



**OPERATIONS COMMITTEE
FEBRUARY 19, 2004**

SUBJECT: UNIVERSAL FARE SYSTEM NEW TECHNOLOGY IMPROVEMENTS

ACTION: RECEIVE AND FILE

RECOMMENDATION

Receive and file the report on new technology options for the Universal Fare System.

ISSUE

In August 2003 staff presented the Quarterly UFS Update to the MTA Operations Committee depicting new electronic fare collection equipment that was not available two years ago when the UFS base contract was awarded. The devices included:

1. Heavy Rail “virtual gates”
2. Driver Control Unit (DCU) with paper printer and smart card validator
3. Bus rear door “light validators”
4. Paper, or “low value” smart cards

Staff reported that “rough order magnitude” (ROM) costs would be obtained for these devices, and reported back to the Board.

Attachment A describes the equipment features and “rough order magnitude” costs. This report is presented for information purposes and therefore does not result in a financial impact to the MTA. If the options discussed in the report are adopted at a later date, they would result in increased costs for the UFS project. Funding options will be presented to the Board at that time.

DISCUSSION

Heavy Rail “Virtual Gates”

Heavy rail virtual gates are not recommended at this time. Staff analysis concludes that while demonstrating considerable positive attributes, financial constraints outweighed the functional benefits of this device at this time.

On-Board Printer and Smart Card Validator with Enhanced Driver Control Unit (DCU)

The on-board printer is not recommended at this time. The cost analysis comparing low value paper smart cards to the on-board printer reflects paper smart cards as the more efficient way to provide day passes and transfers to Munis. In part, maintenance costs make the printer less efficient in a five-year costing analysis. Also, the complications of providing back-up fare media in anticipation of printer malfunction defeats the purpose of providing a printer option. Staff will continue to evaluate the potential usage of low value paper smart cards instead of the printer/DCU consideration.

Rear Door Smart Card Validator

The rear door smart card validator is not recommended at this time. The inability to prevent fare evaders from entering at the rear doors is complicated by the absence of regular fare enforcement on buses. Also, this option would require a costly change-order to the current procurement to add a new driver control unit with functionality to accommodate this secondary device.

Low Value Smart Cards

Staff will continue to pursue the low value paper smart card as the option for accommodating day passes and transfers. A cost analysis of the printer option versus the paper smart card option revealed significant cost savings over the life cycle of the equipment by deploying low value smart cards instead of printers.

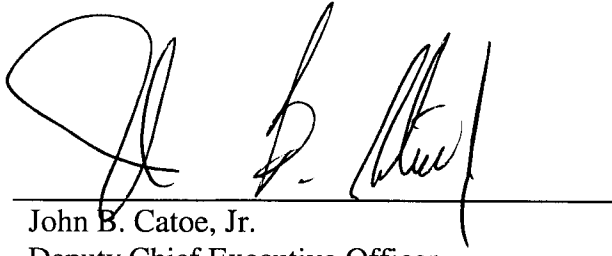
NEXT STEPS

Return to the Board at its March Operations Committee meeting with an analysis and recommendation on the Regional TAP Service Center (formally referred to as the clearinghouse).

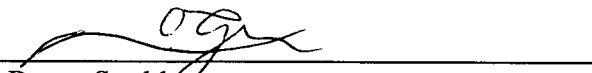
ATTACHMENTS

- A New technology analysis
- B Printer versus paper smart card cost analysis

Prepared by: Alex Clifford, Managing Director, On-Street Support
Cynthia Gibson, Program Director, New Technology and Systems Implementation
Jane Matsumoto, UFS Project Manager



John B. Catoe, Jr.
Deputy Chief Executive Officer



Roger Snoble
Chief Executive Officer

**ATTACHMENT A
NEW TECHNOLOGY ANALYSIS**

HEAVY RAIL “VIRTUAL GATES”	
Device and Functional Purpose	Discussion
<p>“Virtual Gates” for Heavy Rail</p> <ol style="list-style-type: none"> 1. Validates smart card transactions 2. Allows organized ingress and egress from non-paid to paid areas of heavy rail stations 3. Validators on both ends allow flexibility to control pedestrian traffic in either direction. 	<p>Recommendation: Staff analysis concludes that while demonstrating considerable positive attributes, financial constraints outweighed the functional benefits of this device at this time.</p> <p>Evaluation This device was evaluated for potential benefits to address improving fare enforcement, public safety, and the ability to migrate to a full barrier system if desired in the future.</p> <p>Improves safety, security & fare enforcement by inspectors:</p> <ul style="list-style-type: none"> ▪ Ensures orderly patron through-put for entering and existing riders ▪ Assists Law Enforcement officers with visible and audible patron validations <p>Improves ridership and data collection:</p> <ul style="list-style-type: none"> ▪ Device includes automated passenger counters to capture and tally patrons <p>Equipment Maintenance:</p> <ul style="list-style-type: none"> ▪ Reduces patron usage of ticket vending machines (TVMs) ▪ Can be upgraded at a later date to a full-gated system, if required. ▪ Can be considered for MRT <p>Improves safety and security:</p> <ul style="list-style-type: none"> ▪ Reduces pedestrian collisions particularly during “peak” hours with a more orderly ingress into stations ▪ Avoids “queuing” at TVMs that would result from smart card patrons attempting to validate their trip <p>Equipment does not detect fare evasion</p> <ul style="list-style-type: none"> ▪ Virtual Gates will not send an alarm signal for fare evaders (patrons without a smart card) ▪ Will alert fare inspectors to patrons with inadequate value (below \$1.25) ▪ Can require 1-2 fare inspectors at each station, for fixed post fare inspection assignments, if used as an option to hard barriers. This may result in more fare inspectors than currently utilized today on the Metro Red Line.
ESTIMATED COST OF VIRTUAL GATES: Rough Order of Magnitude Costs - \$5 million	

BUS On-Board Printer with Enhanced Driver Control Unit (DCU)

Device and Functional Purpose	Discussion
<p>On-Board printer and Smart Card Validator with Enhanced Driver Control Unit (DCU)</p> <ul style="list-style-type: none"> ▪ Classifies rides taken on buses ▪ Prints paper day passes, also prints transfers to Munis ▪ Provides a second validator for smart cards 	<p>Recommendation: The on-board printer is not recommended at this time. Staff will continue to evaluate the potential usage of low value paper smart cards instead of the printer/DCU consideration.</p> <p>Evaluation: This device was evaluated for potential benefits to address impacts from the new paper day passes. Staff analysis resulted in these conclusions:</p> <p>Increased maintenance and operating costs in comparison to low value paper smart cards</p> <ul style="list-style-type: none"> ▪ Reliability and speed were both better than magnetic or paper “trim” units typically deployed for on-board printing, however, an extra equipment would need to still be maintained on an on-going basis over and beyond the smart card system. <p>Printing passes on board vehicles will have the least fraud and counterfeiting protection.</p> <ul style="list-style-type: none"> ▪ It is difficult to protect paper from being defrauded and easily reproduced. <p>Pre-printed “emergency” paper day passes would be required to address printer equipment failures and malfunctions on board vehicles while in service.</p> <ul style="list-style-type: none"> ▪ The objective of the printers was to eliminate media with value on board vehicles. In the event that this printer fails while in service, operators would need to carry generic, non-date specific emergency day passes to issue in the event of equipment failures or malfunctions. ▪ This emergency media would introduce another opportunity for fraud and counterfeiting. <p>The 2nd validator that comes with the paper printer was evaluated for potentially increasing boarding speeds, by permitting “duo entry” at the front of the bus.</p> <ul style="list-style-type: none"> ▪ While this was potentially an attractive feature during non-peak or on non-crowded lines, it would require the operator to manage two separate lines at the front of the bus. ▪ There would be confusion between two sets of patrons –one, validating smart cards, the other attempting to purchase a paper day pass, off of one device. <p>The maintenance cost and quantities would escalate, based on age of equipment, or increases to service/fleet, in contrast to low value paper smart cards.</p> <ul style="list-style-type: none"> ▪ The older the equipment gets, or the more the fleet expands, the more the maintenance of these printers would go up. ▪ With paper smart, there is no added maintenance on existing equipment, and there is potential for reduction of the cost of the card itself as the technology matures and market penetration increases. <p>The printer equipment is non-proven in the United States.</p> <ul style="list-style-type: none"> ▪ This device has not been deployed anywhere in the domestic market ▪ The low value paper smart card has been issued in Paris, Rome, Capri, and Macedonia. <p>Insufficient data from paper printed media</p> <ul style="list-style-type: none"> ▪ Only the initial sale of the paper pass would be electronically captured. ▪ Tracking the usage of the paper after the first ride would be difficult to enforce since it will default to a visual flash pass. <p>This change would delay the base contract schedule by 8 months.</p>

ESTIMATED COST OF ON-BOARD PRINTER/DCU: Rough Order of Magnitude Costs - \$13 million

BUS – REAR DOOR VALIDATORS” WITH ENHANCED DRIVER CONTROL UNIT

Device and Functional Purpose	Discussion
<p>Rear Door Smart Card Validator with Enhanced Driver Control Unit (DCU)</p> <ul style="list-style-type: none"> ▪ Validates rides from rear door of bus 	<p>Recommendation: Not recommended at this time</p> <p>Evaluation:</p> <ul style="list-style-type: none"> ▪ Inability to prevent fare evaders from entering from rear doors ▪ Absence of regular fare inspection enforcement currently on buses Inability to identify “paid” and “unpaid” areas inside the bus ▪ Would require a costly change-order to the current procurement to add a new driver control unit with functionality to accommodate this secondary device.
<p>ESTIMATED COST OF Rear Door Validator with Enhanced Driver Control Unit: \$10 million</p>	

Low Value Paper Smart Cards

Device and Functional Purpose	Discussion
<p>Low Value Smart Cards</p> <ul style="list-style-type: none"> ▪ Low value disposable card 	<p>Recommendation: To continue to pursue the low value paper smart card as the option for accommodating day passes and transfers.</p> <p>Evaluation:</p> <ul style="list-style-type: none"> ▪ The UFS system is being engineered to allow migration to paper smart cards over time. ▪ As the project is implemented, staff will evaluate price points, and recommend purchasing this media now priced at approximately \$.30/card. ▪ However, please see discussion on prior page, “Paper Printer with Enhanced DCU”, which captures the avoided maintenance and operating costs from implementing this alternative over paper smart cards. ▪ Staff analysis revealed significant cost savings over the life cycle of the equipment, deploying low value smart cards. <p align="center">PLEASE REFER TO ATTACHMENT B FOR ANALYSIS ON PAPER SMART CARD VERSUS PAPER PRINTING ON BUS</p>

ATTACHMENT B PRINTER VERSUS PAPER SMART CARD COST ANALYSIS

(Based on Communication's ridership projections: Yr 1 = 16,450,000 day passes sold/yr. This analysis assumes of those projected sales, 75% of riders will be on electronic pass.)

Analysis of Low Value Paper Smart Cards versus Printing Paper Passes On Bus

Parallel 5-year costs of Paper Smart Card and On-Board Printed Day Passes		1	2	3	4	5	5-YR TOTAL
Day Pass Ridership		16,450,000	16,450,000	16,450,000	16,450,000	16,450,000	16,450,000
Cash Paying Day Pass Riders	25%	4,112,500	4,112,500	4,112,500	4,112,500	4,112,500	4,112,500
Media Cost							
Paper Smart Card	\$ 0.33						
Printed Pass	\$ 0.005						
# of uses/paper smart card	1						
Fraud							
Paper Smart Card Fraud (as % of sales)	0.25%	30,843.75	30,843.75	30,843.75	30,843.75	30,843.75	30,843.75
Printed Pass Fraud (as % of sales)	2.00%	246,750.00	246,750.00	246,750.00	246,750.00	246,750.00	246,750.00
Paper Smart Card							
Equipment Costs	\$	500,000					
Operating Costs							
Maintenance	\$	-	\$ -	\$ -	\$ -	\$ -	\$ -
Fare Media (based on 4,112 cash riders)	\$	1,357,125	1,357,125	1,357,125	1,357,125	1,357,125	1,357,125
Production & Distribution (admin, stocking, initializ)	\$	175,000	175,000	175,000	175,000	175,000	175,000
Total Annual Cost	\$	2,032,125	1,532,125	1,532,125	1,532,125	1,532,125	8,160,625
On-Board Printing							
Equipment Costs							
Cubic DCU & PIM	\$	13,085,531					
Operating Costs							
Maintenance (# of fareboxes; 1 tech/box @ \$43/hrx1084)*	\$	693,483	693,483	693,483	693,483	693,483	693,483
Fare Media (thermal paper x 4,112 riders)	\$	20,563	20,563	20,563	20,563	20,563	20,563
Production & Distribution (ordering, stocking, etc.)	\$	100,000	100,000	100,000	100,000	100,000	100,000
Total Annual Cost	\$	13,899,576	814,045	814,045	814,045	814,045	17,155,758
Fraud							
Paper Smart Card	\$	30,844	30,844	30,844	30,844	30,844	30,844
On-Board Printing	\$	246,750	246,750	246,750	246,750	246,750	246,750

* This maintenance would be in addition to existing farebox maintenance which is approximately \$6.2 million

