

ITS *in Japan*

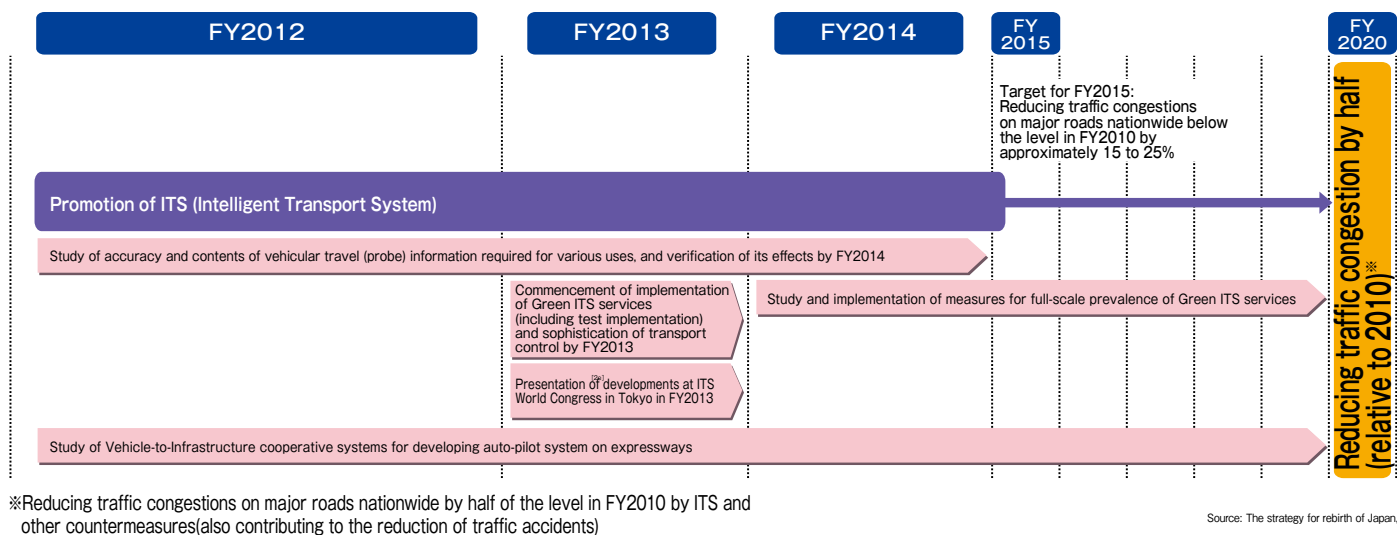


ITS Websites

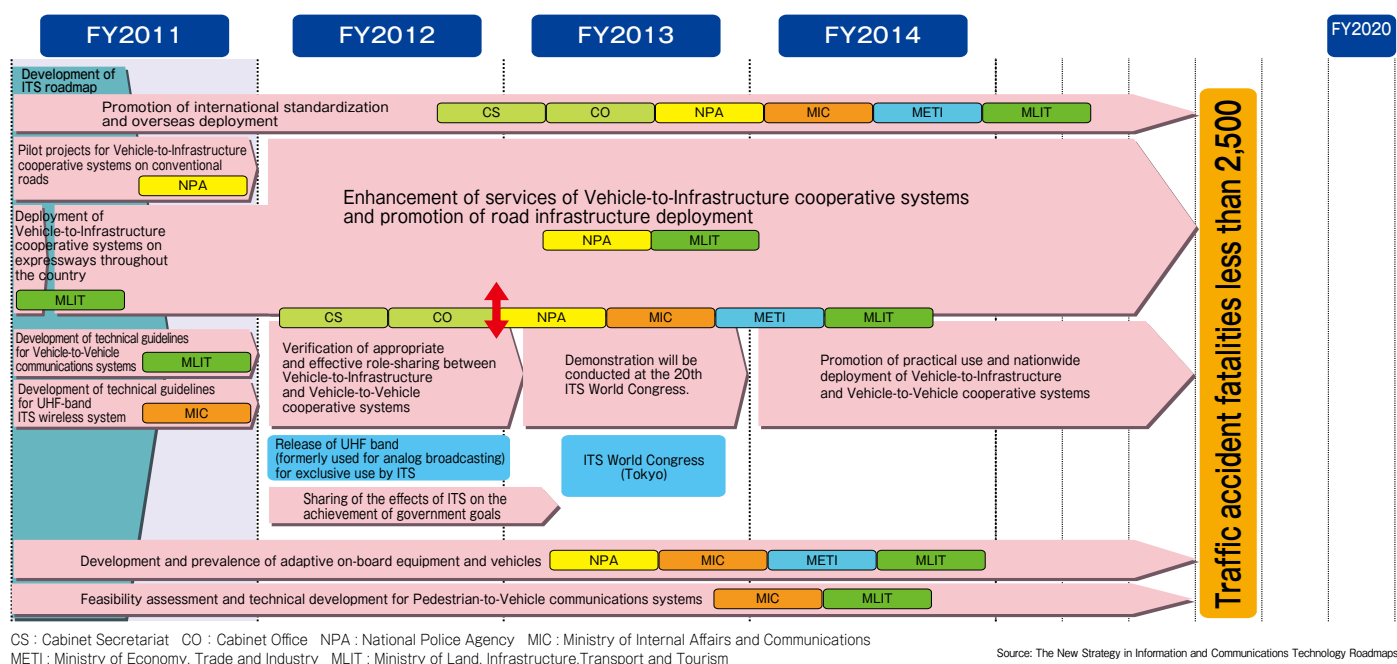
- Road Bureau, Ministry of Land, Infrastructure and Transport
<http://www.mlit.go.jp/road/ITS/>
- National Institute for Land and Infrastructure Management, MLIT
<http://www.nilim.go.jp/japanese/its/index.htm>
- ITS Japan
<http://www.its-jp.org/english/>

National initiatives on ITS

Enabling smooth road traffic by ITS

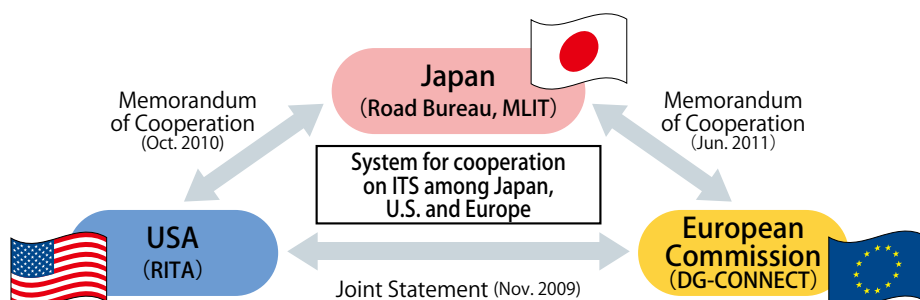


Building safe and secure road transport society using cooperative systems



ITS implementation through international cooperation

The cooperation was established with the United States and European Commission to promote global collaboration on the research and development, deployment dissemination of ITS technology.



ITS Spot services prevailing

ITS Spots and compatible navigation systems enable smart travels.

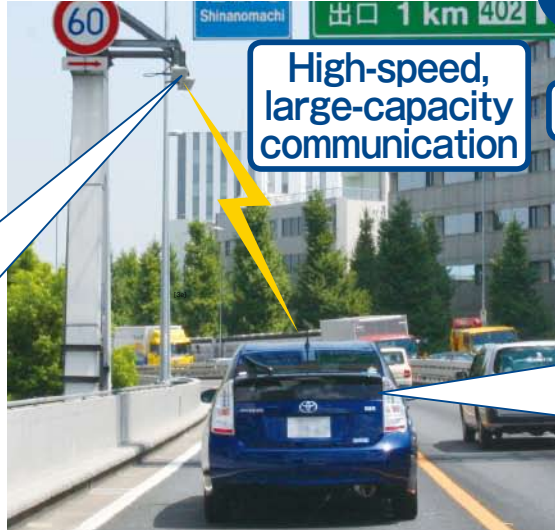
Roads and vehicles are connected to each other via high-speed large-capacity communication(5.8GHz DSRC).

ITS Spot

Installed at about 1,600 locations, mainly on expressways



High-speed, large-capacity communication



Services were commenced in 2011.

Compatible navigation system

Various products available from a number of manufacturers



Three basic services

Dynamic route guidance

Providing wide-area traffic congestion data to enable car navigation systems to select routes smartly

Safety driving support

Reducing close-call experiences by alerting drivers in advance

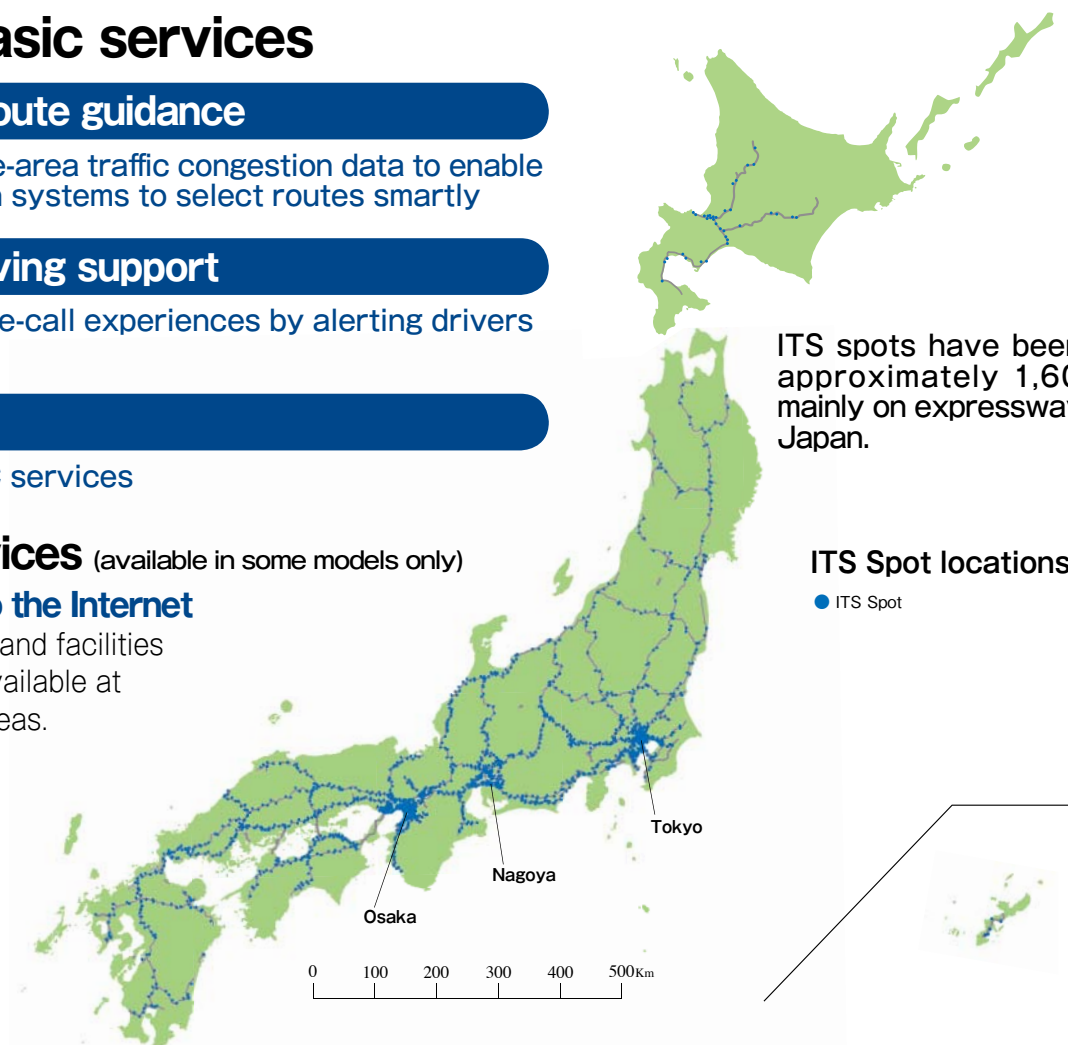
ETC

Providing ETC services

Other services (available in some models only)

Connecting to the Internet

Regional tourist and facilities information is available at roadside rest areas.



ITS spots have been installed at approximately 1,600 locations mainly on expressways throughout Japan.

ITS Spot locations

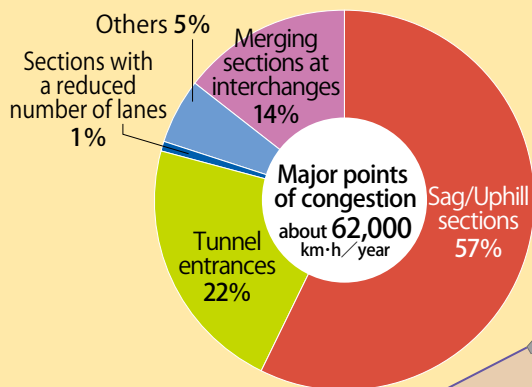
● ITS Spot

New services developing

Advance using ITS Spot technology - In cooperation with vehicular control -

About 60% of congestion on intercity expressways occurs in sag sections.

Congestion on intercity expressways (2008)

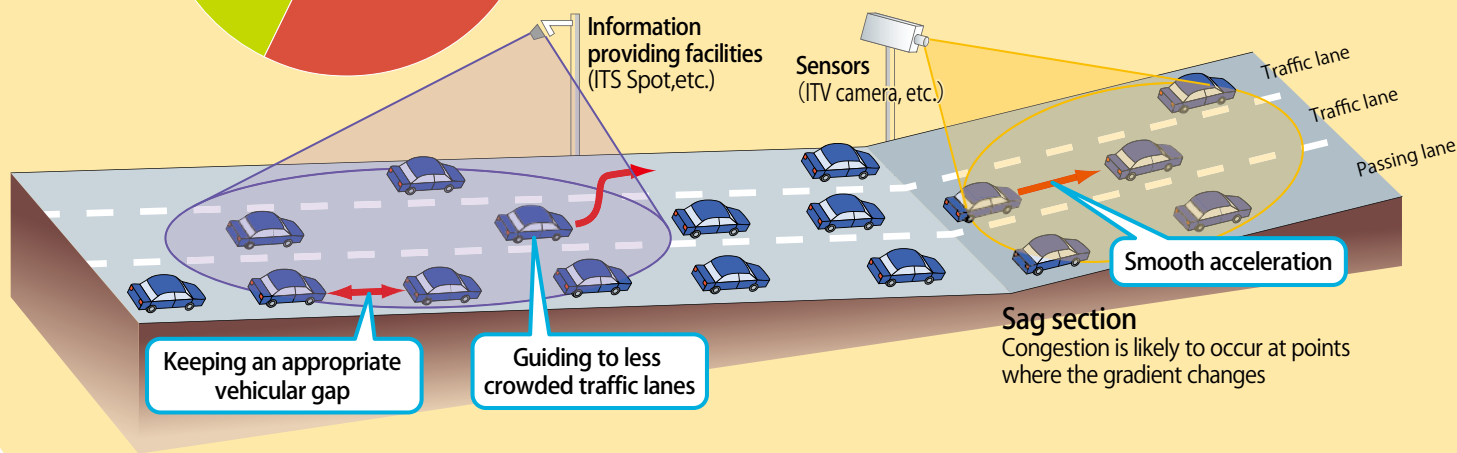


Reducing congestion in sag sections by Vehicle-to-Infrastructure cooperative control

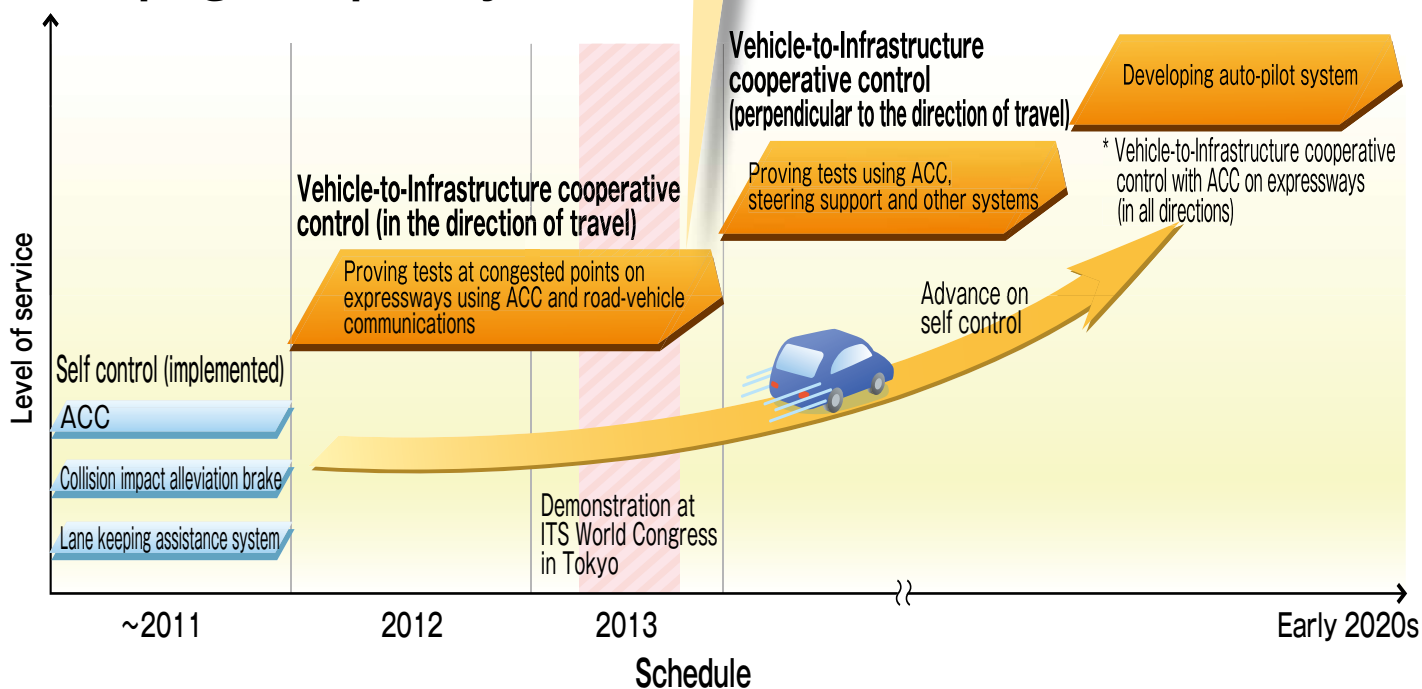
- ① Grasp road conditions by sensors
- ② Disseminate optimum speed, vehicular gap and other information from information providing facilities
- ③ ACC-equipped vehicles automatically control vehicular gap or make necessary adjustments based on the information received.

※ACC(Adaptive Cruise Control) :
Travel speed and vehicular gap are controlled automatically.

Congestion is reduced by approximately 50% if 30% of vehicles are equipped with ACC.

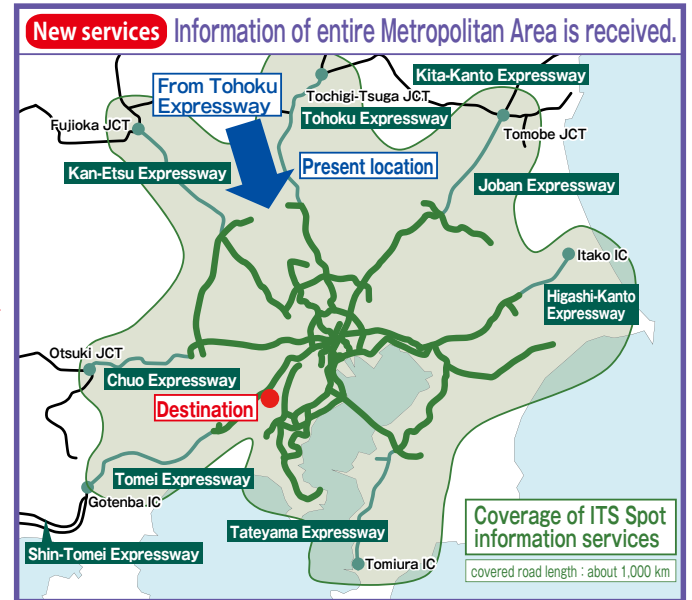
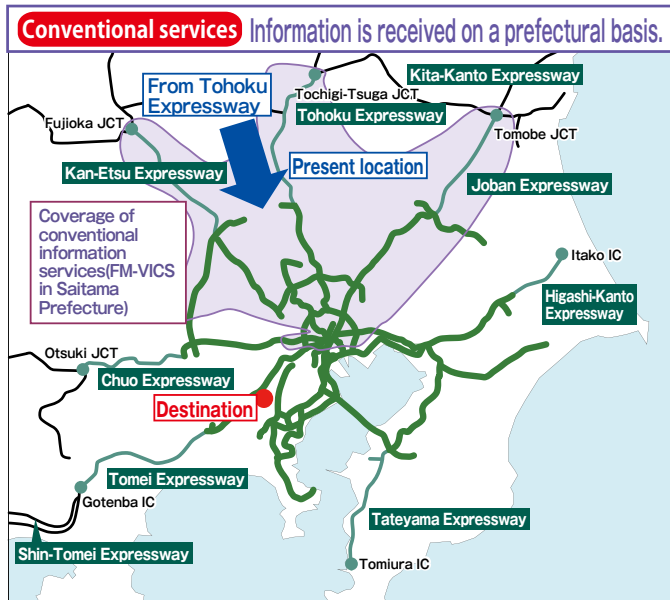


Developing auto-pilot system



Receiving wide-area road traffic information

Car navigation systems smartly select the fastest route.



For a driver heading for a destination through central Tokyo, there are many route choices.



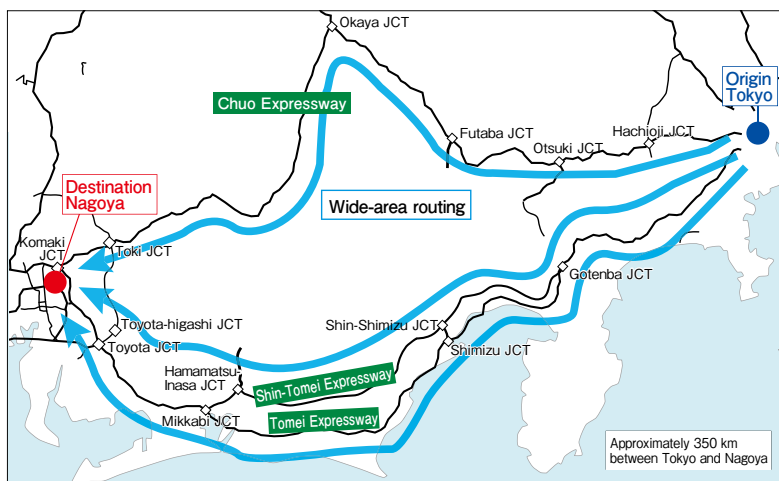
Selecting an optimum route is difficult.

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

The car navigation system smartly selects an optimum route.

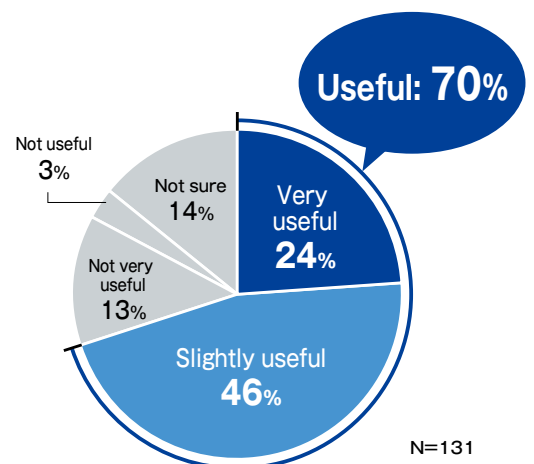
The whole road network can be used effectively.

In the case of travel between metropolitan areas, wide-area information as well as metropolitan area information can be received.



Q Is the dynamic route guidance actually useful?

[User comments]



Source: ITS Spot services questionnaire survey of users conducted in Jan. and Feb. 2012

Alerting drivers in advance

At accident-prone spots, drivers are alerted to oncoming dangers such as congestion behind a blind curve.

For example, traffic accidents occurring in only 2% of the length of the Metropolitan Expressway account for about 20% of all accidents on the expressway.



Services are provided at accident-prone spots as listed below (about 180 spots in the country).

- ◆ Spots where accidents occur at least once in five days.
- ◆ Spots where accidents occur frequently on a regional block basis.
- ◆ Spots where accidents may cause road closure or long-term traffic restrictions

Alerting drivers to on-road obstacles

For example, about 50,000 obstacles are found every year on the Metropolitan Expressway (one in 10 minutes).



Left lane restriction ahead. Drive carefully.

Information on snow cover or on wave overtopping is provided as images.



Present surface condition xx km ahead. Careful driving recommended in the snow.

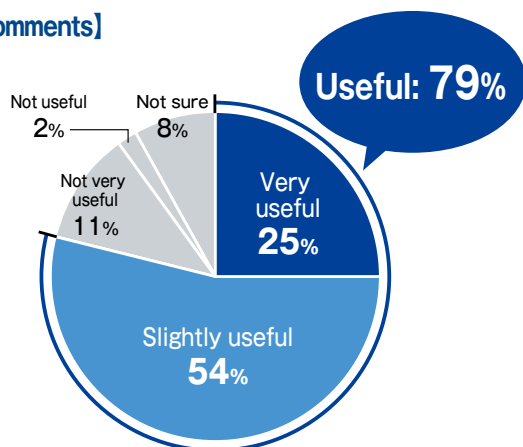
Present surface condition xx km ahead. Careful driving recommended as waves are expected to overtop the barrier.



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

Q Is safety driving assistance information (information on accident-prone spots) actually useful?

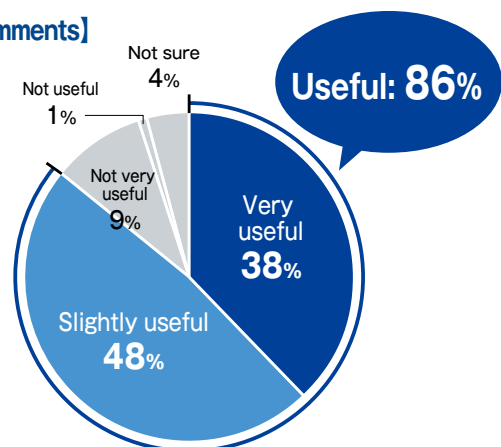
[User comments]



N=190

Q Is safety driving assistance information (information on construction, restrictions or obstacles) actually useful?

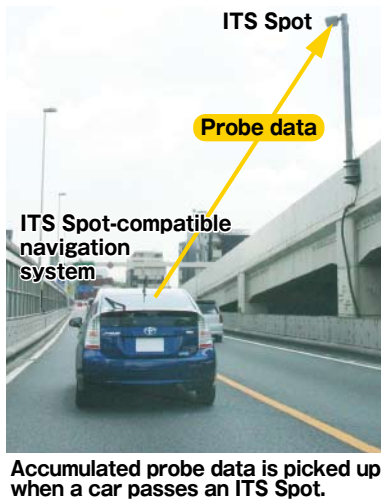
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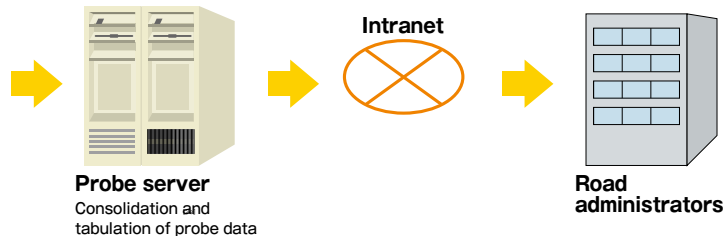
Source: ITS Spot services questionnaire survey of users conducted in Jan. and Feb. 2012

Sophisticating road administration



Collecting and using probe data

Radio communications between ITS Spot and compatible navigation system enables the collection of probe data accumulated in the car navigation system. Probe data is used for sophisticated road administration.

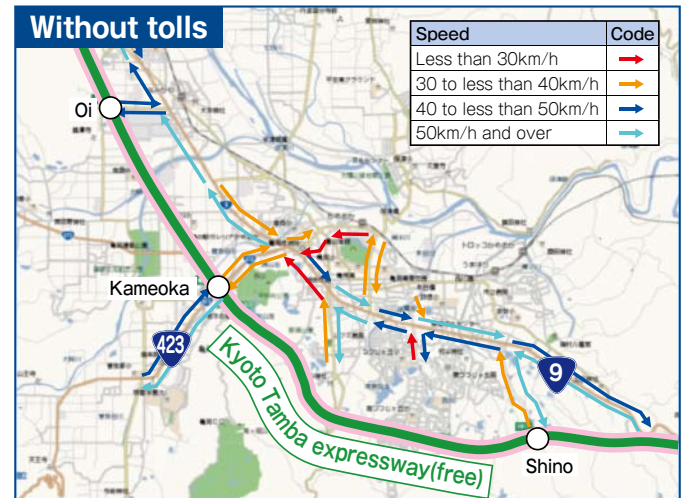
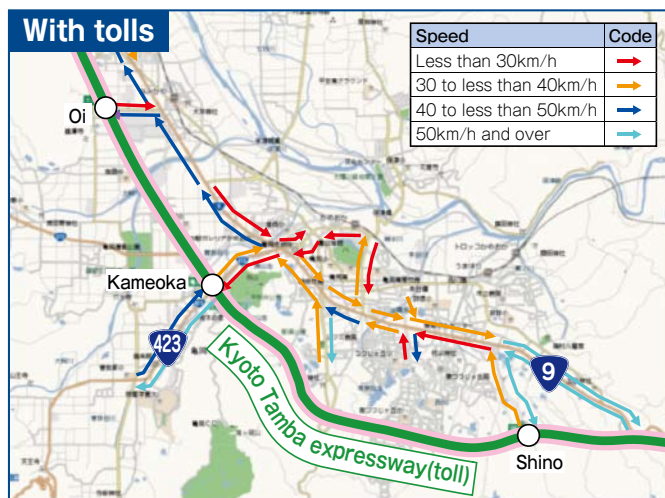


Probe data
Information on the actual moving vehicles such as locations, speeds and others

Evaluation of road policy

Probe data is used to grasp road traffic over a wide area and to evaluate road policy quantitatively.

Change in speed during peak time periods in pilot programs in which transport on toll roads was made free



Identification of potential hazardous points

Extracting locations of sudden braking or abrupt steering from probe data makes it possible to identify potential hazardous points in addition to accident points.



● : Point of frequent sudden braking or abrupt steering

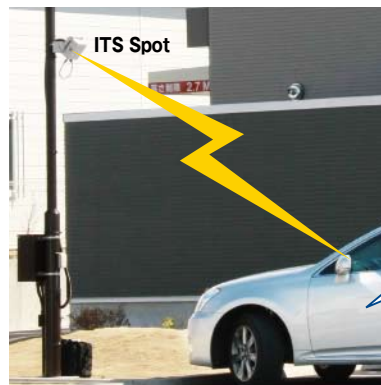
Potential Hazardous Point (no accident)

Source:
AHS Research Association, NILIM (Material of the 2007 ITS Symposium)

New application tests being conducted

Drive-through payment verification tests using car navigation systems

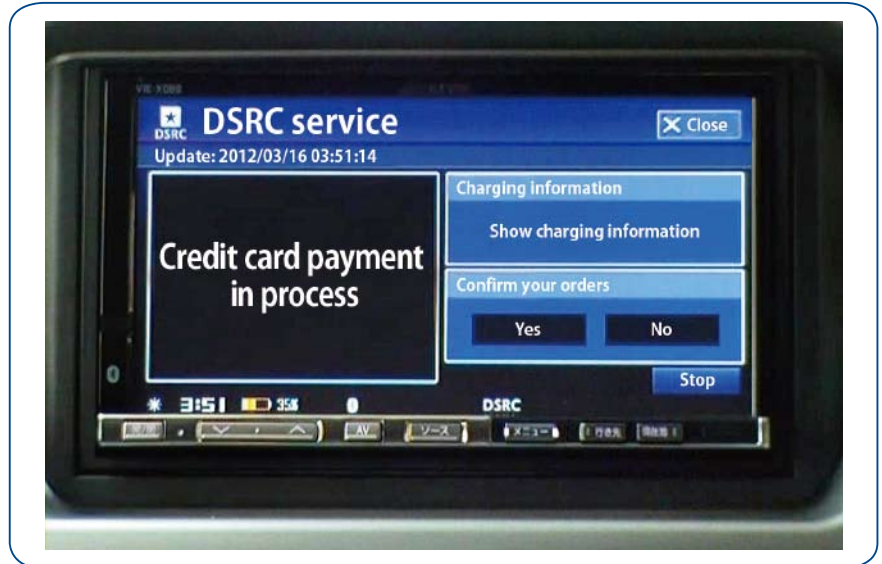
Proving tests using test vehicles were implemented at the *Tsukuba-kenkyugakuen* branch of McDonald's on Mar. 5 through 16, 2012.



Orders are registered by car navigation system.



Receiving merchandise



Cashless payment using credit cards

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

Assisting logistic 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

No	Vehicle number	Date and time of measurement	Latitude	Longitude	Direction (degree)	Yaw angle (deg/sec)	Sudden accelerating/braking (G)	Sudden steering (G)	Speed (km/hr)
14	福岡001	2012/02/01 16:56:45	33.14371	130.53030	●	0.1	0.02	0.36	91
15	福岡001	2012/02/01 19:46:26	32.79354	130.74679	●	-0.1	-0.36	0.00	22
16	福岡001	2012/02/01 19:46:27	32.79357	130.74680	●	0.2	-0.31	0.00	18
17	福岡001	2012/02/01 19:46:28	32.79361	130.74682	●	0.2	-0.36	0.00	14
18	福岡001	2012/02/01 19:48:54	32.80341	130.75019	●	0.1	-0.28	0.00	14
19	福岡001	2012/02/01 19:56:04	32.82951	130.77649	●	11.7	0.00	0.23	40
20	福岡001	2012/02/01 19:56:11	32.83012	130.77662	●	-14.3	0.00	-0.34	34
21	福岡001	2012/02/01 19:56:16	32.83022	130.77720	●	-10.0	0.05	-0.20	48
22	福岡001	2012/02/01 19:56:33	32.82956	130.77859	●	8.7	-0.31	0.15	32
23	福岡001	2012/02/01 19:56:44	32.82908	130.77962	●	-0.1	-0.25	0.00	12

Time

Position

Acceleration

Travel speed

Promoting disaster prevention ITS

For minimizing disaster victims

Providing necessary information to road users using all tools available quickly

- ◆ Emergency earthquake alert
- ◆ Tsunami warning
- ◆ Road elevations
- ◆ Inundation, submergence, etc.
- ◆ Road closure, passable route
- ◆ Weather conditions (heavy rains, snow, etc.)

Sending emergency information to car navigation system

Occurrence of earthquake

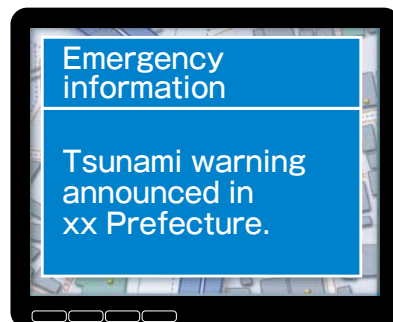
Emergency information is sent to ITS Spot-compatible car navigation systems immediately after the occurrence of an earthquake of seismic intensity of 5 or higher.



Information was provided when the Great East Japan Earthquake occurred.

Tsunami warning

Right after an earthquake occurs, tsunami warning was sent to car navigation systems by FM multiplex broadcasting.



Service was commenced in Apr. 2012.

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

Providing passability of roads via the internet

Integration of information required during a disaster

Integrated website is being developed to show necessary information on a map.

National highway xx in xx Town, xx City, xx Prefecture



Records of vehicle travel were provided right after the Great East Japan Earthquake occurred.

Immediately after the Great East Japan Earthquake, locating the damaged roads was difficult. Probe data was provided at the website as actual traveled route. Road closure information was superimposed. This website helped emergency vehicles find passable routes.

Image of an integrated website (under study)



Source: Test website opened by the Japan Road Traffic Information Center with some additions.

National highway xx in xx Town, xx City, xx Prefecture

Weather	Hourly rainfall	Continuous rainfall	Limit*
Rain	23mm	135mm	150mm

* Roads are closed when continuous rainfall amount exceeds the limit in order to protect drivers from slope failures.

Legend:

- Actual traveled route (provided by private sector makers)
- ✕ Road closure information (provided by road administrators)

Information on vehicle-traveled route provided by: Honda Motor Co., Ltd., Pioneer Corporation, Toyota Motor Corporation, and Nissan Motor Co., Ltd.
Closed road section data provided by: Tohoku Regional Bureau, Iwate prefectural government, Miyagi prefectural government, Fukushima prefectural government, and East Expressway Co., Ltd.
Data integrated by: Non Profit Organization ITS Japan

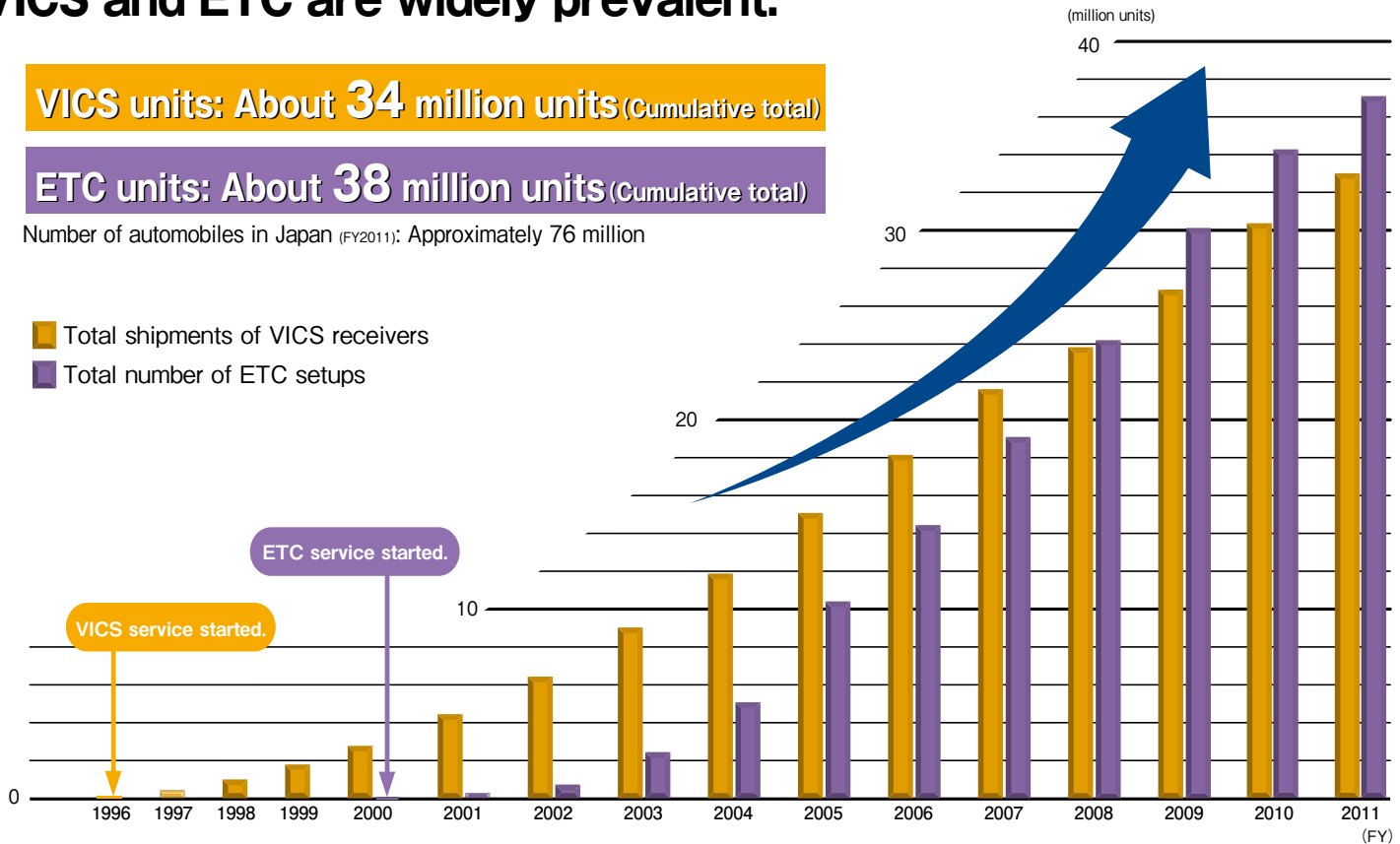
Prevailing Japan's ITS

VICS and ETC are widely prevalent.

VICS units: About 34 million units (Cumulative total)

ETC units: About 38 million units (Cumulative total)

Number of automobiles in Japan (FY2011): Approximately 76 million



ITS Spot services were commenced nationwide in 2011.

ITS Spot is an all-in-one system incorporating VICS and ETC.

ITS Spot-compatible navigation systems are being marketed one after another and an increasing number of vehicles are equipped with such a navigation system as a standard feature.

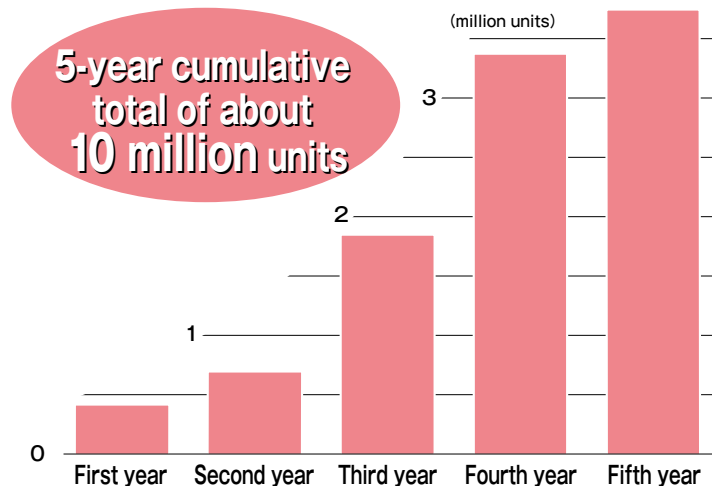
Automobile manufacturers



Manufacturers of navigation systems and on-board units



Projected number of ITS Spot-compatible navigation systems



Source: ITS Japan



Ministry of Land, Infrastructure, Transport and Tourism