

MEETING DATE: April 9, 2003

SUBJECT: Automatic Fare Collection Update

RECOMMENDATION

It is recommended that the Commission receive this report for information, noting that:

- a number of GTA transit operators outside Toronto are considering implementing new smartcard-based automatic fare collection (AFC) equipment because their current electronic money-counting or ticket-cancelling equipment is old and no longer repairable;
- a number of North American transit operators, including Montreal, Atlanta, and Boston, are planning to introduce smartcard-based AFC systems in the foreseeable future, most because of the need to replace their old worn-out fare collection equipment, but some because of objectives such as achieving better integration between their transit system and other services such as commuter parking, or the desire to achieve better inter-regional service integration;
- there is no substantive evidence, from experience in other cities, that adoption of a smartcard-based fare collection system will increase ridership or decrease net operating costs;
- smartcard technology has not been standardized, so properties which are considering adopting smartcard technology must make a "VHS vs. DVD" type of decision; and
- the TTC's current fare collection system is in good working condition, is cost-effective to operate and, therefore, does not support a business case to replace it with smartcard-based technology at this time.

FUNDING

This report has no effect on the TTC's capital or operating budgets.

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BACKGROUND

At its meeting of November 22, 2000, the Commission approved the staff report entitled, *TTC Fare Collection Study*, which said, in essence, that smartcard-based technology is changing rapidly and not stable, that most other cities which are considering adoption of new fare collection technology were doing so because their existing systems were old and had to be replaced, that the TTC's fare collection equipment is in good condition and not in need of replacement and that, therefore, a business case could not be constructed in favour of replacing the TTC's fare collection system with a smartcard system. The Commission requested that TTC staff provide update reports pertaining to this topic, and this current report provides the first such update.

DISCUSSION

Recap of the Original 2000 TTC Study

The original staff report on AFC is included as Attachment 1. The most salient points from that report were contained in its first two recommendations, which are reprinted here:

It is recommended that the Commission:

1) not proceed with procurement of an automatic fare collection (AFC) system at this time, noting that:

- unlike many other cities which have been forced to adopt new fare collection technology because their existing fare systems were old and failing, the TTC's current fare collection equipment is in good condition and is not in need of replacement;*
- the TTC's current fare collection system achieves many of the customer convenience, security, efficiency, and reliability benefits which other cities have been seeking in adopting AFC technology;*
- based on experience elsewhere, it is conservatively estimated that it would cost approximately \$140 million to install an AFC system throughout the TTC subway and surface networks, that operating costs would rise by approximately \$2 million annually and that, therefore, there is presently no business justification to implement an AFC system in Toronto;*
- despite much interest and activity around the world pertaining to smartcard systems, there are very few smartcard-based AFC systems in revenue service in major multi-modal transit systems; many cities are still at the developmental or testing stages;*

- *AFC technology is evolving and improving rapidly, and the TTC can afford to, and should, wait for this technology to mature and become more standardized;*
- *the TTC should review its infrastructure and facilities — notably power and communications – to determine what changes would be necessary to allow future implementation of an AFC system;*
- *staff will be closely monitoring industry progress and developments with respect to automatic fare collection, and will report back on findings which warrant action;*
- *more detailed information pertaining to automatic fare collection systems is contained in the attached report entitled, TTC Fare Collection Study; and*

2) approve initiation of a system-wide study of the improvements and upgrades to infrastructure and facilities which would be necessary to facilitate and accommodate the implementation of an automatic fare collection system in the future, for consideration in the context of the 2002-2006 Capital Program.

The GTA Fare System Initiative

Transit operators in the GTA, except Toronto, implemented electronic/optical/registering fare collection equipment in the mid-to-late 80's. In contrast to the TTC's simple fareboxes, this electronic equipment has the capability of automatically counting and verifying cash fare payments, verifying ticket fare transactions, cancelling or stamping multi-use tickets, and/or reading passes. However, like computers and calculators bought in the 1980's, this type of fare collection equipment is now old and outdated and, because it is used on a constant daily basis, it has become worn-out and unreliable. Also, like computers from the 1980's, replacement parts for this old equipment are no longer available, and servicing has become extremely difficult.

Given these facts, GO Transit decided, in 1999, to begin work on a replacement smartcard-based fare collection system; such a system is also required to handle their complex zone fare system. Recognizing that most of the 905 transit agencies had, or would soon have, a similar need to replace their ageing fare collection equipment, GO Transit invited all GTA transit agencies to participate in an investigation of the feasibility of developing a universal GTA smartcard-based fare collection system. Such a GTA smartcard would allow travellers to use the same card for fare payment on all GTA systems, and would accommodate the differing fare policies of each of the GTA transit operators. A GTA fare system would, therefore, assist in efforts to achieve transit integration in the GTA.

Over the course of 2002, GO Transit led and managed an extremely-intensive collaborative effort, involving all GTA transit operators, to examine the customer,

operator, logistical, and financial implications of establishing a common smartcard-based GTA fare system. TTC staff were part of this collaborative effort, but stated at the outset that, because the TTC's fare system was not in need of immediate replacement, they could not justify the scrapping or replacement of the current fare collection system.

The GTA Fare System initiative was comprehensive, and covered a wide range of topics including policies, functional requirements, and technology to implement a GTA fare system, the application of a municipal business case model to determine the financial feasibility of individual municipalities adopting a smartcard-based system, and possible governance and business models for implementing and operating a GTA fare system. The resulting summary report documents the customer convenience aspects of a common GTA smartcard, as well the societal and environmental benefits such as improved regional mobility. None of the participating transit operators concluded that a smartcard system would lead to increased transit ridership. However, owing to the efforts and expense of maintaining their current deteriorating electronic fare collection equipment, a number of municipalities concluded that a new smartcard-based system would allow operating cost savings to be achieved. The study notes that, in order to implement an integrated GTA fare system, as opposed to independent municipal smartcard systems, a relatively-expensive central processing system would be required. The study stated that the municipalities alone could not financially sustain such a system, and would require the Provincial Government to cover the capital and operating costs of such a central processing system. The summary report is expected to be made public in the near future; it was not available for attachment to this report.

Concurrent with the GTA Fare System initiative, GO Transit undertook a pilot test of a new smartcard system in its Richmond Hill corridor. ERG Transit Systems supplied the hardware and software for the test. Starting in June, 2002, smartcards were available to replace 10-ride tickets and monthly passes, for use on both buses and trains in that corridor. Although GO Transit has not yet issued its formal technical evaluation of this pilot project, they have stated that customers in this corridor have been highly accepting of the new smartcards. The test has identified certain aspects of smartcard fare collection which require improvement. The pilot test is continuing.

Also in 2002, the *Moving the Economy* group, which is affiliated with the City of Toronto's Urban Planning and Development Department, continued research aimed at standardizing smartcard technology and at understanding the ridership and environmental implications of adopting a smartcard fare system. A summary of their activities is included as Attachment 2. *MTE's* report entitled, *Feasibility Study of IMS in the Greater Toronto Area* concluded that, under the assumption that customers who would purchase a smartcard would behave similar to those who use monthly unlimited-ride passes, transit ridership could increase as a result of introducing smartcards. In the context of the GTA, however, the authors note that:

Little "hard" data exists that can be used directly in estimating the (ridership) impacts of implementing an IMS (smartcard) in the GTA... Translating experiences in cities such as New York to the GTA is also difficult, given the very different base fare structures

involved. For example, in the case of the TTC, free transfers from surface routes to subway and vice versa have always existed...Thus, much of the ridership growth obtained in New York is unlikely to occur within the TTC service area in the absence of significant new fare reductions and/or service improvements.

It is TTC staff's understanding that the GTA transit operators who participated in the GTA Fare System initiative are currently preparing reports regarding possible changes to their fare collection technology, for consideration by their municipal councils sometime in 2003. Some of these reports may be delayed pending a provincial announcement regarding funding for this initiative. Staff believe that GO Transit will continue to proceed with implementation of a smartcard system for their entire network.

Smartcard Initiatives Outside of the GTA

A number of North American transit operators are implementing smartcard-based fare collection systems. Here is a brief summary of some of these initiatives:

Montreal

The Société de Transport de Montréal (STM) implemented its current optical and magnetic AFC system in 1966, in time for the opening of its new Métro and the Expo '67 World's Fair. After almost 40 years of operation, STM now describes their system as "obsolete and vulnerable". STM reports they are currently losing \$20 million to \$25 million annually due to fare evasion, and counterfeiting. In April 2002, the STM Board of Directors agreed to invest \$102 million to replace their current AFC system with a new smartcard-based system. STM expects the new system to significantly reduce the very high maintenance costs of their current system, and also hopes to reduce current fare evasion and counterfeiting losses.

Atlanta

In September 2002, the Metropolitan Atlanta Regional Transit Authority (MARTA) issued an RFP for a new smartcard-based AFC system to replace their "worn-out" turnstiles. The plan would allow customers to use the new smartcard system to pay for commuter parking, MARTA fares, and fare payments on adjacent outlying bus services. The project is expected to cost between \$120 million-\$150 million.

Boston

In February 2002, the Massachusetts Bay Transit Authority (MBTA) announced that it would spend \$180 million to implement a smartcard/swipe card AFC system to replace their existing system which has reached the end of its service life. In conjunction with the new AFC system, MBTA hopes to streamline certain of its fare collection business practices.

Washington

The Washington Metropolitan Area Transit Authority (WMATA) introduced a smartcard AFC system for its rail network and commuter parking in 1999. WMATA is expanding this AFC system to be useable on buses in the District of Columbia, Maryland, and Virginia. WMATA is not undertaking a cost-benefit or business-case analysis regarding the costs of expanding this system.

San Francisco

The Metropolitan Transportation Commission (MTC) in San Francisco introduced its TransLink smartcards, on a pilot-test basis, for use on specified routes and stations within their system, in 2002. Plans for expansion are currently encountering difficulties as a result of incompatible technologies between MTC's smartcards, supplied by ERG, and Bay Area Rapid Transit (BART)'s automated turnstiles, which are made by Cubic.

Seattle

The Central Puget Sound Regional Fare Co-ordination Project is intended to establish a smartcard-based regional fare collection system for the 7 transportation agencies operating in that area. The smartcard is intended to replace over 300 different fare media currently offered by these agencies, and the system will be responsible for regional revenue reconciliation.

Technology Standards and Issues

In TTC staff's original 2000 report on fare collection, we reported that:

As with any high-tech equipment, the technology of automatic fare collection systems is evolving very rapidly and there is, as yet, no consensus or standardization of this technology. The different cities visited typically had different card technologies, different reader technologies, different communication technologies, different computer technologies, and different systems reconciliation and processing arrangements. There are international efforts, through organizations such as the Integrated Transport SmartCard Organization (ITSO), the ContactLess technology Users Board (CLUB), and UITP, and locally, the Alternative Transportation Options Association of Toronto, an initiative of Toronto's Moving the Economy group, to establish international standards for AFC technology. No doubt, in time, there will be convergence of this technology. However, at this time, transit properties buying AFC systems are required to choose from among different proprietary technologies offered by different manufacturers.

The smartcard issues related to proprietary technologies, intellectual property rights, the lack of international standards for smartcards, and the resulting challenges of interoperability between different systems, are still present today. The United States' Federal Transit Administration (FTA) is supporting an initiative by the American Public Transportation Association (APTA) called the *Universal Transit Fare Card Standards (UTFS) Program*. The purpose of this program, like those of ITSO, CLUB, UITP, and MTE, is to develop guidelines or documents which could lead to standards for

interoperability of smartcard fare collection technology which could, in turn, lead to lower procurement costs.

Lessons Learned Since TTC's Original Study

Two and one-half years have passed since TTC staff submitted their original report on fare collection. Staff have remained active in this area, and have been monitoring developments to ensure that the TTC can take advantage of developments which would be beneficial. Here is a summary of observations and conclusions from the last two and one-half years:

- There continues to be considerable worldwide interest in smartcard AFC systems. Many more cities are proceeding to implement smartcard systems. As was reported last time, there are relatively few smartcard systems in full-scale revenue service in major multi-modal transit systems. Most cities are still at the developmental or testing stages.
- Most cities which are implementing smartcard systems are doing so because they have to replace old and failing earlier-generation AFC systems.
- Smartcard technology continues to evolve rapidly and there is, as yet, no consensus or standardization. The fact that there are few vendors in this industry, that they each offer proprietary technologies, and that they are very competitive, will likely result in this situation continuing for some time.
- To date, TTC staff have found no substantive evidence that smartcard systems, unto themselves, will increase ridership or revenue, or decrease net operating costs.
- Smartcard systems may be appropriate for specific transit systems if those systems must replace old or failing fare collection systems with new ones, or if generous funding is available to pursue broader societal goals such as inter-regional mobility. In the absence of these circumstances, however, there continues to be no demonstrable or consistent ridership or financial rationale for adopting a smartcard-based fare collection system.

Recent TTC Activities Regarding AFC

TTC staff participated significantly in the GO Transit-led study regarding a GTA Fare System. Staff stated that it was important that any evolving GTA fare system be capable of accommodating the TTC when the TTC is ready to join. The GTA Fare System report stresses the need for a flexible, phased-in approach which would allow the TTC to implement the GTA fare system when appropriate.

By participating in the GTA Fare System initiative, TTC staff were able to test and corroborate their original projections regarding the cost of equipping the TTC system with a smartcard-based system. TTC staff originally projected that the cost of such an initiative would be \$140 million, and this projection was confirmed through application of the consultant's costing model to the TTC's system.

The TTC has agreed to allow GO Transit to install and test smartcard turnstiles at TTC/GO connections such as Finch and Union Stations. This will allow TTC staff to better gauge customer reaction to, and use of this fare medium. All costs associated with this trial will be paid for by GO.

As originally recommended in the 2000 report, TTC staff, with the assistance of consultants, have completed a preliminary assessment of the power and communications capabilities of the TTC's infrastructure and facilities. This will form the basis for upgrades and improvements which would be necessary to allow future implementation of an AFC system.

A new pass vending machine will be introduced, on a test basis, this year. This new vending machine will accept debit cards for payment. Existing token vending machines will be replaced or upgraded commencing in 2005.

Three commuter parking lots will be equipped this year with gate-control equipment which will accept VISA, MasterCard, and American Express credit cards. Further work is being undertaken regarding alternative payment technologies for when gate-control equipment at all of the TTC's commuter parking lots will be replaced in the near future. The conclusions and findings from this work will provide input to the ongoing research into new payment technologies for TTC fares.

Current TTC Position Regarding AFC and Smartcards

TTC staff have confirmed that their original projections regarding the up-front and ongoing costs of a smartcard AFC system for the TTC are in the correct order-of-magnitude. Such a system would cost the TTC approximately \$140 million to install system-wide, would require a net increase in workforce of just under 100 positions, and would increase the TTC's annual operating costs by approximately \$2 million net.

As stated in the March, 2003 staff report entitled, *Ridership Growth Strategy*:

The TTC actively monitors progress in (innovative technologies) to assess the applicability of these emerging technologies to our current systems and procedures.

However, the TTC's extremely-limited funding requires it to take a cautious approach to spending passengers' and taxpayers' money on projects and systems which are not fully proven technically, or for which the ridership benefits are not clear. The TTC's primary role is that of service provider; research and development related to new technologies is outside the scope of the TTC's core transit service business. This results in the TTC having other properties test and develop new transit technologies, and then adopting these technologies when they are proven to be reliable means of improving service and increasing ridership.

In light of these facts, TTC staff re-iterate their original position regarding smartcards, which is that the TTC's unique inter-modal integration, and simple, low-tech fare collection system, results in the TTC's current system operating quite well, with no pressing or urgent need to scrap or replace it. These facts, coupled with the high initial capital cost of implementing an AFC system in Toronto, and the projected increases in workforce and annual operating costs associated with an AFC system, lead to the conclusion that the TTC should not, at the present time, proceed with the procurement of a smartcard-based AFC system.

March 26, 2003

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Attachment 1: TTC Fare Collection Study (November 22, 2000)

Attachment 2: Letter from Moving the Economy (August 19, 2002)