ITS deployment for connected vehicles and people

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CACS (1973～1979)

CACS: The Comprehensive Automobile Traffic Control System
ITS action plan in Japan (1996)

1. Car Navigation
2. ETC
3. Driving Safety
4. Traffic Management
5. Road Management
6. Public Transportation
7. Commercial Vehicle Operation
8. Pedestrian Support
9. Emergency Vehicle Operation
Market Penetration of On-board Units

On-board units sold (as of December, 2012)

- Car Navigation: 54.3 million units
- VICS: 36.5 million units
- ETC: 40.5 million units

Source: Ministry of Land, Infrastructure, Transport and Tourism
Operational framework for ETC

Manufacturer (on-board and roadside equipment)

Type Approval
- Regulation conformity test
- Interoperability Test

Approval

Security Management
- Seeds key generation
- Equipment set-up

Non-disclosure agreement

Security set-up

Procurement

Road operator

Purchase

Road user

Toll payment
Framework of VICS Services

- Highway Operators
- Traffic Police
- Broadcasting Stations

Traffic Information Center (traffic data collection)

VICS Center (encoding)

- Technical data are provided under NDA

Users

On-board Equipment Manufacturers

Digital Road Map Association

Common digital map is shared by both public and private sectors.
Vehicle to Infrastructure Cooperation

Information on Dangers Ahead

Live Image Feed

Merging Assistance
ITS-Safety 2010 Demonstration

Ribbon Cutting Ceremony

NISSAN

TOYOTA

HONDA

MAZDA

SUBARU

DAIHATSU

SUZUKI

MITSUBISHI

ISUZU

HINO

NISSAN DIESEL

FUSO

Mercedes-Benz

Kawasaki

SUZUKI

HONDA

YAMAHA

Volkswagen
Technologies in operation

Vehicle to Infrastructure Cooperation

Safety Assistance

Traffic Information

Dynamic Route Guidance
Theme: *Open ITS to the Next*

Date: October 14th – 18th, 2013

Venue: Tokyo International Forum (Opening Ceremony)
Tokyo Big Sight (Session & Exhibition)
Second phase of connected vehicles

- ITS Spot services
  - (V2I)
- Cooperative ASV (Advanced Safety Vehicle)
  - (V2V, V2P)
- DSSS (Driving Safety Support System) (V2I)
- Congestion mitigation on expressways
  - (V2I, V2V)
- ITS Spot & mobile network
  - (V2I)
Focus areas for the future of ITS

Automated and connected vehicle technologies

- Built-in features of driver assistance will be integrated with connected vehicle technologies for safety and efficiency.
- Evolutional process will continue toward higher level of automated driving by introduction of commercial products.
- Demonstration, exhibition and discussions by global auto manufacturers are organized at Tokyo World Congress.

ITS Big Data, business opportunities and public services

- Huge volume of probe data are collected through navigation systems and mobile communication devices.
- With such ‘Big Data’, new services for personal mobility and business operations as well as public applications for policy performance measures and emergency operations are rapidly emerging.
- Leaders from both private and public sectors are invited for vigorous discussions on its potential and implications. Demonstrations and site visits are also arranged.
Technologies Ready for deployment

Automated Platoon

- Trailing vehicles automatically follow the leading vehicle maintaining specified distance.
- Fuel efficiency and safety will be enhanced and drivers’ work load will be reduced.

Cooperative ACC

- Vehicles automatically maintain distance and minimize speed fluctuation using sensors and V to V communication.
- Congestion will be significantly mitigated and fuel efficiency and safety will be enhanced.

ACC: Adaptive Cruise Control
Intelligent Traffic Management System

Conventional Traffic Information System

Fixed sensor data

Central Tokyo

Traffic Control Center

Mobile Device based System

Probe Data

Central Tokyo

GPS

Location

Time

Traffic Information
Probe data with road closure information
Technologies to evaluate CO$_2$ reduction

- Traffic data
  - sensors
  - probe

- Traffic Flow Simulation

- Behavioral Change
  - driving habits
  - mode selection

- Digital Road Map

- CO$_2$ Emission Simulation

- Emission profile

- Emission Volume