Unified Ticketing System for different

modes of transport in Ahmedabad City

Challenges and Issues

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UNIFIED TICKETING SYSTEM

- Integrated tickets are capable of being used over multiple modes of transport.
- The pricing structures and information sharing is coherent between different public transport operators and is valid for all modes in one specific region.
- Tickets can be paper based or electronic; can be smart or otherwise.
- Integrated ticketing schemes can be extended to other applications viz. merchandizing, entertainment, tourism and other tailor-made services.
- Provides easy access to information about timetables and tariffs of all the modes, irrespective of different operators being involved
- Interoperable i.e. it is not dependent on one organisation, but is open and allows multiple interested parties to join.

WHY NEED UNIFIED TICKETING ?

- Making travel within city seamless and more efficient
- Improving access to public transit system
- Improved and scientific decision system
- Aids multi-modal integration
- Aids policy decision by availability of analytics platform.
- Makes transit cheaper by utilizing the advantages of economy of scale
- Dashboard driven operation and revenue data for the top management.
- Reduction in personal vehicles with better utilization of Public transport infrastructure.

THE GLOBAL SCENARIO

Card	City	Transport modes	Technology	Applications	Users	Remarks
Oyster Card	London (UK)	Rail, PT	RFID, NFC		7 M	CICO system, prepaid smart card
Octopus Card	Hong Kong	Rail, PT, Taxi services	RFID, NFC	Tourism, Shopping, Others	10 M	CICO system, prepaid smart card, mpayment functions
T-money	Seoul (S. Korea)	Rail, PT, Taxi services	RFID	Tourism, Shopping, Others	18 M	CICO system, prepaid smart card
EZ-Link	Singapore	Rail, PT, Taxi services, car sharing	RFID, NFC	Tourism, Shopping, Others	12 M	CICO system, prepaid smart card, mpayment functions
Mi Muovo	Emilia Romogna (Italy)	Rail, PT, bicycle / car sharing	RFID	Others	0.2 M	CICO system, prepaid smart card

NATIONAL COMMON MOBILITY CARD

- MOUD rolled out an integrated mobility card named 'MORE' in December 2011 by UTIITSL. However, due to security issues and absence of interoperability, the card was not a success and was withdrawn in November 2014.
- The National Common Mobility Card committee formed in September 2014 to develop an interoperable system which is not dependent on vendor / operating system and to define card / device specifications & standards.
- The chairman of the committee was Sh. D. S. Mishra, Secretary MOUH; JS/Urban transport, DG/C-DAC, DG/NIC and representatives of NPCI, Department of Financial Services, public & private sector banks, DMRC, BMRCL, KMRL etc. were the members.
- The committee deliberated on various financial models and came out with recommendations.

NCMC COMMITTEE RECOMMENDATIONS

- Develop and publish the NCMC standards & specifications around the EMV open loop card with stored value
- Engage an indigenous domestic payment card network for developing specifications for AFC system / cards / readers / payment networks / software security / mobile phone apps. etc. and payment protocols
- Create certification mechanism for the same.
- Explore use of KMRL model as a business model for PTOs
- Initiate work on designing the metro gates / validators by C-DAC indigenously to minimize dependency on international players
- Align the system with other govt initiatives viz. Make in India, Aadhar base eKYC etc.
- Enable Off-us transactions in the transit echo system. The fee charges applicable should be determined by PTO in consultation with FIs in compliance with RBI guidelines.
- Initiate regional implementation at first and then integrate it at national level.

KOCHI METRO MODEL – Kochi1 Card

- The Kochi One card is a prepaid smart card, issued by Kochi Metro Rail Ltd. and is based on open loop model.
- KMRL engaged a consortium with a financial Institution as the lead member, an AFC solution provider as a compulsory partner and a system integrator as an optional partner through an open competitive bidding process.
- The technically qualified bidder, who quoted the highest NPV of the total royalty payable to KMRL during a period of 10 years, was the successful bidder.
- The card user is able to meet all their payment needs including transportation, retail shopping and e-commerce across different platforms through this card.

AHMEDABAD METROPOLITAN AREA



TRANSPORT SCENARIO IN AHMEDABAD

- UMTA is the nodal agency for transport in Ahmedabad Metropolitan area
- The following modes of Public Transport are available -
 - BRTS Through Ahmedabad Janmarg Limited (AJL)
 - City Bus Services Through Ahmedabad Municipal Transport Services (AMTS)
 - > Aggregate Taxi Services viz. Uber / Ola
 - > Auto Rickshaws
- Metro Rail (MetroLink Express Gandhinagar Ahmedabad) Phase I is in progress
- Integrated Ticketing System has been implemented through Automatic Fare Collection System on BRTS & AMTS by AJL under the aegis of smart city project and is part of Integrated Transport Management System for Ahmedabad city

COMPONENTS OF AFC SYSTEM

- Fare Media viz. Smart Card / Printed Tickets
- Hardware such as Servers / Fare media Validators / Fare media selling or updating terminals / Power supplies / UPS etc.
- Operating System / Application Logic Software
- Relational Data Base Management System
- Communication media viz. OFC / Cat 6 LAN cables etc.
- Business Rules
- Smart Card Host
- Central Clearing House

AFC SYSTEM CONCEPT MODEL

	Design, Develop, Setup, Commission, Operate & Manage					
Ш	Automatic Fare C	collection System	Financial Management			
	AFC Validator/ AFC Card Reader Device Information Management Management		FI & AFC Transaction Reconciliation	Card Manufacturing Management	ICICI B/	
NPF	Business / Fare Rules Engine	AFC Transaction Reconciliation	Card Sale Management	Card Life Cycle Management	TION (
	AFC Transaction Management	MIS & reporting	Smart Card Host System	Fund & Loyalty Management system	NSTITU	
	Terminal Application	Call Centre	Top-up or Recharge Management	MIS & reporting	NCIAL I	
AF(Integration Transport		Smart Card	Call Contro	INA	
	Interface with Ticketing System		Application	Call Centre		

SYSTEM INTEGRATOR (NEC)



AUTOMATIC FARE COLLECTION SYSTEM AT AHMEDABAD

- The Central Server & Data Server along with Switches & Routers are installed in BRTS HQ at Usmanpura.
- Every BRTS station has a station server, Switch, POS, Turnstile Gates & Card Validators. These are interconnected through LAN.
- The central server and station servers are connected on WAN through OFC network.
- M/s. NEC has installed the Electronic Firmware and are the system integrator.
- Telecom hardware & Optical Fiber Cable Backbone has been installed by M/s.
 Sterlite Technology.
- M/s. Price Water Cooper are the Project Management Consultant.

JANMITRA CARD – INTEGRATED SMART CARD FOR AHMEDABAD



JANMITRA RUPAY CARD - SALIENT FEATURES

- Stored Value card issued by ICICI bank.
- It is a prepaid Rupay based smart card providing Interoperable, open loop, contactless payment solution.
- Card supports both contactless and contact payment options.
- Cash can be loaded into the card through online banking or by paying cash.
- The top up points are available in landmark locations and at POS BRTS stations.
- Can be used to make retail transactions besides paying the fares in public transport.
- No further authentication is required for payments below Rs 2,000.

SMART CARD MANAGEMENT

The following information is attached with Smart Card:

- Passenger name
- Smart Card Serial Number.
- Smart card issue date and time
- Fare payment transaction history
- Revaluing transactions history
- Trip history for at least 24 months
- Stored value balance.





TICKET FROM CARD VALIDATOR

TICKET FROM POS

HARDWARE DETAILS

- Central Server along with Switches / Routers
- Station Server with Switch
- Station Card Validator
- Turnstile Type Fare Gate
- Point of Sale Terminal
- Handheld Ticketing Terminal
- Bus Card Validator
- Swing gate for Disabled entry/ Emergency Purposes



STATION SERVER WITH SWITCH



CARD VALIDATOR ON TURNSTILE GATE



POINT OF SALE EQUIPMENT



HAND HELD CARD VALIDATOR

ROLE & RESPONSIBILITY OF FINANCIAL INSTITUTE – ICICI BANK

- Card Management
 - Procurement of Smart cards.
 - Card Issuance and Card personalization.
 - Card Security.
 - Implementation of Card Host System.
 - Marketing and Distribution of Smart Cards by setting up 1000 recharge, Card issuance and Bill payment points in Ahmedabad City
 - Mobile Recharge/Payment Wallet.
- Clearing House Solution.
- Cash Collection at all locations of BRTS/AMTS.
- Transaction Settlement at all places including BRTS/AMTS on T+2 days.
- Setting up a call Centre.

INTEGRATION OF BRTS WITH AMTS FOR UNIFIED TICKETING.

- Seamless Integration of Ticketing
- Fare or tariff integration for end to end travel experience.
- Full transfer rights between modes and operators.
- Cards / tickets to be validated through hand held / pole mounted ticket terminals.
- Integration work in progress. Difficulties faced in installation of pole mounted card validators.

THE ROAD AHEAD

Integration of Janmitra card proposed with -

- Metro rail system MEGA
- Automated Vehicle Parking System
- Auto Rickshaws
- Aggregate Taxi Services
- NMT
- Tourism

PROPOSED MEGA-BRTS AFC SYSTEM INTEROPERABILITY

- MEGA plans to use two type of smart cards as fare media -
- Contactless smart cards (CSC) Type A and Type C, dispensed by staff or from self-service vending machines at metro stations.
- Dual chip card having Bank chip (for Banking use) and Transit chip (NXP chip) allowing full access with read/write permission in to the card.
- Security of cards is managed by cryptographic mechanism or security techniques such as 3-DES/AES etc. for Encryption/Decryption of data.
- Authentication is happening at validator with the help of exchanging keys between SAM (security access module) and Ticket media keys.
- Plans to use store value system instead of Account based system.

CHALLENGES IN PROPOSED INTEROPERABILITY

- Confirmation required from BRTS to allow MEGA cards on their network.
- MEGA has already Settled the Technical Specifications (TS) level issues at both ends while framing AFC Technical Specifications.
- However, BRTS have not taken into consideration MEGA AFC Technical Specifications.
- BRTS has adopted only RuPay Prepaid ICICI Bank card as Fare Media, whereas MEGA plans for EMV cards.

COMPARISON OF AFC SYSTEMS



PROPOSED SOLUTIONS

Fare Media	Requirement	Solution	Repercussion
MEGA in house card to work on BRTS AFC System.	Clearing house (CCHS) set up by MEGA or BRTS.	Since BRTS is not using in house card, CCHS is not required. Hence, CCHS is to be set up by MEGA only.	 One time investment by MEGA on CCHS (CCHS is an optional item in MEGA RFP). MEGA may collect per transaction basis clearing charges from BRTS, if mutually agreed. CCHS can be used for future interoperability.

Fare Media	Requirement	Repercussion		
EMV/Rupay Prepaid card of MEGA's Bank on BRTS AFC System.	Clearing by BRTS bank/payment gateway.	 Expenditure on payment settlement between MEGA & BRTS Banks. Saving of one time CCHS' investment. 		

PROPOSED SOLUTIONS (Contd.)

Fare Media	Requirement		Repercussion		
BRTS RuPay Prepaid card on MEGA AFC System.	Clearing by bank/payment g is required.	MEGA gateway	 Expenditure on payment settlement between MEGA & BRTS Banks. Saving of one time CCHS' investment. 		

CONCLUSION

Integrated Ticketing for public transport through Automated Fare Collection Systems is the need of the hour and shall go a long way in facilitating commuters. This shall not only enhance the attractiveness co-efficient of Public Transport Systems, but shall also result in more economical solutions for all the stakeholders. However, in implementing AFC systems, it is seen that while technically, the integration is feasible, there are substantial challenges in coordinating the various agencies.

Ahmedabad BRTS has started the AFC system through integration on AMTS buses. For integrating with Metro Rail, CCH has to be set up at MEGA end to facilitate usage of Janmitra smart card. Further integration with other entities viz. Automated Parking Systems, Aggregate Taxi Systems, Auto Rickshaws, NMT, Tourism sites etc. can also be done through proper co-ordination.

THANKS FOR YOUR ATTENTION

