Status of ITS in Republic of Korea

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Kweon-seo, Koo
Team Leader / National ITS Center
Korea Expressway Corporation
E-mail : kskoo@ex.co.kr
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Overview

Background

- Area: 100,267 km² ('15)
  - 400 km from Seoul to Busan
- Population: 50.6 million ('15)
  - Yearly increase: 0.5% from '06 ~ '15
- No. of Vehicle: 21 million ('15)
  - Yearly increase: 2.7% from '05 ~ '15 Total
- Length of Public Roads: 107,527 km ('15)
  - 92.1% is paved
- Road Length (ITS established) ('15)
  - Expressway (KEC): 4,193 Km (100%)
  - National Highway (MOLIT): 13,651 Km (21%)
  - Local Roads: 89,386 Km (11%)
    (Metropolitan/Provincial/City/County Roads)
Overview

Background

Increase Rate (Roads & Vehicles)

- 172% (Vehicles) > 43% (Roads)

Increase in Social Costs (Congestion)

- 8.03% Annual Increase

Pollution

Congestion

Accident

Resolving transportation problems by introducing ITS
**Definition and the effects of ITS**

**Intelligent Transport Systems**

ITS is the advanced transport system to maximize the utilization efficiency, to provide convenient and safe transport, and reduce energy by applying advanced electronics, IT, and telecommunication technologies into roads, automobiles, and goods.

- **Existing Traffic Facilities**
  - Traffic flow interrupted/congested
  - Traffic accidents & air pollution
  - Failure in providing real-time traffic information

- **Advanced Traffic Facilities**
  - Collect & Analyze real-time traffic information
  - Control traffic flow and provide traffic information
  - Connection with related information, and integrated management of traffic flow

- **ITS**
  - Collect/Analyze/provide real-time traffic information
  - Maximize the capacity of traffic infra based on smooth traffic flow
  - Improve safety, traffic delay & congestion
Overview

What is ITS?

Fast, Safe, Convenient, Less Pollution

Accident

Pollution

Congestion

ITS
Overview

The effects of the ITS

Create annual $10.7 billion worth Social benefits

Increase travel speed by 15~20%

High B/C ratio of ITS deployment

B/C for ITS deployment by each city: 2.2~6.2

Seoul 2.27, Daejeon 5.2, Ulsan 4.64, Suwon 2.39, Jeonju 2.9, Jeju 6.2

Low cost makes huge effects

Use only 1% of road construction cost to reduce 20% of traffic jam

Eco-friendly technologies

Reducing Greenhouse Gas & Oil Consumption

Per 1,000km of road covered with ITS annually 19,000 tons reduced

Through Hi-Pass(ETCS) service, annually 2.3 tons reduced
Overview

Strategies for the Successful ITS Implementation

- **Establishment and revision of the law**
  - Establish and Revise the National Transport System Efficiency Act
  - Establish plans to deploy & operate ITS project and standardization

- **Establishment of Master-Plan**
  - Establish the Master Plan and Standardization Plan for the ITS
  - The government can push ahead the organized and efficient ITS-related work

- **Creation of Dedicated Body**
  - Create and Reorganize the Dedicated Bodies
  - Establish new government body and institution for ITS to work professionally

- **Promoting and Supporting the Test-run**
  - Promote and Support the ITS Test Run
  - Comprehensively evaluate the deployed ITS projects and prepare for nationwide deployment

- **Financial Funding**
  - Determine the Target & Amount of National Financing for Effective ITS Implementation
  - Promote the ITS deployment by establishing requirement plan between central & local gov't
Overview

History of ITS in Korea

1991~2000

Introduction of ITS & Provision of Basis Law of ITS

'93 Review of ITS by the presidential SOC investment plan group, Introduction of Freeway Traffic Management System

'94 Research on the establishment of ITS basic plan

'97 Confirmation of ITS basic plan

'98 ITS Pilot Project (Gwacheon)

'99 Enactment and effectuation of the Transport System Efficiency Act.

2001~2010

Development and Expansion of ITS

'01 Hi-pass (ETC) Pilot Project

'03 Project on establishing advanced model city

'05 Bus Information System (BIS) Pilot Project

'07 Nation-wide expansion of Hi-pass (ETC)

'08 Complete revision of the Transport System Efficiency Act

'10 Carry forward Advanced Traffic Management System (ATMS)

2011~2020

Next-generation ITS

'12 Plan on ITS for vehicles and roads 2020

'13 Research on introduction plan for C-ITS

'~14 SMART Highway (C-ITS) Project

'~17 C-ITS Pilot Project

'~20 Cooperative automated driving highway system development
ITS Services in Korea

ITS Operation Status in Korea

Expressway
- Installed on 4,193km
- Installed on 100% of Expressway

National Highway
- Installed on 2,823km
- Installed on 21% of total length and will be installed on 45% by 2020

ITS 71.4%
- 4.3% None
- 22.5% BIS/BMS

VDS 3,331
AVC 243
DSRC 237
Expressway (Freeway)

VDS 2,048
DSRC 917
VMS 2,152
VMS 1,175
VMS 601
CCTV 1,165
CCTV 611
National Highway

* Figure means the number of unit installed
ITS Services in Korea

Overview

- ITS services driven by public sector including central and local government are well developed
- Integration of ITS installed nationwide, Standardization for interoperability and compatibility
- Expand ITS nationwide, Advance quality of ITS Services like ATMS, ATIS, UTCS, BIS/BMS, AFC, ETCS reached world class technologies

Travel & Traffic Management
- Traffic Control
- Provide Traffic Info.
- Manage Traffic Incidents
- Real-time Adaptive Signal Control
- Automatic Enforcement

Electronic Payment
- Hi-Pass (ETCS)
- Automatic Fare Collection (AFC) for Public Transportation
- Electronic Payment Reservation (Using Smartphone)

Public Transportation
- BIS/BMS
- Provide Bus Info.
- Manage Bus Operation
- BRT System
- Bus Priority Signal

Intelligent Vehicle & Road
- Smart Highway
- Advanced Safety Vehicles

Traveler Information
- Car Navigation

Commercial Vehicle Operation
- Manage Freight Vehicle
- Manage Hazardous Materials
- Trace Hazardous Materials

Information Mgt
- Integrate and Manage ITS
- Monitor real-time traffic condition
- Provide traffic Info by VMS, Internet, CNS
- Exchange traffic info with other Traffic Centers
ITS Services in Korea

ATMS (Advanced Traffic Management System) : Process Steps

Data Collection
- VDS (Vehicle Detection System)
- CCTV
- Hi-pass (DSRC)
- Patrol team/Customer call

Data Processing

Provide Information
- Variable Message Sign (VMS)
- Traffic Broadcasting System
- Call Center
- Internet, Mobile Phone & etc

Traffic Information Center

Less than 2 Minutes
ITS Services in Korea

Ways of Providing Traffic Information

Smartphone app
- 2010 launching of 1st version
- 2012 launching of simplified version
- Traffic Condition and more
  
  Downloaded over 12 million times

Internet
- http://www.roadplus.com
- Electronic Map, Traffic Condition and more
- http://twitter.com/15882504

Call center
- Tel. 1588-2504
- Voice Recognition Service
- Short Message Service

Broadcasting
- Public TV (KBS, MBC, SBS)
- Cable, Radio, DMB
- 170 times daily
ITS Services in Korea

Field Facilities 1 of ATMS (Advanced Traffic Management System)

- VDS(Vehicle Detection System) : Image / Loop type, 1km, point travel time & velocity
- CCTV(Closed Circuit TV) : Digital type, 2km
- VMS(Variable Message Sign) : Text type, Graphic type, Interchange & Junction points
ITS Services in Korea

Field Facilities 2 of ATMS (Advanced Traffic Management System)

- AVI (Automatic Vehicle Identification): section travel velocity & section travel time, 3～5km on national highway (crosswalk, junction etc), Vehicle number identification
- DSRC-RSE (Road Side Equipment): RF (Radio Frequency) type, 3～5km section travel time & section travel velocity
The circulation of traffic information is very important.
 ITS Services in Korea

Node & Link for Traffic Information Collection, Process and Provide

- **Node**: The change point in the road speed, road geometric, etc.
  - *Type*: Intersection, Bridge SP/EP, Overpass SP/EP, Road SP/EP, Tunnel SP/EP, Underpass Road SP/EP, Administration Border, IC/JC, etc.

- **Link**: A line connecting from node to node, Minimum section for traffic information
  - *Type*: Road, Bridge, Overpass, Underpass, Tunnel, etc.
ITS Services in Korea

History of ETCS (Electronic Toll Collection System)

- KEC began toll collection business in 1970
- KEC has introduced semiautomatic toll collection system (TCS) since 1994
- ETCS, called Hi-Pass system has been installed since 2007 nationwide

1970 ~ 1994
- Manual Collecting

1994 ~
- Toll Collection System

2007 ~
- Hi-Pass System
ITS Services in Korea

ETCS (Electronic Toll Collection System)

- TCS installed in 1,817 lanes, ETCS installed in 1,266 lanes
- No. of Hi-Pass OBU distributed is 14.6 Million (about 71% against registered vehicles)
- Hi-pass Usage Rate is 74.2% (Aug. 2016)

Hi-pass can pay parking fee at the Incheon Int’nal airport parking lot, Yangjae plaza of meeting, etc.

Hi-pass Usage & OBU Sale

It is very efficient to use those Hi-pass OBU equipped cars as a probe car data for traffic management.
ITES Services in Korea

ATES (Automatic Traffic Enforcement System)

- Automatic Enforcement for overspeed, signal violation, illegal parking and overloaded vehicles
- 1,900 for speeding, 1,800 for signal violation, 7,000 for illegal parking enforcement system installed on the road of 106,000 km in Korea(‘12)

Control of signal violations
Control of speed limit violations
Control of parking and stop rule violations
Control of overloaded vehicles

Number plate identification

Improved road capacity

Before
After

Operated by Police Agency
ITS Services in Korea

Bus Information Management System

❖ Real-time Bus Arrival Time, Route Information, etc.
❖ Bus Information Terminal, Internet, Mobile Phone
❖ BIS is operating in 69 local governments including Seoul and Busan, and continue to expand

Before

After

BIS App. on the Smartphone

Selection Bus Stop

Bus No. & Arrival Time
### ITS Services in Korea

#### BRT (Bus Rapid Transit)

**General elements** *(Case of Seoul)*

- **Lane type**
  - Independent Bus-only Lane
  - Median Bus Lane

- **Bus type**
  - Normal Bus
  - Articulated Bus

- **Bus stop type**
  - Normal Bus Stand
  - Fare-Collecting Station
  - Bus Information Terminal (BIT)

- **Management system**
  - Integrated Traffic Management Center
  - BRT Management Center (Only)

- **Fare collection**
  - Vending Machine
  - Smart Card System

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**Before (Jamsil)**

**After (Jamsil)**
ITS Services in Korea

AFC (Automatic Fare Collection) system & Smart card

- Improve convenience of public transport by using Electronic Transport Card to pay fare
- In Seoul, smart card use for Bus is 97.1% and for subway is 100% (as of ‘14. 3)
- Upgrade Service by developing one integrated card available nationwide not only for bus and subway but also KTX train ticketing

![Diagram of Smart Card Management Center]

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage of Smart Card Usage (Seoul)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>82.54</td>
</tr>
<tr>
<td>2005</td>
<td>86.02</td>
</tr>
<tr>
<td>2006</td>
<td>87.86</td>
</tr>
<tr>
<td>2007</td>
<td>90.28</td>
</tr>
<tr>
<td>2008</td>
<td>91.38</td>
</tr>
<tr>
<td>2009</td>
<td>92.37</td>
</tr>
<tr>
<td>2010</td>
<td>93.25</td>
</tr>
<tr>
<td>2011</td>
<td>95.39</td>
</tr>
<tr>
<td>2012</td>
<td>97.10</td>
</tr>
<tr>
<td>2013</td>
<td>95.39</td>
</tr>
</tbody>
</table>

98.9% of passengers are using Smart card for public transportation in Seoul

- Usage of subway is 100%
- Usage of city bus is around 97.1%
### ITS Services in Korea

**AFC (Automatic Fare Collection) system & Smart card**

- **Flat & Distance-based Fare** (Basic rate within 10km, bus or subway)
  - (Additional Fare: 100 won/5km)
- **Free or Discounted Charge for Transfers** (Include Subway)
- **No additional charge for 5 times, during 30 min, within 10km**

<table>
<thead>
<tr>
<th>Method of fare calculation</th>
<th>Before reform</th>
<th>After reform</th>
</tr>
</thead>
<tbody>
<tr>
<td>5km (by bus) + 4km (by bus)</td>
<td>1,200 + 1,200 = 2,400 won</td>
<td>1,200 won (Basic rate within 10km) (Free Transfer)</td>
</tr>
<tr>
<td>5km (by bus) + 7km (by subway)</td>
<td>1,200 + 1,200 = 2,400 won</td>
<td>1,300 won (Basic rate + 100 won (Total distance: 12km, Basic rate: 10km, Additional fare: 5km))</td>
</tr>
<tr>
<td>6km (by bus) + 8km (by subway) + 4km (by bus)</td>
<td>1,200 + 1,200 + 1,200 = 3,600 won</td>
<td>1,400 won (Basic rate + 200 won (Total distance: 18km, Basic rate: 10km, Additional fare: 5+5km))</td>
</tr>
</tbody>
</table>
Future ITS Plan in Korea
Future ITS Plan in Korea

Co-operative ITS?

✔ Focusing Safety, Mobility, Sustainability (Green)
✔ Use V2V, V2I communication to share the information
✔ Providing a service on the open platform

# DGPS : Differential GPS
Future ITS Plan in Korea

C-ITS Pilot Project

**GOAL**

- Before introduction of C-ITS,
  - Conducting FOT on C-ITS technology and services
  - Problems Supplementation

**OUTLINE**

- Total Budget: **1,500 million USD**
  (`'14: 250 million USD, '15: 590 million USD, '16: 670 million USD)
- **87.8km**: Expressway from Sejong to Dejun city (26km), national highway (2.9km) and Urban roads (58.9km)
- **3,000 sets** of vehicle **OBU** (On-Board Unit)

**MAIN TASK**

- Implement 15 applications, install RSUs and OBUs
- Driver Test, Analyze the effect, Suggest improved legal systems including legal responsibility
- Develop standards and certification systems
### Future ITS Plan in Korea

#### C-ITS Pilot Project Location

<table>
<thead>
<tr>
<th>Classification Standard</th>
<th>Road Name</th>
<th>Length (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expressway (26km)</td>
<td>DANGJIN ~ DAEJEON</td>
<td>18.5</td>
</tr>
<tr>
<td></td>
<td>HONAM</td>
<td>7.5</td>
</tr>
<tr>
<td>National Highway (2.9km)</td>
<td>National Highway line 1</td>
<td>2.9</td>
</tr>
<tr>
<td>DAEJEON city (45.8km)</td>
<td>Yuseong-daero</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>Bugyuseong-daero</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>Hanbat-daero</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Daecheok-daero</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>Noeun-ro</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td>Gajeong-ro</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>Munji-ro</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>Expo-ro</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>Daehak-ro</td>
<td>3.7</td>
</tr>
<tr>
<td>SEJONG city (13.1km)</td>
<td>Hannuri-daero</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>Galmae-ro</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>Jeoljae-ro</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Sejong-ro</td>
<td>1.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-</td>
<td><strong>87.8</strong></td>
</tr>
</tbody>
</table>
Future ITS Plan in Korea

C-ITS Pilot Project Main Equipment

**OBU (3,000)**
- Navigation
- Smartphone
- Head up display
- ANT
- OBD-II interface
- HMI
- OBU

**RSU (79)**
- ANT
- Controller

**AIDS (7)**
- Road Side Unit (Communication)
- Automatic Incident Detection System
- Tracing CAM
- Road Rader

**ETC (3)**
- Electronic Toll Collection System

**PDS (6)**
- Pedestrian Detection System

**SPaT (12)**
- Signal controller
- Signal Phase and Time
Future ITS Plan in Korea

C-ITS Pilot Project OBU

<table>
<thead>
<tr>
<th>No</th>
<th>Type</th>
<th>EA</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>HUD</td>
<td>200</td>
</tr>
<tr>
<td>OBU</td>
<td>Navigation</td>
<td>1,400</td>
</tr>
<tr>
<td></td>
<td>Smartphone</td>
<td>1,400</td>
</tr>
</tbody>
</table>

OBU Config

- GPS ANT
- WAVE ANT
- WAVE OBU
- HMI
- ECU
- Smart Phone
- Head Up Display (HUD)
- Navigation
Future ITS Plan in Korea

C-ITS Base Plan

Expressway (V2I Service)
- 10% Penetration of OBU
- Supply Standard OBU (Safety Info, ETCS)
- Expressway 100%

Big City (Expand V2I, V2V service)
- 50% Penetration of OBU
- Vehicle Interworking Service
- Reviewing Commercial Vehicle Equipment Regulation

Small, Medium sized City (Expand V2V/V2P service)
- 70% Penetration of OBU
- Creation of Infrastructure for Automated Driving
- Reviewing Individual Vehicles Equipment Regulation

Expressway 100%
National Highway 21%, Urban road 8%

Long Term 2026~2030

Mid Term 2021~2025

Source: C-ITS Base Plan (2013. 12)

17 Billion USD
‘0’ Traffic Fatality
Future ITS Plan in Korea

Definition of Smart Tolling System

- Multi-Lane Tolling + Hi-pass Vehicles + Non-OBU Vehicles
  (1~4 Lanes)  (Automatic Vehicles Identification ⇒ post paid)
- Goal: Vehicle Identification Rate (99%), Manual Identification (90%) ⇒ 99.9%

![Diagram of smart tolling system components: Detection, Communication, Recognition car number, Recognize type of cars, Violation Camera, Vehicle Classification, RF • IR Antenna, Integrated control system.]

Toll Charges have been processed.
Future ITS Plan in Korea

Pilot System of Multi-Lane Tolling

- Goal: To check the performance of 2 lanes tolling system
- Installation (2014)

- System Performance (2015)
  - trend of Hi-pass error rate
  - accuracy of vehicle identification
**Future ITS Plan in Korea**

**Effect of Smart Tolling**

- **Critical Success Factor**
  - Increase in Hi-pass usage rate: over 85%
  - Accuracy in vehicle identification: over 99%

- **Effect of Smart Tolling**

<table>
<thead>
<tr>
<th>As-Is</th>
<th>Item</th>
<th>To-Be</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Speed for Safety (30km/h)</td>
<td>Speed</td>
<td>High Speed Driving</td>
</tr>
<tr>
<td>1 worker/Lane Booth (24 hours/day)</td>
<td>Toll Booth</td>
<td>No Worker</td>
</tr>
<tr>
<td>Trumpet Type</td>
<td>Interchange</td>
<td></td>
</tr>
<tr>
<td>[Diagram of Expressway, Toll Booth, and Interchange]</td>
<td>[Diagram of Expressway, Connection Road]</td>
<td></td>
</tr>
</tbody>
</table>
Future ITS Plan in Korea

Plan of Smart Tolling

Pilot Project
NamHae Expressway
Yeongam-Suncheon (2016~)

System Set-up
System Improvement & Set-up (2017~)

Service Start
Nationwide Service Start (Jan. 2020~)

- NamHae Expressway Yeongam-Suncheon Section
  - Isolated, no connection with another expressway
  - Various types of tolling
    (flat-rate tolling, ticket system tolling)
  - Hi-pass usage rate: 65%, Truck usage rate: 12%
Good Experiences in ITS
Good Experiences in ITS

Telecommunication Network for ITS

1992: Government Approval of Private Telecommunication Network by Law
1993: Establishment of Master Plan for Expressway Optic Telecommunication Network
2016: Installation on all the expressway, 4,193km
Good Experiences in ITS

Improvement Telecommunication Duct - COD

- COD (Corrugated Optic Duct): integrated duct that is combined several inner duct and a corrugated outer duct to protect from outside pressure.
- Inner-duct to put into optic-fiber cable is 3~6 duct.
- A piece of COD: coiled 500~800m, installed one time between two manholes.

<table>
<thead>
<tr>
<th>Description of comparison</th>
<th>COD System</th>
<th>Conventional PVC system</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Corrugated Duct</td>
<td>Sub ducts</td>
</tr>
<tr>
<td>View</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Raw material</th>
<th>HDPE</th>
<th>HDPE</th>
<th>PVC</th>
<th>HDPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Up to 500m ~ 800m</td>
<td></td>
<td>6 meters (At maximum)</td>
<td>No Limit</td>
</tr>
<tr>
<td>Connection</td>
<td>Every 500m ~ 800m</td>
<td></td>
<td>Every 6 m</td>
<td></td>
</tr>
<tr>
<td>Insertion of inner ducts</td>
<td>No need</td>
<td></td>
<td>Insert</td>
<td></td>
</tr>
<tr>
<td>Excavating Depth</td>
<td>60%</td>
<td></td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Damage rate from earth quake</td>
<td>0%</td>
<td></td>
<td>Over 90%</td>
<td></td>
</tr>
<tr>
<td>Intermediate Manhole</td>
<td>No need to build</td>
<td></td>
<td>To build in turning point</td>
<td></td>
</tr>
</tbody>
</table>
How to build Telecommunication Duct

- For cost down, Duct is installed under construction of expressway
- Location: Filling Section – under the shoulder of road, crossing-road conduit, Bridge – protective wall, Tunnel – tunnel common duct
How to build Telecommunication Network

- Existing road: 2 types of how to build telecommunication network for ITS
  - 1st: to set up the telecommunication pole (7m Iron Pole, 10m Concrete Pole etc)
  - 2nd: to utilize the electric-power pole (middle point – communication cables)

[Suggestion]
★ Joint Construction of Communication-Duct with Communication Common Carrier During the Road Building Time
**Good Experiences in ITS**

**Tunnel Automatic Incidents Detection System**

- Automatically detecting a parking car, a reverse-driving car, a pedestrian, a fallen object and fire in the tunnel through analyzing the CCTV images.
- Then, make an emergent alarm to center operator.
- Center operator make quick emergency countermeasures
- Present condition: all the tunnel, 430 tunnels, No. of CCTV is 3,327.

**System Process**

![Diagram of system process]
Good Experiences in ITS

One Click System: Integrated Emergency Situation Management System

One Click System

Situation Propagation

- **One Click** Situation Propagation
  - Voice Alarm
  - SMS
  - Application

- Police Patrol, 911, Headquarters
- Wreckers, Related Employees
- KEC Patrol, Wreckers

Effect of One Click System

- Situation propagation time cut down
- Secondary accident prevention through rapid emergency treatment

< Accident Management >

- Real-time auto recording
- Classification of work (Icon/Color)

< Real-time Location Tracking using GPS >

- Patrol Location & Estimated time of arrival
- Accident Location

44/50
Good Experiences in ITS

Emergency Real-Time Alarm Service

- This service assists with safe driving by providing location-based real-time traffic information via smartphones navigation application.

Service Process

- System Diagram

- Info. Provider (30M)
  - Mobile Carrier (T-map)
  - Navi. Provider (Naver, i-Navi, Atlan, MBC TPEG)
Good Experiences in ITS

Improvement in ITS Field Facilities

- CCTV Dual Eye: Main Camera + Fixed Camera, 2-direction always monitoring
- The exterior of Camera Pole

- Dual Eye’s Image: Eliminate the blind area, Promptly detect the congestion or accidents
Good Experiences in ITS

Improvement in ITS Field Facilities

- VMS Web Camera: To monitor the text on the VMS
- The exterior of VMS Pole and its texts on the monitoring image
Good Experiences in ITS

Improvement in ITS Field Facilities

- VDS Accuracy Improvement by Arm Extension

  Arm(2M) → Arm Extension (7M)

  **Effect**
  - Traffic Volume Accuracy: 94.5% → 97.8% (3.3% increased)
  - Velocity Accuracy: 95.2% → 96.2% (1.0% increased)
Introduction of Performance Evaluation on ITS

- **Goal**: Evaluating the performance and improving the function of the traffic data collecting device for increase the reliability of the traffic information
- **Target device**: Traffic information collection device (VDS, AVI, DSRC)
- **Evaluation type and time**

<table>
<thead>
<tr>
<th>Evaluation type</th>
<th>Time</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Performance Evaluation</td>
<td>After the new equipment be made</td>
<td>One time</td>
</tr>
<tr>
<td>Installation Performance Evaluation</td>
<td>Before installation is completed</td>
<td>One time</td>
</tr>
</tbody>
</table>
| Regular Performance Evaluation         | After installation, During operation time | VDS, AVI : every 2 years  
                                         |                                           | DSRC : every 4 years                      |

- **Evaluation item and criteria**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Evaluation item</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDS</td>
<td>Accuracy of Speed</td>
<td>≥ 90%</td>
</tr>
<tr>
<td></td>
<td>Accuracy of Traffic Volume</td>
<td></td>
</tr>
<tr>
<td>AVI</td>
<td>Rate of Number Plate Recognition</td>
<td>≥ 85%</td>
</tr>
<tr>
<td>DSRC</td>
<td>Success Rate of Communication</td>
<td>≥ 98%</td>
</tr>
</tbody>
</table>
Good Experiences in ITS

Introduction of Private Sector’s Traffic Information

**Background**

<table>
<thead>
<tr>
<th>ITS Installation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Highway</td>
</tr>
<tr>
<td>14M</td>
</tr>
<tr>
<td>3M 21%</td>
</tr>
<tr>
<td>Local Road</td>
</tr>
<tr>
<td>89M</td>
</tr>
<tr>
<td>10M 11%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lack of Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5 Billion USD</td>
</tr>
<tr>
<td>100% ITS Installation</td>
</tr>
<tr>
<td>National Highway: 10,828km</td>
</tr>
<tr>
<td>Local Road: 79,554km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Traffic information service In private sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>T map</td>
</tr>
<tr>
<td>KT Navi</td>
</tr>
<tr>
<td>i Navi</td>
</tr>
</tbody>
</table>

**Government’s Policy Change**

- MOU between Government (MOLIT) and Private Sector (2014. 10)
  - Private Sector: SK Telecom (Mobile Carrier), ThinkwareSys (Navigation Provider)
- Minimum Installation of Traffic Information Collecting Equipment
  ⇒ Introduction of Private Sector’s Traffic Information
- Extension installation of Equipment related to Safety
  - CCTV (Frequent Accidents Section, etc), Automatic Incident Detection System, etc
- Smartphone’s Navigation is added as Traffic Information Providing Media
Thank you very much.