National Common Mobility Card Ecosystem

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Centre for Development of Advanced Computing

Premier R&D organization of the Ministry of Electronics & Information Technology (MeitY) to carry out R&D in ICT, Electronics & associated domains

1988

Established Year

11

Locations

2700+

Professionals

High Performance Computing

Multilingual and Heritage Computing

Professional Electronics, VLSI & Embedded Systems

Software Technologies including FOSS

Cyber Security & Cyber Forensics

Health Informatics

Education and Training
Development of NCMC Ecosystem – The Need

Fare collection in cash poses challenges
- Cash handling & reconciliation
- Revenue leakages ...

Digitization of fare collection using Closed Loop Cards has its set of problems
- Proprietary
- Mostly imported – Expensive
- Vendor Lock-in – High Maintenance Costs, Monopoly
- Not Interoperable
MoHUA constituted an Expert Committee to make recommendations for a Transit Fare Collection system:
- Based on a Common Mobility Card
- Vendor Agnostic – based on standard interfaces
- Indigenous

Goals
- One card for all transit needs – travel, parking, toll ...
- Also useable for retail transactions
- Specify complete ecosystem
- Make In India
Expert Committee’s Recommendations

Extensive deliberations by committee on the possible models for NCMC after studying the various models being followed across the world

- Develop and publish NCMC Standard and Specification around EMV open loop card with stored value
- Engage domestic agency for developing specification of NCMC Ecosystem - AFC System, Card, Metro Gate, Validator, and banking interface.
- Create certification mechanism for each component of NCMC Ecosystem.
- Initiate indigenous development of Metro Gates / Validators
Development of NCMC Ecosystem – The Beginning

- Standardization of all interfaces of NCMC Ecosystem
  - Automatic Fare Collection System (AFC)
  - Mechanical Gate
  - Validation Terminal
  - Financial Settlement

- Develop a prototype of NCMC system
- Deploy a Proof of Concept (PoC) with a Transport Operator

- Develop the hardware components – Mechanical Gates and Validators

- Develop Card specifications
  - Payment settlement system
NCMC based AFC Ecosystem for Metro Rail

NCMC Card:
   RuPay qSparc V2.0
NCMC Eco-System:
   Part-IV: Transit Service
   Part-V: Terminal - AFC System and Acquirer Communication
   Part-VI: AFC System - Acquirer Interface
   Part-VII: Terminal –Gate Interface
NCMC based AFC – Status @ Metro Rail

Development Status

- Metro Gates and Validation Terminal Hardware developed by BEL
  - L1 certification achieved
- Validation Terminal Software Kernel and AFC Software Developed by CDAC
  - L2 and L3 certification achieved
- Soft Launch of NCMC based AFC by Secretary MoHUA 31 Jan ’19
- AFC Ecosystem - NCMC Card, Sweekar (Swachalit Kiraya) AFC and Swagat (Swachalit Gate), launched by Honourable PM on 04 March 2019

NCMC Pilot

- Field trials ongoing at 3 Metro Stations of DMRC
- More than 20 banks issuing NCMC cards
- Field trials at 2 stations of Bengaluru Metro in December
- Retro fitment of BMRC Ph 1 gates by Aug 2020
- Rollout on 44 Stations of BMRC Ph 1 by Dec 2020
Standardization Status

NCMC

- All NCMC interfaces specified (Part IV – VII)
- Common service Governance and Data sets specification defined after detailed deliberation among NPCI, CDAC, DMRC and BEL
- NCMC qSparcV2.0 Specs
- STQC to set-up testing and certification facilities

QR Code

- Drafting of QR Code Specification by NPCI, CDAC in progress
## Key Items and Players

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
<th>Certification</th>
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</thead>
<tbody>
<tr>
<td>Card</td>
<td>NPCI</td>
<td>NPCI, EVMCo</td>
</tr>
<tr>
<td>Terminal</td>
<td>NPCI, CDAC / MoHUA</td>
<td>EVMCo, NPCI, STQC*</td>
</tr>
<tr>
<td>Mechanical Gate Interface</td>
<td>CDAC / MoHUA</td>
<td>STQC*</td>
</tr>
<tr>
<td>AFC System Interface</td>
<td>CDAC / MoHUA</td>
<td>STQC*</td>
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</tbody>
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* Action Ongoing with STQC
NCMC based Centralized AFC for Buses

Development and Proof of Concept deployment for an NCMC compliant Centralized AFC solution for Road Transport Operators

First PoC at BEST Mumbai

Advantages

- Low Initial Expenditure (Validators / Ticketing Machines to be procured / leased)
- Low Operation and Maintenance Cost
- High availability of system
- Quick Implementation of NCMC Solution for on-boarding any new PTO
- Easy Inter PTO integration for common ticketing / data sharing

03-12-2019
Top Level Architecture – Centralized AFC System

- Data flow from each and every terminal (ETIM, HHD & Fixed Validator) installed in field
- Online configuration and other controls from centralized AFC to any terminal device
- Alarm/event messages from terminals to AFC

Centralized AFC System

CDAC Hosted DC/DR

PTO-1
- ETIM-1
- ETIM-2
- ETIM-n
- Fixed Validator-1
- Fixed Validator-2
- Fixed Validator-m
- HHD-1
- HHD-2
- HHD-p

PTO-2
- ETIM-1
- ETIM-2
- ETIM-n
- Fixed Validator-1
- Fixed Validator-2
- Fixed Validator-m
- HHD-1
- HHD-2
- HHD-p

PTO-n
- ETIM-1
- ETIM-2
- ETIM-n
- Fixed Validator-1
- Fixed Validator-2
- Fixed Validator-m
- HHD-1
- HHD-2
- HHD-p

Acquirer

NPCI

Issuer

PTO-1
- Depot-1
- Depot-2
- Depot-x

PTO-2
- Depot-1
- Depot-2
- Depot-y

PTO-n
- Depot-1
- Depot-2
- Depot-z

Centralized dashboard
- Status of Depot wise buses and terminal machines
- Txn settlement report
- Reconciliation
- Activation or deactivation of any device

03-12-2019

One Vision. One Goal… Advanced Computing for Human Advancement…
Baseline AFC software features

Central System
- User Management
- Configuration Management
- Transaction Management
- Reconciliation

Depot System
- Monitoring of device health
- ETIM Issuance
- Revenue Reconciliation
- Dashboards and MIS reports

Mobile Application for QR ticketing
- Interface with existing Mobile App (if already existing)

Third party system Integration
- Vehicle Tracking System (VTS)
- Integrated Transit Management System (ITMS)
Hand Held Terminals (HHT)

ETIM/HHD

Validator
NCMC based Integrated Ticketing System for Mumbai

Integrated Ticketing System
- Card Services Management
- Interface with Clearing House
- Scheme operations and Maintenance

Fare Collection & Settlement
Service Level Agreement
Transaction based business model

PTO | Ridership (Lakhs)
---|---
Mumbai Suburban | 74
BEST Buses | 31.2
MMRDA Metro | 17.4
Metro 3 | 12
Metro One | 3.2
CIDCO Metro | 2.4
NMMT Buses | 2.4
Others | 3.4
Total | 146

A setp towards Mobility as a Service (MaaS)

One Vision. One Goal… Advanced Computing for Human Advancement
One Vision.

One Goal...

Advanced Computing

for Human Advancement...

Thank You!