ITS initiatives in Japan
## Practical application of VICS and ETC

### V I C S  (Vehicle Information and Communication System)

- Road traffic information on car navigation unit screens.
- **Approximately 30 million automobiles are now equipped with VICS onboard units.**
- VICS will reduce annual CO₂ emissions by 2.5 million tons by 2012.

<table>
<thead>
<tr>
<th>Information via FM multiplex broadcasting</th>
<th>Beacon (radio wave, optical) information</th>
</tr>
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<tbody>
<tr>
<td>Displayed if manually selected</td>
<td>Automatically pops up</td>
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</table>

### E T C  (Electronic Toll Collection)

- **ETC utilization rate** on toll roads is approximately 85% (cumulative set-ups in approximately 45 million automobiles)
- Eliminates almost all toll-gate congestion on expressways throughout Japan.
- And cuts CO₂ emissions by about 210,000 tons per year

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

ETC usage rate (%) | CO₂ reduction brought by introduction of ETC (ETC usage rate of 85%)
--- | ---
50 | 10,000 tons CO₂
40 | 50
30 | 40
20 | 30
10 | 20
0 | 10

ETC usage rate: 0% | ETC usage rate: 85%
Now that ETC is in wide use, toll gate congestion has almost disappeared from expressways. Because 60% of congestion now occurs at sags and on upslope sections, measures are urgently needed at such locations.

Congestion on inter-city expressways

- **2002 without ETC**
  - Total congestion amount = 65,226 km·h per year

- **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)
Traffic accidents caused 4,863 fatalities in 2010.
- About 1/3 of the record number of fatalities of 16,765 (1970)
- About 1/2 of the second peak of 11,451 fatalities (1992)

[Changes in numbers of traffic accident deaths and deaths/injuries]

Note: Numbers of accidents, deaths, and deaths/injuries up to 1971 do not include Okinawa Prefecture.

Source: Prepared based on data of the National Police Agency
Comparison of Traffic Accidents Fatalities

A comparison of numbers of fatalities per 100,000 people ranks Japan fifth lowest at 4.5 fatalities (2009).

Notes:
1. Based on IRTAD data
2. Figures are for 2009, with the exception of those countries with years appearing in parentheses following their names.
3. All figures were calculated based on data for people who died within 30 days from the day of the relevant accident.

Source: Prepared based on IRTAD data
Goal: Halving traffic congestion on major roads nationwide by 2020 (compared with 2010)

- Promoting green transport of people and goods

<table>
<thead>
<tr>
<th>FY2010</th>
<th>FY2011</th>
<th>FY2012</th>
<th>FY2013</th>
<th>FY2014</th>
<th>FY2020</th>
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</thead>
<tbody>
<tr>
<td>Promoting international standardization and deployment</td>
<td>CS</td>
<td>CO</td>
<td>NPA</td>
<td>MIC</td>
<td>METI</td>
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<tr>
<td>Studying the precision and contents etc. of probe information required according to purpose of use and verification of its effectiveness</td>
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<td>Collection and distribution of a wide range of road traffic information</td>
<td>NPA</td>
<td>MIC</td>
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<td>Verifying effectiveness of collection and use of probe information</td>
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<td>Collection and verification of effectiveness of data</td>
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<td>Enacting a roadmap for the overseas expansion of advanced IT and systems for automobiles</td>
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<td>Coordination with road and traffic management measures</td>
<td>NPA</td>
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<td>Blending infrared beacon information and sensor information and their application to signal control and road traffic information provision</td>
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<td>Verification of the effectiveness of measuring impact on traffic volume</td>
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<td>Advancing traffic control</td>
<td>NPA</td>
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<tr>
<td>Development and verification of technologies to apply probe information to signal control and to advancing road traffic information</td>
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<td>Advancing signal control and road traffic information provision through centralized control of signals, program multi-stage systematization, and multiple traffic phases, etc.</td>
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<td>Optimizing road traffic management according to traffic flow</td>
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<td>Applying effects of technology development</td>
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<td>Deployment of Green ITS Services such as optimum route guidance</td>
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<td>Full-scale deployment</td>
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<td>Announcements of initiatives etc.</td>
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<td>ITS World Congress (Tokyo)</td>
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<td>Reducing traffic congestion by half (from 2010 level)</td>
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ITS Roadmaps

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

• Promoting disaster, crime, and accident countermeasures

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<th>FY2010</th>
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<tr>
<td>Promoting international standardization and deployment</td>
<td>Pilot projects for road-vehicle cooperation systems on conventional roads</td>
<td>Nationwide deployment of road-vehicle cooperation systems on expressways</td>
<td>Completing services provided by road-vehicle cooperation systems and advancing improvement of road infrastructures</td>
<td>Enacting technical guidelines for vehicle-vehicle communication system</td>
<td>Enactment of technical standards for UHF band ITS radio systems</td>
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<td>Development and deployment of compatible on-board units and vehicles</td>
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<td>Feasibility study and technology development of pedestrian-vehicle communication systems</td>
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<td>Creation of the roadmap</td>
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<td>ITS use UHF band broadcasting (formerly analog broadcasting)</td>
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<td>Demonstration performed at the Twentieth ITS World Congress</td>
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<td>ITS World Congress (Tokyo)</td>
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<td>Advancing the worldwide deployment of practical road-vehicle and vehicle-vehicle corporation systems</td>
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</table>

Driving safety support systems

Traffic accident fatalities fewer than 2,500
Deployment of “ITS Spots”

- “ITS Spots”, which are a cooperative vehicle-highway system used on Smartways have been installed at about 1,600 locations throughout Japan, reaching the practical application stage nationwide in August 2011.
- Two-way high volume communications by DSRC provide a variety of services including wide-area road traffic information, driving safety support, and probe information collection.

“ITS Spot” compatible car navigation systems went on sale in the fall of 2009

“ITS Spots” have been installed at about 1,600 locations, mainly on expressways.

3 Basic Services
- Dynamic Route Guidance
- Safety Driving Support
- ETC
“ITS Spot” Compatible Car Navigation Systems

Toyota Motors  
(Sold beginning October 2009)

Nissan Motors  
(Sold beginning June 2011)

Pioneer  
(Sold beginning October 2009)

Panasonic  
(Sold beginning March 2010)

Mitsubishi Heavy Industries  
(Sold beginning March 2010)

Alpine  
(Sold beginning July 2011)
Drivers can obtain congestion data on all expressways in the Metropolitan Region via “ITS Spots.” They can select routes avoiding city center congestion from among multiple routes, permitting the overall effective use of the road network.
Safety Driving Support
Advance warnings to reduce unexpected troubles while driving

“ITS Spot”, which provide wide-area road traffic information, also provide safe driving support information.

**Warnings of obstructions fallen on the road**
- On the Metropolitan Expressways, obstructions fall on the roads up to 50,000 times each year (an average of 140 times per day, or once every 10 minutes).
- Information collected by the traffic control center is broadcast

![Drive carefully: Obstruction ahead in left lane](image)

(Displayed about 1 kilometer before the obstruction.)

**Warning of congestion invisible beyond a curve etc. at an accident hot spot**
- On the Metropolitan Expressway system, 20 percent of accidents occur at locations on 2% of the total route length.
- Rear end collisions have been reduced by 60% at such accident hot spots.

![“Warning. Congestion ahead”](image)

**Images inform drivers of snow, fog, and other weather conditions, and of congestion inside tunnels.**

(Displayed about 1 kilometer before the obstruction.)
Sag congestion countermeasure based on cooperation between the road infrastructure and automobiles.

- “ITS Spots” installed on the roadside transmit optimum speed, headway distance, and other information.
- ACC※ equipped automobiles automatically control headway etc. based on the information they have received.
- The goal is to eliminate or reduce major congestion on expressways.

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

Provision of the following information from the roadside:
- Optimum speed
- Inter-vehicular distance
- Road surface conditions
- Grade information, etc.

Vehicle control using information from the roadside and ACC:
- Provision of the following information
- Smooth acceleration
- Change in grade (sag section)
- Guidance to a less congested lane
- Maintaining appropriate distance between vehicles
- ITv camera, etc.

* Approximately 60% of traffic jams occur at changes in grade (sag sections), etc.
Improving the level of road management with probe information, on-board cameras, sensor information.

- Efficient and advanced management of road traffic by collecting information such as automobile probe information, on-board camera information, sensor information, emergency brake locations etc. and other behavior information.

### Probe data (example of Sapporo City)

<table>
<thead>
<tr>
<th>Speed</th>
<th>Color code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to less than 20 km/h</td>
<td>Red</td>
</tr>
<tr>
<td>20 to less than 40 km/h</td>
<td>Yellow</td>
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<tr>
<td>40 to less than 60 km/h</td>
<td>Green</td>
</tr>
<tr>
<td>60 to less than 80 km/h</td>
<td>Cyan</td>
</tr>
<tr>
<td>80 to less than 100 km/h</td>
<td>Blue</td>
</tr>
<tr>
<td>100 km/h and over</td>
<td>Blue</td>
</tr>
</tbody>
</table>

Average of 12 daylight hours between Saturday, April 23, and Tuesday, May 10.
Disaster Countermeasures

- The public and private sectors cooperatively collect probe data and provide travel history information and traffic restriction information during disasters.

○ Information provision by Web sites (to start by April 2011)

- Traffic record data (blue lines) use private-sector telematics data.
- Traffic control data (red Xs) use data provided by road managers.

○ Range of probe collection and provision during the Great East Japan Earthquake

Source: ITS Japan website