ITS initiatives in Japan
Outline of ITS in Japan

• ITS is designed to integrate people, roads and vehicles in order to resolve road traffic problems such as traffic congestion, traffic accidents and environmental degradation.

- Environmental degradation:
  • 20% of all CO2 emissions in transport sector

- Traffic congestion Time loss:
  • 5 billion hours annually

- Traffic accidents:
  • 730,000 accidents resulting in 4,863 fatalities (FY2010)
Structure of the Japanese government to promote ITS

Organizational structure to promote ITS

Four ITS related ministries
- MLIT
- NPA
- MIC
- METI

ITS Standardization Committee
*Promotion of standardization at ISO

ITS Japan
*Promotion of ITS by the industry and academia composed of knowledgeable persons, private parties, etc.

Comprehensive Plan

1. Advances in navigation systems
2. Electronic toll collection systems
3. Assistance for safe driving
4. Optimization of traffic management
5. Increasing efficiency in road management
6. Support for public transport
7. Increasing efficiency of commercial vehicle operations
8. Support for pedestrians
9. Support for emergency vehicle operations

Orange indicates efforts in which MLIT is particularly actively involved.

MLIT: Ministry of Land, Infrastructure, Transport and Tourism
NPA: National Police Agency
MIC: Ministry of Internal Affairs and Communications
METI: Ministry of Economy, Trade and Industry
• Goal: Halving traffic congestion on major roads by 2020 (compared with 2010)

Enable smooth road traffic by ITS

<table>
<thead>
<tr>
<th>FY2012</th>
<th>FY2013</th>
<th>FY2014</th>
<th>FY2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Target for FY2015: Reducing traffic congestions on major roads nationwide below the level in FY2010 by approximately 15 to 25%</td>
</tr>
</tbody>
</table>

Promotion of ITS (Intelligent Transport System)

- Study of accuracy and contents of vehicular travel (probe) information required for various uses, and verification of its effects by FY 2014
- Commencement of implementation of Green ITS Services (including test implementation) and sophistication of transport control by FY2013
- Study and implementation of measures for full-scale prevalence of Green ITS services
- Presentation of developments at ITS World Congress in Tokyo in FY2013
- Study of Vehicle-to-Infrastructure cooperative systems for developing auto-pilot system on expressways

※ Reducing traffic congestions on major roads nationwide by half of the level in FY2010 by ITS and other countermeasures (also contributing to the reduction of traffic accidents)

ITS Roadmaps - IT Strategic Headquarters (July 2012)

**Goal**: Fewer than 2,500 fatalities in 2018 (4,863 fatalities in 2010)

**Building safe and secure road transport society using cooperative systems**

- **FY2011**: Development of ITS roadmap
- **FY2012**: Promotion of international standardization and overseas deployment
  - Pilot projects for Vehicle-to-Infrastructure cooperative systems on conventional roads
  - Deployment of Vehicle-to-Infrastructure cooperative systems on expressways throughout the country
  - Deployment of technical guidelines for Vehicle-to-Vehicle communications systems
  - Deployment of technical guidelines for UHF-band ITS wireless system
- **FY2013**: Enhancement of services of Vehicle-to-Infrastructure cooperative systems and promotion of road infrastructure deployment
  - Verification of appropriate and effective role-sharing between Vehicle-to-Vehicle cooperative systems
  - Development and prevalence of adaptive on-board equipment and vehicles
  - Development of technical guidelines for Pedestrian-to-Vehicle communications systems
- **FY2014**: Demonstration will be conducted at the 20th ITS World Congress
  - ITS World Congress (Tokyo)
  - Sharing of the effects of ITS on the achievement of government goals
- **FY2015**: Promotion of practical use and nationwide deployment of Vehicle-to-Infrastructure cooperative systems
  - Feasibility assessment and technical development for Pedestrian-to-Vehicle communications systems

Traffic accidents fatalities less than 2,500

Source: The New strategy in Information and Communications Technology Roadmaps, July 2012
History of ITS development

(1) 1973 : Traffic control center was established on Metropolitan Expressway

(2) 1980 : Trial operation of Highway Advisory Information Radio system

(3) 1996 : VICS service began

(4) 1996 : Successful test of cruise control system on public road (world first)

(5) 1997 : ETC service began

(6) 2011 : ‘ITS Spot’ service began

With 25 companies participating, 11 vehicles were operated continuously for 11 km

VICS: Vehicle Information and Communication System

ETC: Electronic Toll Collection System

Three Basic Services
- Dynamic route guidance
- Support for driving safety
- ETC
Practical application of VICS and ETC

**VICS**

- Provides road traffic information on car navigation screens.
- Equipped on 35 million automobiles.
- Reduced annual CO₂ emissions by 2.4 million tons in 2009.

**ETC**

- Usage rate on toll roads is 87% (39 million automobiles).
- Eliminates almost all toll-gate congestion on expressways (30% of all expressway congestion).

---

**CO₂ reduction brought by introduction of ETC**

(ETC usage rate of 85%)

IntRODUCTION OF ETC ELIMINATES TRAFFIC CONGESTION, WHICH REDUCES CO₂ EMISSIONS BY APPROXIMATELY 210,000 TONS EACH YEAR.

Figure: ETC usage rate and reduced amount of CO₂ emissions

MLIT
Ministry of Land, Infrastructure, Transport and Tourism
Congestion on Expressways in Japan

- 60% of congestion occurs at sags and on upslope section.
- Urgent measures urgently required.

### Congestion on inter-city expressways

#### 2000 without ETC

Total congestion frequency = 12,378 per year

Source: H23 ETC Handbook Simplified version

#### 2009 with ETC

Total congestion amount = 107,516 km·h per year

Prepared based on totals for three NEXCO companies

(congestion amount = number of congestion incidents x average congestion time x average maximum congestion length / 2)

End of lane, 0.1%
Tunnel entrance, 7.3%
Interchange junction, 18.9%
SA-PA junction, 0.5%
Other, 11.7%
Toll plaza, 32.1%
Sag or upslope section, 60.3%
Other, 3.7%
End of lane, 1.2%
Toll plaza, 0.1%
Sag or upslope section, 60.3%
Interchange junction, 13.9%
Tunnel entrance, 20.8%
Deployment of ‘ITS Spots’

- Car navigation systems for ITS Spots released in 2009.
- 1,600 ITS Spots installed mainly on expressways.

3 Basic Services
- Dynamic Route Guidance
- Safety Driving Support
- ETC
Car Navigation Systems and OBU for ‘ITS Spots’

- 16 automobile manufactures, navigation systems and OBU manufactures for ITS Spot.
- 10M OBU units to be sold over 5 years.

Projected number of ITS Spot-compatible navigation systems

5-year cumulative total of about 10 million units

Automobile manufacturers

- Audi
- MAZDA
- Mercedes-Benz
- PEUGEOT
- NISSAN
- SUZUKI
- TOYOTA

Manufacturers of navigation systems and on-board units

- ALPINE
- Clarion
- Mitsubishi Electric
- Mitsubishi Heavy Industries, LTD
- Panasonic
- Pioneer
In the case of travel between metropolitan areas, wide-area information as well as metropolitan area information can be received from ITS Spot.

Travel time data for all road segments in the metropolitan area are received from ITS Spot.

The car navigation system smartly selects an optimum route.

The whole road network can be used effectively.
• ‘ITS Spots’ supports safe driving.

**Obstructions Warning**

*Drive carefully. Obstruction ahead in left lane*

(Displayed about 1 kilometer before the obstruction.)

**Congestion Warning (Invisible beyond a curve etc. at an accident hot spot)**

*Warning. Congestion ahead*

Images inform drivers of snow, fog, and other weather conditions, and of congestion inside tunnels.
Utilizing probe data

- Probe information used for efficient and advanced road management.

**Probe information in Sapporo**

Gathering of travel speed data (average 12 hours/day) in Central Sapporo (Sep - Nov 2011 (3 months))

*The bold line is the speed of expressway.*

**Probe information in Central Osaka**

Gathering historical behavior data (forward and backward) acceleration Jun - Nov 2011 (6 months) in Central Osaka.
**Distribution Support Services**

- Probe data of each logistic vehicle is collected at ITS Spots free of communications charges, and provided to the logistic center real-time.
- Physical distributors use the probe data for controlling vehicular operation and cargo delivery.

**Travel route, position and close call spots for each individual vehicle are grasped.**

---

The Study Group of Consumer Electronics Logistics  
(Organizer: MITSUI-SOKO-LOGISTICS Co., Ltd.)

Copyright © 2012 TOPPAN PRINTING CO., LTD. All Rights Reserved
Cashless Transactions

- Demonstration using test vehicles were implemented at the Tsukuba-kenkyugakuen branch of McDonald's on Mar. 5 through 16, 2012.

Orders are registered by car navigation system.

Messages on the screen of car navigation systems are actually displayed in Japanese.

Receiving merchandise

Cashless payment using credit cards
Sag congestion countermeasures based on cooperation between the road infrastructure and automobiles.

- ‘ITS Spot’ transmit optimum speed, headway distance.
- ACC* equipped automobiles automatically drive based on the information.
- Experiment to be carried out from 2012.

* ACC (Adaptive Cruise Control): Function which controls speed and headway of a moving automobile.

According to the results of the simulations for congestion on Saturday, August 21, 2010, the spread of 30%, it is possible to reduce the amount of about 50% congestion.
Direction of Next-generation ITS

Realization of "Autopilot"

Experiment at congestion points on highway using steering assist in addition to ACC

Cooperative Vehicle Control (Lateral)

Cooperative Vehicle Control (Longitudinal)

Autonomous control (Implemented)

2011 2012 2013

Demo at ITS World Congress (Tokyo)

Early 2020s

Developing safer autonomous control

ACC* Pre-crash brake Lane keeping assist

Experiment at congestion points on highway using ACC, road-to-vehicle communication

Realization of Cooperative Vehicle Control ACC on highways (Longitudinal and lateral)

* ACC (Adaptive Cruise Control): Function which controls speed and headway of a moving automobile.