Strategic Fare Collection Technology Assessment

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SPECIAL BOARD WORKSHOP

MTA Board of Directors

August 15, 2001

MTA and the Muni operators have been working together for several years designing the UFS

The MTA Board has been highly supportive of efforts to develop a common regional fare collection system. Board specified UFS objectives include…

- Coordinated fare collection system with other transit operators, providing a "seamless" fare system

- Replace MTA's aging bus and rail fare equipment

- Establish policies and procedures for fare systems coordination, leading to a regional fare clearinghouse

- Maximize customer convenience in using transit throughout the County

MTA has received proposals to provide fare collection equipment for the region

▶ MTA received fare equipment proposals on July 5, 2001

▶ All proposals include multiple technology options, as specified by MTA in consultation with regional operators

▶ MTA should select technology options to support BAFO's

▶ Multiple parties have been consulted: MTA staff, Muni General Managers, the Money Committee, MTA labor unions, the BRU

▶ A Board decision on technology options at the August meeting would allow the procurement to remain on schedule

The UFS project is on schedule, but there is little room for slippage

▶ MTA will require ticket vending machines to open the Pasadena Blue Line in spring of 2003

▶ Vendors have indicated an ability to make this schedule if NTP occurs by the end of this calendar year

▶ The current schedule calls for several Board decisions:

— August 2001 -- select UFS technology

— September 2001 -- review regional UFS budget needs

— November/December 2001 -- award contract to vendor

— November/December 2002 -- adopt fare policies/procedures

Today's presentation reviews the initial business analysis for the UFS

▶ This document explores technology, policy and procedural options for UFS implementation

▶ The August Board decision addresses only technology options -- policy and procedural alternatives are presented as a way to demonstrate technology impacts on these areas, and to begin the discussion of policy approaches

▶ While the document explores a wide range of issues and opportunities related to UFS -- the only decision required in August is what technology to buy as part of the current procurement

▶ The discussion of the initial business plan results also provides additional direction in fare systems planning beyond the technology purchase

MTA's procurement includes five basic technology alternatives (all options will accept cash)

▶ Magnetic core fare collection system with smart card capability

▶ Smart card core fare collection system with magnetic capability

▶ Smart card core fare collection system with printer

▶ Smart card core fare collection system with manual paper transfers

▶ Smart card core fare collection system

▶ For the purposes of the August decision -- the last two option are the same

With magnetic options, existing Metrocard fare devices and fare media would require replacement

- ▶ MTA magnetic options use encrypted technology. Encryption and serialization reduces potential to counterfeit cards

- ▶ Risk of fraud is shared in a regional system where fare revenues are distributed through a clearinghouse mechanism. Recent MTA estimates of fare fraud range from $5.5M to $11.1M annually

- ▶ Non-encrypted fare media will not be accepted (existing Metrocards must be replaced on all systems if MTA implements magnetics)

- ▶ Both existing GFI Odyssey fareboxes and legacy systems will require upgrade or replacement – logic boards and magnetic systems

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Many peer agencies initially used magnetics and are now moving to smart cards

Region	Current or Prior Technology	Implemented or Planned Technology
Chicago	Magnetic Card, Limited Smart Card	Smart Card
Hong Kong	Smart Card	Smart Card
London	Paper fare media	Smart Card
New York	Magnetic Card	Smart Card
Paris	Magnetic	Smart Card
San Francisco	Magnetic card (rail), paper media (bus)	Smart Card (bus and rail)
Singapore	Magnetic	Smart Card
Sydney	Smart Card	Smart Card
Washing-ton, D.C.	Smart card (rail), magnetic card (rail), paper fare media (bus)	Smart Card (rail and bus)

Technology options were evaluated from several perspectives in terms of...

▶ Customers

▶ Partners

▶ Regional Fare Integration

▶ Individual Operators

A significant portion of MTA riders pre-pay for fare media -- these riders can use electronic media easily

▶ 74% of MTA riders pre-pay for trips either through tokens or passes. These riders can easily be transferred to electronic fare media

▶ 97% of MTA bus riders and 90% of all MTA riders ride at least once a week

▶ Policies can be adopted that improve the market share of electronic fare media (e.g., balance protection, loyalty programs, low fare guarantee)

▶ MTA can reasonably be expected to reach a 90% market share for electronic media -- Muni's share will increase substantially from current use

Lower income riders acceptance of smart cards is indicated from findings at other agencies

▶ Focus groups in Washington indicated lower income individuals perceive significant benefits associated with smart cards

– Durability of fare media relative to paper or magnetics

– Balance protection feature

– Reduced need to carry cash

– Lowest fare guarantee and other loyalty programs

▶ Baltimore area focus groups also indicated that lower income individuals perceive benefits of smart cards – convenience, balance protection and potential application of low fare guarantees

Fare policy options vary significantly by technology

	Smart Card	Magnetics
More convenient than cash	●	●
Rolling period passes	●	●
Supports new discount programs	●	●
Seamless transfers	●	●
Balance Protection	●	◑
Customer Loyalty Program	●	◑
Supports Employer and Social Service Agency Programs	●	◑
Autoload	●	○
Guaranteed Lowest Fare Program	●	○
Act as Pass and Cash	●	○

Customers can benefit from all alternatives. Smart cards may offer the most customer benefits

	1) Magnetic System	2) Smart Card System with Magnetic Transfers	3) Smart Card System with Printed Transfers	4) Smart Card System with Manual Transfers	5) Smart Card System
Convenience: Purchasing	●	◕	◔	◕	◕
Convenience: Use to Pay	◐	◕	◔	◔	●
Convenience: Transfers	◕	◕	◐	◔	●
Fare System Reliability	◐	◕	◐	◕	●
Fare Type Choice	◐	●	●	●	◕
Fare Media Durability	◐	◕	◐	◐	●
Fare Value Security	◐	●	◕	◕	●
Additional Applications	◐	●	●	●	●

Worst	to	Best
○	()	●

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Partnering with other organizations can enhance benefits to riders and the region

▸ Potential partners include:

– Financial organizations

– Other transportation interests (e.g., parking, taxis, ferries, private buses, paratransit, school buses)

– Employers

– Social service organizations

– Schools

– Government

– Retail enterprises

– Convention center, hotels, sporting venues

Other regions have used smart cards to create wider partnering opportunities

Region	Partners
Chicago	Public: bus, rail Private: convention center
Hong Kong	Public: bus, rail Private: stores, newstands, restaurants, bus
London	Public: bus, rail, parking Private: bus, rail, parking
New York	Public: bus, subway, commuter rail Private: bus
Paris	Public/Private: bus, rail, parking
San Francisco	Public: bus, heavy rail, light rail, commuter rail, parking (future: banks)
Singapore	Public/Private: rail, bus
Sydney	Public: bus, rail, parking, ferry Private: bus, taxi, ferry
Washington, D.C.	Public: bus, heavy rail, light rail, commuter rail, parking Private: water taxis, banks, employers, convention center (future: tolls, parking)

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There is substantial partnership potential for Los Angeles beyond transit using electronic fare systems

Activity	Smart Cards	Magnetics
Purchase Fare from TVM and POS with Credit/Debit Card	●	●
Post Billing Hotels, Social Service Agencies, Schools, Employers	●	◗
Combination identification/ transit card	●	◗
Autoload from Credit/Debit Card or Employer Benefits	●	○
Combi-Card with Bank Credit/Debit Card	●	○
Loading from ATMs	●	○

Different technology choices have varying capabilities to fully integrate the region

▶ Both magnetics and smart cards offer improved integration capabilities

▶ Magnetics integrate best from an electronic purse (e.g., cash) stand point, passes are also possible (but both cannot be on the same card)

▶ Smart cards have significantly more memory and capability than magnetics, enhancing integration potential and a wide variety of fare options on a single card

▶ Smart cards provide greater capability to track and audit trips and transactions, placing less strain on the logic, memory and processing time for fare equipment

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While both technologies offer enhanced regional integration capabilities, smart cards are better

	Smart Cards	Magnetics
Ability to accommodate fare structures	●	◑
Ability to differentiate between riders	●	◑
Auditibility	●	◑
Ease of card distribution	●	◑
Ability to hold multiple fare types	●	○
Fare flexibility	●	○

Operators

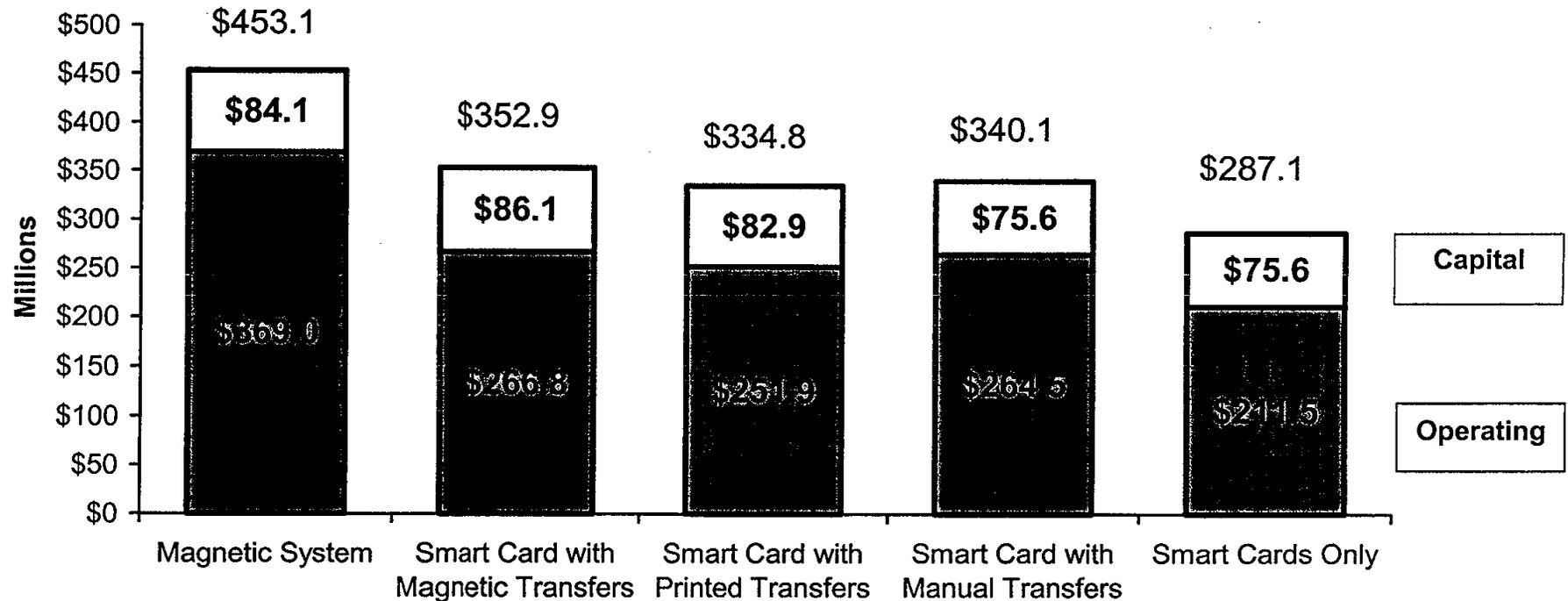# We examined the impact on individual operators in terms of...

▸ Capital Cost

▸ Operating Cost

▸ Fraud/Abuse

▸ Reliability

▸ All cost data reflects MTA only -- relationship of costs among options reflects expected Muni experience as well

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Utilizing smart cards for the base fare collection system provides the least cost investment

Estimated Capital and Lifetime Operating Costs of Alternatives

		Capital
Magnetic System	$453.1	$84.1 / $369.0
Smart Card with Magnetic Transfers	$352.9	$86.1 / $266.8
Smart Card with Printed Transfers	$334.8	$82.9 / $251.9
Smart Card with Manual Transfers	$340.1	$75.6 / $264.5
Smart Cards Only	$287.1	$75.6 / $211.5

(1) Net of reduced fraud/abuse

(2) Costs reflect MTA only, relationship is comparable to other operators

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Fraud is a significant consideration -- and MTA desires to minimize fraud in future systems

▶ Current MTA fare fraud is estimated at between $5.5M and $11.1M annually (includes transfers, passes, tokens and rail fare evasion)

▶ Under any regional fare collection system, all participating operators are open to and share the same fraud pool

▶ The hierarchy of fraudable fare media (easiest to hardest) is:

- Transfers (pre-printed, real time printing)

- Printed passes and identifications (colors, holograms)

- Magnetics (stock, serialization, encoding)
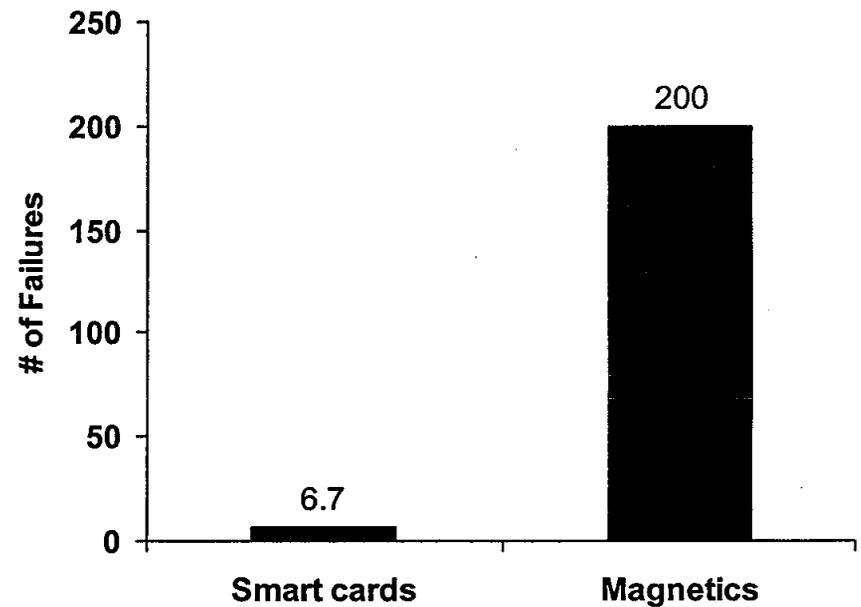
- Smart Cards (serialization, encoding)

A fare collection system utilizing smart cards is more reliable than magnetics
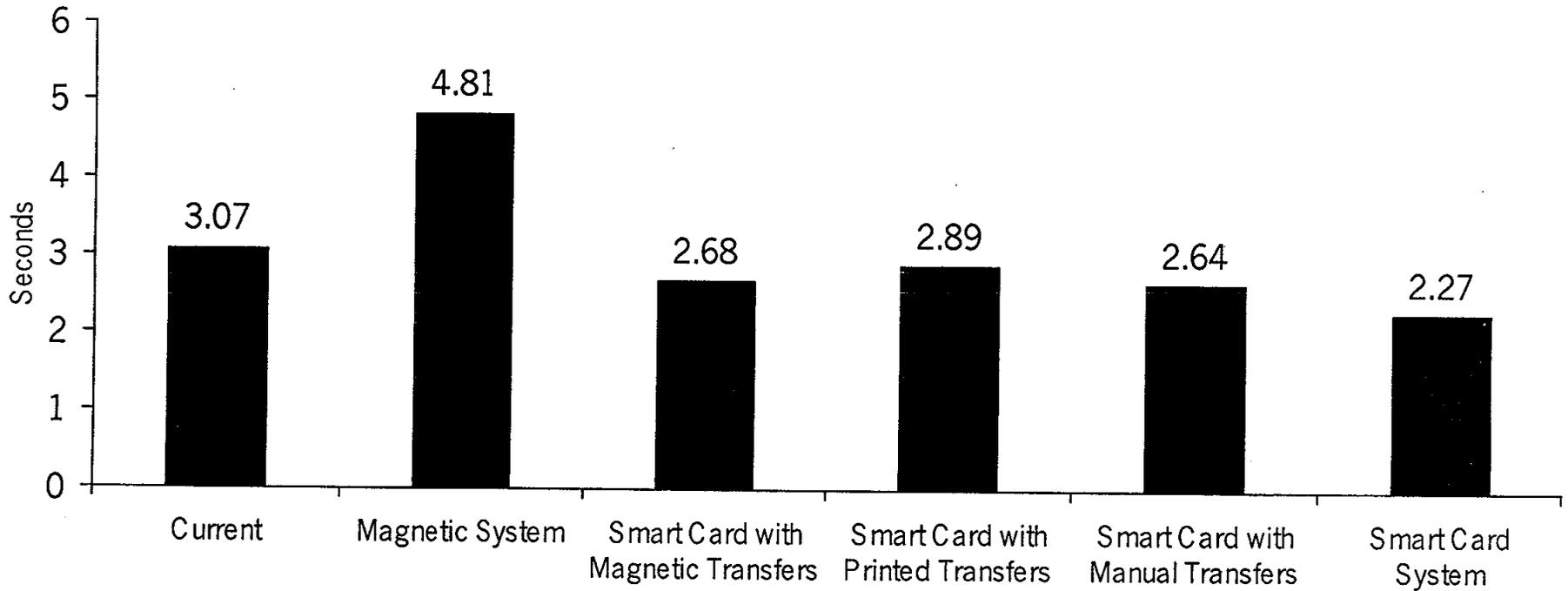
Reliability
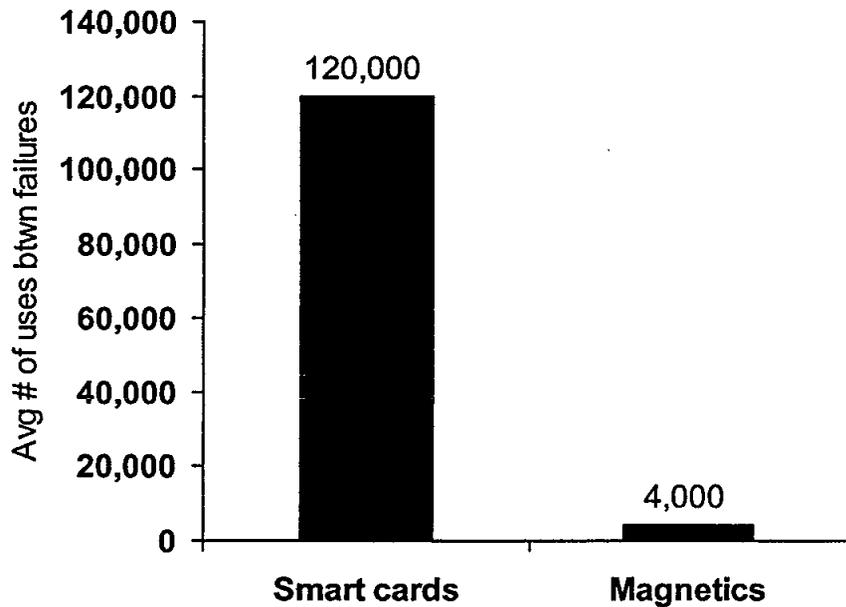
Average Number of Daily Failures

System failures impact multiple riders

Using smart cards as a base fare collection system will reduce transaction times (1 second = 69,000 hours yr.)

Estimated Transaction Times of Fare System

	Current	Magnetic System	Smart Card with Magnetic Transfers	Smart Card with Printed Transfers	Smart Card with Manual Transfers	Smart Card System
Seconds	3.07	4.81	2.68	2.89	2.64	2.27

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Smart card only system offers the greatest benefits to MTA, especially if adopted at other agencies

	1) Magnetic System	2) Smart Card System with Magnetic Transfers	3) Smart Card System with Printed Transfers	4) Smart Card System with Manual Transfers	5) Smart Card System
Reliability	○	◑	◑	●	●
Dwell Time Impacts	○	◑	◑	◕	●
Driver Impacts	◔	◕	◑	◔	●
Data Collection	◑	◕	◔	◔	●
Fare System Security /Enforcement	◑	◕	◔	○	●
Administrative Requirements	◑	◕	◕	◔	●
Auditability	◕	◕	◑	◑	●
Regional Integration	◑	●	●	●	●
Multi-Application Potential	◑	●	●	●	●

Worst	to	Best
○	◑	●

Smart card and cash only system provides the greatest benefit at the least cost

▶ Customers experience the greatest benefits in terms of convenience, fare payment options, protection, durability and flexibility. Infrequent riders who choose not to use smart cards and transfer are subject to a higher fare

▶ Smart cards provide the greatest potential for partnering with financial and other organizations in the future

▶ Regional integration is best accomplished with a smart card -- MTA passengers with a magnetic pass (56% of MTA riders use passes) will not be able to board Muni buses with this ticket

▶ Smart cards far out perform magnetics in terms of capital and operating cost, transit travel time, reliability, fraud and abuse

If MTA implements a smart card and cash system, Muni's have the most options for local fare collection

▸ While Muni fare collection equipment would be upgraded to accept regional smart cards, Muni operators can continue to use Metrocard within and among operators with this technology. Further, Muni's may use paper transfers and passes within and among systems accepting paper

▸ If MTA implements both magnetics and smart cards as the regional solution, it is likely that Muni's can no longer use the Metrocard, even within their own system. Muni's can continue to use paper within their own system, if desired

There is a regional consensus supporting smart cards as the UFS technology choice

▶ MTA management and staff support and recommend the smart card and cash system (Option 5)

▶ MTA labor unions (UTU, ATU, TCU, AFCSME) all endorse the smart card and cash concept (Option 5) citing passenger, driver, maintenance and reliability benefits

▶ The Munis support smart cards (Option 5: smart card and cash only) as the regional fare integration technology. Muni operators have four areas of concern they would like addressed as the region moves forward with UFS: 1) ensuring the ability of passengers to transfer without having to pay full fare; 2) funding the UFS upgrade for all Municipal Operators; 3) ensuring the smart card will allow integration with Muni fare collection systems; and 4) developing smart card financial clearing procedures before equipment is installed regionally

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MTA and Muni Operators will work together to ensure passengers can transfer with a discount

▸ It is anticipated that current paper transfers would be honored by all operators until such time as adequate provisions are made for cash paying passengers who wish to transfer

▸ Smart cards can accommodate transfers seamlessly, and require:

– Real customer benefits from smart card use (e.g., loyalty discounts, autoload, low fare guarantee, floating period passes, durability, exact change not required, balance protection, load bonuses)

– Easy access to smart cards (e.g., wide distribution through 1000 outlets; ticket by mail, telephone and email; partner distribution)

– Focused customer education on benefits and access to smart cards

▸ The transition period (at least one year) allows the region to monitor passenger use of smart cards and adjust actions appropriately

MTA and Muni Operators will work together to ensure fare collection system integration

▶ The purpose of the UFS is to provide a fully integrated fare collection system countywide

▶ The smart card technology has the greatest capacity to address complex and varied fare policies and rules -- affording the highest capability for integration

▶ A regional fare collection system will require several common fare policies and practices -- e.g., transfer rules, load bonuses, negative balance, balance protection -- pricing and fare structure can be different among operators

MTA and Muni Operators will continue efforts to develop regional clearing procedures

▶ The Money Committee has drafted some of the proposed policies and procedures to support regional clearing (distributed clearing,operator independence over fare policies, shared information) -- several issues are outstanding (cost sharing, fraud, frequency of clearing)

▶ The regional clearing policies and procedures should be in place prior to full installation of the equipment -- there is adequate time to develop regional clearing policies

▶ The Money Committee will continue working efforts to address regional clearing procedures and report on progress periodically

We are seeking Board approval of preferred technology

▶ Board decision is requested at the August meeting regarding the technology to be procured (all accept cash and currency):

    − Smart card

    − Magnetics

    − Printing on bus

▶ An August decision would significantly foster timely procurement of a new fare collection system, which is essential to meeting Pasadena Blue Line requirements on time