The Second Stage ITS

November 2005

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Agenda

1. Progress of Smartway

1) Spread of car navigation systems and VICS
2) Spread of ETC

2. Development of smart mobility

1) Providing a variety of services with a single ITS on-board unit
2) Providing a strong impetus for all areas of ITS
3) Promotion of government-private joint research

3. Future development

1) Realization of ITS services by 2007
   (1) Information provision services along roadways
   (2) Information connection services such as at roadside rest areas
   (3) Public parking lot settlement services
2) Developing new services on the platform
   (1) Systems to support safe driving (Advanced Cruise-Assist Highway Systems, AHS)
   (2) Use of private sector services

1. Progress of Smartway

1) Spread of car navigation systems and VICS

- With continued steady growth, a cumulative total of about 18 million car navigation systems and 12 million VICS units have been shipped.
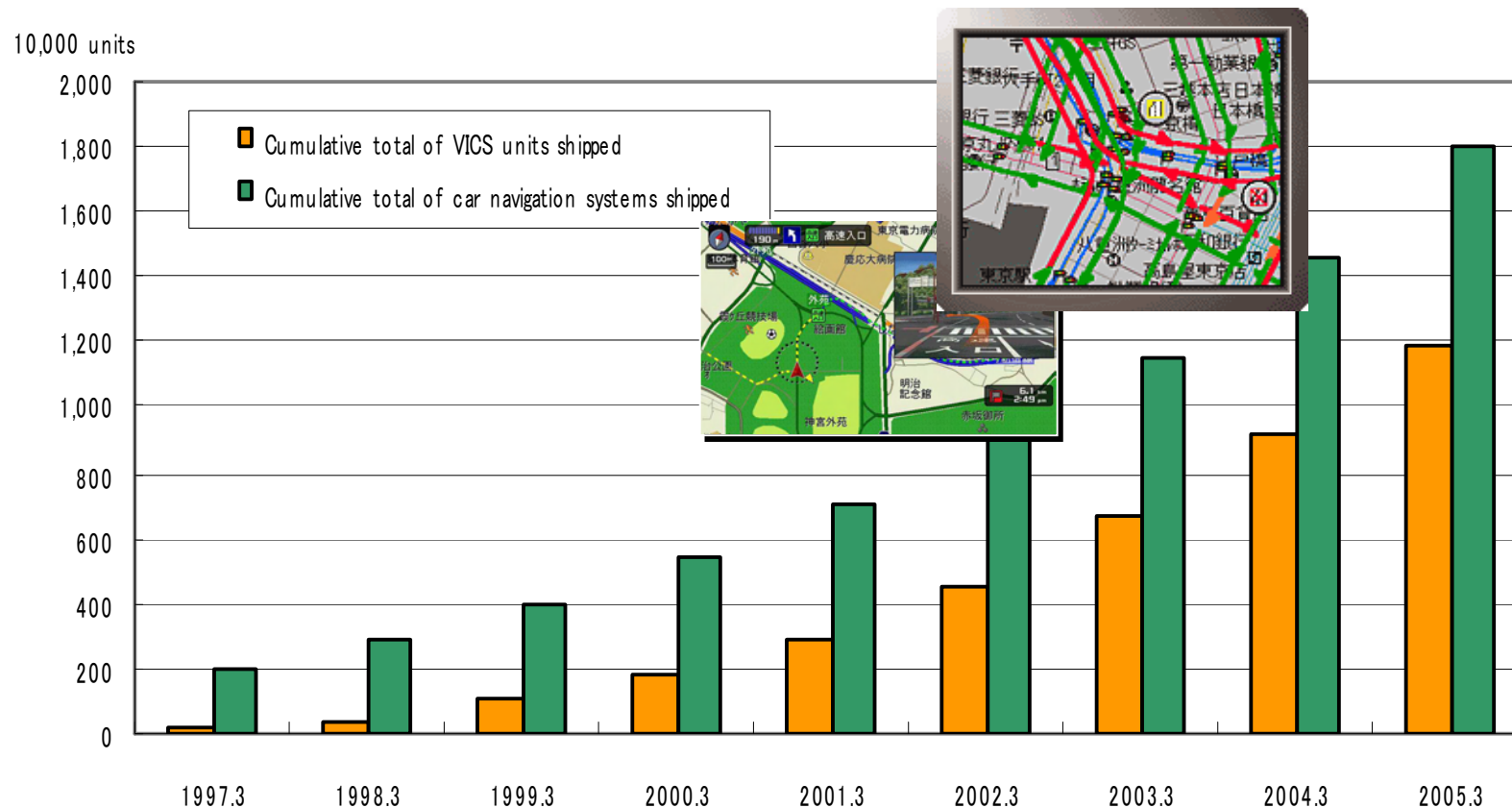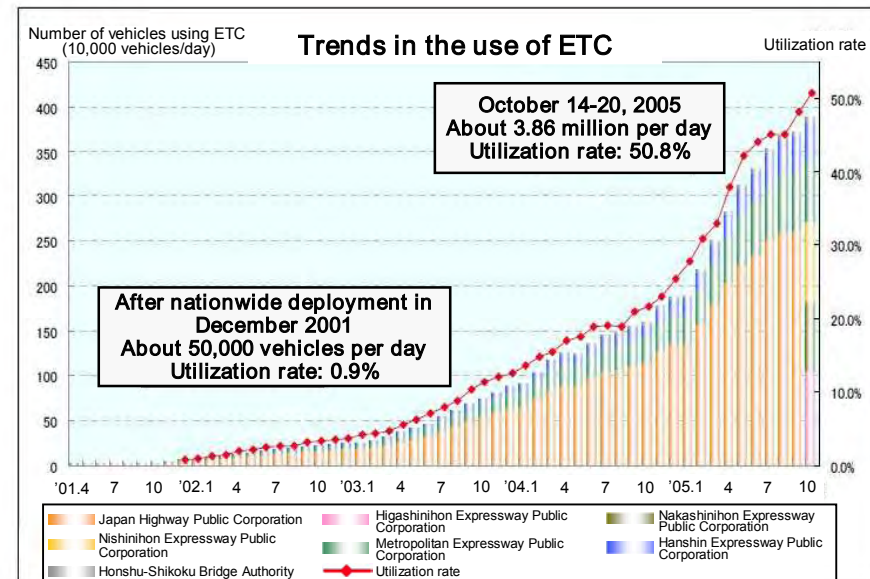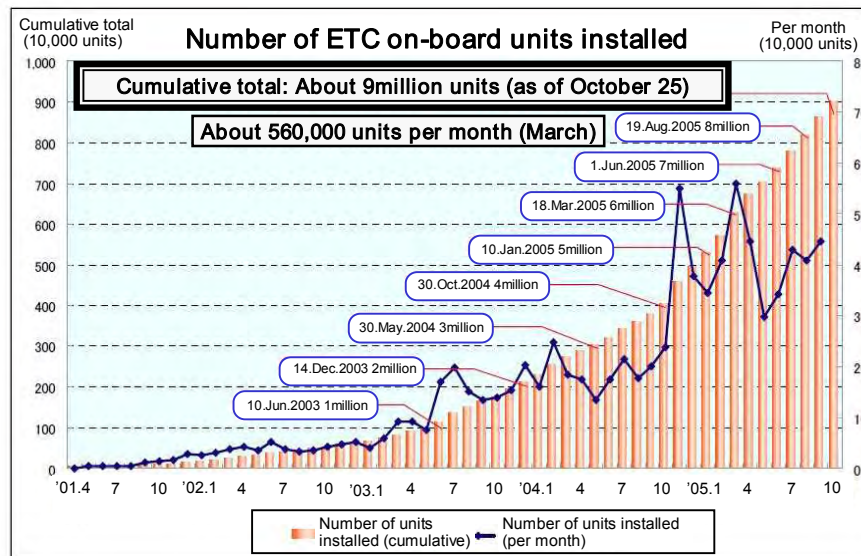- More and more, these are becoming standard equipment for vehicles.

Fig.: Trends in the cumulative totals of car navigation systems and VICS units shipped

2. Progress of Smartway

2) Spread of ETC

- The number of ETC units installed has risen to 9 million, utilization rate to 50% .
- On Metropolitan Expressways,more than 60% of Vehicles use ETC.

Number of ETC on-board units installed

Cumulative total (10,000 units) / Per month (10,000 units)

Cumulative total: About 9million units (as of October 25)

About 560,000 units per month (March)

- 19.Aug.2005 8million
- 1.Jun.2005 7million
- 18.Mar.2005 6million
- 10.Jan.2005 5million
- 30.Oct.2004 4million
- 30.May.2004 3million
- 14.Dec.2003 2million
- 10.Jun.2003 1million

Number of units installed (cumulative) / Number of units installed (per month)

Trends in the use of ETC

Number of vehicles using ETC (10,000 vehicles/day) / Utilization rate

October 14-20, 2005
About 3.86 million per day
Utilization rate: 50.8%

After nationwide deployment in December 2001
About 50,000 vehicles per day
Utilization rate: 0.9%

Japan Highway Public Corporation / Higashinihon Expressway Public Corporation / Nakashinihon Expressway Public Corporation / Nishinihon Expressway Public Corporation / Metropolitan Expressway Public Corporation / Hanshin Expressway Public Corporation / Honshu-Shikoku Bridge Authority / Utilization rate

	Japan Highway Public Corporation	Metropolitan Expressway Public Corporation	Hanshin Expressway Public Corporation	Honshu-Shikoku Bridge Authority	Nationwide
Number of vehicles using ETC	2,703,200 /day	691,500 /day	426,600 /day	45,300 /day	3,866,700 /day
Total number of vehicles using expressways	5,547,100 /day	1,128,500 /day	842,600 /day	87,000 /day	7,605,100 /day
ETC utilization rate (%)	48.7%	61.3%	50.6%	52.1%	50.8%

2) Spread of ETC

- ETC has practically cleared congestion at tollgates on the main lines of Metropolitan expressways, which had been sites of chronic traffic congestion in the past.
- The benefits of cleared congestion are not limited to ETC users, but are enjoyed by others as well.
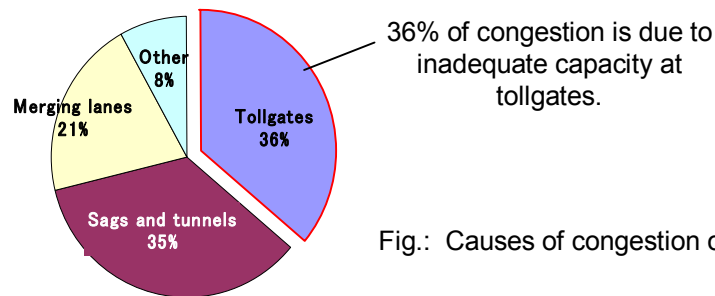- ETC has had an effect in reducing the environmental burden.

Other 8%
Merging lanes 21%
Tollgates 36%
Sags and tunnels 35%

36% of congestion is due to inadequate capacity at tollgates.

Fig.: Causes of congestion on expressways

Fig.: Congestion practically cleared at Kawaguchi Toll Plaza

Amount of congestion
ETC utilization rate
43.8%
30.6
26.6
21.1%
12.5
7.3%
Congestion cleared
2.5%
2.6
Apr-02   Apr-03   Apr-04   Apr-05
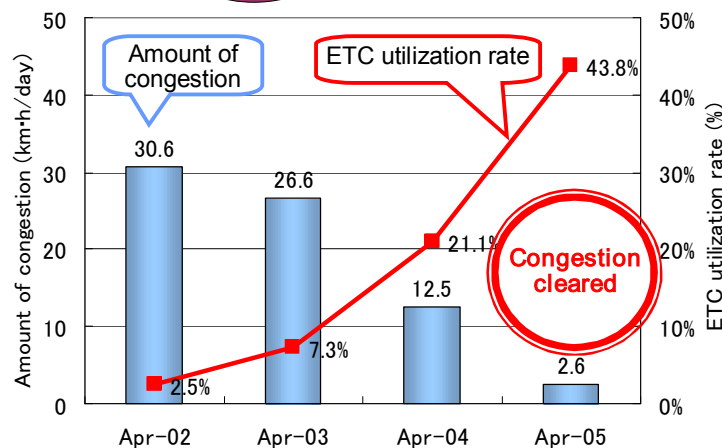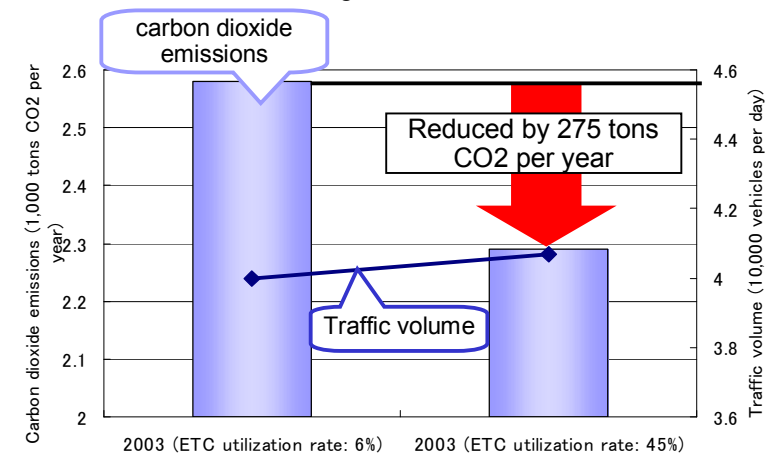
Fig.: Trends in ETC utilization rates and congestion at tollgates on the main lines of Metropolitan Expressways

carbon dioxide emissions
Reduced by 275 tons CO_2 per year
Traffic volume
2003 (ETC utilization rate: 6%)   2003 (ETC utilization rate: 45%)

Source: Conference on highway policy to prevent global warming (May 23, 2005)
Fig.: Change in carbon dioxide emissions at Kawaguchi Toll Plaza

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2. Development of smart mobility

1) Providing a variety of services with a single ITS on-board unit

- For the sake of developing various services, it is important to establish a common infrastructure.
- The establishment of an open platform (an infrastructure that can be used in common by many operators, including the private sector) will be promoted.
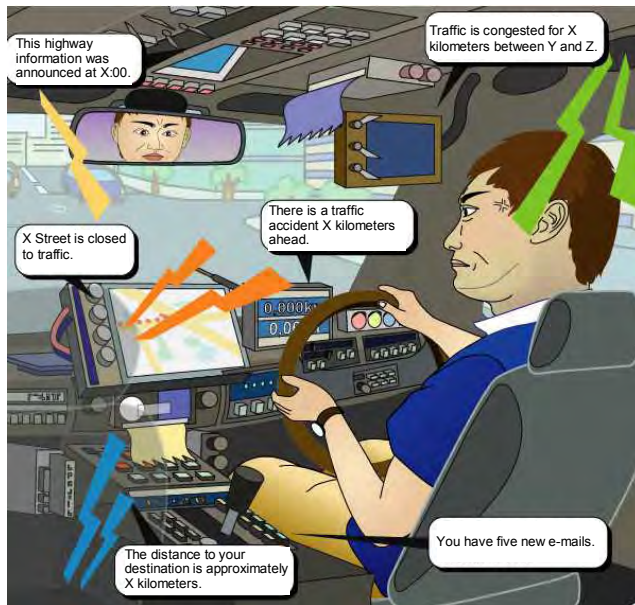
It is not convenient for users if a different device is needed for each application.

Using multiple applications with a single ITS on-board unit

2. Development of smart mobility

2) Providing a strong impetus for all areas of ITS

- The platform will be pioneered through the realization of three road services by 2007.

Timely driving support information

- Instant providing of information while driving, including locations with frequent accidents, detailed road construction information, and notification when approaching a congested section, in order to improve safety.

Road traffic information provided using 5.8 GHz VICS.

Regional guides according to location and needs

- Collecting and delivering area road information and regional or tourist information to improve convenience and revitalize the local community.
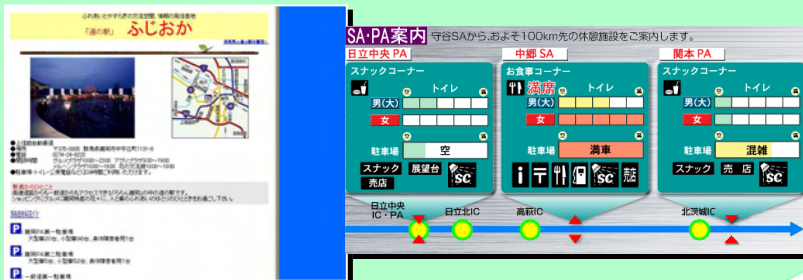
Road and traffic information provided at rest areas, service areas, and parking areas.

Smooth passage through all types of gates

- Enabling smooth passage by means of the cashless payment of parking fees, etc.

Fee payment at public parking facilities.

Entry/exit management at public parking facilities

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2) Providing a strong impetus for all areas of ITS

- Primed by the ITS services which are to become available in 2007, the promotion of a variety of services in all areas of ITS will be accelerated in order to achieve the four goals.

2. Progress of Smartway

3) Promotion of government-private joint research

- Public recruiting for joint studies on systems to provide next-generation road services
- 23 companies are participating, and a cooperative research office has been established.
- Government-private joint research will be promoted with the goal of full-scale realization of ITS services in 2007.

Dec. 2004 - Jan. 2005 — Public recruiting for joint research

Feb. 2005 — Commencement of joint research

July 2005 — Interim report

President Watanabe, DSRC Forum Japan | Bureau Manager Taniguchi, Road Bureau

Public recruitment for fourth joint research program in FY 2004

The following guidelines have been established for the fiscal 2004 public recruitment for joint research, to be performed in accordance with the cooperative research rules of the National Institute for Land and Infrastructure Management (March 28, 2002 Order No. 378 of the Engineering Affairs Section, Minister's Secretariat, Ministry of Land, Infrastructure and Transport; and Order No. 124 of the National Institute for Land and Infrastructure Management). Persons who will engage in the joint accomplishment of such research are to be recruited.
Dec. 17, 2004
Tatsuo Hamaguchi, Director General, National Institute for Land and Infrastructure Management.
1. Research items
Research concerning systems to provide next-generation road services.
2. For details concerning the research topics and application procedures, visit the website of the National Institute for Land and Infrastructure Management at http://www.nilim.go.jp/.
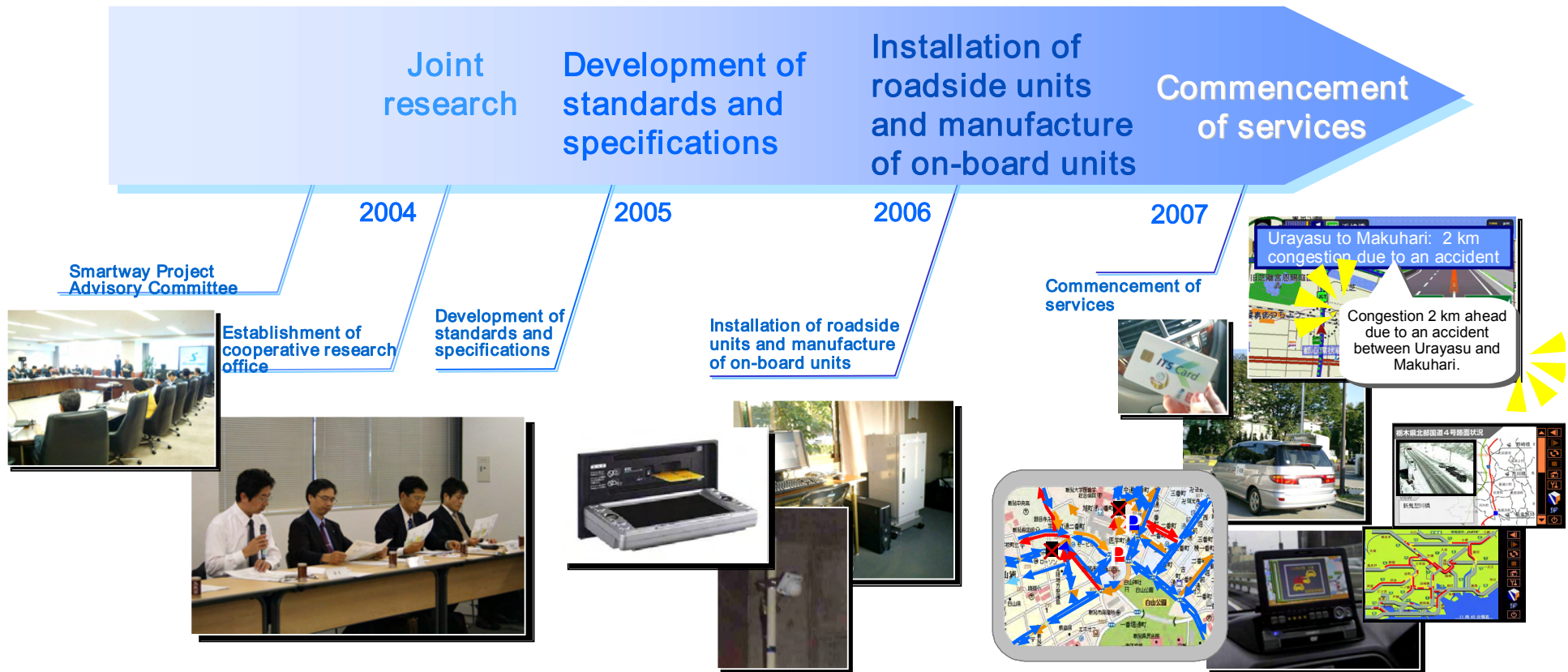
Companies participating in government-private joint research

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3. Future development

1) Realization of ITS services by 2007

- In fiscal 2005, beginning work on the formulation of standards and specifications when future directions are identified regarding systems.
- In fiscal 2006, actively promoting installation of roadside units and the manufacture of ITS on-board units.

Note: Careful consideration is also needed regarding ways to provide users with security, such as a common symbol, and ways to ensure security and protect personal information.

Joint research

Development of standards and specifications

Installation of roadside units and manufacture of on-board units

Commencement of services

2004   2005   2006   2007

Smartway Project Advisory Committee

Establishment of cooperative research office

Development of standards and specifications

Installation of roadside units and manufacture of on-board units

Commencement of services

Urayasu to Makuhari: 2 km congestion due to an accident

Congestion 2 km ahead due to an accident between Urayasu and Makuhari.
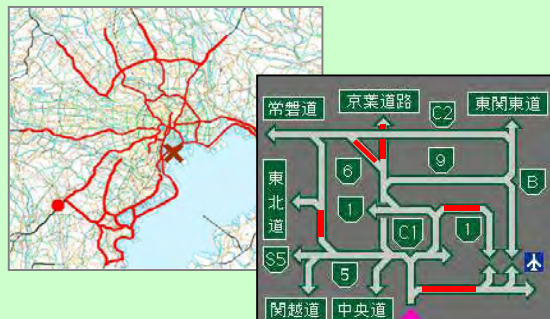
3. Future development
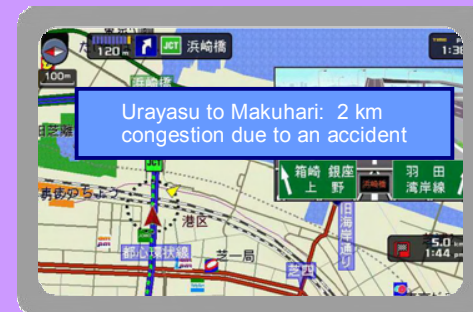
1) Realization of ITS services by 2007

(1) Information provision services along roadways

- With VICS, using 5.8 GHz DSRC to handle broad-band telecommunications, a wide range of information will be provided than was previously possible.
- Timely information by voice provide comprehensible information and warnings to drivers, including senior citizens.

[Wide range of information]

[Information by voice]

Urayasu to Makuhari: 2 km congestion due to an accident

Congestion 2 km ahead due to an accident between Urayasu and Makuhari.

Urayasu to Makuhari: 2 km congestion due to an accident

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1) Realization of ITS services by 2007

(1) Information provision services along roadways

- Static images of road surfaces and other scenes taken by roadside cameras will be used to provide much more easily understandable information than in the past.
- Probe data* which is uploaded from vehicles will be used to provide information on greater numbers of routes than in the past.

* Data on a vehicle's location, time, etc. is stored in the on-board unit. This data can be processed to determine traffic congestion, etc.

[Information by static image]

Icy road surface ahead.

Icy road surface ahead.

[Information on greater numbers of routes]

3. Future development

1) Realization of ITS services by 2007
(1) Information provision services along roadways

- Based on the decision by IT Strategic Headquarter, the VICS Probe Council was established as a venue for collaboration among industry, academia, and government concerning matters such as the gathering of probe data using VICS on-board units in order to make available more accurate road traffic information.

IT Policy Package 2005 (excerpt)

(February 2005 decision by IT Strategic Headquarters)

(2) Improvement in the convenience and safety in movement of people and transportation
 a) Measures towards the advanced Intelligent Transport Systems (ITS)

iii) Promotion of the provision of highly accurate road traffic information (NPA, MIC, MLIT)
An infrastructure for gathering road traffic information will be established in order to make available more accurate road traffic information. In addition, in order to supplement the information obtained from such infrastructure, standards and specifications will be established during fiscal 2005 through cooperation among industry, academia, and government relating to the gathering of information (probe information) from automobiles that have been equipped with a vehicle information and communication system (VICS).

Members of Strategic Headquarters

Director-General:	Junichiro Koizumi	Prime Minister
Deputy Director-General:	Yasufumi Tanahashi	Minister of State for Information Technology
	HIroyuki Hosoda	Chief Cabinet Secretary
	Taro Aso	Minister of Internal Affairs and Communications
	Shoichi Nakagawa	Minister of Economy,Trade and Industry
Members	13Ministers	

Members of the VICS Probe Council

(chairman)
Masao Kuwahara
Professor,University of Tokyo

Hirokazu Akahane
Professor, Chiba Institute of Technology

Kiyoshi Mizui
Professor, Kanto Gakuin University

Takayuki Morikawa
Professor, Nagoya University

Automobile manufacturers (3 companies)

Navigation system manufacturers (3 companies)

Commentators and Journalists,

NPA, MIC, MLIT,

and other related organizations, etc.

Secretariat: Vehicle Information and Communication System Center (VICS Center)
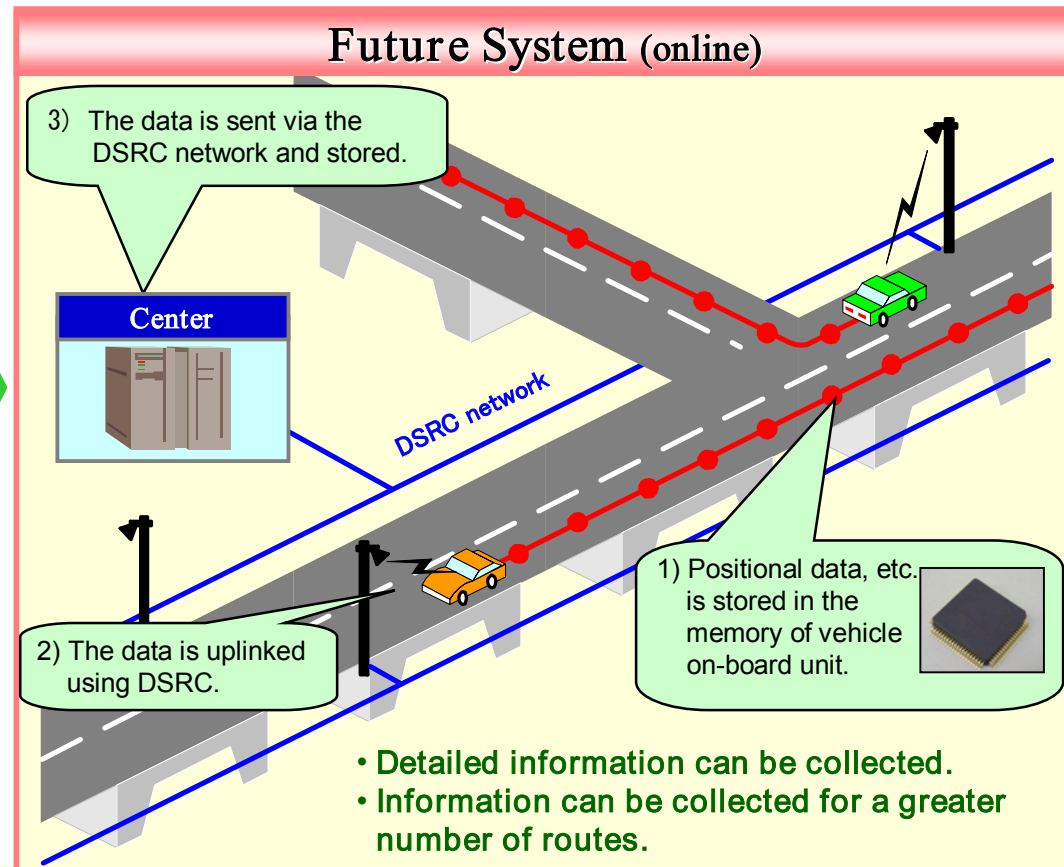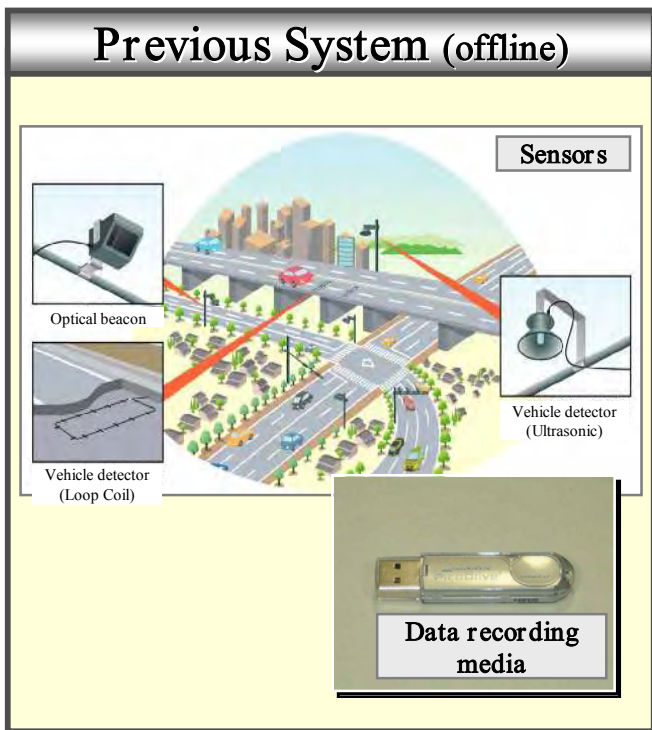
3. Future development

1) Realization of ITS services by 2007
(1) Information provision services along roadways

- Probe data will be gathered by collecting positional data and so on from GPS satellites in the on-board unit and uplinking the data when the vehicle passes a beacon.
- Thorough consideration will be given to protecting personal information in the handling of probe data.

Previous System (offline)

Sensors

Optical beacon

Vehicle detector
(Ultrasonic)

Vehicle detector
(Loop Coil)

Data recording media

Future System (online)

3) The data is sent via the DSRC network and stored.

Center

DSRC network

2) The data is uplinked using DSRC.

1) Positional data, etc. is stored in the memory of vehicle on-board unit.

- Detailed information can be collected.
- Information can be collected for a greater number of routes.

1) Realization of ITS services by 2007

(2) Information connection services such as at roadside rest areas

- When requested by users who have stopped at Michi-no-Eki, service areas, and parking areas, information on road traffic conditions, etc. is provided for safety and safe driving.
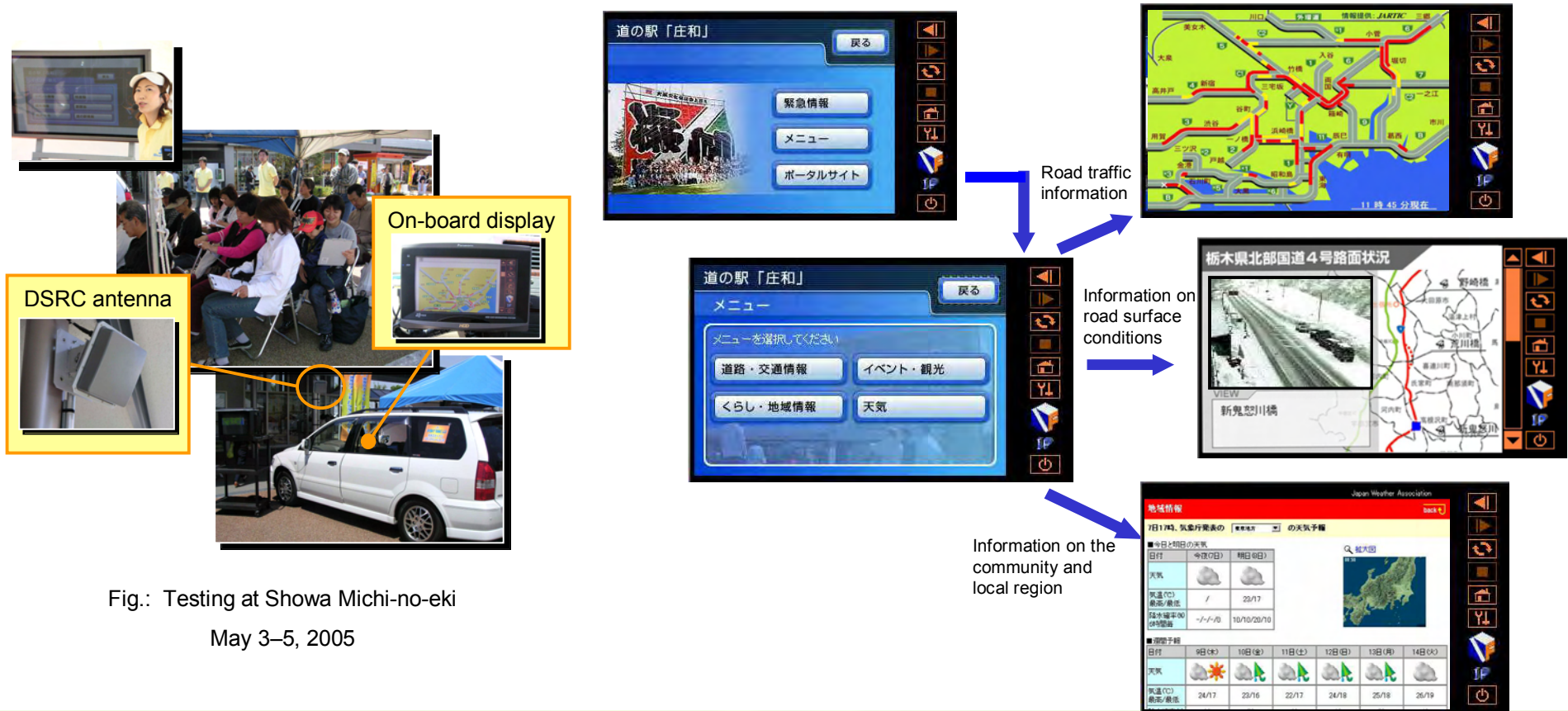- Understandable information on the local region and tourist information presented.

On-board display

DSRC antenna

Road traffic information

Information on road surface conditions

Information on the community and local region

Fig.: Testing at Showa Michi-no-eki
May 3–5, 2005

1) Realization of ITS services by 2007

(3) Public parking lot settlement services

- Smooth passage by cashless fee payment at public parking lot.
- A new mode of cashless payment, using an ITS on-board unit along with a general IC type credit card*, will be deployed.
- Flexible pricing services such as point systems or discount for customers.
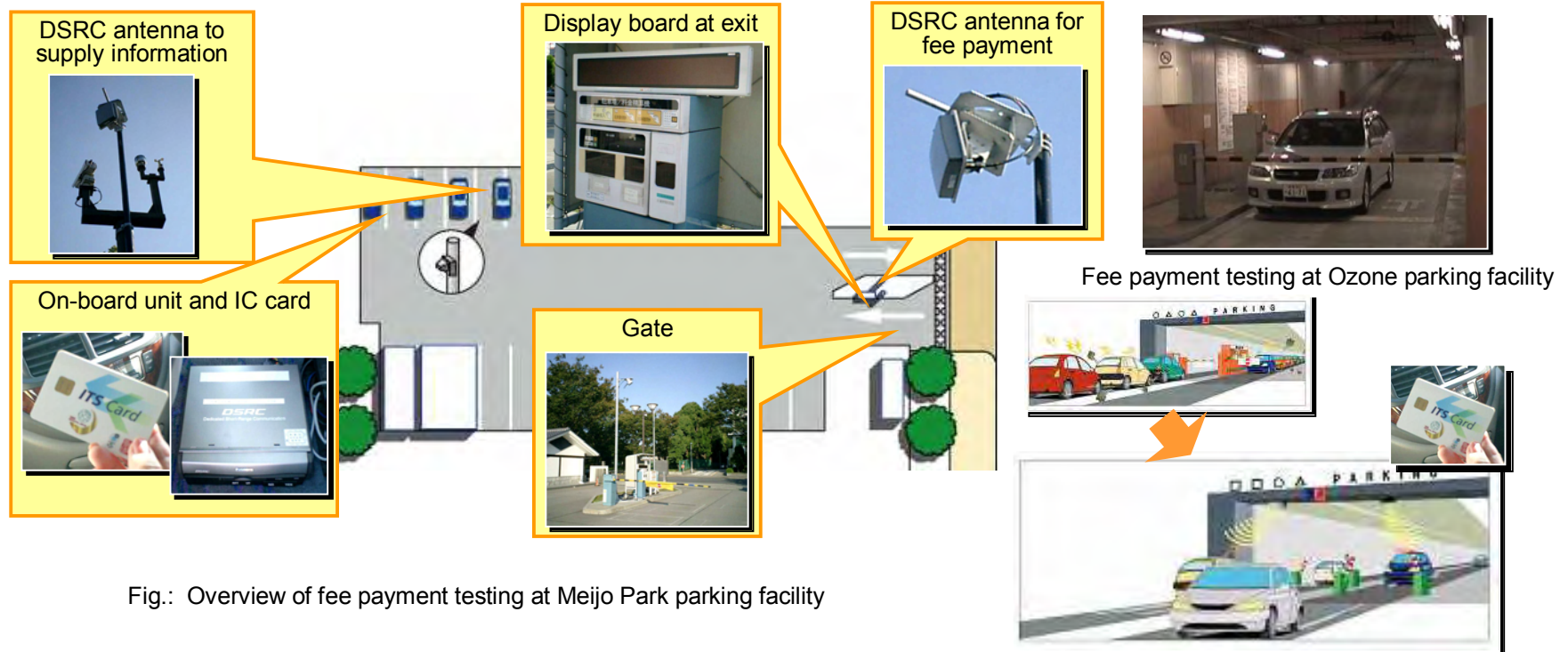
* Credit card with IC (Integrated Circuit) chip.

DSRC antenna to supply information

Display board at exit

DSRC antenna for fee payment

On-board unit and IC card

Gate

Fee payment testing at Ozone parking facility

Fig.: Overview of fee payment testing at Meijo Park parking facility

2)Developing new services on the platform

- Developing various services on the platform with an eye to future development beyond 2007 as well.

(1) Systems to support safe driving (Advanced Cruise-Assist Highway Systems, AHS)

- Promoting research and development on driving support systems, using vehicle control functions as well as road-vehicle communications, to contribute to safety and safe driving.

[Testing the supply of information on congestion beyond a curve]

Test site: Sangubashi curve on the Metropolitan Expressway, No. 4 Shinjuku Line

Toward central Tokyo

Toward Hachioji

Source: Advanced Cruise-Assist Highway System Research Association

[Testing the supply of information on road surface conditions and congestion beyond a curve]

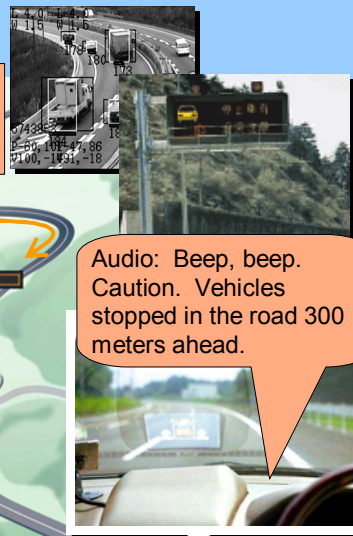Test site: Maiya area on National Highway 25

In this area, road conditions and stopped or slow-moving vehicles are detected.

Toward Osaka

The locations of slow-moving vehicles are transmitted.

The locations and speeds of slow-moving vehicles are transmitted.

Audio: Beep, beep. Caution. Vehicles stopped in the road 300 meters ahead.

- Base point beacon
- Information beacon
- Information sign

Base point information is transmitted.

Toward Yokkaichi Bound for Tokyo

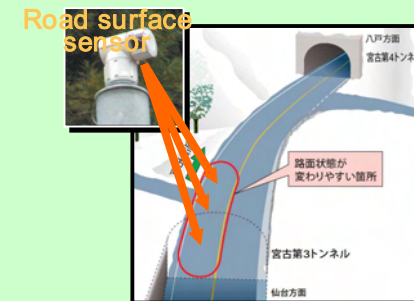Bound away from Tokyo

Source: ITS Handbook

[Testing the supply of information on road surface conditions at tunnel exit]

Test site: Miyako Tunnels on National Highway 45

Road surface sensor

Data measured by sensors is analyzed.

Information on road surface conditions is provided near the tunnel exit.

Source: Advanced Cruise-Assist Highway System Research Association

3. Future development

2)Developing new services on the platform

(2) Use of private sector services

- Awaking a variety of private sector services through the combination of common functions of the platform.
- Giving thorough consideration to promoting the widespread adoption of ITS on-board units, by ensuring security and protect personal information, and by establishing mechanisms that provide users reliance, such as common symbol.

Private parking facilities

Gas stations

Map downloads

Cashless payment

Support for safe driving

ITS services in 2007
- Information provision along roadways
- Information connection at rest areas
- Public parking lot settlement

Platform

More efficient road administration

Creating business opportunities

Restaurants

Greater business efficiency

Dispatch control

Convenience stores and supermarkets

Traffic control

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