Integrated Transportation Payment Systems

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The Payment System Industry Perspective

The following brief presentation shall highlight the system integration needs derived from an Automatic Fare Collection System.

The general approach is similar for Parking Systems and other Payment Systems in Transportation.

The design objective for an integrated payment system is to find the right balance between:

Convenience, Security, Privacy, and Costs aspects
Premise

Classic and electronic payment means will continue to coexist and the future ITPS shall be prepared to handle all of those payment/ticketing media:

– Cash,
– Credit Cards / Debit Cards,
– Electronic purse (on Smart Cards, NFC Devices, etc.),
– Electronic Tickets (on Smart Cards, NFC Devices, etc.),
– Electronic Passes (on Smart Cards, NFC Devices, etc.),
– Electronic IDs (on Smart Cards, NFC Devices, etc.)
Premise

Future ITPS shall be prepared for mixed modes of Fare / Tariff Processing, including:

- Front/End Fare Processing
- Back Office Fare Processing
- Primary Back Office w/ Front End fall-back
- Account based (prepaid or postpaid)
- Card based (primary prepaid)
- ID based (not registered Credit Cards, etc.)
• The security of the ITPS is primarily built on the system level, that is by combining the security elements imbedded in the payment / ticketing media with back office processes to monitor its use.

• Transportation providers need to assess the risk level which deems acceptable.

• A efficient Payment System is based on a balanced approach between Convenience, Security, Privacy and Costs.

• Fare and Payment Media have always been subjected to falsification and unauthorized use and will be in the future; no matter how high the barrier will be raised, there will always be an approach to compromise the security of a media readily accessible.
Premise

Implementing Integrated Transportation Payment Systems is a balancing act between:

- Convenience and ease of use
- Security
- Privacy protection
- Implementation and operations costs
At first:

Brief introduction of the elements currently used within Integrated Transportation Payment Systems
Payment/Ticketing Media for Transit
Self Service Ticket Vending Machines
On Board Vending Terminals & Farebox
Ticket Office Equipment
Fare Gates, Hand Helds and Smart Card Validators
Systems for fare collection / innovative bus equipment
Parking System Devices
• **Credit Cards / Debit Cards**
  – as payment instrument only,
  – *not* as credential for entering the system

• **Security**, if used in online environment: low risk for Transit Agency

• **Privacy**: Low risk for user if the use as payment instrument is PCI compliant implemented

• **Costs**:
  – Implementation Costs are moderate
  – Operations Costs (fees) can be substantial
• **Credit Cards (proximity cards only)**
  – as credential for entering the system;
  – as registered card for account based processing;
  – prepaid account value or postpaid upon use
  – not as anonymous credit card unknown to the AFC System

• **Security:**
  – low risk if prepaid
  – moderate risk for Transit Agency if postpaid

• **Privacy:** some card information and card use are linked for a limited time

• **Costs:**
  – Implementation Costs are moderate
  – Operations Costs (fees) can be substantial
• **Credit Cards (proximity cards only)**
  – as credential for entering the system;
  – as anonymous credit card unknown to the AFC System

• **Security:**
  – low risk if used in an online environment
    (online environment for Bus Operation maybe not 100% available)
  – moderate risk if offline authorized, provided the allowed purchase value is limited accordingly

• **Privacy:** some card information and card use are linked for a limited time

• **Costs:**
  – Implementation Costs are moderate for stationary equipment
  – Costs for a guarantied online environment for mobile applications could become substantial
  – Operations Costs (fees) are substantial
• **Smart Card**
  – as agency issued card
  – registered or anonymous
  – account based or primarily card based
  – with active Ticket Products
  – and Electronic Purse encoded on the card

• **Security:**
  – The Transportation provider issues the cards and creates therewith an controlled environment in which the security is build on the System Level by utilizing the security features imbedded in the card in conjunction with the Back Office data processing means.
Further to Smart Cards

• **Security, continued:**
  – The Smart Card’s own security can be challenged like it has been over decades with Magnetic Tickets
  – The System behind can provide effective processes for Fraud Detection and Risk Management

• **Privacy:**
  – Anonymous Cards provide low risk but at the price of less convenience
  – Registered Cards are more exposed but the use is based on consensus between the patron and the agency
Innovation in ticketing

esprit - Just board and ride
How it is done - Vehicle infrastructure

Radio transmitter configured as peripheral to an on board computer providing information like time, location, vehicle-ID by means of unidirectional data broadcast

- One transmitter / many receivers
- No answer from the receivers back to the transmitter
- No collision detection problems

The tariff engine creates a comprehensive radio signal, providing all information required by the ticket medium for calculation of the exact fare.
1 Load stored value

2 Automatic fares calculation and charging, recording of transaction data

3 Upload of transaction data
4 Top up of stored value

Back Office
Thank You