The Future Of Cloud based Ticketing

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Goal for today

Establish a route for enabling Cloud Based Ticketing

Introduction
What is Cloud Based Ticketing
Why would PTOs & PTAs consider it
How to get there
Introducing UL

• Working for a safer world since 1894
• Transaction Security guides companies within the mobile, payments and transit domains through the complex world of electronic transactions.
• Safeguarding security, compliance and global interoperability
• Offering advice, test and certification services, security evaluations and test tools
Global Transit Best Practices

LTA Singapore called upon UL to set up the CEPAS certification authority and build the CEPAS test center.

On behalf of RTA Dubai, UL acts as a Test & Certification Authority for the complete AFC scheme.

Plovdiv (Bulgaria) chose UL as its main adviser during the preparation, testing and implementation of the AFC system.

TLS is the owner of the Dutch AFC Scheme. UL’s scope of work includes:
• Specification Services
• Back-Office Support.
• Advisory Support for Card Migration

Exclusive Certification Center on behalf of NXP (MIFARE Classic, DESFire, MIFARE Plus cards) and for MIFARE4Mobile on behalf of the M4M Industry Group

For the SEFT Project UL is responsible for the Quality Assurance. UL contributes to the testing procedure in design, analysis and implementation.

Part of the Dutch OV-chipkaart System has to be implemented at the PTO’s. UL provides support to the Dutch PTO’s for the implementation of their AFC architectures.

For APTA (USA) UL drafted test design specifications and test cases specifications for the CFMS Standard.

For VDV-KA, UL developed and maintains the test tools for the test services in Germany.
Trends & Developments in Public Transport

Trends
• Ticketless Travel
• Quick Product Dissemination
• Real Time Travel Information
• Multi-modal / Multipurpose Fare Media
• Operational Excellence for Transport Operators

Developments
• MIFARE 4 Mobile
• EMV @ The Gate
• Open Loop Payment
• Innovative Fare Products
• Mobile Ticketing/Payment
• City cards
• Cloud Technologies
Challenges

Open-Loop Payment? Cloud Based Travel? What to choose?

How to deal with legacy & backwards compatibility?

EMV, NFC MIFARE4Mobile ...Wow!

How does this leverage our business?

Hum.. what about security?

What is the way forward?
A Point on a Trendline
It moves the logic from the front-end...

Card Centric Off-line Ticketing
...to the back-end...

Cloud Based Ticketing

- Sales Logic
- Validation Logic
- Inspection Logic
- Fare Products
- Clearing & Settlement

Vending Machine

Gate

Inspection Device

Fare Medium

Authent-
tication

ID

Authent-
tication

ID

Authent-
tication

ID

Authent-
tication

ID
... and radically changes fare management

Identification
- Hello, we are...
- Present your travel card please
- Present the ID you have

Fare Calculation
- How much?
- Where are you going to?
- We charge aggregated usage

Payment
- How to pay?
- Present your travel card please
- Configure the account you like

Card centric off-line ticketing:

Cloud based ticketing:
Benefits

- Lower card issuance costs
- Cheaper and Enhanced Retail Network
- Increase Customer Loyalty
- Value Added Services

- Flexibility in fare media and in payment means
- Single check-in / check-out
- Enhanced customer support

- Flexibility in Fare Products
- Decrease CAPEX / OPEX
- Lower cost for customer support
Cloud Based Ticketing
How to migrate existing systems to the cloud?

• Cloud Based ticketing is all about decoupling:
  • Identification
  • Fare calculation
  • Payment

• When is a ticketing system fully cloud based?
  • When the three elements are fully decoupled!
Cloud Based Ticketing
The generic roadmap of UL

1. Account Based Ticketing
2. Future proof acceptance infra.
3. Go Mobile
4. Integrate additional payment and ID

Cloud Based Ticketing
Account Based Ticketing
the Fare Calculation Engine

• Decoupling the three elementary processes in fare management:
  1. Identification
  2. Fare calculation
  3. Payment

Let us explore the option to move fare calculation to the back-end...

... at least a Fare Calculation Engine in the backend
Account Based Ticketing
the Account Management System

• Fare calculation is the execution of
  • usage rules
  • pricing rules
  • payment rules
    on the journey

• Hence an Account Management System in the backend
to store the fare products
Account Based Ticketing
what does it look like

- Back end
  - Clearing & Settlement
  - Billing & Invoicing System
  - Fare Calculation Engine
  - Account Mngt. System

- Vending Machine
  - ID
  - Sales Logic
  - Authentication
  - Gate
  - Inspection Logic
  - ID
  - Authentication
  - Inspection Device

- Fare Medium
  - ID
  - Fare Products
  - Authentication

No change in customer medium
No change in front-end
Future proof acceptance infrastructure
Continue decoupling

• The three fare management elements:
  1. Identification
  2. Fare calculation
  3. Payment

What is needed to use a building access card for the identification?

• Verify contactless interaction
• Add identification logic
• Ensure permanent connection
Future proof acceptance infrastructure
Standardize contactless interface

• ISO 14443...
  • Many options
    - Operating volume, Signal to noise, Transaction time
      • ... capacity (passenger throughput)

• EMV Contactless Level1!
  • Specifies options for payment
  • Works for transit
  • The de-facto global standard
Future proof acceptance infrastructure

Flexible (multi-app) terminal architecture

- Controller
  - Business Logic
  - Can be: One per protocol, Move to back-end

- Reader
  - Can be: RS232, TCP-IP

Decouple **dumb reader** from **intelligent controller**
Future proof acceptance infrastructure
Permanent connection between frontend and backend

• Purposes
  - Online authorization request
  - Remote terminal management

• Technology
  - Fiber
  - 4G

• Challenges
  - Cost
  - Coverage
  - Speed

• Mitigation
  - Deferred authorization
Go Mobile
serving Account Based Ticketing

• Open points
  - How to access account ‘on the go’?
  - How to receive notifications?

• ... a mobile app on a smart phone

No NFC required
Go Mobile
take its full potential for the connected smart journey

1. Plan
2. Purchase
3. Pre-journey info
4. Redeem
5. On-board info
6. Post-journey info

Visual
- Display
- Capture

Audio
- Microphone
- Speaker

Contactless
- Tag Reader
- Writer mode
- Card Emulation

Remote
- Send
- Receive

Audio
- Microphone
- Speaker

Remote
- Send
- Receive

Contactless
- Tag Reader
- Writer mode
- Card Emulation
Go Mobile
Virtualizing contactless cards

• Features
  - Standardized contactless interface
  - Flexible (multi-app) architecture

• Challenge
  - Major ticketing protocols partially ISO compliant

• Options
  1. Adapt NFC phone to major ticketing protocols
  2. Adapt ticketing protocols to ISO

Make a business case
Integrate additional payment and ID means
Finish decoupling

• The three fare management elements:
  1. Identification
  2. Fare calculation
  3. Payment

• The three previous steps enable:
  • Integration of payment mean
  • Integration of ID mean
Integrate additional payment and ID means
Accept bank issued contactless payment card

Account-based by design
Couples Identification and payment
Can be mobile
Cloud Based Ticketing
towards the Smart City

1. Account based ticketing
2. Futureproof Acceptance infrastructure
3. Go mobile
4. Integrate additional Payment and ID means
THANK YOU.