Korea Smart Card Status And Proposal

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01 Transportation Card Status
1) Progress and status

- '96. 7: Transportation card system introduced Seoul city bus for the first time in Korea.
- '03.10: Introduction of Highway Tollgate Hi-pass
- '05: Mobile Transportation Card Service (Card, KT, LGT, SKT)
- '11.~: NFC (Near Field Communication) Transportation Card Service Promotion
- '13.~: Nationwide interoperable transportation card issuance.
- '14.~: Nationwide interoperable transportation card use
2) Nationwide Interoperable Transportation Card Status

**Prepayment**
- **Municipality**
  - Gwangju HANPAY Card
  - 850,000
- **Corporation**
  - KORAIL High-pass

**Deferred payment**
- **Credit-card company**
  - Citizenship Card
  - 9,298,000
  - Post-Paid Card
  - 7,934,000
  - Pre-Paid Card
  - 9,298,000 (38.9%)
  - 7,934,000 (33.0%)
02 Financial Card Status

IC Card Conversion Status
Measures for IC Card Conversion
1) IC Card progress and status

1. Ensure the safety and reliability
   To ensure the safety and reliability of electronic financial transactions, forwarding policies to switch to an MS card since the IC card 2004

2. IC Card conversion
   Switching of the IC card is promoted in order cash transactions (deposits and withdrawals, transfers), card loans (cash service), credit

3. Prepare a countermeasure
   After a discussion twice, the Financial Supervisory Service provides the measures for IC Card conversion.
2) Necessity for IC Card Conversion

Duplication of card incident that occurred over the last five years is a total of 27,940, it was caused by duplication of MS card or POS terminal hacking.

It is completed the switching or forwarding of the IC card to prevent card duplication incident in over 194 countries.

IC Card Conversion is required in order to ensure the stability and reliability of electronic financial transactions through the fundamental exclusion of card illegal duplication incident.
3) IC Card Conversion Status

Cash Card

- No Conversion: 10%
- Conversion: 90%

Credit Card

- No Conversion: 19%
- Conversion: 81%

Standard in March 2012
4) Measures for IC Card Conversion

2. Financial Card Status

Limit Cash Transactions from ATM
Pilot Test for one year from February 2013.
Promote the goal of the front limit of MS card cash transactions from February 2014.

Restriction of Credit Purchase Transactions
Existing terminal IC terminals switch to the IC terminal (combined MS) by the end of 2014.
If the inconvenience of customers is a concern, consider adjusting the timing of MS Card transaction ban.

Limit Card Loan from ATM
Promote the goal for full implementation of the MS card loan limit from January 2015, all converted to IC card by the end of 2014.
Processing Projects

1. Free-flow Multi-lane Smart Tolling System

2. Development of the transportation electronic payment system using nationwide interoperable transportation card

3. Research on Standard Settlement Specifications development for nationwide interoperable transportation card

4. WBS AFC Standard SW Solution Development
1. Free-flow Multi-lane SMART TOLLING SYSTEM
(1) Toll System History

- Manual Collecting
- Toll Collection System
- ETCS
(2) Toll System State

**TCS**
- Collected by Ticket + Cash, Electronic Card, or Magnetic PrePaid-Card
- Nationwide Opening of TCS: 1994
- TCS lanes: 1,894 lanes in 326 toll gates
- Cards: 11.5 million
- TCS-Using Rate: 47%

**Hi-pass**
- Collected by OBU and Electronic Card (OBU: On Board Unit)
- Nationwide Opening of Hipass: 2007
- Hipass lanes: 832 lanes in 326 toll gates
- OBUs: 5.5 million
- Hipass-Using Rate: 53%
Free-flow Multi-lane SMART TOLLING SYSTEM

(3) TCS System

**Closed-Type**
- **Entrance Lane**
  - 615 Entry lanes

**Closed-Type**
- **Exit Lane**
  - 1,279 Exit lanes

**Open-Type**
- **Lane**
  - 187 lanes
(4) ETCS System

Hi-Pass System

- Non-Stop Payment at Tollgate
- Communication between OBU and Antenna
- Automatic Fare Deduction from Inserted Smart Card in OBU

Touch-Pass System

- Touch & Go at Tollgate
- Communication between Smart Card and Antenna
- Automatic Fare Deduction from Smart Card
(5) Characteristics of Hi-pass

- 4-Types OBU, 5.5 millions OBU, 27 Companies, 124 Models
  - General (80%), Room Mirror (16%), Navigation (4%), Disabled

- 2-Types Smartcard, 11.5 millions Card
  - Credit card (Postpayment) (63%), Prepayment card (37%)
(6) Technology trends

Asia, Oceania

Free-flow Multi-lane SMART TOLLING SYSTEM

Korea

Singapore

Australia
(6) Technology trends

Canada

Korea

America

Free-flow Multi-lane SMART TOLLING SYSTEM
(6) Technology trends

Europe

Sweden

England

German
(7) Research development Definition

Free-flow Multi-lane SMART TOLLING SYSTEM

SMART HIGHWAY
Road Technology + IT Technology + Automotive Technology
(8) Background and Necessity

Free-flow Multi-lane SMART TOLLING SYSTEM

- Electronic Toll Collection System
- Law speed
- Congested
- Lanes are closing for maintenance

Free-Flow Multi-Lane base on SMART Tolling System

- Smart Tolling System
- High speed
- 24 hours
- 365 days non-stop operation
- Smoothly
- Eco-friendly
(9) Research development vision

Any Terminal device, Any Lane
Free-flow, Multi-lane
Smart Tolling System
2. Development of the transportation facilities fare system using the nationwide interoperable transportation card
(1) Introduction

A. Definition

Research to develop an electronic payment system can be useful with the transportation facilities (Parking lots, Gas stations), the existing infrastructure (High-pass) and nationwide interoperable transportation card.

B. Goal

Development of the transportation electronic payment system using nationwide interoperable transportation card

- Development of integrated e-payment system
- Development of integrated settlement system
- Development of Smartphone interlocking technology
(2) Development Necessity

No application services using the built infrastructure

- Supply of High-pass terminal (7.76 million units) and expansion of the system (319 office)
- No application services using the infrastructure

Need to provide the convenience of utilizing various method of payment

- Need to provide convenience in a variety of facilities and services
- Need to provide convenience to reduce operating costs and unattended operation by simplifying

Necessity of nationwide interoperable transportation card activation

- Conservative approach of an existing large transportation card business.
- Difficulty in use national transport card by excluding the High-pass settlement part.
- Activation through road-based service of nationwide interoperable transportation card

Development necessity of the transportation electronic payment system using nationwide interoperable transportation card
(3) Project Goals

- **Prepayment CO.**
- **Settlement system**
- **Deferred Payment CO.**
- **Nationwide interoperable card CO.**

Ultimate Goals:

- Development Necessity of the transportation electronic payment system using nationwide interoperable transportation card.
- Demonstrate the possibility of commercialization through a pilot.
(4) Plan for Applications

Application proposals presented to the market, as soon as the end of the study.

Research:
- Establishment of operating system.
- Demonstration Construction.

Step 1:
- National transportation card introduced into the system of public authorities.
- Korea Highway Corporation, Korea Railroad Corp., local governments, etc.

Step 2:
- Promotion of private enterprise
- Using the concept of private investment, contract operators to manage the parking lot.
- Commercialization through collaboration with Card business or an facility operator petrol stations, department stores, etc.

Step 3:
- Construction to expand nationally
- Excavation of various complex services
- Construction and operation expand nationally
Development of the transportation electronic payment system

(5) Effectiveness

**National**
- Expanding the use of existing infrastructure and using **One Card All Pass**.
- Contribute to the revitalization of the ITS market by expansion of public and private infrastructure. (Parking lots, Gas stations, etc.)

**Transportation electronic payment system**

**Personally**
- Settlement of parking fee is conveniently available in the car.
- The quick inflow/outflow car service is available in the parking lot.

**Operational**
- Customer satisfaction increase by quick inflow/outflow car service.
- Settlement Transparency of Parking Fee and automation.
- Various services are available to local governments, private parking, gas stations etc.
3. Research on Standard Clearance System Specifications for nationwide interoperable transportation card
(1) Introduction

A. Background

- Nationwide interoperable transportation card completed the step1 infrastructure in the first half of 2012.
- Planning to proceed mutual technical discussions between many business operators.
- Technical-based, the necessity of the Standard Settlement Specifications came to the fore.

B. Purpose

- Supporting the regional transportation card business
- Prepare the reasonable and practical Standard
- Reduce the social costs.
- Strengthen the technological competitiveness
(3) Range of Standardization

Aggregate System

Collect /Clearance System (Center)

Other Issue System

Urban Railway Corp.

Bus Union

Other...

Transactional Information collection

Settlement result transmission

Clearance System (KSCC, EB card)

Range of Standardization

Operating information (PL/BL)

Transactional information Authentication request

Card Company (Prepayment, Deferred Payment)

Operating information (PL/BL)

Transactional Information Authentication request

Operating information (PL/BL)

Transactional Information Authentication request

Operating information (PL/BL)

Transactional Information Authentication request
(4) LAB Test and Field Test

- LAB & Model Office Test
  - Development
    - Run Test (unit/integration)
      - Output
        - Error range is exceeded
          - No problem
          - Restoration
        - Step-by-step application
          - Condition change
            - Set of test conditions
              - Run Test
                - Field Test
                  - Continuous monitoring
                    - Output Application
                      - Error range is exceeded
                        - No problem
                        - Field Application

03 Processing Projects

4. WBS AFC
Standard SW Solution Development
“The AFC standard SW solution development” is selected as one of 7 WBS projects. KSCC is in charge of this project.

**Development of AFC System Standards**
Sophistication of traffic standard that shall apply domestic and overseas standard

**Solution Development**
Development of AFC standard S/W unit solutions that are based on standards

**Construction of test bed**
Construction of operational pilot system that integrates the solutions of the units have been developed

1 year

2 year

3 year
Current state

1. Construction of mobile interoperability between Korea – Singapore

2. Card management system delivered to Bogota, Colombia.

3. Solutions consulting of mobile media management system and technical cooperation

4. Proposed technology-based solutions for Seoul next-generation system

5. Technical proposal to the United States FDC (First Data Corporation)
Expected effect

- Securing diversity of transportation fare policies
- On a single card, with various traffic products
- Compatible with a Uniform quality between the settlement company and the issuing company
- The use of a variety of alliance products
- Improve efficiency of traffic card market through competition

SW solution development that takes into account the international and Standards technical specifications of the AFC system

Industry activation of the domestic transportation card and the Leading overseas transportation card business
Korea Proposal

1. Background

2. ISO/TC204/WG8

3. Asia Standard Needs
1) Background

(1) What is Transportation Card?

- **Definition**
  - When pay fare of mass transit, using electronic money and credit card.
  - Electronic money is Pre-Paid transportation card ordinarily, credit card calls by post pay transportation card.

- **Form**
  - Classified as plastic cards, card and mobile accessories type card.
  - Plastic cards: ISO 7810 ID-1 standard (85.60 × 53.98 mm, thickness 0.76 mm) or ISO 7810 ID-00 standard (66 × 33 mm).
    - Accessory card: no standard about size and material.
1) Background

(2) Transportation Card Fare Payment players

Business Architecture and Technical Developing Point

Global AFC Center System

Issuer System
- Card Management System
- Key Management System
- Authentication System
- Card Re-Load System
- Internet / Mobile

Issuer System
- Card/SAM
  - Card OS
  - SAM OS

Center System
- Clearinghouse
  - Settlement & Clearing System
  - Management System
  - Inner/Outer Connection

Operator System
- Station System
- Terminal Application System

Standard Terminal Platform
- Application Platform
- Technical Platform
1) Background

(3) Transportation Card Fare Payment Flow

** Most pre-paid card operator operated in conjunction with Settlement system operator
2) ISO/TC204/WG8

(1) ISO/TC204/WG8

The ISO 24014 consists of 3 parts:

Public transport: Interoperable fare management system – Part 1: Architecture (FDIS)

Public transport: Interoperable fare management system
   – Part 2: Supplementary Concepts of Part 1 for Business Practices

Public transport: Interoperable fare management system
   – Part 3: Complementary concepts to Part 1 for multi application media

The players in ISO 24014

- Device suppliers: card, mobile phone, network devices, etc.
- Application owner: prepaid, postpaid, debit, seasonal tickets, top-up, etc.
- Some kind of retailers
- Operators: Terminal operator, clearing operator, etc.
The objective of ISO 24014 is to define a reference functional architecture for IFMS (Interoperable Fare Management System) and to identify the requirements that are relevant to ensure interoperability between several actors in the context of the use of electronic tickets.
2) ISO/TC204/WG8

(3) Transportation Card Interoperable Standard

# Processing Stage of IFMS
2) ISO/TC204/WG8

(4) Methods for Interoperable

#1. Changing the card – ISO 24014

**Advantage: No Infra Change!**

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Main interesting view of PTO:
How secure download and managing the application?

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Question:
How about existing cards?
Only possible ticket service, But how about pre-paid cards?
How many services possible?
2) ISO/TC204/WG8

(4) Methods for Interoperable

#2. Changing the Infra- Korea Smart card, ebCard, Mybe

**Advantage: No Card Change! Using pre-paid cards, easily adaptable.**

Main interesting point:
How shall clear the fare from each?

Question:
How can I change the infra by low cost?
What can I do at the coming a new PTO?
Advantage: Nevertheless the new PTO, It’s OK if the new PTO adapts the common.

Main interesting point: How shall clear the fare from each?

Question: How define the common?
2) ISO/TC204/WG8

(5) Reference Standards related to AFC System

<table>
<thead>
<tr>
<th>Specification</th>
<th>Contents</th>
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| International Standard | ISO/IEC 7816  
• IC Card with Contacts  |
|                     | ISO/IEC 14443  
• Contactless proximity Card  |
|                     | ISO/IEC 18092  
• Near Field Communication - Interface and protocol  |
|                     | ISO/IEC 24014  
• Interoperable fare management system - Architecture  |
| EU Standard         | EN-1545  
• Surface transport applications. Elementary data types, general code lists and general data elements  |
|                     | EN-15320  
• Surface transport applications. Interoperable public transport applications framework  |
| Korea Standard      | KS X 6923  
• Payment SAM specification  |
|                     | KS X 6924  
• Transit Card specification  |
|                     | KS X 6925  
• Payment terminal requirements  |
|                     | KS X 6926  
• Reload terminal requirements  |
|                     | KS X 6927  
• Reload SAM specification  |
| De facto Standard   | ITSO Standard  
• The Integrated Transport Smartcard Organization’s standard (In United Kingdom)  |
|                     | CFMS (APTA)  
• Contactless Fare Media Standard (In The United States of America)  |
3) Asia Standard Needs

(1) Reasons

1
2
3
4
3) Asia Standard Needs

(2) Needs

- Development of Interoperable Automatic Fare System
- The Standard of each country establish as the Asia standard.
- Compatibility standards that can be acceptable to the Standard of each country.
- Progress in Matching Fund system in each country
- Participation of related companies
  (Mobile manufacturer, S/W Development company, OS development company of Smartphone(Apple and Google))
Thank you for listening.