

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 :

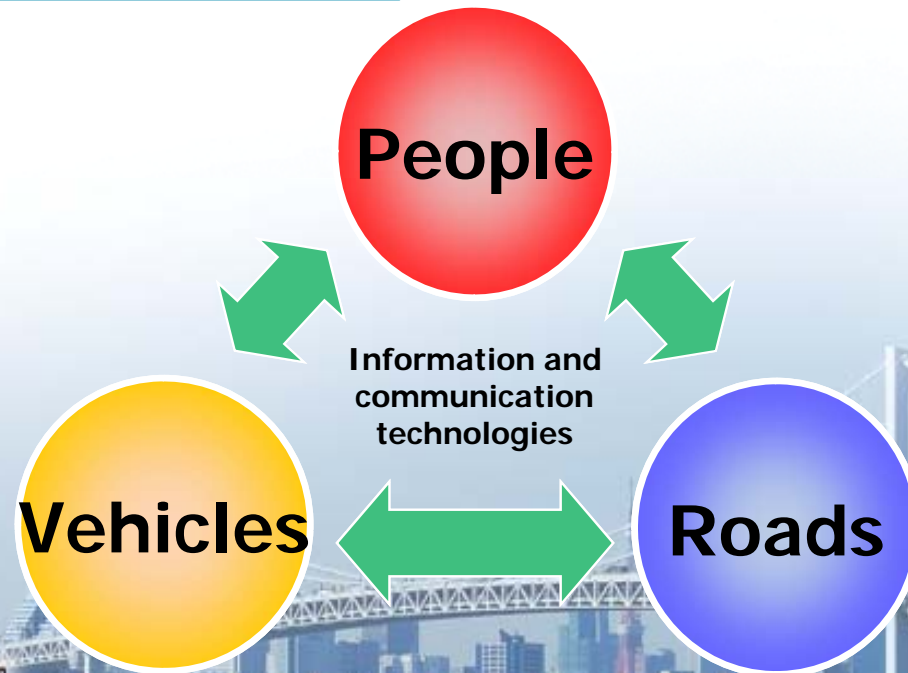
- 20% of all CO2 emissions in transport sector

• Traffic congestion Time loss :

- 5 billion hours annually

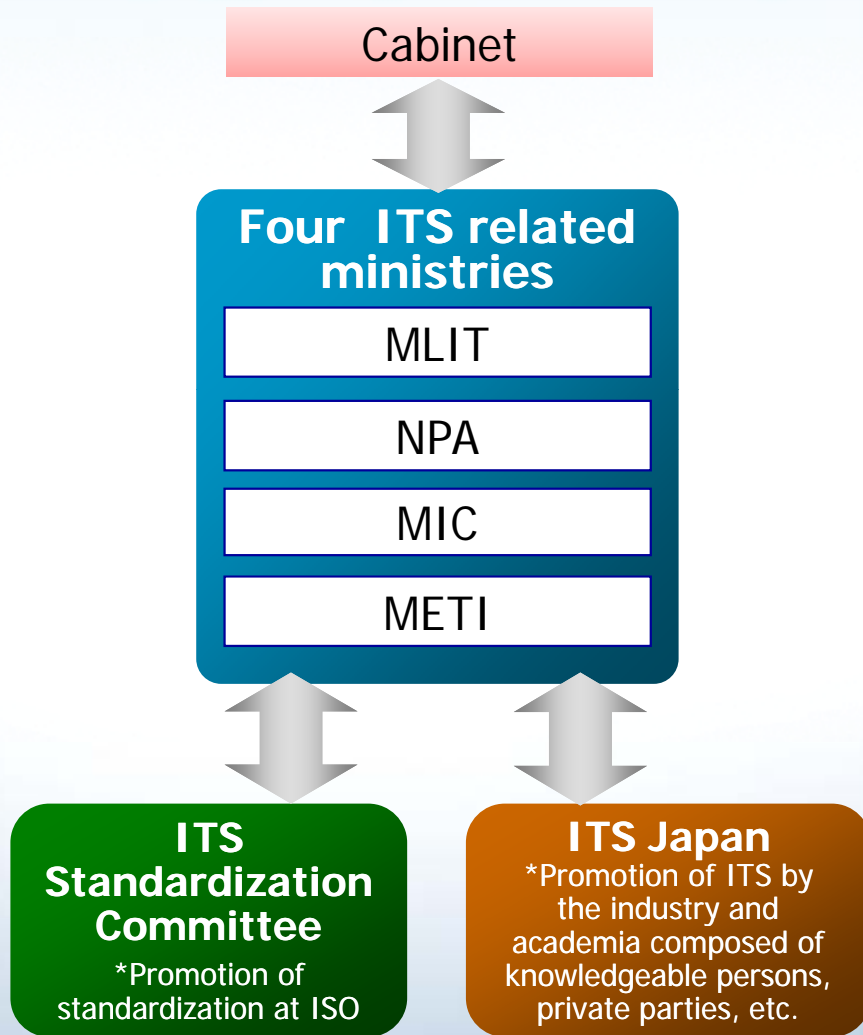
• Traffic accidents :

- 730,000 accidents resulting in 4,863 fatalities (FY2010)



Structure of the Japanese government to promote ITS

Organizational structure to promote ITS



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

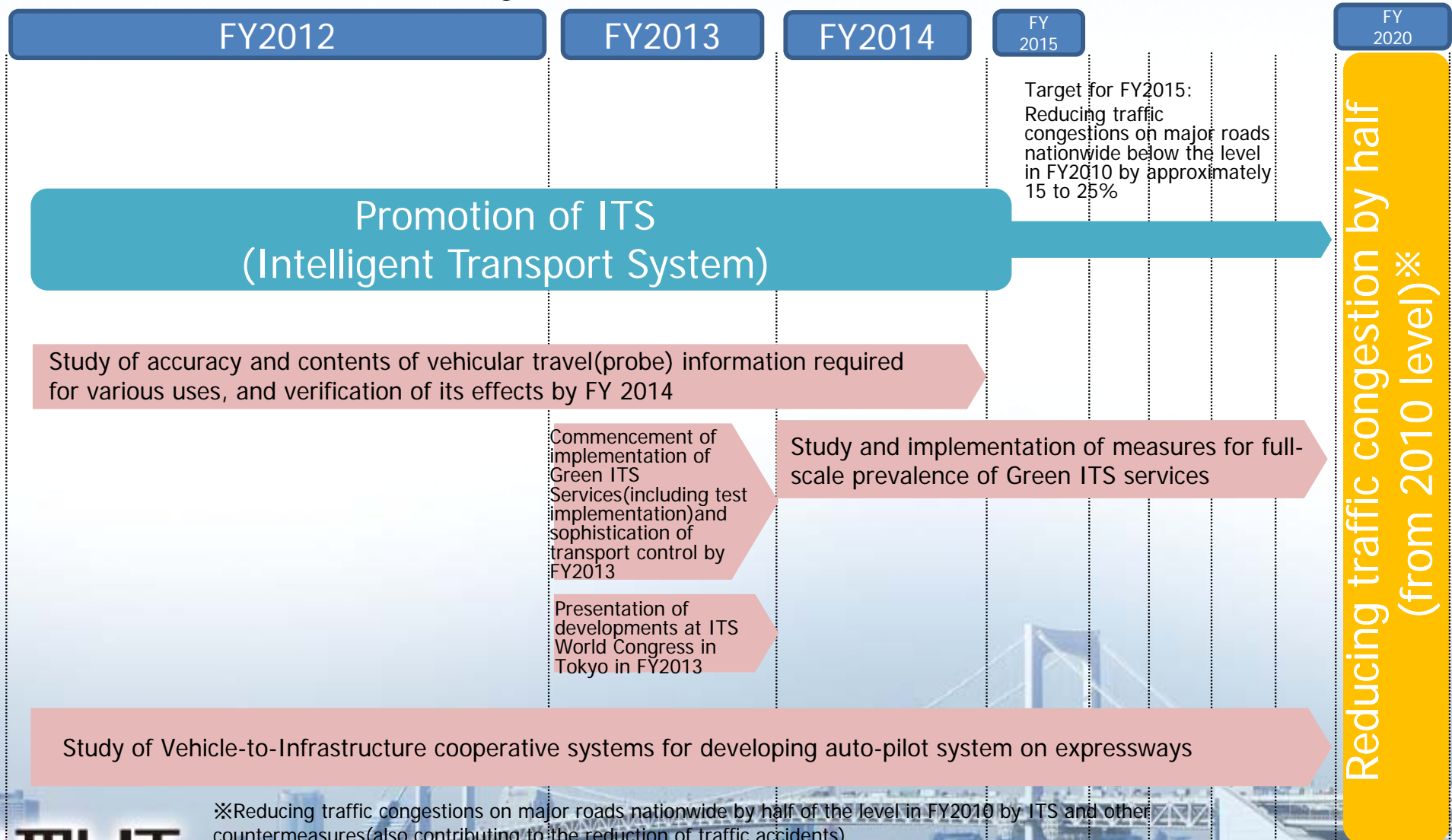
Orange indicates efforts in which MLIT is particularly actively involved.

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

ITS Roadmaps - IT Strategic Headquarters (July 2012)

- Goal : Halving traffic congestion on major roads by 2020.(compared with 2010)

Enable smooth road traffic by ITS

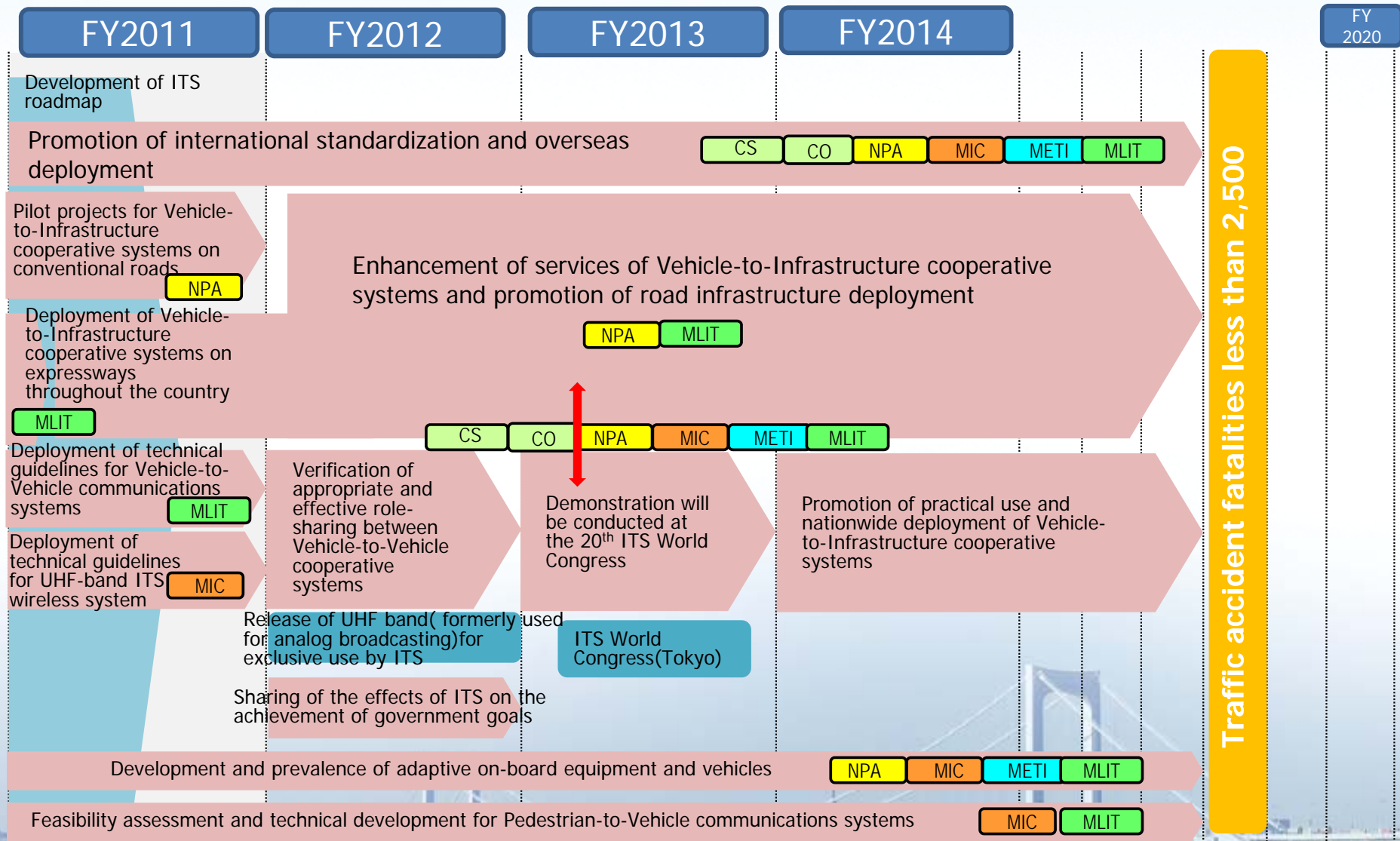


*Reducing traffic congestions on major roads nationwide by half of the level in FY2010 by ITS and other countermeasures (also contributing to the reduction of traffic accidents)

ITS Roadmaps - IT Strategic Headquarters (July 2012)

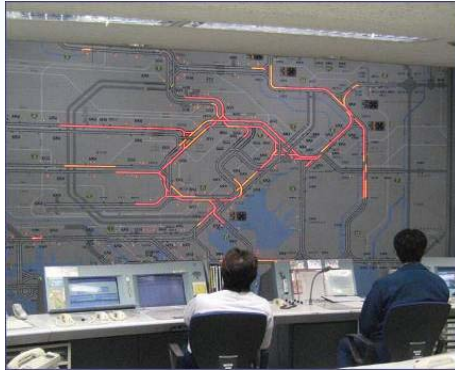
- Goal : Fewer than 2,500 fatalities in 2018 (4,863 fatalities in 2010)

Building safe and secure road transport society using cooperative systems



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

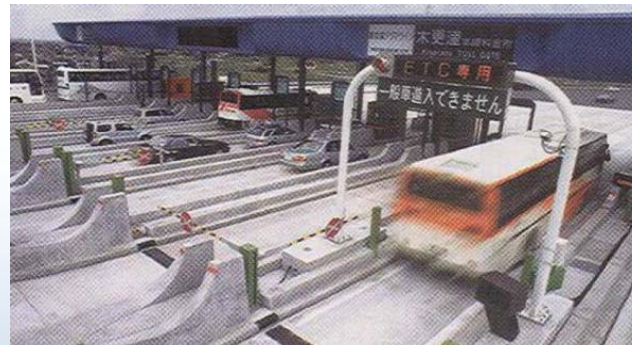


VICS: Vehicle Information and Communication System

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



(5) 1997 : ETC service began



ETC: Electronic Toll Collection System

(6) 2011 : 'ITS Spot' service began



Three Basic Services

- Dynamic route guidance
- Support for driving safety
- ETC

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







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).

	Information via FM multiplex broadcasting Displayed if manually selected	Beacon (radio wave, optical) information Automatically pops up
Ordinary road	 <p>Area for which information desired is selected from the menu.</p> <p>Example of FM simple map display</p>	 <p>Information on direction of travel provided based on vehicle location (▲ indicates vehicle location)</p>
Inner-city expressway	 <p>Area for which information desired is selected from the menu.</p>	 <p>Information on direction of travel provided based on vehicle location (▲ indicates vehicle location)</p>
Inter-city expressway	 <p>Area for which information desired is selected from the menu.</p> <p>Example of FM simple map display</p>	 <p>Information on direction of travel provided based on vehicle location (▲ indicates vehicle location)</p>

CO₂ reduction brought by introduction of ETC (ETC usage rate of 85%)

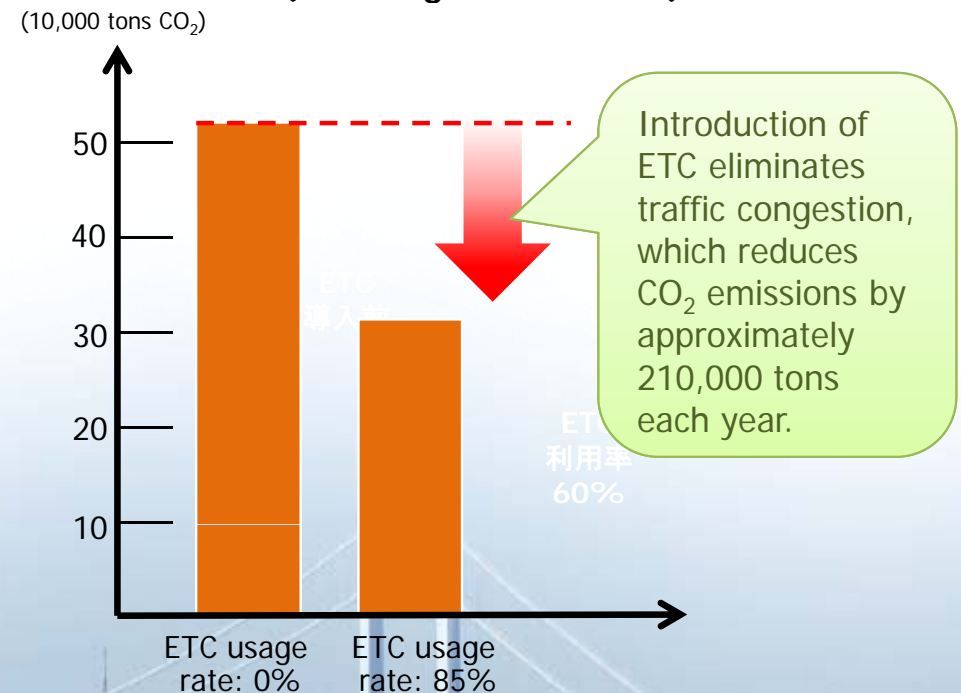
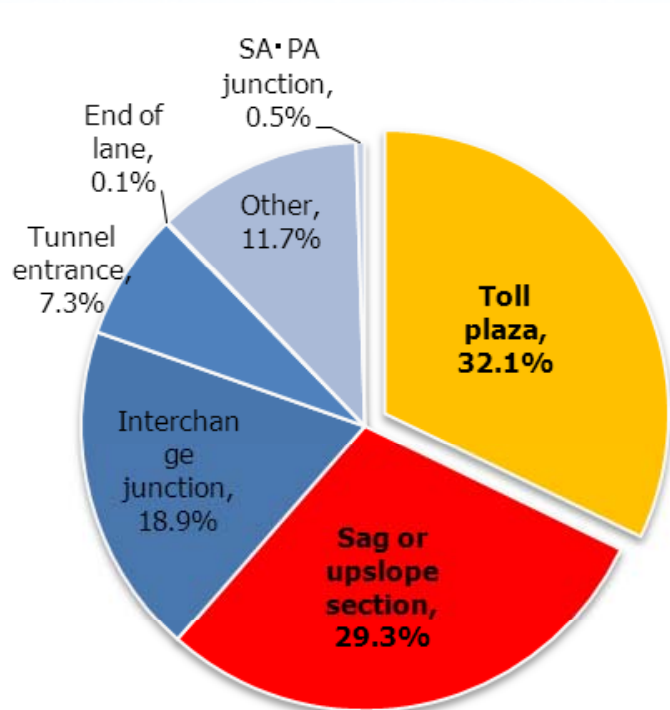


Figure: ETC usage rate and reduced amount of CO₂ emissions

Congestion on Expressways in Japan

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

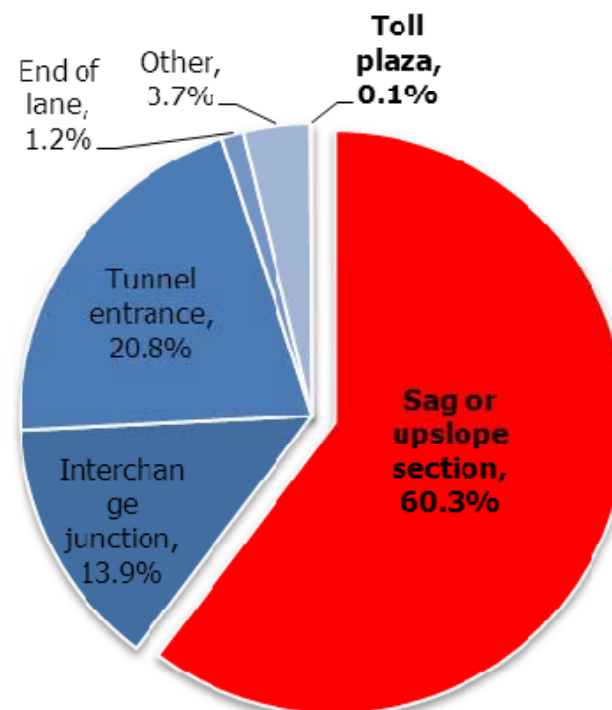
Congestion on inter-city expressways



2000 without ETC

Total congestion frequency =
12,378 per year

Source : H23 ETC Handbook Simplified version



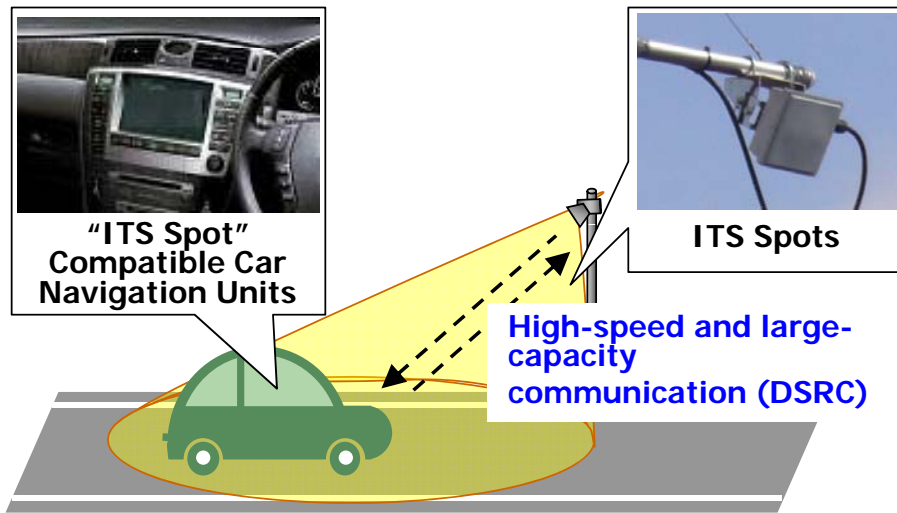
2009 with ETC

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)

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.

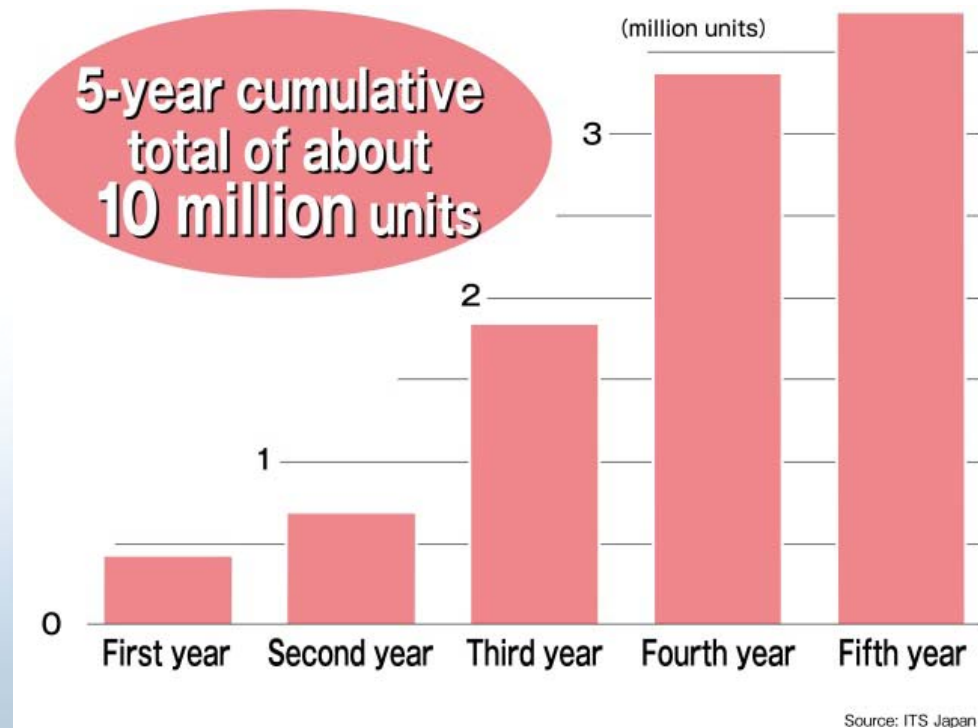
Automobile manufacturers



Manufacturers of navigation systems and on-board units

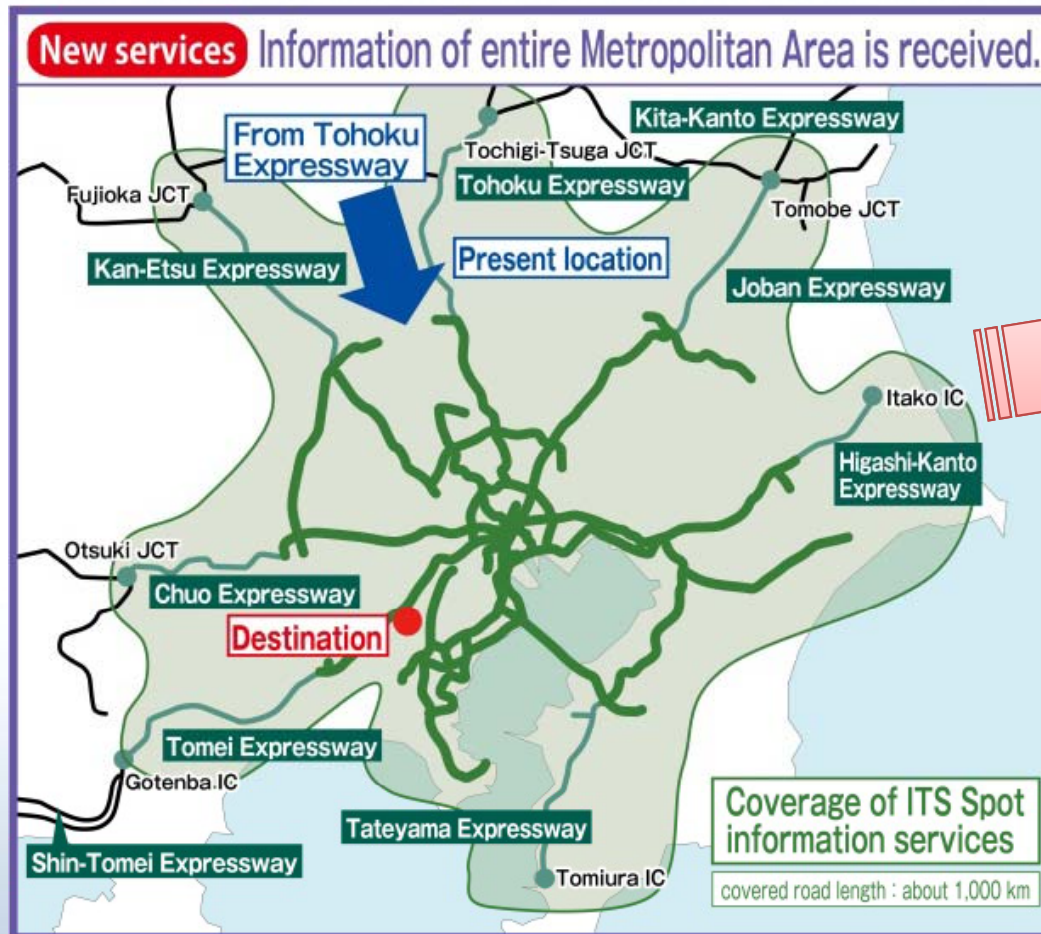


Projected number of ITS Spot-compatible navigation systems



Service1 : Dynamic Route Guidance

- 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.

Service2 : Safety Driving Support

- 'ITS Spots' supports safe driving.

Obstructions Warning



(Displayed about 1 kilometer before the obstruction.)

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



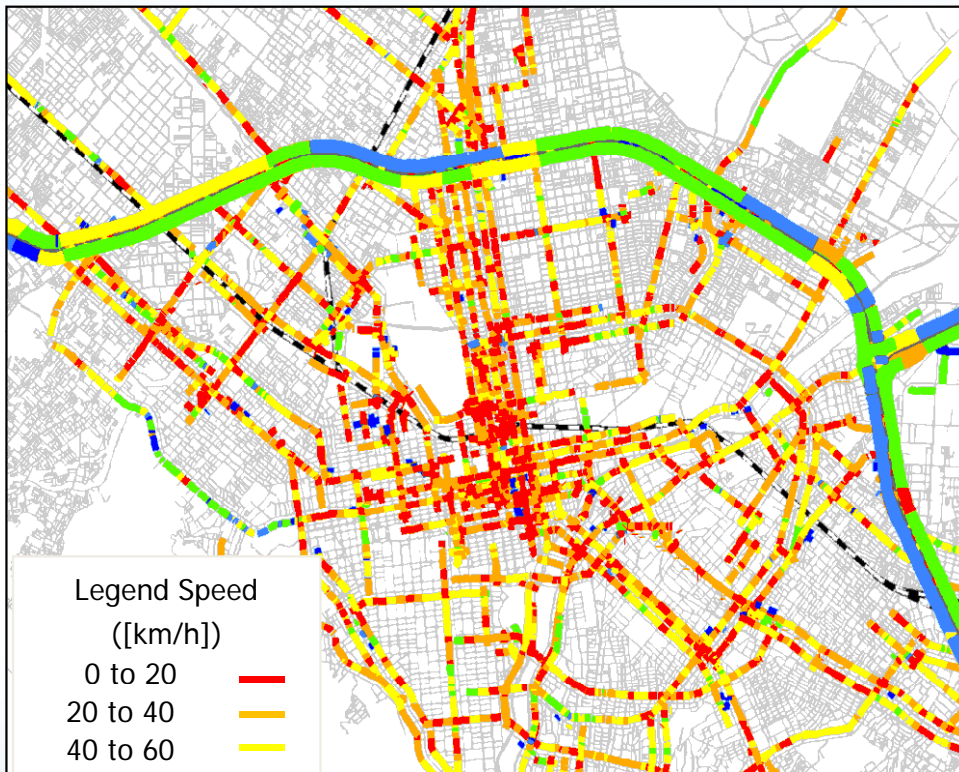
Images inform drivers of snow, fog, and other weather conditions, and of congestion inside tunnels.



Utilizing probe data

- Probe information used for efficient and advanced road management.

Probe information in Sapporo

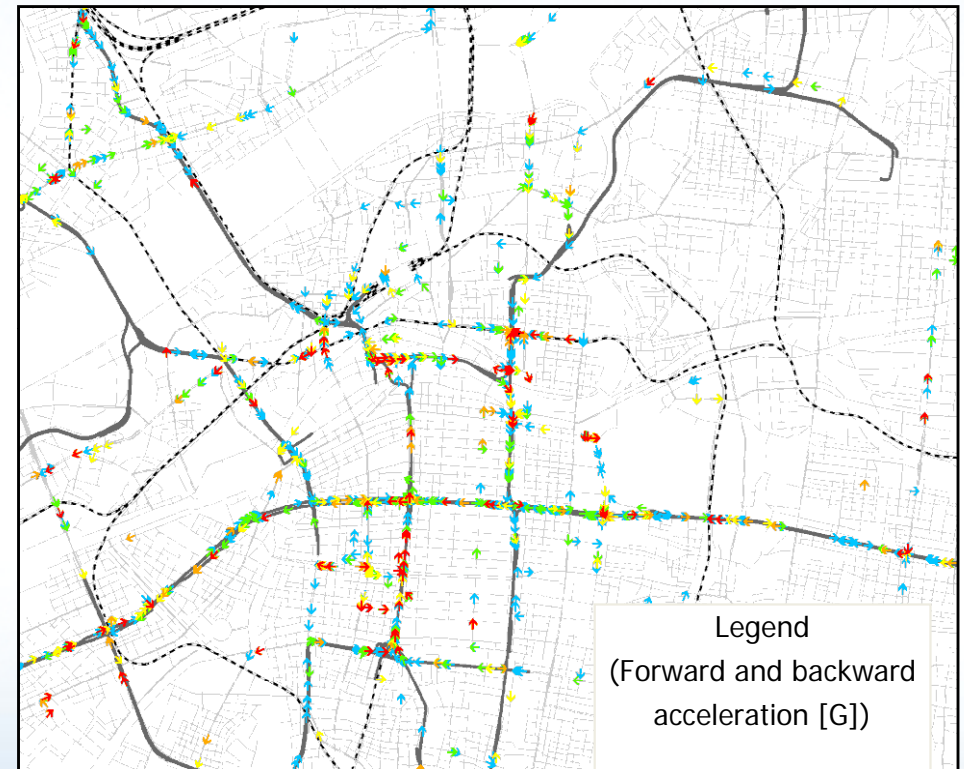


Legend Speed ([km/h])	
0 to 20	Red
20 to 40	Orange
40 to 60	Yellow
60 to 80	Light Green
80 to 100	Blue
100 or more	Dark Blue
Legend (Others)	
Expressway	Thick grey line
Ordinary roads	Thin grey line
Railway (JR)	Black line with cross-ticks

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



Legend (Forward and backward acceleration [G])	
-0.25 to -0.30	Light Blue arrow
-0.30 to -0.35	Light Green arrow
-0.35 to -0.40	Yellow arrow
-0.40 to -0.45	Orange arrow
-0.45 to -0.50	Red arrow
Legend (Others)	
Expressway	Thick grey line
Ordinary roads	Thin grey line
Railway(JR)	Black line with cross-ticks

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



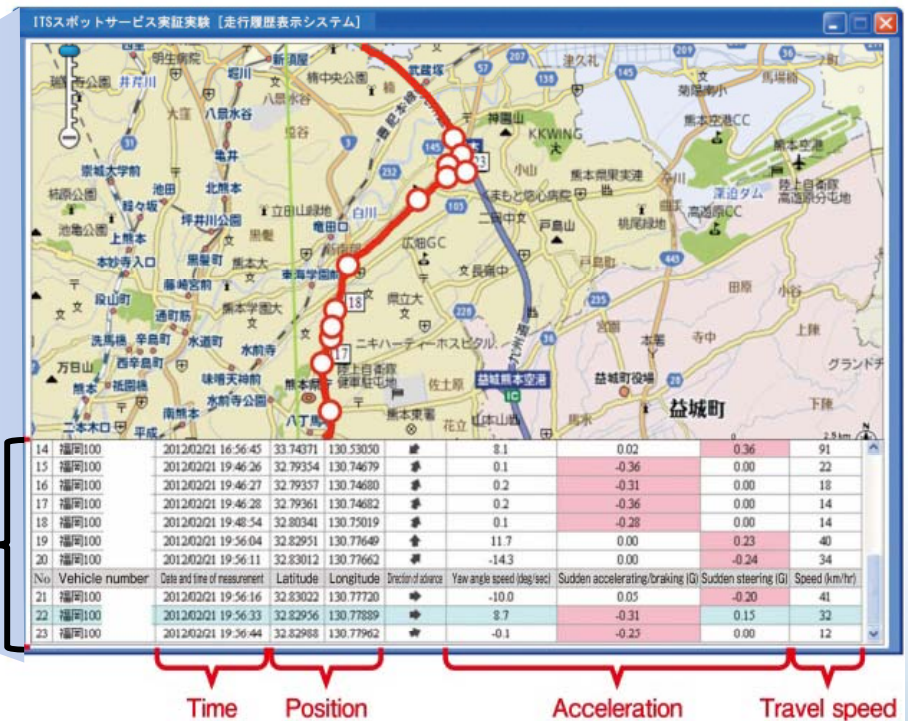
Distribution Support Services

- 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.



■ Travel route
○ Close call spots



List of close call spots

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

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.

Receiving merchandise

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

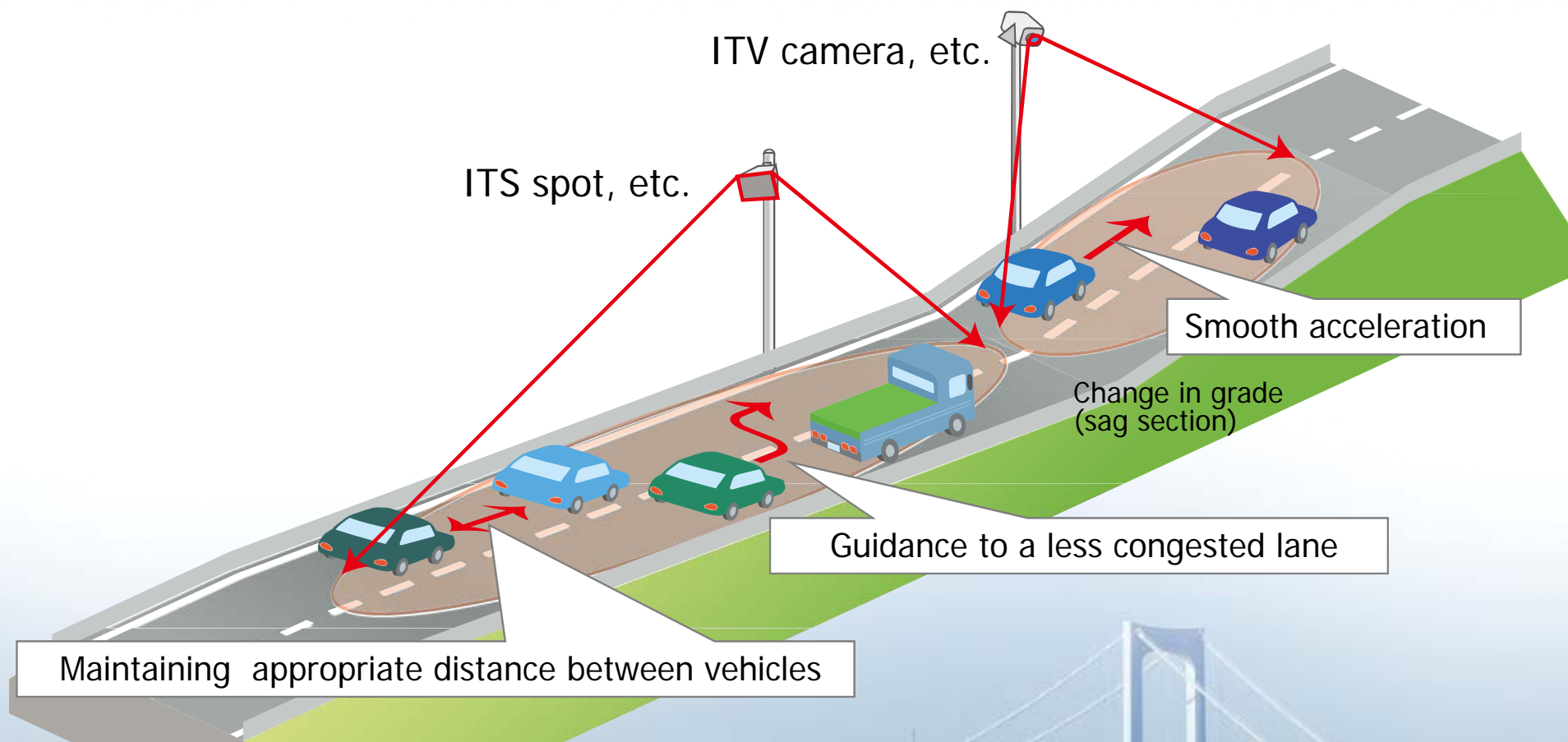


Cashless payment using credit cards

Sag congestion countermeasures based on cooperation between the road infrastructure and automobiles.

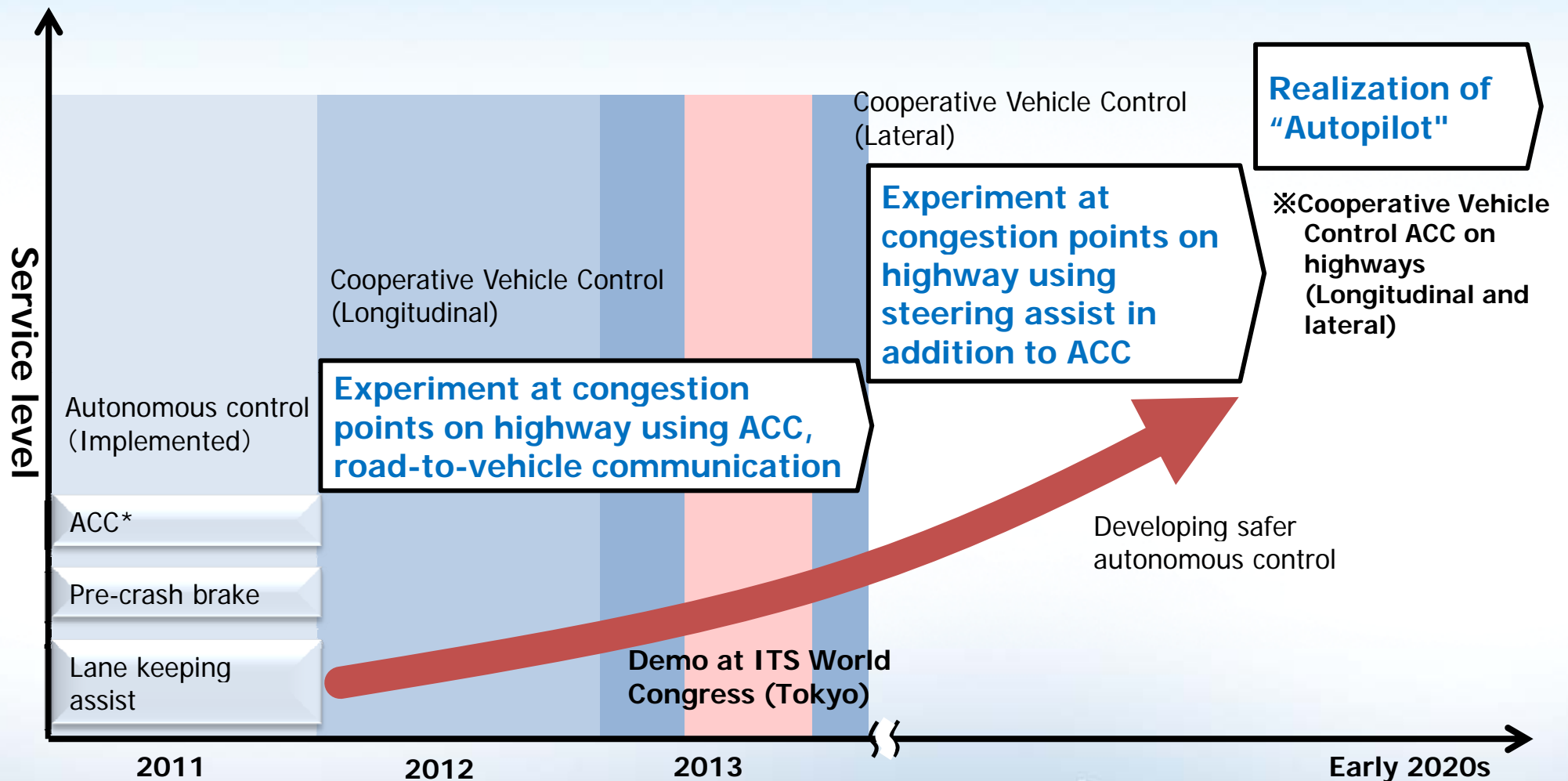
- 'ITS Spot' transmit optimum speed, headway distance.
- ACC* equipped automobiles automatically drive based on the information.
- Experiment to be carried out from 2012.

* 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



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