Ministry of Land,
Infrastructure and Transport

Ministry of Land, Infrastructure, and Transport

INTRODUCTION OF
KOREAN ITS

2017. 5

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1) Background

2) The effects of the ITS

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Overview

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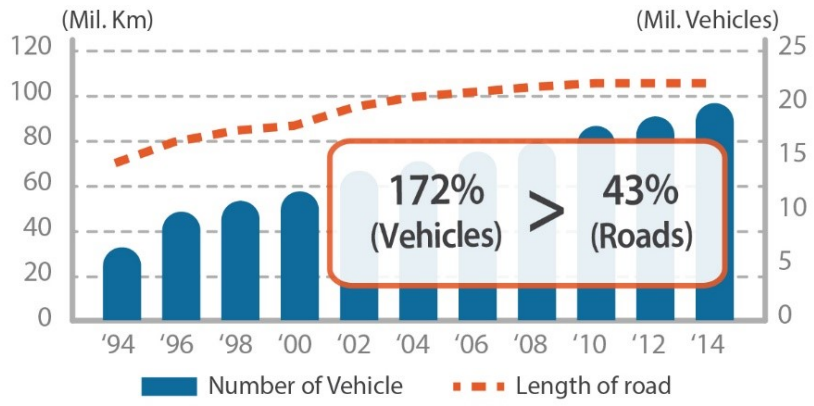
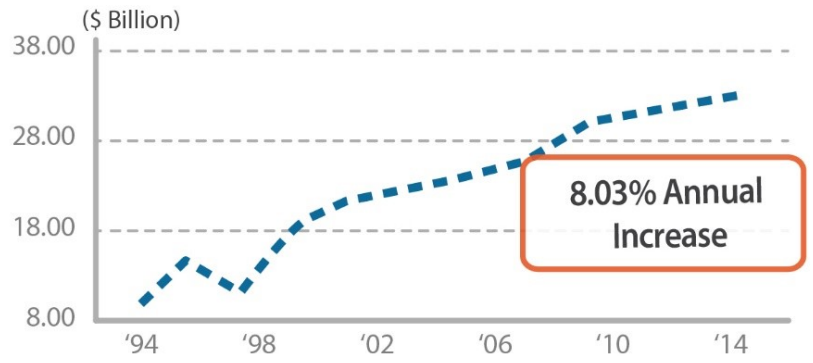
Background

Increase Rate (Roads & Vehicles)



Increase in Social Costs (Congestion)



Pollution

Congestion

Accident

Resolving transportation problems by introducing ITS

Overview

The effects of the ITS

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Improvement

No. of Bus Passenger

Economic

High benefit-cost ratio

Use only 1% of road construction costs to reduce 20% of traffic jams
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

$11.8 billion worth of social benefits per year

Increase travel speed by 15 ~ 20%

Effect on Hipass
Tollgate passing time : 14 sec. 2 sec. reduced (improvement of 85.7%)
Social benefit : USD 9.6 M/year

Safe

Number of fatal accidents

Convenience

Citizens Satisfaction

Eco-friendly

Reducing reenhouse gas & oil consumption

Reducing greenhouse gas & oil consumption based on decrement of traffic congestion and idling

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

Through Hi-pass(ETCS) service
▶ annually 2.3 tons reduced

CO2 DOWN

Overview

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Milestones of ITS in Korea

1993 - 1998

Stage 1 (Introduction of ITS)

- 1993 Review of ITS by the President SOC Investment Plan Group
- 1994 FTMS Pilot Project (Gyeongbu Expressway)
- 1997 Establish 1st National ITS Master Plan
- 1998 Hold the 5th ITS World Congress in Seoul

1999 - 2004

Stage 2 (Laying Legal Foundation & System)

- 1999 Enactment of the Transport System Efficienct Act
- 1999 Developement ITS Architecture
- 2001 Establish 2nd National ITS Master Plan
- 2002 National ITS Stansardization Plan Established
- 2003 Project on Establishing ITS Model City (Jeonju, Daejeon, Jeju)

2005 - 2010

Stage 3 (Growth & Expansion)

- 2005 Bus information System(BIS) Pilot Project
- 2007 Nationwide Expansion of Hi-pass (ETC)
- 2009 Revision of National Transport System Efficiency Act
- 2010 Host 17th ITS World Congress in Busan

2011 - Present

Stage 4 (Next Generation of ITS)

- 2012 Establishment of ITS Master Plan for Vehicle and Road 2020
- 2013 Research on Introduction Plan for C-ITS
- 2014 SMART Highway Project
- 2016 C-ITS Pre-Deployment Project
- 2016 R&D on Cooperative Automated Driving Highway System (C-AHS)

2. ITS Services in Korea

1) Korean ITS Service Architecture

2) Bus Information Management System (BIMS)

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

4) ATMS (Advanced Traffic Management System)

5) ATSCS (Advanced Traffic Signal Control Systems)

6) ATES (Automatic Traffic Enforcement System)

7) ETCS (Electronic Toll Collection System)

8) PIMS(Parking Management Information System)

9) Integration of Traffic Management Center

ITS Services in Korea

Korean ITS Service Architecture

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Traffic Management

- Traffic control & providing traffic Information
- Manage traffic Incidents
- Real-time adaptive signal control
- Automatic enforcement

Traveler Information

- Car navigation

Commercial Vehicle Operations

- Management Freight vehicle
- Management hazardous materials

Korean ITS

Public Transportation

- Provide Bus Information
- Management bus operation
- BRT system
- Bus priority signal

ITS Centrer

- Integrate and manage ITS
- Monitoring real-time traffic condition
- Provide traffic Informarion (VMS, Internet, APP)
- Exchange traffic information with related centers

Electronic Payment

- Hi-pass (ETCS)
- ETCS : Electronic Toll Collection System
- AFC for public transportation
- AFC : Automatic Fare Collection

Intelligent Vehicle & Road

- C-ITS
- Autonimous driving & road

ITS Services in Korea

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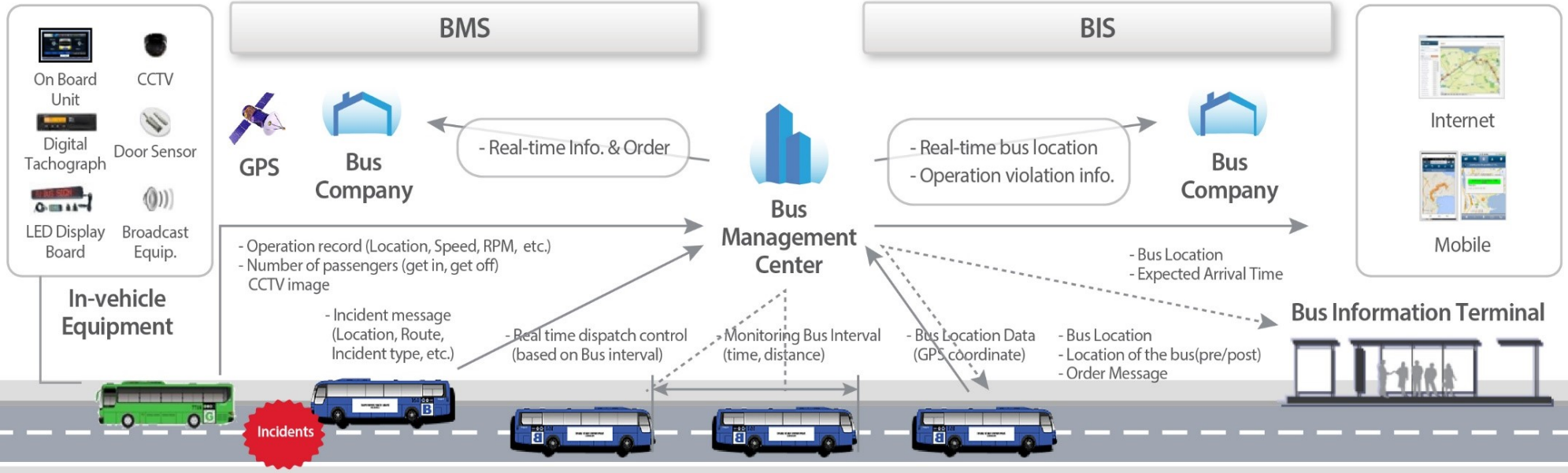
Bus Information Management System (BIMS)

- BIMS tracks buses' location and status in real-time to improve punctuality of bus operation
  Also, it disseminates real-time bus information through the internet, mobile app and Bus Information Terminal to improve convenience of users
- BIMS is operating in 69 local governments and continues to expand



Data Collection → Data Processing → Information Provision

ITS Services in Korea

AFC (Automatic Fare Collection) system & Smart card

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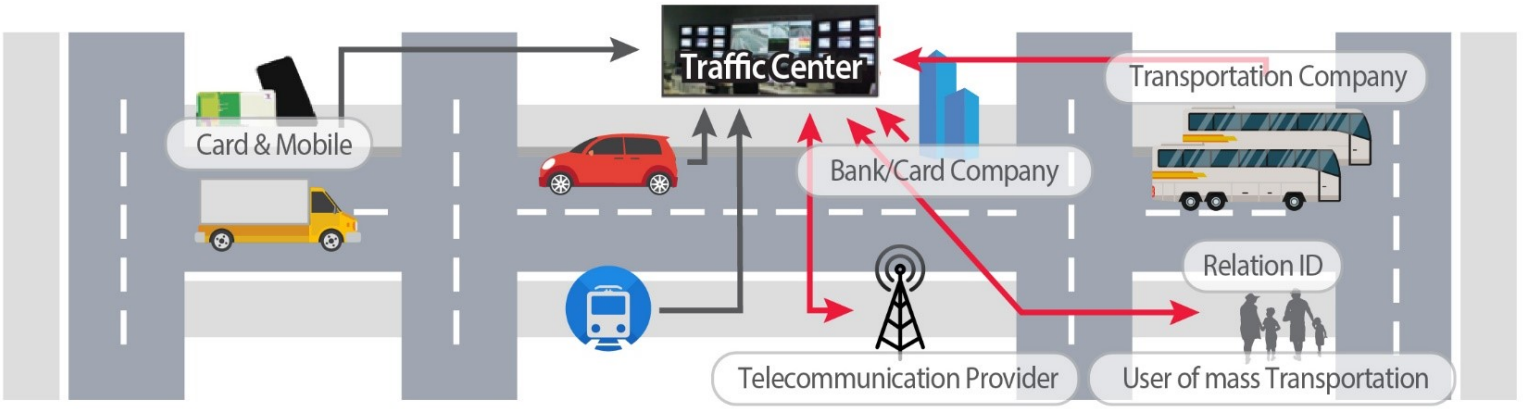
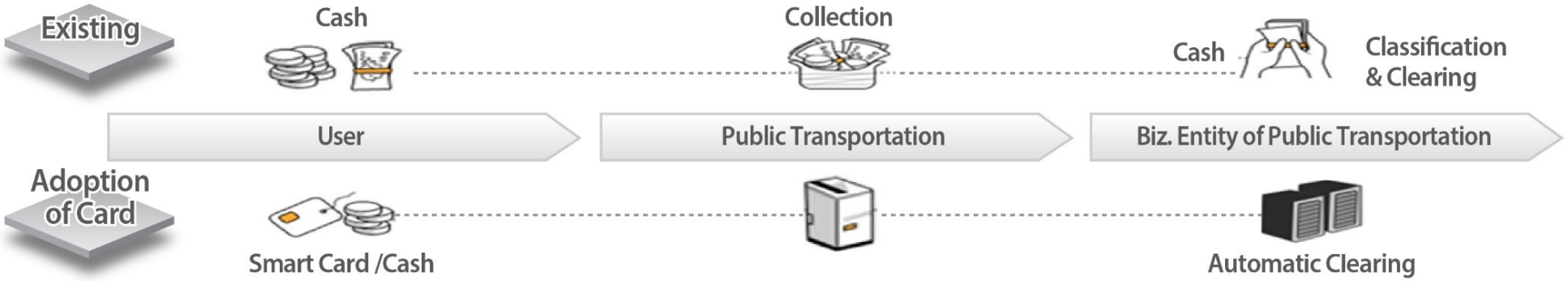
- AFCS is a payment service that allows to pay for all the public transport modes with one card.
- It improves convenience of users and clarity of fare collection by using Electronic Transport Card to pay fare.
- In Seoul, the smart card use rate for bus is 98.6% and for subway is 100% (as of '16.12)





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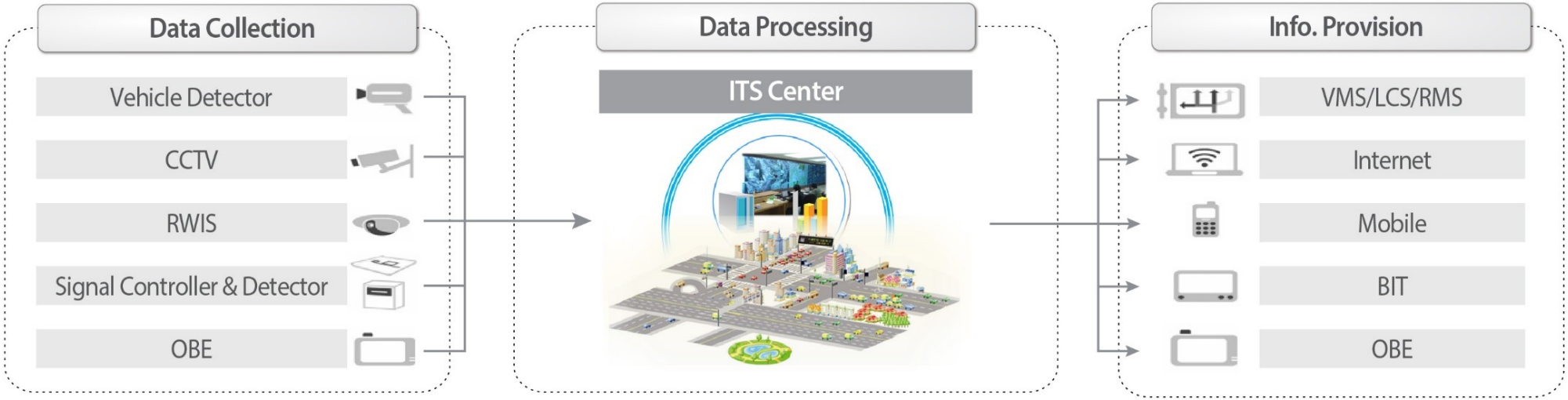
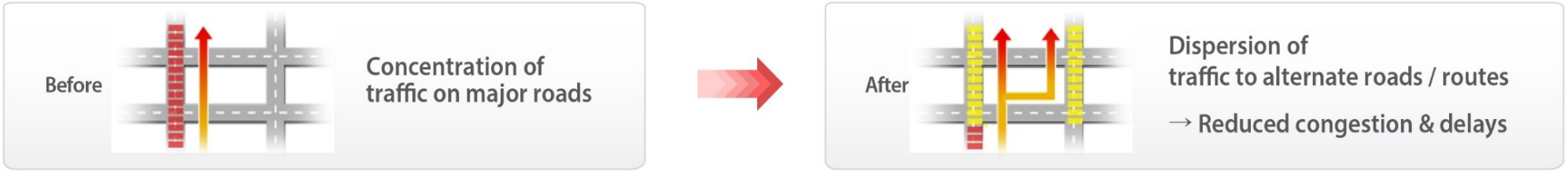
ATMS (Advanced Traffic Management System)

- ATMS is a system to manage traffic flow based on real-time road status
- By using VDS, CCTV and other ITS devices, the traffic data on the road is collected and processed by the ITS center
- Processed traffic information is disseminated to users in real time to disperse users and manage traffic flow



* ATMS should be linked with TSCS(Traffic Signal Control System) and BIS(Bus Information System) to maximum effect.



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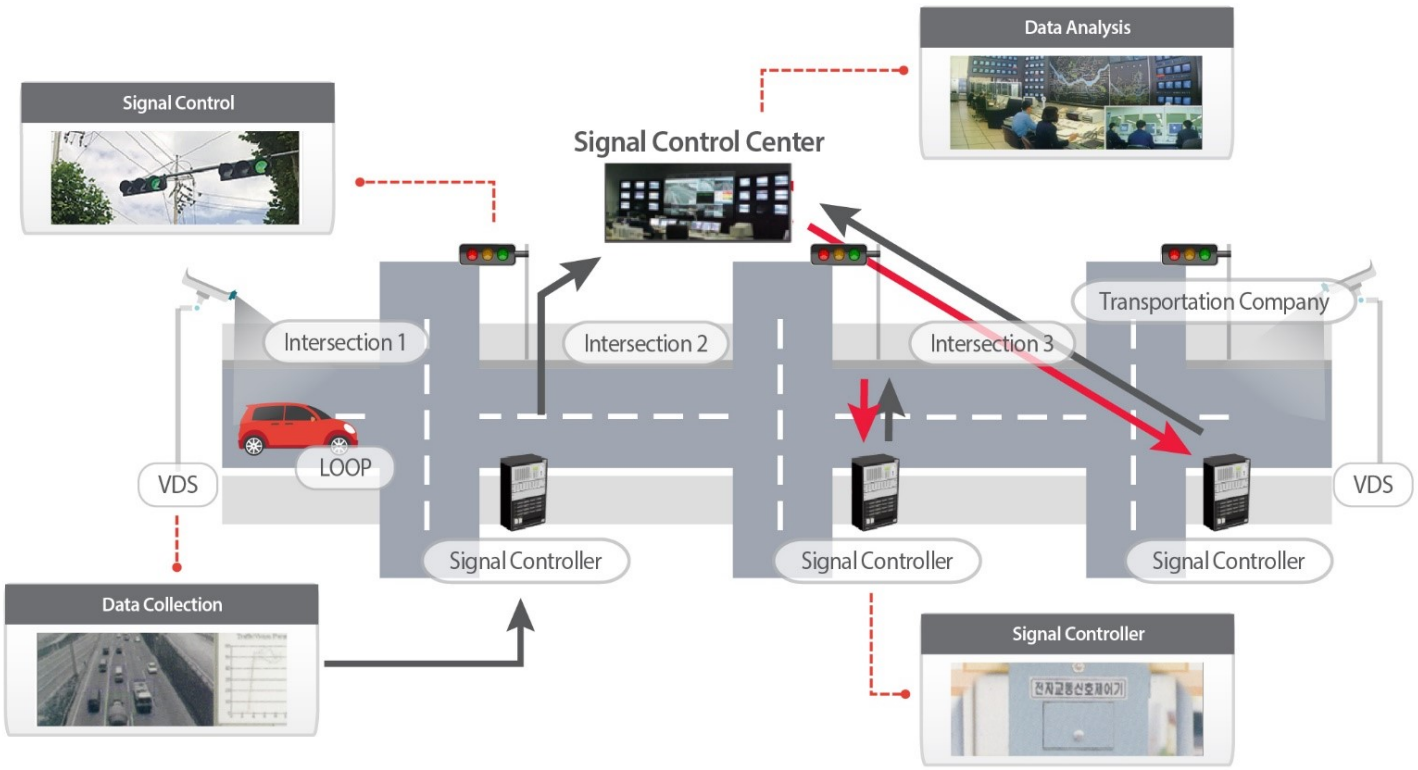
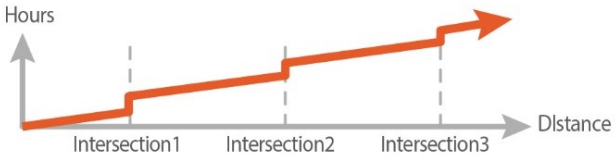
ATSCS (Advanced Traffic Signal Control Systems)

- TSCS is a system that reflects the data collected by the vehicle detector to provide the best signal for the current traffic situation
- It reduces traffic congestion by giving the driver signals not to stop at the intersection

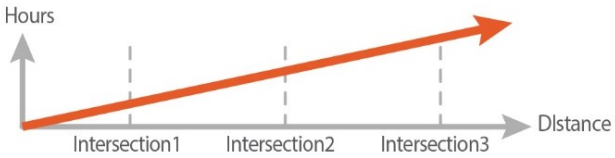
* If there is no sensor, the signal time is changed according to a predetermined plan(TOD Plan)



Before



After



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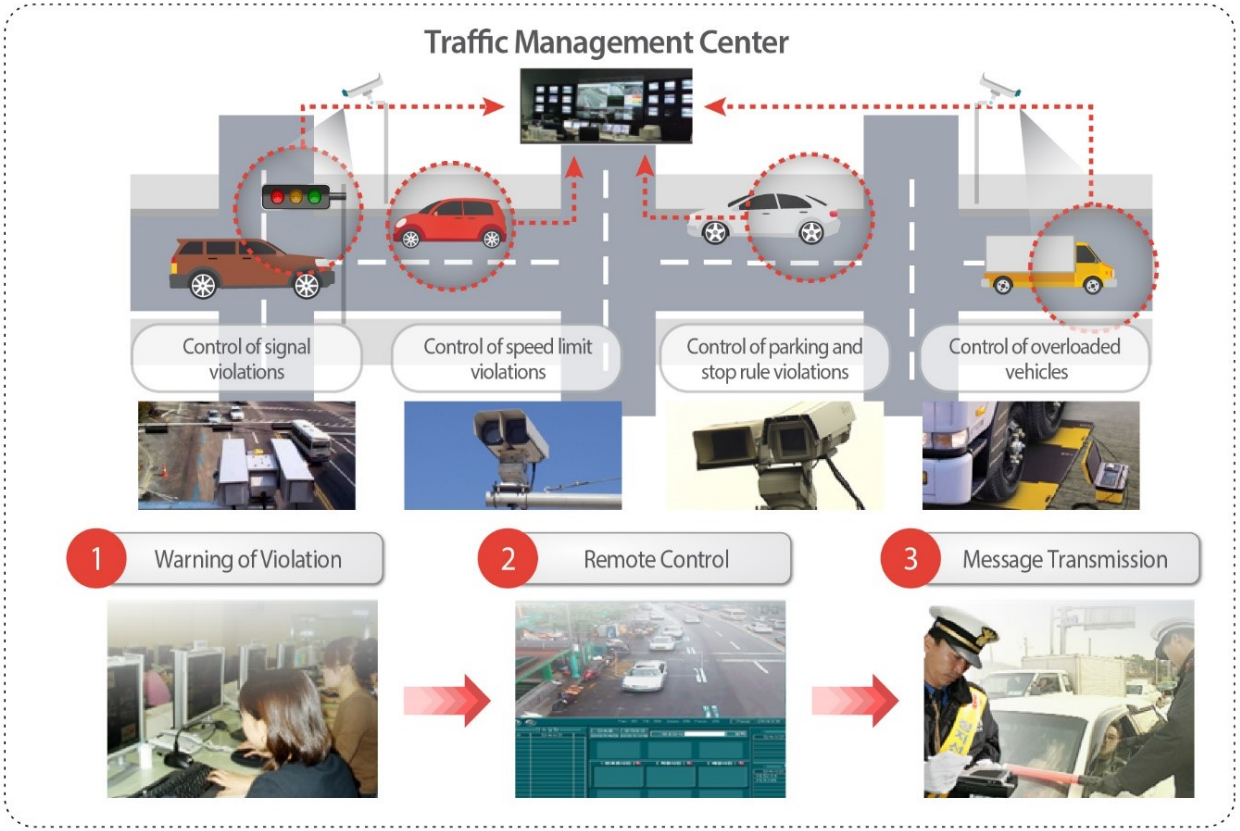
ATES (Automatic Traffic Enforcement System)

- ATES is a system to enforce violation vehicles on the roads including speeding, signal violation, illegal parking and overloaded vehicles
- It contributes to smooth traffic flow & accident prevention by securing the road capacity through enforcement



ITS Services in Korea

ETCS (Electronic Toll Collection System)

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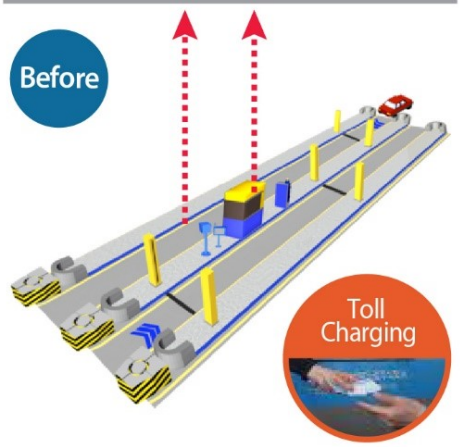
- ETCS is a toll payment system using DSRC to avoid unnecessary stopping at the toll booth
- As of Dec. 2016, It has been installed in 42% of toll booths and 76% of the users has been using it to pay toll fees for toll roads

TCS Vehicle Process

TCS Charging data

Toll center

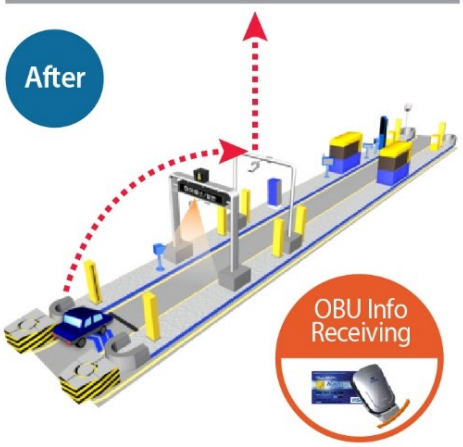


" TCS capacity:
450 vehicles /hour "

ETCS Vehicle Process

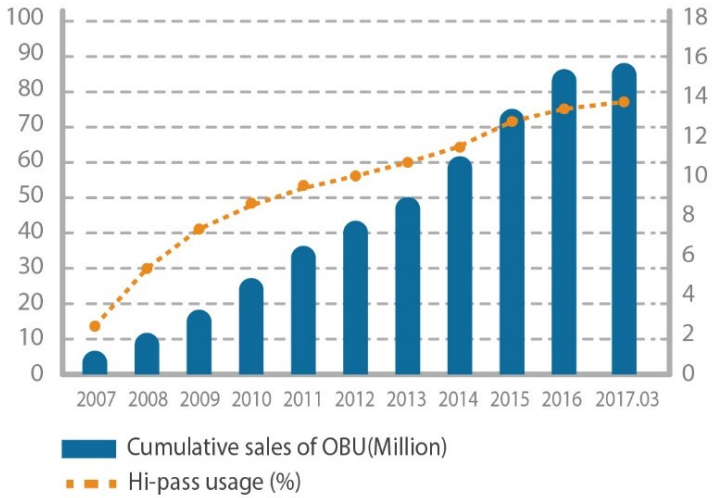
ETCS Charging data

Toll center



" ETCS capacity:
1,800 vehicles /hour "

Installed on all expressway



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.

ITS Services in Korea

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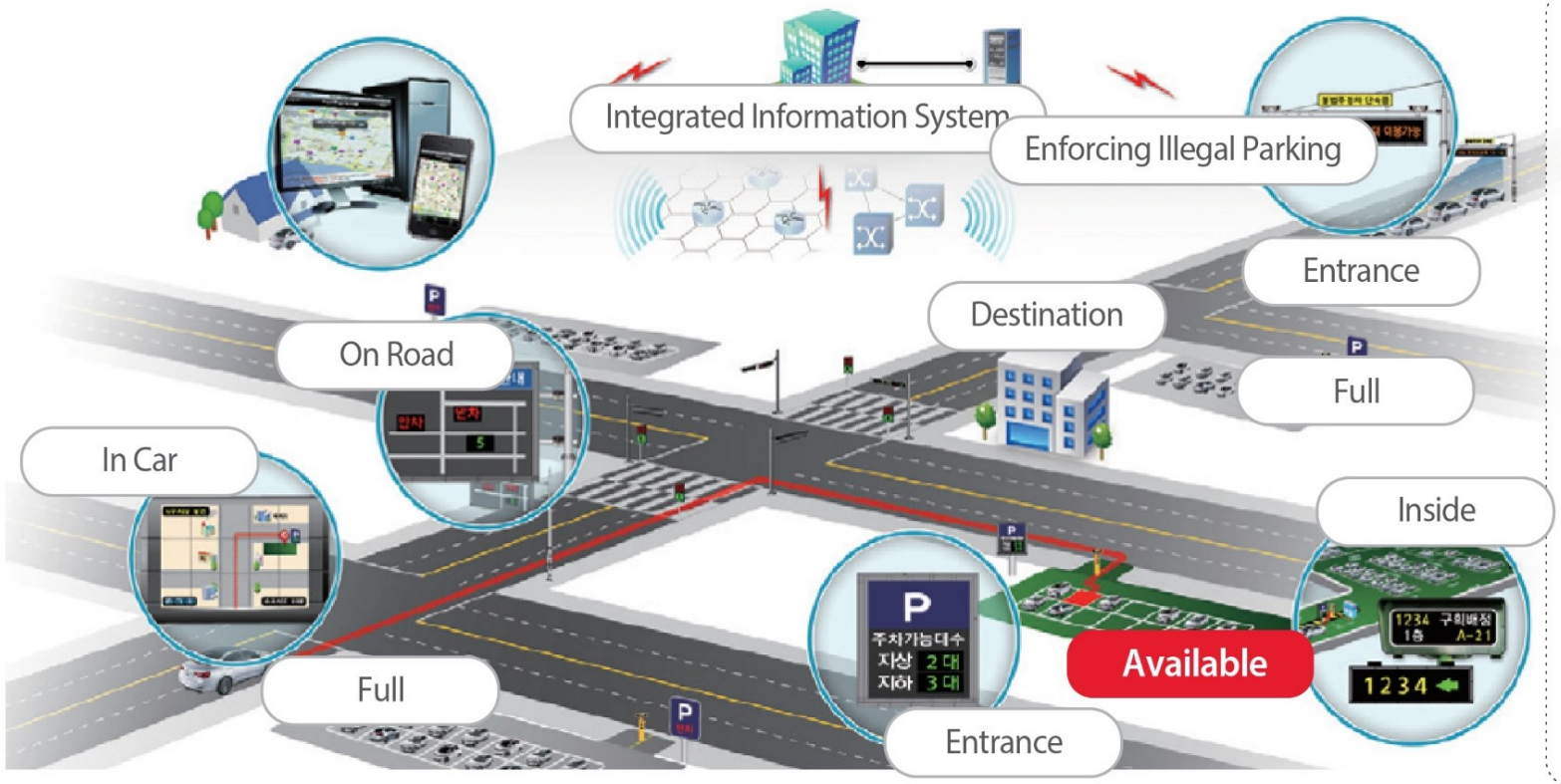
PIMS (Parking Management Information System)

- PIMS provides real-time parking information by detecting the available parking space
- PIMS contributes to the reduction of traffic volume caused by vehicles wandering for finding parking spaces, so it secures the road capacity



Parking lot Navigation App

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Integration of Traffic Management Center

- Transportation information collected from various ITS centers is linked to the National Traffic Management Center and is integrated and managed by the center
- This integrated management is effective in reducing budgets by preventing dual investment in facilities
- Based on ITS Standardization, centers can be integrated and linked

National roads (Total road networks)

National Transport Information Center
: 5 Road traffic information centers

Expressway

KEC Traffic Information Center
: 7 Provincial centers

Regional roads

44 Regional Centers

Real-time monitoring & Management 24/7

Congestion Management

Congestion Management

Congestion Management

Congestion Management

3. Next Generation of ITS in Korea

1) Cooperative ITS

2) C-ARS

Next generation of ITS in Korea

Cooperative ITS

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Object	Verifying technologies and servies and laying the foundation for C-ITS deployment
Period	July 2014 ~ July 2017
Area	88km long on expressway near Sejong city and Daejeon city, national highway, and urban road

C-ITS Master Plan

Short Term 2014 ~ 2020	Mid Term 2021 ~ 2025	Long Term 2026 ~ 2030
V21 Service on Expressway Standardization of Service	V21 Service on Expressway Standardization of Service	V21 Expansion to Small and Medium-sized Cities V2P Satety Service
- Mount OBU up to 10% - Provide basic from of OBU (Safety message, tolling)	- Mount OBU up to 50% - Link control between vehicles - Mandatory OBU installation in commercial vehicle	- Mount OBU up to 70% - Build foundation for autonomous driving - Mandatory installation in non-commercial vehicle
C-ITS Deployed by 4% 68% of Expressway	**C-ITS Deployed by 18%** 100% of Expressway, 16% of National Highway, 12% of Urban Road	**C-ITS Deployed by 30%** 100% of Expressway 67% of National Highway, 17% of Urban Road

Total 3.5 Billion

Traffic Fatalities "ZERO"

Next generation of ITS in Korea

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Cooperative ITS

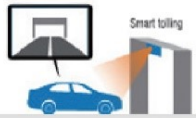
01. Prove Data Collection

Location based probe data collection

02. Location Base Traveler Information Service

Location based traveler information service such as VMS (12V)

03. Smart Tolling (Multi Lane Free Flow Tolling)



Multi lane free flow toll collection based on DSRC (WAVE)

04. Road Hazard Warning

Radar detector recognizes obstacies on the road then broadcasting warning messages via RSE

05. RWIS (Road Weather Information System)

Microscopic road weather & surface condition information service via RSE

06. Work Zone Warning

Broadcasting work zone warning via 12V, V2V

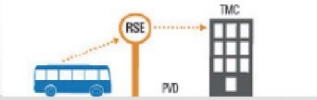
07. Red Light Violation Warning

Detecting red light violation cars then broadcasting caution warning

08. Right Turn Assist

Notifies a driver who is attempting to make a right turn when it is not safe to proceed

09. Bus Management



Fleets monitoring system via DSRC collecting locations and violating conditions

10. School Bus Warning

Broadcasting boarding or alighting condition from the school bus

11. School Zone Safety

Alerting school zone and advising recommended speed

12. Pedestrain Warning

Warns a driver when pedestrians are near a crosswalk

13. FCW / EEBL

Warns a driver when the front vehicle makes hard breaking or stopping

14. EV Approaching Warning

The emergency vehicle broadcasts its conditions for priority

15. Emergency Warning

The broken car broadcasts its conditions to prevent secondary accidents

Next generation of ITS in Korea

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C-ARS

Project Title	Cooperative Automated Driving Road System
Goal	Development of Road Infrastructure and System to Cooperate with Autonomous Vehicles for Safe and Efficient Autonomous Driving
Period	July 2015 ~ July 2020 (5years)
Budget	31 Million USD (75% of goverment investment & 25% private investment)

Vision

Safe, Pleasant Road Environment for Autonomous Driving

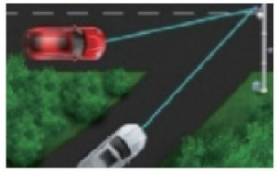
Strategic Goal

Smart Cooperative Road System for Autonomous Driving

Mobility | Safety | Connectivity | Convenience

LDM (Local Dynamic Map)

Collectinf road traffic information

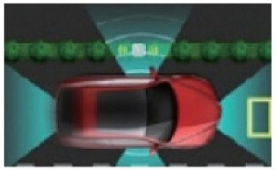


Real-time detection in diverging/merging area

V2X

Enhanced road infrastructure (lane marking etc.)

High-precision positioning



Autonomous vehicle

4. International Cooperation

1) International Cooperation

International Cooperation

Current status of ITS Export

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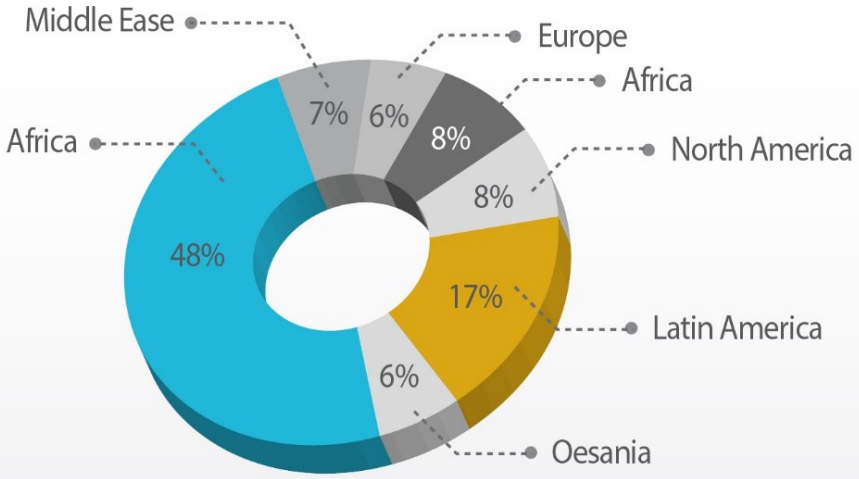
- Korea ITS exported to 35 countries since 2006
- As of May 2017, a total of about 102 projects have been conducted including ETCS (Electronic Toll Collection System), ATE (Automatic Traffic Enforcement), AFC (Automatic Fare Collection), ATMS (Advanced Traffic Management System) and PIS (Parking Information System), WIM(Weigh In Motion)



Thank you

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