ITS Service of SK C&C & C-ITS of Korea

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Definition of ITS

Intelligent transportation system (ITS) is a next-generation transportation system that integrates ICT with existing transportation infrastructure to enable efficient management and to secure a fast and safe transportation environment.

What is ITS?

- **Existing transportation infrastructure**
  - e.g., road, rail, road signs

- **Cutting-edge ICT**
  - e.g., cutting-edge equipment, communication technology, system integration

- **Intelligent transportation system**

Seamless integration and operation upon separate implementation of individual systems

- Collect and analyze real-time traffic data
- Maximize traffic flow and facility utilization
- Improve safety
2 Benefits of ITS

ITS is expected to contribute to urban development and improve the quality of residents’ lifestyle in terms of traffic/transport, socioeconomic impact, policy, and energy/environment.

Benefits of ITS Implementation

- **Traffic/transport**
  - Reduce delays at intersections (around 36% on average)
  - Increase travel speed (around 33% on average)
  - Encourage use of public transportation (average increase of 15% in no. of users)

- **Policy**
  - Provide information for transport policy decision-making
  - Use of overall road network more efficiently

- **Energy/environment**
  - Improve Energy efficiency and air environment

- **Socioeconomic impact**
  - Increase resident satisfaction to 80% or over
  - Raise cost-benefit ratio at least threefold on average

Anticipated benefits listed above are based on quantitative data from ITS implementation cases in Korea (Yongin City, Ansan City, Gwangju City).
3 ITS Solution Map of SK C&C

CASE3 RMS & ETCS

Charge: ₩6,640
Balance: ₩10,600

Please charge your device

Accident ahead 2KM
Detour ahead
SK C&C ITS Service areas

ITS is comprised of four key service areas according to service target and content along with the convergence business service area, which is comprised of the integration and reorganization of the four key services with related areas as per varying needs.

**Key Service Areas**

1. Traffic management
2. Public transport management
3. Freight transport management
4. Electronic payment

**Convergence with Related Areas**

- Municipal facilities management
- Security and crime prevention
- Metropolitan transportation services (e.g., rail, air, ship)
- Logistics

**Convergence Business**

1. City combination type (ITS+Surveillance)
2. Multi-modal Transport Information
3. Customizable ITS packages for Small and medium cities

**Reorganization as per needs**

- City size (e.g., floating population, surface area)
- Traffic conditions
- Business sectors
## SK C&C ITS Service Components

<table>
<thead>
<tr>
<th>5 Areas</th>
<th>12 Services</th>
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<tbody>
<tr>
<td><strong>Traffic Management</strong></td>
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<td>Traffic Flow Control</td>
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<td>Violation Enforcement</td>
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<td>Parking Management</td>
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<td><strong>Public Transport Management</strong></td>
<td>Bus Service Management</td>
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<td>Taxi Service Management</td>
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<td><strong>Electronic Payment</strong></td>
<td>Electronic Toll Collection</td>
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<td>Electronic Public Transport Fare Collection</td>
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<td><strong>Freight Transport Management</strong></td>
<td>Freight Service Management</td>
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<td><strong>Convergence Business</strong></td>
<td>City Combination Type (ITS + Surveillance)</td>
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<td>Multi-modal Transport Information</td>
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<td>Customizable ITS Packages for Small and Medium Cities</td>
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SK C&C is the first in ITS implementation in Korea as well as the first Korean company to implement ITS projects overseas.

Major ITS References

- **Ulaanbaatar City (Mongolia)**
  - Completed (2009~2010)
  - 12,487,765 USD

- **Baku City (Azerbaijan)**
  - Completed (2008~2012)
  - 112,000,000 USD

- **Seoul City (Korea)**
  - Completed (1998~2007)
  - 49,200,000 USD

- **Bucheon City (Korea)**
  - Completed (2006~2009)
  - 11,000,000 USD

- **Gwangju City (Korea)**
  - Completed (2004~2005)
  - 5,100,000 USD

- **Gwacheon City (Korea)**
  - Completed (2008~2009)
  - 2,892,000 USD

- **Yongin City (Korea)**
  - Completed (2008~2010)
  - 5,169,000 USD

- **Ansan City (Korea)**
  - Completed (2006~2009)
  - 14,746,000 USD

- **Jeju City (Korea)**
  - Completed (2006~2009)
  - 14,746,000 USD
6 Case Study _ Baku City (Azerbaijan)

A large-scaled public finance project that enhanced the overall traffic flow of the city such as increase in average travel speed by 21km/h

**Baku City Government ITS Project**

**Before**
- Congestion and traffic accidents due to inadequate traffic signal control
- Limitations of manned violation enforcement
- Severe illegal parking problem

**After**
- Raised travel speed by up to 21km/h and by 15km/h on average
- Enhanced obeying traffic law and regulations by around-the-clock unmanned traffic violation enforcement system
- Reduced rate of traffic accidents
6 Case Study _ Ulaanbaatar city (Mongolia)

A small-scale project using EDCF that has reduced the average travel time by 15% and significantly lowered the rate of traffic accidents.

Mongolia Ulaanbaatar City Government ITS Project

**Before**
- Traffic congestion and accidents due to lack of order on roads
- Limitations of manned violation enforcement
- High rate of traffic accidents due to jaywalking

**After**
- Reduced average travel time by 15% with improved traffic flow
- Enhanced obeying traffic law and regulations by around-the-clock unmanned traffic violation enforcement system
- Reduced rate of traffic accidents
The first Korean ITS, Naebu Expressway ITS in Seoul, achieved traffic speed increase, traffic accident decrease and real-time traffic information service on urban arterial road.

**Naebu Expressway ITS In Seoul**

**Before**
- Poor follow-up on traffic incidents
- Intensified main road congestion by the incoming traffic from the ramp
- Decreased road use satisfaction due to lack of provided information

**After**
- Smoothly travel speed maintenance through traffic flow management
- Decrease traffic accident through unexpected event management
- Establish pleasant transportation environment through providing traffic information

• Smoothly travel speed maintenance through traffic flow management
• Decrease traffic accident through unexpected event management
• Establish pleasant transportation environment through providing traffic information
Case Study _ Jeju Island (Korea)

Jeju Island ITS has reduced travel time by 20% and enhanced traffic safety, securing a high level of satisfaction with traffic/transport services befitting Korea’s leading tourist destination.

**Characteristics of Jeju Island**
- 600,000 residents
- Korea’s top island destination that attracts 10 million visitors
- Access into the island limited for road vehicles
- Severe congestion in and around the airport and major tourist destinations during peak season
- Traffic congestion and incidents due to tourists who are unfamiliar with the geography
- Inconvenient public transportation system

**ITS Impact**
- Reduced travel time by 20%
- Decreased traffic accidents by 40%
- Cut fuel consumption by 10%
- Curbed response time to traffic incidents by 30%
- Increased bus users by 7.6%
- Enhanced user convenience with public buses by 20%
There are four possible ITS project financing options: official development assistance (ODA), multilateral development banks (MDB), build-operate-transfer (BOT) financing, and government contracts.

**Project Financing Options**

- **Grant (KOICA)**
  Various forms of grants—i.e., cash or in-kind transfers without legally binding loan obligations.

- **Credit Assistance (EDCF)**
  Credit in the form of low-interest government loans that need to be repaid within a set period of time.

- **ODA (Official Development Assistance)**
  Projects are financed by long-term, low-interest funds extended by multilateral development banks (WB, ADB, IDB, Afdb, EBRD).

- **BOT (Build-Operate-Transfer)**
  The government provides resources required for the project within their expected government budget, and private business conduct the project by winning a bid.

- **MDB (Multilateral Development Banks)**
  The government provides resources required for the project within their expected government budget, and private business conduct the project by winning a bid.

- **Public finance**
  Infrastructure is transferred to the government for free of charge when the concession period ends.

- **Private business**
  The private business that receives the concession finances the project and recovers the investment with the income generated (e.g., tolls, service charges) from operating the respective infrastructure.
For safety, mobility and sustainability (environment-friendly, efficiency), C-ITS, which exchange and share the traffic information through two-way communication such as Vehicle-to-Vehicle and Vehicle-to-Infrastructure by providing service in an open platform.

Key words

Safety
V2X Service
Information exchange
Open platform
Cooperative ITS
Connected Vehicle
ITS Spot
Talking Car
Car talk System
8 C- ITS of Korea _ Pilot project by Korea MOLIT

- Traffic accident reduction, Introduction of next-generation ITS (C-ITS)
  - National issue of the current government
    - USA: Confirmed the vehicle safety rating of C-ITS terminal (‘14.Feb)
    - Japan: Started the basic service such as safe driving support in jointing section and toll collection (‘11)
    - Europe: Ready for commercialization since 2015

- Building C-ITS infrastructure for 30 years of zero traffic fatalities
  - Established “Next-generation ITS Master plan” spread terminal devices (‘13.Dec)

- Laws and services, and technical validation for the introduction of C-ITS
  - Institutional maintenance, standardization and certification criteria provided such pilot projects (2017)

Service development
- Implemented 15 key features
- Service implementation for road environment

Foundation

Verification
- Transportation Safety Effectiveness
- Economic Validation
8 C-ITS of Korea _ Project mgt. agencies designated

**KEC**

*Project management of C-ITS*
- Development of C-ITS service (15ea) for accident prevention
- Development and dissemination of communications infrastructure and vehicle terminal for the verification and implementation of the road environment

**KOTI**

*Service Optimization and benefit analysis, the legal system maintenance*
- Sensitivity analysis based on operator response and expressed information,
- Analysis of Traffic Safety and pilot project effectiveness for the next generation of ITS core features and full service according to the road conditions and traffic conditions
- Improvement of legal system vehicle information collection and using vehicle location information

**ITS Korea**

*Standardization and standard certification*
- International standardization promotion of domestic development standards through the cooperation with International Standardization Organization (ISO), USA and EU
- Certification standards for the C-ITS and system development
8 C-ITS of Korea _ Configuration of C-ITS (Current ITS)

Private company
MNO, Portal operator
Broadcast, Motor company

Mobile terminal
Mobile communication
(3G, LTE ...)

Vehicle

Current ITS

Center
Optic fiber network

Roadside
(Korean) DSRC
UTIS(Police station)

Signal time
Image
Location, Passing time
Traffic rate, speed

V2I, I2V

Communication information

DSRC, UTIS(Communication)

RSE passing time, Encrypted terminal ID

Telematics

Mobile communication

Vehicle

DSRC
UTIS

Com. Information
VMS
DSRC
LCS
BIT
Security system
Provide secure authentication and verification of V2V to ensure trust between vehicles

GPS, WAVE antenna

In-Vehicle equipment

WAVE modem
- Data collection from antenna

GPS receiver
- Provide vehicle location and time to WAVE modem
- Provide time management signal for application

Memory
- Security certification
- Application data etc.

Application
- Data collection of ECU
- Generation of common safety message
- Driving application

HMI
- Warning to driver
- Additional Service

Vehicle internal communication
- OBD II
- CAN communication

Ref. : Crash Avoidance Metrics Partnership and GAO
C-ITS of Korea _ Pilot project service
(application)

- Improved information collection
  - Collecting Probe Vehicle Data (PVD)
  - Providing Traffic Information

- Smart tolling
  - Smart Tolling (using WAVE communication)

- Safe driving support
  - Hazardous Location Notification
  - Road obstacle warning
  - Roadwork warning

- Intersection safety
  - Red Light Violation Warning (RLW)
  - Right Turn Assistance (RTA)

- Public transportation safety
  - Bus Information and management

- Safety for children and pedestrians
  - School zone warning
  - Yellow bus notification
  - Pedestrian collision warning

- V2V prevention of accidents
  - Forward Collision Warning (FCW)
  - Emergency Vehicle Warning
  - Emergency Situation Notification

Ver. 1.7 (2014.11)
Dziękuję za uwagę!
Thanks for the attention!