maintenance of the fare gates. TTC is responsible for first line maintenance of the fare gates. Fare gates are installed at 75 TTC subway and Rapid Transit (RT) stations. TTC has an SLA with S&B which was signed September 2018. Fare gates generate fare gate activity codes which are recorded and uploaded to the FareGo System. Fare gate activities are monitored using FareGo 3.2, which is an S&B software system, currently hosted by Telus on behalf of Accenture, a vendor of PRESTO. See figure 7 below which outlines the roles and responsibilities of the various vendors associated with TTC's subway fare gates.

Figure 7: TTC Fare Gates – Roles and Responsibilities

Fare gates are owned by TTC and TTC bought them from S&B. TTC is responsible for the first line maintenance and S&B is responsible for the second line maintenance

TTC Staff manually identify out-of-service fare gates for maintenance



Card reader is owned by TTC. The software of the card reader which calculates the fare rules are developed and managed by Accenture on behalf of PRESTO

Revenue transactions and fare gate activities are uploaded to data concentrators (hosted by Telus on behalf of Accenture) and then to FareGo subsystem (hosted and supported by PRESTO on behalf of TTC). BAI communication provide network connectivity from the device to the concentrator

Fare gate availability target is 99.5%

TTC's reported fare gate availability is 98.15% in April 2019

As per the SLA, the fare gate availability target is 99.5 per cent. TTC reported that its fare gate availability rate was 98.15 per cent in April 2019. Since its installation, fare gate availability has remained below the target 99.5 per cent, although it has improved and remained above 97 per cent since July 2018.

TTC staff advised that availability has improved by working with its vendor on defect issues for hardware, software updates, etc.

We conducted 4 days of fieldwork observation across 74 subway stations

There are some issues that cause a fare gate to be only partially available, with only the exit side of the gate working but not the entry side

45 out-of-service fare gates observed with 8 of those gates stuck in the open position

TTC staff have advised us that over the years, availability of the gates has improved due to working with its vendor on defect issues for hardware, software updates, increased TTC first line maintenance staffing, and increased diligence in TTC's preventive maintenance process for fare gates.

Results of Subway Fare Gate Observation Fieldwork:

We conducted four days of fieldwork observation of fare gates across 74 stations (992 total fare gates).

When a fare gate goes out of service, the FareGo software monitoring tool should capture the gate as being out-of-service. During our observation of TTC fare gates and discussion with TTC staff, it came to our understanding that certain fare gates that are only partially available result in the exit side of the gate working, but not the entry side, such as fare gates with:

1. an amber light (amber light refers to one of the three lights near the card reader on the fare gate); or
2. a frozen wait screen ("wait" message appearing on the screen).

These gates are not available for customers to tap and enter and should be captured as out-of-service on FareGo.

It is important to note that given the subway fare gates are a "closed system" (i.e. should not be able to enter paid area unless gate opens), the only scenario that directly impacts revenue loss is when fare gates are stuck in the "open position" and not physically barricaded. Although some of the other scenarios we found and describe are inconvenient to customers, they should not result in revenue loss, as the customer will need to simply tap at the gate beside that one - unless the customer manages to find a way to get through the gate illegally and there are no TTC staff present to educate them or inspect their fare.

Our staff observed 45 out-of-service gates at 27 subway stations:

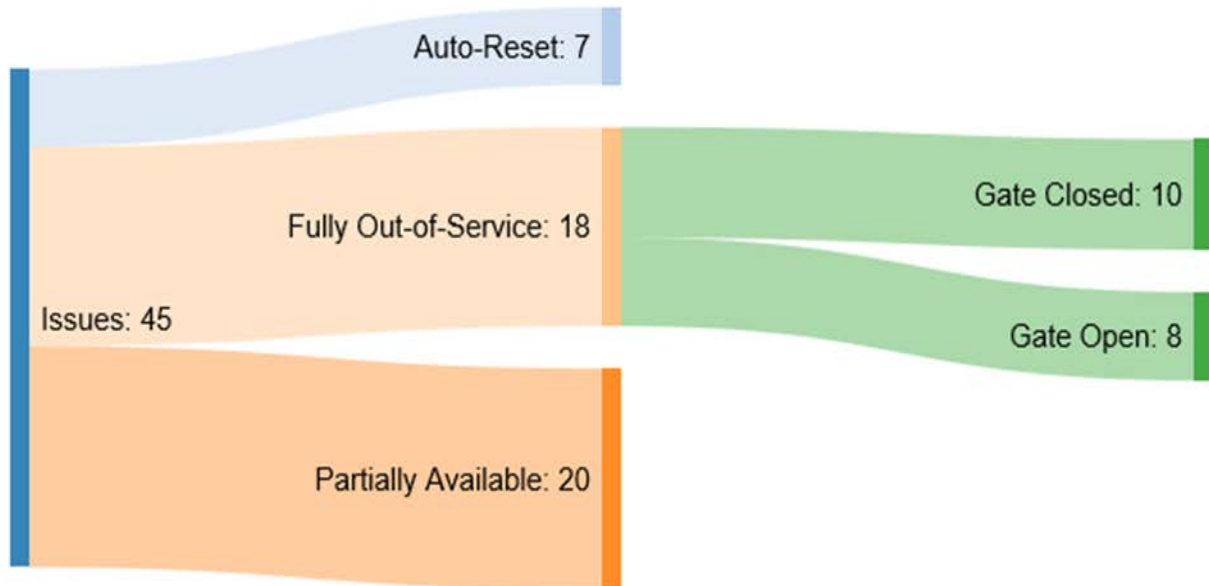
- 18 gates were fully out of service (showing red "X" sign) with eight of these gates stuck in an open position.
- Seven gates automatically reset back in-service during the staff attendance, with the reset time ranging from 30 seconds to two minutes.
- 20 of the gates were partially available – they were only available from the exit side and did not accept customer taps from the entry side, as described above.

20 partially available fare gates did not show as out-of-service in availability calculation for fare gates

The 20 gates that were only partially available, however, showed as being in-service in the FareGo system. TTC staff advised us that if the gate is partially available (i.e. only exit side works), the gate would still show as being “in-service” in the FareGo system.

Figure 8 below shows the overall results of our fare gate observations and the breakdown for gates stuck in the open and closed position for those fully out of service.

Figure 8: Fare Gate Observations



13 of the 18 out-of-service gates were fixed by our afternoon follow-up observation

Of the 18 gates that were fully out-of-service in the morning, we observed:

- 13 gates were fixed; and
- Five gates were not fixed by the time staff went back in the afternoon.

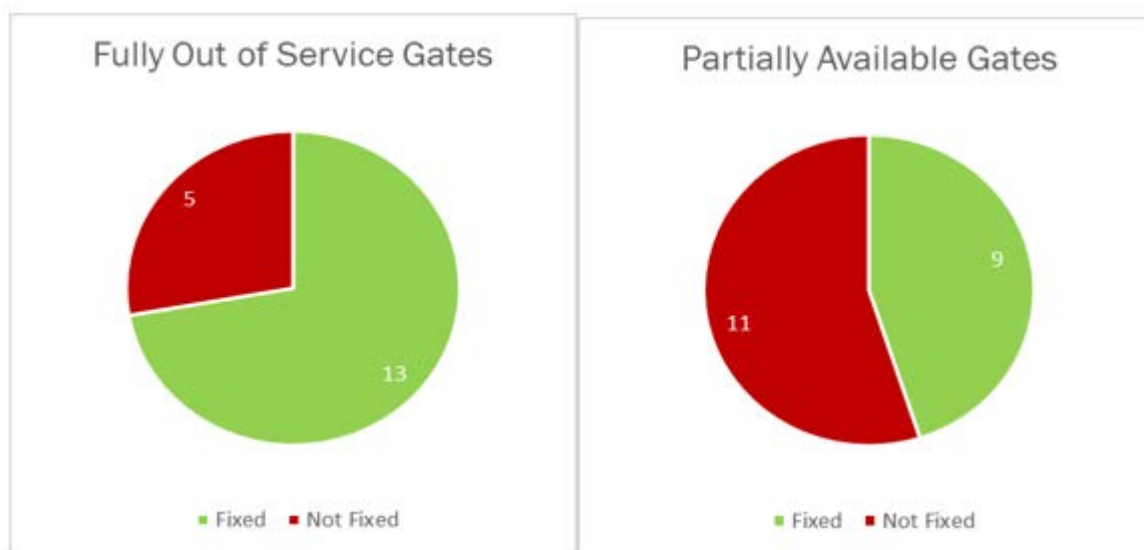
9 of the 20 partially available gates were fixed by our afternoon follow-up observation

Of the 20 gates that were only partially available:

- Nine gates were fixed by the time staff went back in the afternoon; and
- 11 gates were not fixed. Only one of the 11 was serviced by TTC staff after we observed them in the morning, but went out of service again in the afternoon.

Figure 9 below shows the breakdown of those gates that had been fixed by that afternoon and those that had not for the fully and partially available fare gates observed.

Figure 9: Gates Fixed by Afternoon for Fully Out-of-Service and Partially Available Fare Gates



5 of the 8 fare gates stuck in an open position were fixed by our afternoon follow-up observation

Of the five gates above that were not yet fixed:

- Two of them were serviced by TTC staff after we observed in the morning, but went out of service again in the afternoon;
- Two gates were attended to by TTC staff and escalated for S&B's second-line maintenance; and
- One gate was fixed after our observation in the afternoon - this work did not have a work order opened in TTC's work order management system.

Of the eight gates that were stuck in an open position:

- Five gates were fixed by the time staff went back in the afternoon;
- Two were not fixed but had pylons placed in front of the gates and had been escalated by TTC staff for S&B's second line maintenance; and
- One was serviced by TTC staff after we observed in the morning, but went out of service again in the afternoon and it remained stuck open with no barricade.

Almost all of the fare gates that were stuck in an open position were either fixed within the target timelines by TTC staff or physically barricaded and appropriately escalated for the vendor to perform second line maintenance. As a result, the revenue loss was insignificant for our sample tested. The one gate that went out of service again and was not barricaded is an issue, and TTC should work to ensure this does not happen in the future.

For those fare gates fixed through TTC's first line maintenance, all were completed within the target of 4 hours

Partially available gates are difficult to spot and less likely to be reported by TTC station staff. However, addressing these gates is still important since it impacts availability of the gates and customer service.

All the above fare gates fixed through first line maintenance by TTC staff were completed within the target of four hours.

Fare Gate Availability Calculation Can Be Improved

TTC's definition of service availability as stated in the CEO report is *"Percentage of time fare gates are available for use"*. TTC selected two codes from the FareGo events to calculate and report its fare gate availability, however these codes do not include fare gates with reduced functionality where customers are unable to tap to make a payment.

TTC's availability rate for fare gates does not include partially available fare gates and could be overstated

The table below shows what the recorded downtime in FareGo compared to our observed downtime for fully out of service gates and partially available gates. For gates that were fully out of service, the difference in downtime was six hours and 27 minutes. However, for the partially available gates the observed downtime was approximately 20 times more than the recorded downtime in FareGo system. Therefore, TTC's reported availability rate could be overstated and should be refined further to include partially available gates.

Table 1: Difference in Downtime for Fully Out-of-Service vs. Partially Available Fare Gates - during our audit observation period

	Fully out of service (18 gates)	Partially available (20 gates)
Downtime observed	31:15:00	60:32:00
Downtime recorded in FareGo	24:47:53	3:22:54
Difference	6:27:07	57:09:06

Recommendations:

24. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with its vendor, to continue to make improvements to the functionality of fare gates, and to hold its vendor accountable to meet the target availability rate for TTC fare gates.

25. The Board request the Chief Executive Officer, Toronto Transit Commission, to consider refining its fare gate availability calculation methodology to better account for partially available fare gates.

D. 2. Limitations with Current Version of FareGo Software

Manual Identification of Fare Gate Issues

Currently TTC staff must manually identify functionality issues with fare gates for tickets to be raised and issues to be addressed

When a fare gate goes out of service, the FareGo system does not create an automatic incident ticket. TTC staff (including Station Supervisors and Fare Collectors) are required to raise the incident with Transit Control when they spot an issue with the fare gate functionality. Transit Control then logs the incident in TTC's work order management system for TTC's Revenue Equipment Attendant (REA) staff to go out in the field to fix the gates. TTC staff do make efforts to barricade an entrance when it is stuck in the open position until someone comes to fix it. However, there is a higher risk at automatic entrances for broken gates (including those stuck in an open position) to go unreported for longer periods, as there is no TTC staff presence, and it would generally require a station supervisor or REA staff to notice the issue.

There is a higher risk at automatic entrances for broken fare gates to go unreported for longer periods

TTC is planning to purchase FareGo version 3.9 which allows for automatic email alerts when a gate goes out of service

TTC staff advised us that the current version of FareGo (version 3.2) does not support automatic alerts when a gate goes out of service. However, TTC is planning to purchase FareGo version 3.9 which allows for automatic email alerts when a gate goes out of service.

Issues with Data Concentrators Impacting Ability to Monitor Fare Gates in Real Time

PRESTO's data concentrators sometimes go down given the high volume of activities – this lack of consistent real time data makes it harder for TTC staff to monitor gate functionality in real time

Fare gate activities are uploaded to four PRESTO data concentrators before being uploaded to the FareGo system. PRESTO owns the four data concentrators provided to TTC. When the data concentrators are down and/or stop working, FareGo will not receive any activities in real time at all. We were advised by TTC management that the issue with data concentrators is due to the high volume. The lack of consistent real time data makes it harder for TTC staff to monitor the gate functionality in real time or to do inquiry.

TTC staff advised us that FareGo version 3.9 will not require data concentrators

TTC staff have advised us that data concentrators will upload the fare gate activities once they are back online and running, and when TTC moves to FareGo version 3.9, it is expected that data concentrators will no longer be required.

Recommendation:

26. The Board request the Chief Executive Officer, Toronto Transit Commission, to continue efforts in expediting the implementation of FareGo 3.9 in order to streamline the fare gate incident management process.

D. 3. Vendor Exceeding Target Timeline for Second Line Maintenance

Vendor is responsible for second line maintenance of the fare gates

TTC and its vendor have agreed upon service commitments for time frames by incident priority

Vendor Exceeding Target Timeline for Second Line Maintenance (SLM) to Resolve Fare Gate Issues

S&B is responsible for the second line maintenance (SLM) of the fare gates, which occur when issues cannot be resolved by TTC's first line maintenance team and are escalated to S&B. According to section 2.1.2 of the SLA, all incidents are assigned to five categories of incident priority: critical, high, moderate, low and information request. S&B has a service commitment to resolve priority incidents within certain time frames, as listed in Table 2 below.

Table 2: Second Line Maintenance Resolution Timeline Targets

Incident Priority	Resolution time	Incidents solved within resolution time
Critical	4 hours 8 hours	95% 100%
High	8 hours during operated service time 16 hours during operated service time	95% 100%
Moderate	24 hours during operated service time 48 hours during operated service time	95% 100%
Low	48 hours during operated service time 96 hours during operated service time	95% 100%

Average resolution time for the 150 second line maintenance work orders in June 2019 was just over 27.5 hours

In June 2019, there were almost 3,000 TTC work orders created for fare gates, with approximately 150 of these escalated for SLM. The average resolution time for these June 2019 SLM work orders was just over 27 ½ hours. TTC staff advised us that generally all SLM incidents are considered high to critical priority.

The work orders are not given an incident priority in the TTC's work order management system, making it difficult for us to assess whether its vendor met its target resolution time for SLM. Although TTC has some daily spreadsheet logs used for operational purposes to capture the majority of the work orders, it is difficult for TTC to properly track, determine, and prove whether its vendor has met its SLM resolution time requirements. TTC staff should be entering the incident priority in its work order management system for ease of tracking.

Vendor did not meet its target for second line maintenance resolution time in the month tested

However, all of the work orders that were tracked by TTC in their daily spreadsheet logs were noted as either critical or high priority incidents, for a target SLM resolution time ranging from four hours to 16 hours. According to TTC's spreadsheet, average resolution time was just over 27 ½ hours; this demonstrates that the SLM target resolution times were not met.

TTC has been receiving maximum monthly service credits from its vendor related to targets for SLM not being achieved

TTC has already been receiving the maximum monthly service credits from its vendor related to targets not being achieved by them. However, they should continue to ensure its vendor is working to improve the timeliness of SLM resolution time, particularly for any gates stuck in the open position.

Vendor Not Providing Back-Up Documentation for Service Credit Calculation to TTC

TTC and its vendor signed an SLA in September 2018. As per the SLA, S&B charges TTC a monthly service charge for managed services. S&B issues service credits to TTC if its vendor does not meet the fare gate availability target of 99.5 per cent and the SLM resolution time. The targets for the SLM resolution time range from four hours to 96 hours, depending on the incident priority level from critical down to low (and up to 192 hours for information requests). See table 3 above for details of targets by priority level.

TTC does not receive back-up documentation from its vendor on their availability calculation and service credit amount

S&B calculates its own fare gate availability rate for the purpose of calculating the service credit amount according to the definitions in the SLA. As per the SLA, certain downtime from S&B's availability calculation is excluded, such as fare gate downtime caused by PRESTO software issues, TTC's preventive maintenance etc. TTC calculates and reports its fare gate availability differently, so that it reports a more accurate availability rate and does not include the exceptions outlined in the SLA. Most often the fare gate availability rate calculated by the vendor is higher than TTC's calculation, due to various downtime exclusions incorporated into the SLA availability calculation. TTC does not receive sufficient back-up documentation from the vendor to verify their availability calculation and service credit amount, and they should be receiving this information to verify the rate and amount.

The service credit amount is capped at 25 per cent of the service charge and TTC has already received the full service credit from the vendor for October 2018 to February 2019 invoices. However, without the supporting documentation, TTC cannot verify whether the monthly service credit provided by S&B is accurate or not.

Recommendations:

- 27. The Board request the Chief Executive Officer, Toronto Transit Commission, to identify fare gate incident priorities in TTC's work order management system and track targets for second line maintenance by its vendor based on those incident priorities.**
- 28. The Board request the Chief Executive Officer, Toronto Transit Commission, to negotiate with its vendor to receive all relevant data and information regarding calculation of the fare gate service credit.**

E. Ensuring TTC Receives All the Revenue It Should

E. 1. TTC Needs More Assurance from PRESTO on their Controls

Metrolinx Roles and Responsibilities:

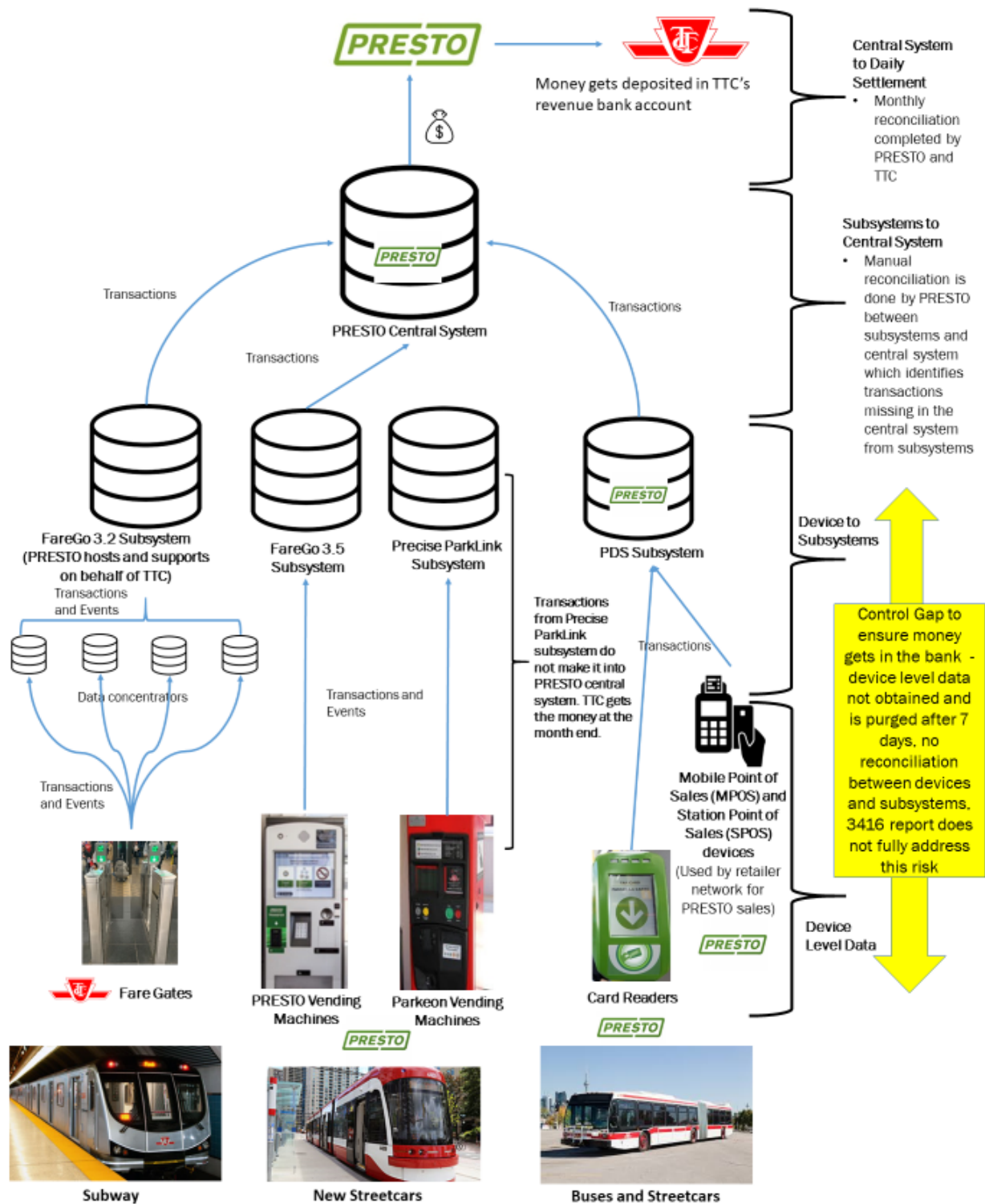
Metrolinx is responsible for processing, remitting, and reporting all TTC revenue transacted through the PRESTO system.

Metrolinx provides a monthly reconciliation of all revenue remitted to the TTC

The Master Agreement between TTC and Metrolinx requires Metrolinx to provide a monthly reconciliation of all revenue remitted to the TTC. Assurance over the completeness, accuracy, and timeliness of these reconciliations is provided by an independent auditor. The monthly reconciliations completed by Metrolinx compare the revenue reported from the device subsystem to the PRESTO central system, and to the financial settlements made by Metrolinx to TTC's revenue bank account.

Figure 10 below shows the flow of transactions and events from the fare equipment devices, (PRESTO card readers, PRESTO vending machines on new streetcars, TTC fare gates) to the device subsystems, (FareGo and PDS) to PRESTO's central system, and then to the deposit in TTC's revenue bank account.

Figure 10: Transaction and Event Flow From Device to PRESTO's Systems



An independent auditor performs an annual audit (CSAE 3416 report) to provide assurance on Metrolinx's controls related to PRESTO revenue for its transit agencies

Metrolinx contracts an independent auditor to perform an annual CSAE 3416 Type II audit ("3416 report"). The 3416 report provides assurance for the external financial statement auditors of its transit agencies, including TTC, that Metrolinx maintained effective and efficient internal controls related to financial reporting that includes, but is not limited to, the following key areas:

- Design and installation of PRESTO card readers and point-of-sale devices;
- The collection, reconciliation, and remittance of coin and token fare payments from PRESTO vending machines on new streetcars (called Single Ride Vending Machines); and
- Processing, recording, reporting, and settlement of PRESTO transactions.

CSAE 3416 report is also one of TTC's contractual business requirements

The 3416 report is also one of TTC's business requirements in its contractual arrangement with Metrolinx, which specifies that this report:

"must address all key controls necessary to ensure that customers are properly charged and that revenue allocated to TTC, and unearned revenue is properly calculated, complete (i.e. including any 'exception' transactions), and remitted to TTC within the settlement time frame outlined in the Agreement."

To support TTC with validating PRESTO reported revenues, Metrolinx provides TTC with several key financial reports including financial transaction history, daily bank settlement, and extract reports on tap transactions (usage) and sales and payments.

TTC Roles and Responsibilities:

TTC staff use the financial reports and reconciliation provided by Metrolinx to perform its own monthly reconciliations of PRESTO revenue

TTC Finance uses the key financial reports provided by Metrolinx to perform its own monthly reconciliations and financial reporting of PRESTO revenues. TTC's monthly reconciliations include comparing revenue reported from the financial settlements made by Metrolinx to TTC's revenue bank account to the PRESTO central system and to the device subsystems (PDS and FareGo). TTC also ties its reconciliation from the financial reports to Metrolinx's monthly reconciliations.

During our audit, we identified gaps, risks and issues related to TTC receiving all of the PRESTO revenue that it is entitled to receive. The majority of the time when we asked PRESTO staff about potential risks, we were informed they were addressed fully by the 3416 report. Two of the risks we identified related to:

- missing transactions between the systems; and
- transactions not checked after devices re-connect to the system after being offline.

Missing Transactions Between Subsystem and Central System

When Metrolinx prepares its monthly reconciliation for TTC, it manually identifies transactions missing in the subsystems but appearing in PRESTO's central system, and vice versa. When there is a discrepancy identified by PRESTO staff manually, a ticket is raised internally to investigate the issue further. PRESTO Staff advised us that transactions from the subsystem are manually pushed into the central system as a result of the investigation. Manual identification of issues and pushing of transactions from the subsystem to central system are prone to human error. TTC only receives revenues that appear in the PRESTO's central system. Every month, approximately 10,000 transactions on average from the subsystem do not get uploaded into PRESTO's central system for TTC. Although this monthly amount of missing items is not considered financially significant, it is important to ensure this risk is addressed so that potential revenue is not missed.

There is no automatic exception reporting produced by the PRESTO systems when transactions do not get reported to either the subsystem or central system. Currently the manual reconciliation is a comparison against what is reported in the subsystem vs. PRESTO central system, so it is an even higher risk when transactions do not get reported to either of the systems (subsystem and PRESTO central system) as this would not be caught by the manual reconciliation.

Transactions on Devices that Do Not Upload on Day of Transaction Occurrence

We also noted that there are transactions that do not get uploaded to PRESTO's system on the day of the transaction occurrence. These delayed transactions occur when the device is offline and the device doesn't upload the transactions at that time, because it isn't connected to the network, or there might be a system issue where the transactions do not get pushed from the subsystem to PRESTO's central system. If there is a loss in connectivity and the device goes offline, the PRESTO card readers are designed so that the device will still successfully accept the taps, and the transactions will be uploaded once online again. However, this delay can sometimes be several days or longer. PRESTO's systems do not provide exception reporting when a device does not upload its transactions on the day of the transaction occurrence. They also do not provide exception reporting on the delayed transaction receipts. Metrolinx staff advised us that the transaction gets a delayed transaction exception flag only when a transaction is received in the system 30 days later than the actual transaction date and time.

TTC has been using its ridership count as a way to try and determine potential missing revenues, however this method would likely only identify very large variances and TTC's ridership count has been calculated from revenue (vs passenger onboarding count). For example, TTC noted as part of its ridership count comparison exercise that for a particular day the revenues reported from PRESTO vending machines were 75 per cent lower than average. TTC raised the incident with PRESTO and PRESTO staff confirmed that there was an issue with the system's data transmission which was later fixed. TTC was then able to get their complete revenue transactions uploaded to the PRESTO central system.

TTC's analysis should be improved to analyze in comparison to expected revenue per day by vehicle and card reader (device), and incorporate actual ridership, to be able to review potential revenue loss at a more granular level. Given the risk in this area, increased attention and analysis by TTC is important.

Since TTC's missing revenue verification method is on a lump sum total comparison to previous days' transactions, instead of on individual vehicles and card readers, there is a possibility that TTC may miss an entire vehicle revenue proceeds from PRESTO (or more). For example, a vehicle's devices could be offline and therefore did not upload the transactions, or there might be issues with the system data transmission.

Additional controls and assurance is needed that revenue is captured properly from the device to the subsystem level

We identified this risk and control gap - it is important for PRESTO to have additional controls in place to provide assurance that the existing interface controls are working properly and transmitting revenues completely, accurately and timely from device level to subsystems (PDS and FareGo) and subsequently to PRESTO's central system.

The experienced professionals we engaged from an external audit firm confirmed this, with the control gap related to "device has malfunctioned, resulting in the inability for customers to tap their PRESTO cards" and concluded the following:

"Not all device failures are captured/logged in the monitoring tool. Further, vending machines on new streetcars and fare gates are not subject to the same detailed monitoring controls over PRESTO card reader device failures.

It is recommended that management assess the impact and severity of known device malfunctions and their root cause for not resulting in an event, and either a) configure or monitor the monitoring tool/device to log these events, or b) address the residual risk (i.e. for those events that cannot be logged) through a compensating review control, or c) implement new monitoring controls."

Gap Assessment of PRESTO's Assurance Provided on its Controls

Given risks and potential control gaps we identified through our audit work, we augmented our team with experienced professionals from an external audit firm to perform a gap assessment of TTC's risks related to PRESTO revenue against the controls covered by the 3416 report.

External audit firm found 12 out of 35 controls that were either not implemented, not included in 3416 report, or insufficient information to conclude on the gap

We found some key controls were not included in the 3416 report; 12 out of 35 controls were either not implemented, not included in the 3416 report, or in one case, insufficient information was available to conclude on the gap. The main issue highlighted was that gaps exist in ensuring all revenue transactions are captured between the fare equipment (devices) and the subsystems.

This main issue includes the following risks that need to be addressed:

1. There are no formalized controls between TTC owned fare gates, PRESTO owned data concentrators, and the subsystem.
2. With regards to TTC monthly passes and single-use tickets, there is a lack of reconciliation controls designed to address variances between proceeds received and the information captured in PRESTO's central system. Specifically, sales from retailers are not subject to reconciliation controls and similar controls have not been validated for cash received from PRESTO owned Point of Sale (POS) devices. Thus the extent, impact and treatment of potential variances is currently unclear and bears further investigation.
3. Errors that occur at the device level are not consistently identified by the existing controls. In addition, varied vendors and subsystems create further challenges in identifying whether all devices have consistent levels of control. For example, incomplete or failed taps do not always result in errors being logged (i.e. card reader faults). The impact of these "unknown" errors cannot be quantified at this point.

The above risks as well as the other gaps for financial reporting should either be included in or clarified in PRESTO's 3416 report. For controls at PRESTO's retailer network, those should either be included in PRESTO's 3416 report, or a separate 3416 report should be provided by this vendor to PRESTO for its transit agencies. At a bare minimum, PRESTO should have the right to audit its retailer network vendor.

TTC should ensure that the assurance specifically includes that the interface controls between the device level and subsystems are adequately designed and operating effectively. For example, verification for a sample of devices on a monthly basis that transactions were transferred from the device level to PRESTO's subsystem, and offline devices uploaded their transactions completely and accurately once they reconnected back to the network.

Some gaps relate to operational risks and are typically addressed by another mechanism such as a Service Level Agreement

Some of the gaps relate to operational risks which would typically be addressed outside of a 3416 report through another mechanism, such as an SLA. Given Metrolinx and TTC are not close in finalizing an SLA, it is important that the parties find a mechanism to address these operational controls.

Recommendation:

- 29. The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:**
- a. ensure the required controls are both sufficiently and clearly covered in the CSAE 3416 report or through another mechanism(s); and**
 - b. ensure the assurance specifically includes that the interface controls between the device level and subsystems are adequately designed and operating effectively.**

E. 2. Audit Scope Limitation, Device Level Data Not Provided by PRESTO to TTC

AGO Scope Limitation:

For the section on completeness and accuracy of PRESTO revenue transmission to TTC, the Auditor General required and requested the device level data from PRESTO at the April 2019 joint kick-off meeting for the audit. Device level data is at the level of PRESTO card readers in buses and streetcars. Although reports were made available from the daily bank settlements and from the central system –if transactions did not make it from the device to the central system, we would have no way of knowing this without the device level data.

Device level data was not made available to us during our fieldwork and we were provided with a quote which was cost prohibitive and informed the data is purged after 7 days

There were no concerns or objections raised by PRESTO at the time of our joint kick-off meeting to provide this data to us. After several follow-up requests and varying reasons provided by PRESTO on why this data could not be provided, we were informed too late in the audit (end of July 2019) that the device level data is available to be decrypted, but is purged after 7 days at the device level, and PRESTO's vendor's quote for the additional cost per device to obtain this decrypted data would have been cost prohibitive for the AGO. PRESTO's vendor's staff informed us that the high cost was due to the manual process to decrypt each device individually.

We were able to perform some audit procedures from PRESTO's central system – however there is a risk that not all transactions are properly uploaded from the device to subsystem level

We were able to perform some audit procedures to test accuracy, and timeliness of TTC's PRESTO revenue from PRESTO's central system. However, there is a risk that not all transactions are properly uploaded from the devices to the subsystem and then to the central system. Therefore our audit scope is limited in the area of completeness of PRESTO revenue, as we were unable to audit this risk given the lack of data made available to us for our audit period.

Device Level Data Not Provided to TTC

Device level data is a contractual business requirement for TTC

One of the business requirements in the Master Agreement states that Metrolinx has to:

"capture data in a manner that permits TTC, PRESTO, and an authorized independent auditor to reconstruct, track, and analyze all elements in the transaction process from initiation by a Customer through completion of the exchange of funds between a Customer, PRESTO and TTC."

TTC does not receive device level data from PRESTO despite requesting it for several years

Currently, TTC does not receive any device level data from PRESTO, despite requesting it for several years. It wasn't until our audit request was made that they were told it could be decrypted and made available at an additional cost. Without that data, TTC cannot verify completeness and accuracy of transactions from the device level to the PRESTO systems. TTC's Farecard team could also use this data in checking against the physical observations from their device audits. TTC has submitted a formal change request to Metrolinx for device level data and this request is currently being assessed for feasibility by Metrolinx.

It is our view that the provision of this data should have already been considered and discussed with TTC considering the requirement in the Master Agreement and the requests made by TTC. PRESTO also does not receive the device level data from its vendor and does not appear to be performing a verification of transactions reported from the device level to the PRESTO systems. Instead, PRESTO staff advised us that they rely on their integration and user testing before the deployment of a device, and that their policy is to only deploy to production with appropriate acceptance criteria. PRESTO also relies on its 3416 report. We expected to find controls in place after a device had been deployed and as noted later in this report, we found control gaps between the device and subsystem levels.

Recommendation:

30. The Board request the Chief Executive Officer, Toronto Transit Commission, to continue to pursue the receipt of device level data (revenue related transaction and error event logs) from PRESTO in accordance with its Master Agreement with Metrolinx.

E. 3. TTC Needs to Further Improve its Analysis and Monitoring

TTC can further improve its monitoring to ensure it is receiving all the PRESTO revenue it is entitled to

There are several areas where TTC can further improve its monitoring in order to ensure it is receiving all the PRESTO revenue it is entitled to, including:

- Verifying that all expected transactions are reflected, for example, whether all individual vehicles and devices are included for analysis
- Check that all offline devices later upload to PRESTO's central system
- Follow-up of Metrolinx resolution on missing transactions

The contract requires Metrolinx to retain data for seven years and to keep information in a data warehouse for TTC to access. TTC is not accessing this information and it is not being kept by Metrolinx as required under the contract. For example, device level data (whether there was a successful tap or not and on which machine) is key to identifying ongoing equipment issues, calculating device availability, and reconciling revenue. Under the contract, Metrolinx must keep this and other contract information for seven years, but it does not. The information is encrypted and purged after seven days. This is an area where TTC needs to "drive the bus" to get the information it requires to fulfill its oversight responsibilities to citizens. Examples are outlined below.

E.3.1 Verification Not Done to Individual Vehicles and Devices

Neither TTC or Metrolinx perform a revenue reconciliation to the level of individual vehicles and card readers

Metrolinx's monthly revenue reconciliation includes comparing revenues from the device subsystem (PDS and FareGo) to the PRESTO central system, and to the financial settlements made by Metrolinx to TTC's bank account. Metrolinx does not reconcile revenue received to TTC's individual vehicles or card readers to ensure there are no missing in-service vehicles or missing card readers in the revenue reported. We have been informed by Metrolinx staff that they rely on their system controls to ensure completeness and accuracy of transaction transmission from the devices to PRESTO's systems. As a result, Metrolinx does not perform revenue reconciliation to the individual vehicles and card readers.

TTC's monthly reconciliation also does not include revenue reconciliation to the individual vehicles and card readers. Reconciling revenue to the individual vehicles and card readers ensures that revenue is received from all in-service vehicles that are on the road collecting fares. TTC staff informed us that for the completeness and accuracy of revenue reported from the PRESTO system, TTC relies on the assurance provided by the 3416 report. As noted in this audit report the 3416 report was missing key controls that needed assessing.

As part of our audit procedures, we performed revenue reconciliations of all vehicles and card readers that were on the road collecting fares and in-service fare gates for one day in May 2019 to see whether there were transactions reported from all in-service vehicles and devices. We initially found that for 7 in-service devices there were no transactions reported within the first 5 business days from the actual transaction date, however TTC confirmed that there were transactions reported in later tap transaction reports, some up to 30 days after the date. There were no issues identified through this particular reconciliation related to completeness of transactions from the PRESTO central system to the settlement in TTC's bank account. However, the scope of our audit was limited given the lack of device level data available for our audit period, and therefore our audit does NOT confirm that all of the financial transactions received by the devices are completely and accurately transmitted to PRESTO's systems.

TTC should also be including this completeness check in its regular revenue reconciliations using the tap transaction (usage) reports which provide details on the individual vehicles and card readers. It is important for TTC to ensure that there are transactions reported from all in-service vehicles and fare gates and to follow-up with PRESTO for any discrepancies identified.

E.3.2 No Check that Offline Devices Later Uploaded to PRESTO's Central System

PRESTO Card Readers

When a PRESTO card reader is offline and is not connected to the network, the card reader does not upload the revenue transactions to the PRESTO system until it reconnects to the network. This could be the same day or several days later. According to PRESTO Staff, the card reader will continue to accept taps when it is in offline mode for up to the first seven days. After the seventh day, the card reader goes out of service and does not accept any taps. At this point in time, PRESTO service technicians have to restore the card reader to online mode for it to upload the transactions from the previous seven days.

There is no verification by TTC or Metrolinx on whether all the card readers that were offline later uploaded transactions completely and accurately to the PRESTO system once reconnected

Currently, there is no verification done by Metrolinx or TTC as to whether all the card readers that were offline uploaded their transactions to the PRESTO system completely and accurately once the device gets reconnected to the network. Metrolinx staff advised us that their system integrity and controls provide assurance that the data on the offline devices are retained and uploaded to the PRESTO system completely and accurately once they are reconnected to the network. TTC relies on the 3416 report to provide assurance on the data upload of offline devices to the PRESTO central system completely and accurately.

TTC gets a daily report from PRESTO on card readers that were offline for more than 24 hours. It is important for TTC to ensure that there are transactions reported for those card readers that came back online. Although this check does not guarantee that all transactions were completely and accurately uploaded to the PRESTO central system, it does provide some assurance that devices that came back online had transactions reported for the days that they were offline.

TTC Fare Gates

Similarly for fare gates, TTC does not currently monitor fare gate offline status in real time as the current tools in place do not provide a reliable mechanism to determine whether a fare gate is offline or not. However, TTC does receive a daily report from its vendor on offline status gates. The daily report that TTC receives is a snap shot of the fare gates at a specific point in time. Gates can go offline at various times of the day and the snap shot report provided would not help in identifying all the gates that were offline for a prolonged period of time. It is important for TTC to identify gates that were offline for more than a specific period of time. For example, a system generated exception reporting on gates that were offline for more than 8 hours would allow TTC to more diligently monitor the offline gates.

TTC staff have advised us that they have recently taken steps to identify fare gates that did not report transactions during the entire week through a weekly report that is sent to TTC's Revenue Operations team to investigate to ensure that there are no issues with the fare gates connectivity to the network.

E.3.3 Follow-up of Metrolinx Resolution on Missing Transactions

Metrolinx staff create incident tickets to investigate the discrepancies between the subsystems and central system internally and TTC staff have advised us that those internal investigations results are not shared by PRESTO. During our audit we requested PRESTO to provide their resolution summary on the incident tickets raised for the November 2018 discrepancies between the subsystems and central system, and asked TTC staff whether the missing transactions were potentially received by TTC as mentioned by PRESTO on their resolution summary. TTC staff confirmed that the missing transactions in the central system were eventually received by TTC in the following month or dates mentioned by PRESTO on their resolution summary.

TTC should follow up with PRESTO on the results of their internal investigations to verify outstanding receivables

It is important for TTC to follow-up with PRESTO to get the results on PRESTO's internal investigations regarding these discrepancies and to verify the outstanding receivables from the missing transactions in the central system, to ensure they are receiving all PRESTO revenue.

Recommendations:

31. The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure that there are transactions reported from all in-service vehicles and fare gates by doing a reconciliation against transactions received from PRESTO's central system.
32. The Board request the Chief Executive Officer, Toronto Transit Commission, to improve controls that verify whether there were transactions reported from offline devices when they reconnect back to the network.
33. The Board request the Chief Executive Officer, Toronto Transit Commission, to regularly follow-up with PRESTO on the results of their internal investigation regarding monthly discrepancies between the subsystem and central system, and perform validation to confirm the receivables of the missing transactions in the central system.

E. 4. TTC Monthly Passes and Single Use Tickets – Including Retailer Network Controls

TTC Monthly Passes and Single Use Ticket Sales

TTC receives compensation for reconciling items of one revenue stream (when customers tap PRESTO cards) but not for the two other streams (monthly TTC passes and single-use tickets)

For sales from customers tapping their PRESTO cards (called e-purse), TTC receives a reconciliation from PRESTO, including compensation for reconciling items where the revenue transactions did not initially upload properly to the central system from the subsystem. **However, TTC does not receive compensation for these same reconciling items for TTC monthly passes or single-use tickets.** These two fare payment methods began in 2018 and are now becoming financially significant for the TTC. PRESTO staff advised this has not been provided in the past to TTC as contractually TTC is to receive revenue for these items based solely on its central system. However, there is no wording in the contract to this effect currently.

TTC also does not receive a reconciliation report of how many monthly TTC passes or single-use tickets were sold vs. how many transactions made it to PRESTO's central system

Although TTC receives a sales extract report from PRESTO for monthly TTC passes and single-use tickets sales from PRESTO's third party retailer network, fare vending machines, and websites, the report only has sales transactions that made it to PRESTO's central system. If the sales transaction did not make it to PRESTO's central system, TTC does not receive any revenues. PRESTO also does not provide TTC with a reconciliation report of how many monthly TTC passes or single-use tickets were sold vs. how many transactions made it to the PRESTO central system.

TTC should be receiving compensation for reconciling items from all of its revenue streams, including TTC monthly passes and single-use tickets

PRESTO staff initially advised both us and the expert professionals we engaged that these reconciliations and the related compensation have never been provided to TTC, as contractually TTC is to receive revenue for these items based solely on PRESTO's central system. However, we reviewed the contract and there is no wording in the contract to this effect. When we inquired further with PRESTO staff, they later advised us it is not stated in the contract, but that there was informal agreement from TTC during the PRESTO roll-out in 2014 and that PRESTO's internal process narratives include it, but could not provide anything in writing regarding TTC's agreement. TTC disagrees that this is the agreed upon settlement method for TTC monthly passes and single-use tickets. In our view, TTC should be receiving compensation for these reconciling items for TTC monthly passes and single-use tickets and should work through this issue together with Metrolinx. It is very important for TTC to know how many sales transactions did not make it to PRESTO's central system to get compensation for potential missing revenues.

Retailer Network Controls

There are control gaps with the retailer network cash and debit/credit reconciliations that need to be addressed

In particular for the sale of TTC monthly passes and single-use tickets from PRESTO's third party retailer network, there are control gaps with the cash and debit/credit reconciliations that need to be addressed. It is possible the retailer network may have some controls in this area, but there are no reconciliation reports provided to PRESTO nor included in its 3416 report. PRESTO relies solely on the sales transactions from its central system for the retailer network and does not receive any type of reconciliation report from them. In our view, this control should be put in place, Metrolinx should be providing assurance on its retailer network controls, and obtain a 3416 report from its retailer network vendor.

Recommendation:

- 34. The Board request the Chief Executive Officer, Toronto Transit Commission, to request Metrolinx to:**
- a. include controls related to the retailer network in next year's CSAE 3416 report or obtain a separate CSAE 3416 report from its vendor for the retailer network; and**
 - b. receive a reconciliation from Metrolinx of retailer sales transaction receipts listing with the sales extract report from PRESTO's central system, to monitor potential missing revenues.**

Conclusion

This Phase 2 audit focused on whether the TTC is receiving all the PRESTO revenue it should, including the functionality of fare equipment (PRESTO card readers, PRESTO vending machines on new streetcars, TTC subway fare gates), TTC's contract with Metrolinx, and PRESTO revenue transactions on TTC captured through PRESTO's back-end systems.

We have concluded that TTC's PRESTO revenue may not be complete. We will not be providing an estimate of lost revenue because of information gaps and control weaknesses. It is our view that TTC and PRESTO need to focus on tracking the right things in a complete and accurate manner – while retaining supporting evidence for further analysis. Undertaking this exercise will assist the parties in resolving issues through its governance framework (once fully operationalized) to improve the completeness of revenue.

34 recommendations to help TTC and Metrolinx address issues with functionality of fare equipment and ensure TTC receives all the PRESTO revenue it should

Implementing the 34 recommendations will help both TTC and Metrolinx address issues with the functionality of the PRESTO fare equipment and the incident management process, and improve the accuracy and completeness of the availability calculation of PRESTO card readers, as well as provide TTC with required information/data to monitor and address its risks related to completeness of PRESTO revenue.

We hope that this report will help both parties to move forward together to ensure the contractual needs and business requirements of TTC are met, and that this will be done in an efficient and effective manner through the contractual arrangement.

It will also help TTC to continue to improve areas it is accountable for and that also affect revenue calculations, including the functionality of its fare gates and contract management practices with its vendor.

It will help both TTC and Metrolinx to ensure that sufficient assurance is being provided on controls related to completeness of PRESTO revenue by addressing the gaps in the 3416 report.

Finally, the governance structure contemplated in the contract needs to be put in place to support the resolution of the issues highlighted in this report: the outstanding contractual deliverables, and any new issues that arise over the remainder of the contract term.

Audit Objectives, Scope and Methodology

The Auditor General's 2018 Audit Work Plan, received by City Council on December 5, 2017, includes a review of the efficiency and effectiveness of Toronto Transit Commission's (TTC's) Revenue Operations. This is the second phase of the audit, with the first phase focussing on fare evasion and fare inspection and published in February 2019.

We have taken a phased approach to the TTC Revenue Operations audit with two audit phases (this audit is the second phase), given the complexity and multiple risk areas within revenue operations.

This report on our Phase 2 audit focuses on whether TTC is receiving all of the PRESTO revenue it should, including a review of the following:

- Functionality of fare equipment (PRESTO card readers, TTC subway fare gates, PRESTO vending machines on new streetcars)
- TTC's contract with Metrolinx
- Capturing all PRESTO revenue transactions on TTC through PRESTO's back-end systems

Our review covered the period from January 1, 2018 to August 31, 2019, except in multi-year trend analyses.

We had a **scope limitation in our audit** due to the following limitations in obtaining data and information requested from Metrolinx:

- Unable to receive device level data to test completeness of revenue from the device level to the subsystem (requested and received quote late in audit from PRESTO's vendor, but data we needed for audit was already purged, due to records only being kept for seven days and quote to unencrypt was cost prohibitive)
- Unable to receive all of the information required in the device monitoring software tool and related back-up for the weekly availability rate as data is purged after 60 days
- No reporting capability or ability to extract data from the device monitoring software tool for TTC
- Unable to easily track swapping of PRESTO card reader devices as inventory is not managed in a log or report by PRESTO
- No direct access to staff provided by Metrolinx and an executive member was always required to be present during interviews/meetings

Our audit methodology included, but was not limited to the following:

- Review of policies, procedures, and guidelines
- Interviews with staff of TTC's Fare Card, Finance, Bus Transportation, Bus Maintenance, Transit Control, Revenue Services Equipment Maintenance (RSEM - fare gates), Procurement, Legal, Vehicle Operators, and Executive
- Interviews with TTC Board Commissioners, TTC Union, NextBus staff
- Interviews with staff of PRESTO and Accenture
- Interviews with other PRESTO transit agencies (Ottawa, Brampton, Burlington) and review of their internal audit reports
- Review of TTC-Metrolinx agreement signed in November 2012
- Review of TTC-S&B Master Agreement signed in December 2012 and SLA signed in September 2018
- Review of documents and responses received from TTC, PRESTO, Accenture and S&B

- Conducted four days of fieldwork observation of fare gates across 74 subway stations (992 fare gates) with four teams consisting of two audit staff per team
- Bus device audit – see description below
- Conducted one day of fieldwork observation of PRESTO vending machines and PRESTO card readers on new streetcars with two teams consisting of two audit staff per team
- Performed revenue reconciliations of all in-service devices that were on the road collecting fares and fare gates for one day in May 2019 to see whether there were transactions reported from all in-service devices and fare gates
- Review of TTC's PRESTO revenue reconciliation process and related documents, and its calculation and methodology for its revenue loss claim
- Corroborative analysis of the gaps in the 2018 PRESTO 3416 report by an independent firm

Bus Device Audit Approach and Methodology

In order to efficiently evaluate PRESTO card reader functionality, we obtained the assistance of over 100 TTC bus operators from all seven bus garages who drove 168 buses. The operators were asked to observe and write any PRESTO issues on an audit form during their shifts on two days in June 2019. We received the completed audit forms and compared them to the device monitoring software tool and to PRESTO's incident management system to determine which device status was captured and whether an incident ticket was opened.

Compliance with generally accepted government auditing standards

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix 1: Management's Response to the Auditor General's Report Entitled: "Review of Toronto Transit Commission's Revenue Operations: Phase Two – PRESTO/TTC Fare Equipment and PRESTO Revenue"

Summary: TTC accepts all of the Auditor General's recommendations. Most of the recommendations are consistent with TTC management and actions to date and ongoing efforts to address and resolve the issues as identified in the recommendations.

Recommendation 1: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx and its vendors to:

- a. identify the root cause for frozen and intermittent PRESTO card readers;
- b. develop a method to detect above issues in the device monitoring software tool; and
- c. ensure frozen and intermittent readers are included in the PRESTO card reader availability calculation.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- a. **Identify the root cause for frozen and intermittent PRESTO card readers;**
 - In June 2019, TTC requested Metrolinx establish a dedicated team to identify the root cause for frozen and intermittent PRESTO card readers. The work includes a review of incident and device log data, TTC initiated audits and weekly team meetings to review issues and progress. In July, a software update was deployed to all card readers that resulted in some improvement of performance. Further software updates to address this issue are expected from Metrolinx by end of 2019.
- b. **Develop a method to detect above issues in the device monitoring software tool; and**
 - As Metrolinx completes the work under 1 a) above, the TTC has requested access to additional SOTI data and has commenced working with Metrolinx to better identify the incidents and alerts for frozen or intermittent PRESTO card readers. The additional access is expected to be provided in Q2 2020.
- c. **Ensure frozen and intermittent readers are included in the PRESTO card reader availability calculation.**
 - As Metrolinx completes the work under 1 a) and b) above, TTC has requested Metrolinx update PRESTO card reader availability calculations to include frozen and intermittent card readers.

Recommendation 2: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to determine the best method to capture complete and accurate information on in-service vehicles for the PRESTO card reader availability calculation, including assessing TTC's Vision system for this purpose.

Management Response: ☒ Agree ☐ Disagree
Comments/Action Plan/Time Frame:

The implementation of VISION provides a number of opportunities for improvements. TTC will initiate a review with Metrolinx, of the current process for determining in-service vehicles for the PRESTO card reader availability calculation. The option of using data from the VISION system will be included in the review along with any other tools that can improve the current process. This review is expected to be completed in Q4 2020.

Recommendation 3: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:

- a. explore ability to have more frequent pinging while ensuring impact on device performance and customer experience is minimized; and
- b. discuss using the most frequent device status during an interval instead of the latest event for the availability rate calculation.

Management Response: ☒ Agree ☐ Disagree
Comments/Action Plan/Time Frame:

- a. Explore ability to have more frequent pinging while ensuring impact on device performance and customer experience is minimized;
 - TTC has engaged with Metrolinx to reduce the pinging interval. Metrolinx's initial assessment indicated the possibility of adverse effects on device performance. TTC has requested Metrolinx also review other alternatives that would not impact device performance also be assessed.
 - b. Discuss using the most frequent device status during an interval instead of the latest event for the availability rate calculation.
 - Based on the work described above, the TTC will consider Metrolinx using the most frequent device status, rather than the latest event for availability rate calculation. This complements the work outlined the response to recommendation 1.
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Recommendation 4: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:

- a. ensure missed devices in the device monitoring software tool are identified by PRESTO and communicated to TTC;
- b. determine and address the underlying issue for missed devices in the device monitoring software tool; and
- c. obtain back-up for the weekly card reader availability rate calculations.

Management Response: ☒ Agree ☐ Disagree
Comments/Action Plan/Time Frame:

- a. **Ensure missed devices in the device monitoring software tool are identified by PRESTO and communicated to TTC.**
- TTC has requested Metrolinx to review the SOTI monitoring tool to ensure missed devices are identified and communicated to TTC.
- b. **Determine and address the underlying issue for missed devices in the device monitoring software tool.**
- Consistent with a) above, TTC has requested Metrolinx to address and remedy the underlying issues which result in missed devices in the SOTI monitoring tool.
- c. **Obtain back-up for the weekly card reader availability rate calculations.**
- TTC has requested Metrolinx to provide supporting data for the weekly availability rate calculations.

Recommendation 5: The Board request the Chief Executive Officer, Toronto Transit Commission, to continue discussions with Metrolinx to:

- a. **obtain the daily PRESTO card reader availability spreadsheet for all seven days of the week, including weekends and holidays in Canada; and**
- b. **ensure that TTC's availability calculation includes holidays in the country of PRESTO's vendor.**

Management Response: ☒ Agree ☐ Disagree
Comments/Action Plan/Time Frame:

- a. **Obtain the daily PRESTO card reader availability spreadsheet for all seven days of the week, including weekends and holidays in Canada;**
- TTC has requested Metrolinx provide for the daily PRESTO card reader availability spreadsheet for all 7 days of the week including weekends and holidays in Canada.
- b. **Ensure that TTC's availability calculation includes holidays in the country of PRESTO's vendor.**
- This is complete. Metrolinx is providing card reader availability reports on holidays irrespective of holidays in the country of PRESTO's vendor.

Recommendation 6: The Board request the Chief Executive Officer, Toronto Transit Commission, to:

- a. **ensure the availability calculation of PRESTO vending machines includes all out-of-service incidents, including the status when the coin box is full and the machine is not available for the customer to pay by coins; and**
- b. **provide TTC with the detailed back-up data/information that supports the weekly availability rate.**

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- a. Ensure the availability calculation of PRESTO vending machines includes all out-of-service incidents, including the status when the coin box is full and the machine is not available for the customer to pay by coins;
 - TTC has requested Metrolinx review the availability calculation for all vending machines.
 - b. Provide TTC with the detailed back-up data/information that supports the weekly availability rate.
 - Consistent with a) above, TTC has also requested that Metrolinx provide source data for availability calculations.
-

Recommendation 7: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to restore the contracted deliverable of the credit and debit card fare payment method on the new streetcars, with estimated timing provided by Metrolinx.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC agreed to a proposal from Metrolinx and S&B to remove debit/credit functionality from SRVMs to improve availability for a test period. The test demonstrated significant improvement in SRVM performance from approximately 88% to 95%. TTC will request a meeting in Q4 2019 with Metrolinx to review.
-

Recommendation 8: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:

- a. ensure that PRESTO's vendor's monitoring team is consistently logging tickets for all out-of-service card readers, even if able to successfully recover remotely; and
- b. regularly receive a log of devices that successfully re-boot.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- a. Ensure that PRESTO's vendor's monitoring team is consistently logging tickets for all out-of-service card readers, even if able to successfully recover remotely;
 - This is complete. TTC requested Metrolinx ensure an incident ticket is logged for each out of service card reader, including those recovered remotely by Accenture. Metrolinx implemented this process in early 2019.
 - b. Regularly receive a log of devices that successfully re-boot.
 - This is complete. This information is captured in the process outlined above.
-

Recommendation 9: The Board request the Chief Executive Officer, Toronto Transit Commission, to:

- a. provide training and communication to TTC forepersons for them to log all tickets in PRESTO's incident management system (ServiceNow) for PRESTO issues identified by TTC staff, including TTC operator sign-in sheets; and
- b. require TTC technicians to maintain a log of PRESTO devices reset, including whether the reset was successful or not in resolving the PRESTO issue, and provide this to TTC forepersons and PRESTO repair staff.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- a. Provide training and communication to TTC forepersons for them to log all tickets in PRESTO's incident management system (ServiceNow) for PRESTO issues identified by TTC staff, including TTC operator sign-in sheets;
 - This item is complete. The current process requires bus Operators to report defective card readers and Supervisors to generate a ticket in ServiceNow.
 - Additional training and communications has been delivered to supervisors and forepersons to reinforce the process.
 - b. Require TTC technicians to maintain a log of PRESTO devices reset, including whether the reset was successful or not in resolving the PRESTO issue, and provide this to TTC forepersons and PRESTO repair staff.
 - TTC records all vehicle maintenance using a Work Order system (IFS). This captures PRESTO device resets performed by technicians. TTC will improve data entry processes to ensure IFS captures whether a reset was successful or not.
-

Recommendation 10: The Board request the Chief Executive Officer, Toronto Transit Commission, to discuss with Metrolinx:

- a. enabling data extraction from the device monitoring software tool in a usable format;
- b. consideration of updating to a new version of device monitoring software tool that includes reporting capability; and
- c. ability to maintain and obtain data logs for greater than 60 days from the device monitoring software tool.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- a. Enabling data extraction from the device monitoring software tool in a usable format;
 - TTC has submitted a request to Metrolinx to provide additional SOTI data log information in acceptable formats for reporting
-

- b. **Consideration of updating to a new version of device monitoring software tool that includes reporting capability;**
 - TTC has requested Metrolinx provide data reports using current version of SOTI. TTC will request Metrolinx review the option of updating the current version of SOTI.
 - c. **Ability to maintain and obtain data logs for greater than 60 days from the device monitoring software tool.**
 - This item will be considered with a) above.
-

Recommendation 11: The Board request the Chief Executive Officer, Toronto Transit Commission, to request Metrolinx to regularly provide a running list for all swapped devices, including the device IDs for both the original and swapped devices and mapping to the vehicle.

Management Response: ☒ Agree ☐ Disagree
Comments/Action Plan/Time Frame:

- Under the Master Services Agreement, Metrolinx is responsible for inventory management including controlling, managing, and maintaining the inventory of PRESTO equipment that is installed on TTC buses, streetcars, and in stations. TTC will reinforce with Metrolinx the obligation to perform proper inventory management of the equipment. This item is expected to be completed in Q4 2019.
-

Recommendation 12: The Board request the Chief Executive Officer, Toronto Transit Commission, to request Metrolinx to ensure that for all PRESTO card readers, an inventory log is regularly provided to TTC, including mapping by device IDs to the vehicle numbers.

Management Response: ☒ Agree ☐ Disagree
Comments/Action Plan/Time Frame:

- Metrolinx is responsible for inventory management including controlling, managing, and maintaining the inventory of PRESTO equipment that is installed on TTC buses, streetcars, and in stations. TTC will reinforce with Metrolinx the obligation to perform proper inventory management of the equipment under the Master Services Agreement. This item is expected to be completed in Q4 2019.
-

Recommendation 13: The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure the TTC Bus Transportation department:

- a. **reiterates the importance to TTC Operators to sign in all PRESTO issues, even if they are a daily or intermittent occurrence;**
 - b. **evaluates the need for additional communication and/or training for TTC Operators on the sign-in process; and**
-

- c. implements a process that reconciles all vehicles to the sign-in sheets to ensure all are signed in, and for any not signed in, a separate list is maintained which includes the reason for not being signed in and whether there were any issues.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- a. Reiterates the importance to TTC Operators to sign in all PRESTO issues, even if they are a daily or intermittent occurrence;
- TTC implemented a communications campaign to remind Operators to sign in all PRESTO card reader defects. This will continue as part of a larger cycle of communications to Operators on key issues. TTC is also using the VISION system as a tool to assist in reminding Operators to sign in defects.
- b. Evaluates the need for additional communication and/or training for TTC Operators on the sign-in process; and
- As outlined above in a), communications and training will be updated accordingly. Communications and training will be reviewed to determine if additional initiatives are required.
- c. Implements a process that reconciles all vehicles to the sign-in sheets to ensure all are signed in, and for any not signed in, a separate list is maintained which includes the reason for not being signed in and whether there were any issues.
- TTC will convene a Working Group to determine a process to reconcile sign in sheets and ensure all defects are identified at sign in of the vehicle.

Recommendation 14: The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure the TTC Bus Maintenance department provides an accurate listing of "bus out-of-service greater than seven days" to PRESTO.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC tracks the status and location of all vehicles. TTC will convene a Working Group to develop a list of "bus out of service greater than seven days" leveraging current processes.

Recommendation 15: The Board request the Chief Executive Officer, Toronto Transit Commission, to run daily reporting on warnings for the coin box being full or 75 per cent full, and ensure those streetcars, at a minimum, are made available for the nightly coin collection.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC submitted a request to Metrolinx to provide daily reporting of warnings on coin box at 75% or greater for SRVMs.

Recommendation 16: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to evaluate whether the coin collection needs to occur more frequently for new streetcar vending machines.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC is working with Metrolinx to review the current process for daily collection of coins/token from SRVMs. This item is expected to be completed in Q4 2019.
-

Recommendation 17: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:

- a. establish a governance framework that addresses the governance gap, by re-starting and continuing the Joint Executive Committee as envisioned in the Operational Services Agreement; and
- b. formalize that TTC's contractual and operational issues are appropriate to address directly with Metrolinx at the Joint Executive Committee table, and includes regular status, service and planning review meetings.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- By joint agreement, TTC and Metrolinx agreed to temporarily replace the Joint Executive Committee (JEC) with a bi-weekly integrated schedule meeting. The Executive and team representation remained consistent from JEC to the bi-weekly integrated schedule meeting. The purpose of the bi-weekly integrated schedule meetings was to bring a pragmatic, decisive executive review and decision making approach to ensure the milestones in the schedule for the PRESTO implementation at the TTC was delivered and all risks, schedules and cost issues were addressed. Agendas, minutes and decision logs were set and tracked against schedule. As the Wheel Trans app is being delivered over the remainder of 2019, TTC will advise Metrolinx to reinstate the JEC and governance procedures in accordance with the Master Services Agreement. The TTC will formalize that the contractual and operational issues are to be addressed at the JEC and include status, service and planning review meetings.
-

Recommendation 18: The Board request the Chief Executive Officer, Toronto Transit Commission, to request a schedule and plan from Metrolinx for the remaining contracted deliverables of TTC.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC and Metrolinx have had numerous discussions at the project team level in an attempt to establish a Service Level Agreement (SLA). The requirement escalated to the executive level. The discussions have stalled. In accordance with the Master Service Agreement, TTC will proceed with the establishment of an expert SLA panel to resolve the outstanding SLA issues.
-

Recommendation 19: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to identify and agree upon outcome areas and targets, and to measure and monitor those areas.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC and Metrolinx have had numerous discussions at the project team level in an attempt to establish a Service Level Agreement (SLA). The requirement escalated to the executive level. The discussions have stalled. In accordance with the Master Service Agreement, TTC will proceed with the establishment of an expert SLA panel to resolve the outstanding SLA issues.
-

Recommendation 20: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to agree upon and finalize the Service Level Agreement, and to utilize an Expert Panel as outlined in the Operational Services Agreement if needed.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC and Metrolinx have had numerous discussions at the project team level in an attempt to establish a Service Level Agreement (SLA). The requirement escalated to the executive level. The discussions have stalled. In accordance with the Master Service Agreement, TTC will proceed with the establishment of an expert SLA panel to resolve the outstanding SLA issues.
-

Recommendation 21: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to obtain the required information to refine their estimate of revenue loss due to malfunctioning PRESTO fare equipment.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC has formally engaged Metrolinx over the past three years to refine the methodology to calculate revenue loss. A third party review of TTC's methodology has been completed and validated TTC's approach. As part of the Q4 2019 invoice to Metrolinx, TTC again, requested a discussion to resolve the methodology without resolution. The TTC will also include, as part of the discussion, the method and process to obtain information to refine the estimate of revenue loss due to malfunctioning PRESTO equipment. TTC will include the revenue loss claim as an issue subject to the joint dispute resolution process as set out in the Master Service Agreement.
-

Recommendation 22: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to come to an agreement on a methodology for the revenue loss claim acceptable to both parties, and leverage its contractual governance framework of the Expert Panel if needed.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC continues to invoice Metrolinx for revenue losses incurred and continues to calculate revenue loss due to fare equipment issues on a monthly basis. TTC has invoiced Metrolinx for 2019 year-to-date revenue losses [\$1.4M]. TTC will include the revenue loss claim as an issue subject to the joint dispute resolution process as set out in the Master Service Agreement.

Recommendation 23: The Board request the Chief Executive Officer, Toronto Transit Commission, to make necessary changes to require proper approval sign-off by TTC for Metrolinx to be able to withdraw amounts from TTC's revenue bank account.

Management Response: ☒ Agree ☐ Disagree
Comments/Action Plan/Time Frame:

In recognition of the fact that Metrolinx has made unauthorized withdrawals from TTC's PRESTO revenue bank account, TTC has taken action to recall the funds debited from TTC's bank account without authorization and put in place a stop payment to prevent similar unauthorized transactions from occurring. Funds related to unauthorized withdrawals in 2019 were returned to TTC on September 20, 2019.

TTC has also sent various notices to Metrolinx that they have no authority to withdraw these funds.

TTC will continue to assert with Metrolinx that the proper dispute resolution process is followed and that funds not be withdrawn from our revenue stream without the TTC's authorization. TTC will continue to advise Metrolinx they do not have authority to withdraw these funds.

TTC has also responded to a request from Metrolinx to modify payment terms in section 4.3(e) of the Master Agreement for request for change (RFC) template. TTC is not in agreement with Metrolinx as their requested changes to the current payment terms are not consistent with commercial management in the public sector whereby payment is only made after deliverables have been received and confirmed. Furthermore, the proposed change is also contrary to the terms of the Master Agreement.

TTC will consider this an issue for the dispute resolution process under the MSA.

Recommendation 24: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with its vendor, to continue to make improvements to the functionality of fare gates, and to hold its vendor accountable to meet the target availability rate for TTC fare gates.

Management Response: ☒ Agree ☐ Disagree
Comments/Action Plan/Time Frame:

- TTC and S&B have a Service Level Agreement in place and we continue to work with S&B to improve functionality both for availability and for data and reporting. TTC will hold S&B to account in accordance with the Service Level Agreements for availability targets.

Recommendation 25: The Board request the Chief Executive Officer, Toronto Transit Commission, to consider refining its fare gate availability calculation methodology to better account for partially available fare gates.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- In September, TTC and S&B implemented “patch 3” on faregates without incident. This will allow TTC to update faregate availability reporting. The two defects specifically noted in the report of “amber light” and “frozen wait screen” are addressed in the patch. TTC expects significant reduction in incidents.
-

Recommendation 26: The Board request the Chief Executive Officer, Toronto Transit Commission, to continue efforts in expediting the implementation of FareGo 3.9 in order to streamline the fare gate incident management process.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC plans to implement FareGo 3.9 in Q1 2020 and will continue to find ways to expedite the implementation.
-

Recommendation 27: The Board request the Chief Executive Officer, Toronto Transit Commission, to identify fare gate incident priorities in TTC’s work order management system and track targets for second line maintenance by its vendor based on those incident priorities.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC will implement the change in Maximo to track targets for second line maintenance and update the process and related systems accordingly.
-

Recommendation 28: The Board request the Chief Executive Officer, Toronto Transit Commission, to negotiate with its vendor to receive all relevant data and information regarding calculation of the fare gate service credit.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC is currently in discussions with S&B to clarify the data used to calculate faregate availability, these discussions will include S&B providing all relevant data.
-

Recommendation 29: The Board request the Chief Executive Officer, Toronto Transit Commission, to work together with Metrolinx to:

- a. ensure the required controls are both sufficiently and clearly covered in the CSAE 3416 report or through another mechanism(s); and
 - b. ensure the assurance specifically includes that the interface controls between the device level and subsystems are adequately designed and operating effectively.
-

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- As PRESTO adoption has increased, TTC has communicated in 2017 and 2018 these gaps in controls to Metrolinx. Metrolinx response indicated the revenue streams were either immaterial (2017) or existing controls were sufficient (2018).
- TTC's Finance Dept. has again, in 2019, raised these concerns to Metrolinx Finance counterparts.
- TTC will be formally escalating these concerns to ensure changes are addressed and TTC will consider this an issue for the dispute resolution process under the Master Service Agreement.

Recommendation 30: The Board request the Chief Executive Officer, Toronto Transit Commission, to continue to pursue the receipt of device level data (revenue related transaction and error event logs) from PRESTO in accordance with its Master Agreement with Metrolinx.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC has requested device level data from Metrolinx since at least 2011. As a result of TTC's 2019 requests and as part of continuous improvements, a dialogue has begun with Metrolinx over the provision of device logs from bus and streetcar fare card readers.
- FareGO 3.9 is targeted for a Q1 2020 deployment. Once a new version of FareGO has been deployed, TTC will work to pull TTC fare-gate device level data and incorporate into appropriate revenue controls.
- TTC will include the request for device level data as an issue subject to the joint dispute resolution process as set out in the Master Service Agreement.

Recommendation 31: The Board request the Chief Executive Officer, Toronto Transit Commission, to ensure that there are transactions reported from all in-service vehicles and fare gates by doing a reconciliation against transactions received from PRESTO's central system.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- As part of the work to address the recommendations from the Phase 1 AG report, TTC has developed reporting to identify PRESTO fare equipment (including card readers on faregates, buses and streetcars) for which revenue transactions have not been received for an extended period.
- TTC will perform analysis on the new reporting and will align its resources in 2020 in preparation for the 2021 budget process to best identify areas of improvement and work with vendors to address, as needed.

Recommendation 32: The Board request the Chief Executive Officer, Toronto Transit Commission, to improve controls that verify whether there were transactions reported from offline devices when they reconnect back to the network.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC has identified the resources and infrastructure, including new servers with improved performance and associated 2020 budget required to implement this control.
- Once TTC's additional infrastructure to support the development of new reports and analysis is in place, the control will be addressed.

Recommendation 33: The Board request the Chief Executive Officer, Toronto Transit Commission, to regularly follow-up with PRESTO on the results of their internal investigation regarding monthly discrepancies between the subsystem and central system, and perform validation to confirm the receivables of the missing transactions in the central system.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- TTC has implemented the control for 2019 as all material discrepancies noted on PRESTO's monthly reconciliations are now inventoried monthly and followed up with PRESTO on a quarterly basis to ensure an acceptable resolution has been reached and any funds owed have been remitted.
- It should be noted that PRESTO's monthly reconciliations and the Incident Management are processes that are included in Metrolinx's CSAE 3416 report where assurance over their effectiveness is provided by an independent 3rd party. Furthermore, any revenue that is subsequently received due to investigations into discrepancies would be identified and reconciled as a part of the TTC's existing monthly reconciliation processes.

Recommendation 34: The Board request the Chief Executive Officer, Toronto Transit Commission, to request Metrolinx to:

- a. include controls related to the retailer network in next year's CSAE 3416 report or obtain a separate CSAE 3416 report from its vendor for the retailer network; and
- b. receive a reconciliation from Metrolinx of retailer sales transaction receipts listing with the sales extract report from PRESTO's central system, to monitor potential missing revenues.

Management Response: ☒ Agree ☐ Disagree

Comments/Action Plan/Time Frame:

- As the PRESTO adoption has increased, TTC has communicated in 2017 and 2018 these gaps in controls to Metrolinx. The Metrolinx response indicated the revenue streams were either immaterial (2017) or existing controls were sufficient (2018).

- TTC's Finance Dept. has again, in 2019, raised these concerns to Metrolinx Finance counterparts.
- TTC will be formally escalating these concerns to ensure changes are addressed and TTC will consider this an issue for the dispute resolution process under the Master Service Agreement.
- TTC has also identified the resources and infrastructure, including new servers with improved performance and associated 2020 budget required to implement a missing product sales report control.
- Once TTC's additional infrastructure to support the development of the missing product sales report and analysis is in place, we will ensure a mechanism to follow up with Metrolinx for settlement is in place, as required.

**AUDITOR
GENERAL**

TORONTO