



Current Overview of ITS in Japan

Toward the Launch of Full-Scale Services in 2007

TAKAHIRO ASANO

ITS Policy and Program Office, Road Traffic Control Division
Road Bureau, Ministry of Land, Infrastructure and Transport, Japan

Scope of this presentation:

1. Current status of ITS in Japan, having entered the second stage
2. Services to be provided from a single ITS on-board unit beginning in 2007:
 - Services to provide information during road travel
 - Information link services at rest areas, etc.
 - Services for payment of public parking fees
3. Efforts toward realization of services

1. Spread of currently available services



1) Spread of car navigation systems and VICS

- The numbers of car navigation systems and VICS units shipped have been steadily increasing. The cumulative totals are 18 million car navigation systems and 12 million VICS units.
- These are becoming accepted as standard equipment for automobiles.

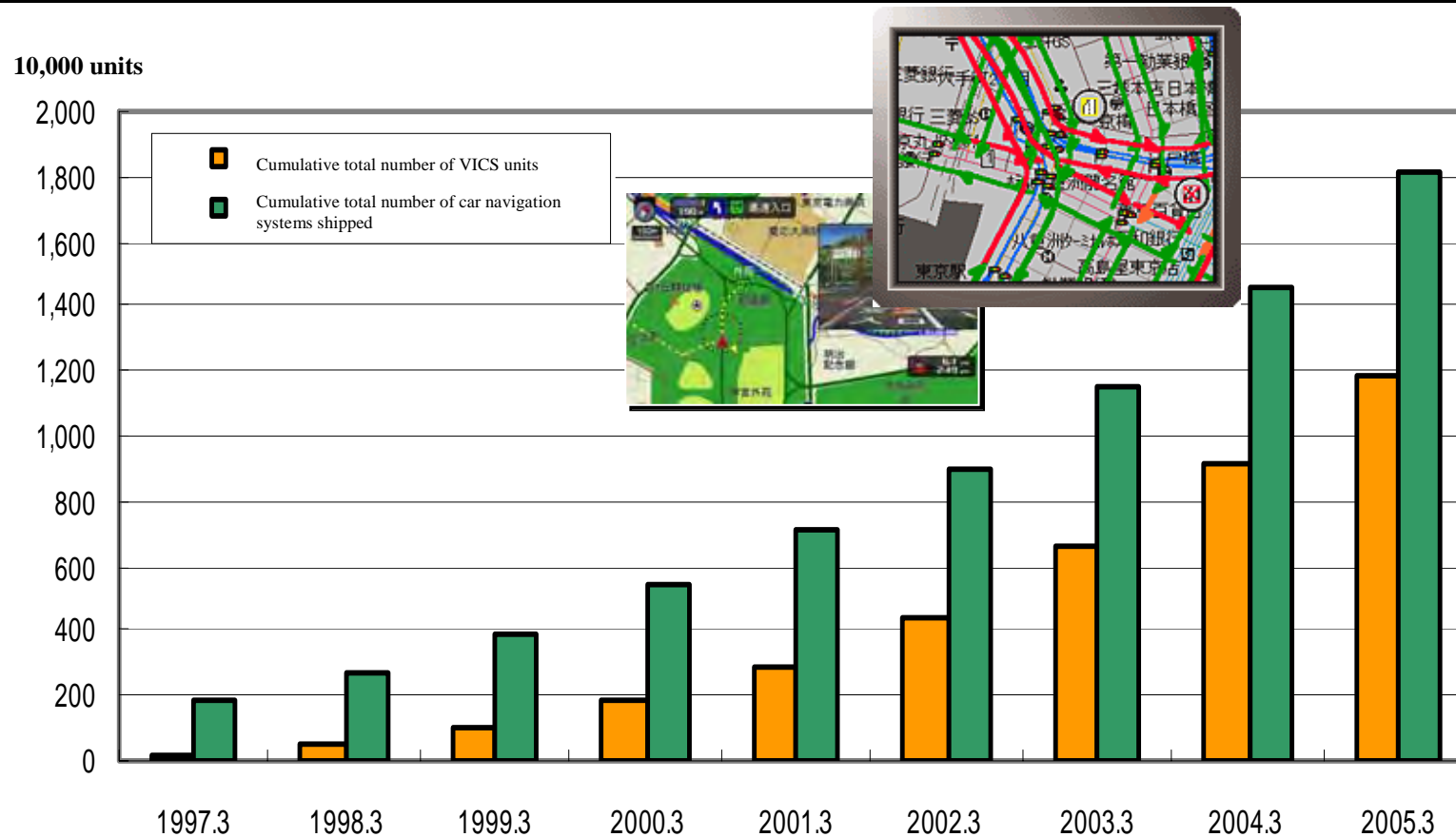


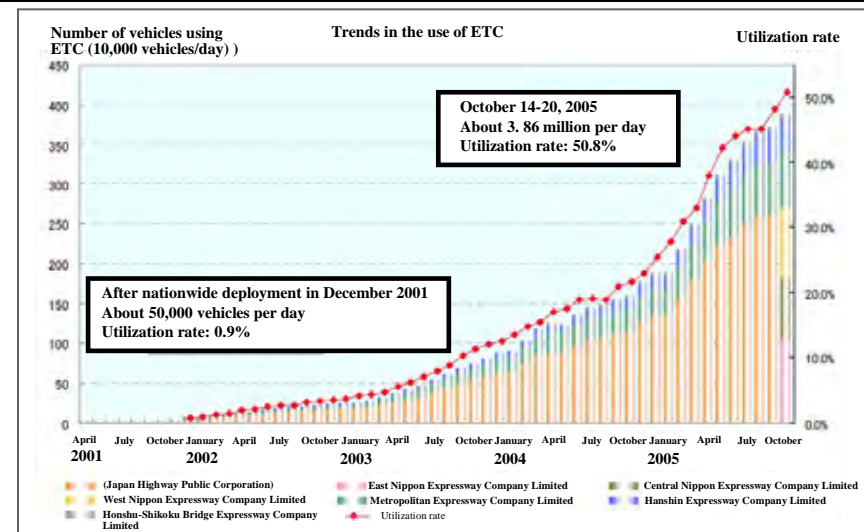
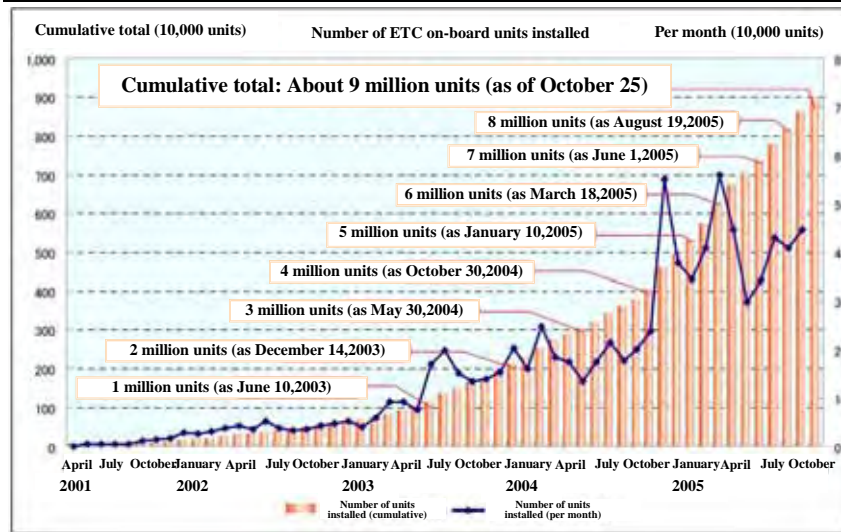
Fig. Trends in the cumulative total numbers of car navigation systems and VICS units shipped

1. Spread of currently available services



2) Spread of ETC

- During the little more than the one-year period since the proposal, the number of ETC units installed has risen to 9 million, doubling the rate of utilization to about 50% (compared to 3.50 million units and 20% at the time of the proposal).
- On Tokyo Metropolitan expressways, 60% of vehicles uses ETC.



	East Nippon Expressway Company Limited	Central Nippon Expressway Company Limited	West Nippon Expressway Company Limited	Metropolitan Expressway Company Limited	Hanshin Expressway Company Limited	Honshu-Shikoku Bridge Expressway Company Limited	Nationwide
Number of vehicles using ETC	About 1,032,600 vehicles/day	About 776,900 vehicles/day	About 893,700 vehicles/day	About 691,500 vehicles/day	About 426,600 vehicles/day	About 45,300 vehicles/day	About 3,866,700 vehicles/day
Total number of vehicles on expressways	About 2,107,500 vehicles/day	About 1,429,600 vehicles/day	About 2,010,000 vehicles/day	About 1,128,500 vehicles/day	About 842,600 vehicles/day	About 87,000 vehicles/day	About 7,605,100 vehicles/day
ETC utilization rate (%)	49.0%	54.3%	44.5%	61.3%	50.6%	52.1%	50.8%

1. Spread of currently available services



- Two types of discounts are combined for high volume and high frequency of use: individual vehicle discounts and fleet contract discounts.
- Under nighttime discounts, fees are reduced by 50% for up to 100 kilometers of total travel distance through suburban zones of large cities between the hours of 10 PM and 6 AM.

Expressway tolls per vehicle per month	Discount
Portion from ¥5,000 to ¥10,000	➔ 10%
Portion in excess of ¥10,000, up to ¥30,000	➔ 15%
Portion in excess of ¥30,000	➔ 20%

+10%

If the fleet contract holder's total monthly expressway usage is in excess of ¥5 million and the average monthly usage per vehicle is in excess of ¥30,000.

Example:

Discount if the monthly expressway usage per vehicle is ¥40,000 and the total usage under a fleet contract (200 vehicles) is ¥8 million

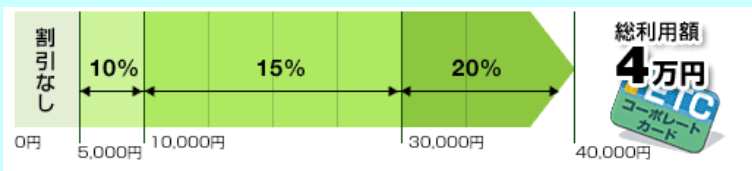
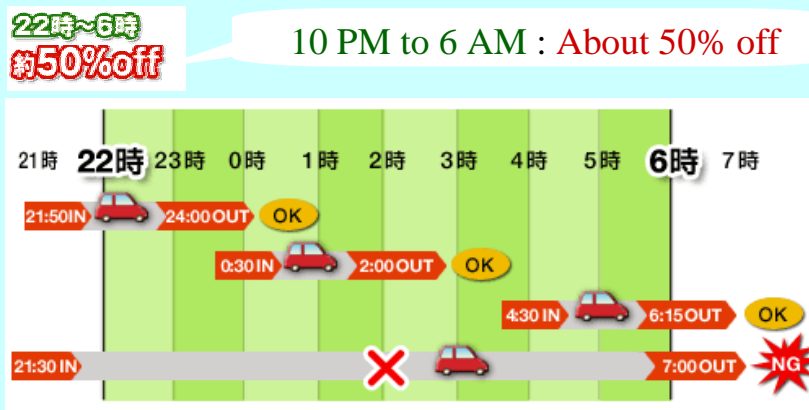
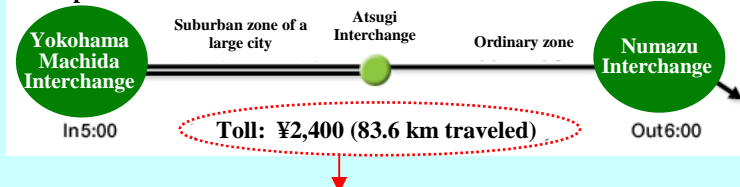


Fig. Example of discounts for high volume and high frequency of use



Example:



This trip is eligible for the discount because it meets the entrance/exit conditions as well as the time conditions.

$$\rightarrow 2,400 \times 0.5 = 1,200$$

Fig. Example of nighttime discounts

Source: General portal site for ETC, <http://www.go-etc.jp/>

1. Spread of currently available services



- In discounts based on days of the week and times of day, tolls are reduced by 3% to 20% according to the time of day during off-peak hours on weekdays, nighttime hours, and non-working days (Sundays and holidays).
- Environmental road pricing is a system that provides discounts for trucks only in order to reduce the concentration of traffic in residential areas and shift it to coastal areas where there is less impact on the environment by charging different fees.



Weekdays and Saturdays Sundays and holidays

Tokyo routes (ordinary toll: ¥700)

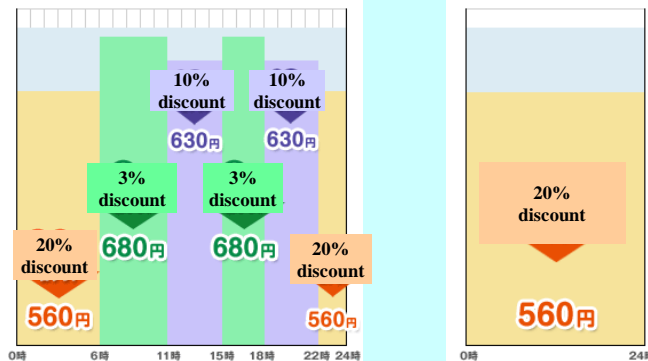
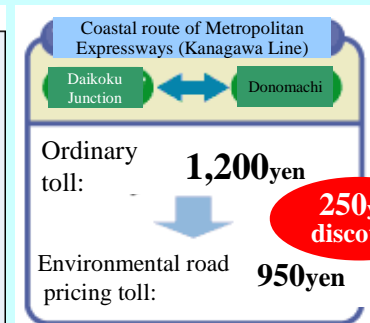


Fig. Example of discounts based on days of the week and times of day



* Tonomachi - Ukishima and Higashi-Ogishima - Ukishima section use only 600 yen
 * Common use of advance payment discount of ETC, night discount and special section are possible.



Fig. Example of environmental road pricing

Source: General portal site for ETC, <http://www.go-etc.jp/>

1. Spread of currently available services



- ETC has practically eliminated congestion at tollgates on the main routes of the Metropolitan Expressways, which had suffered from chronic traffic congestion in the past.
- The benefits of reduced congestion are not limited to ETC users, but are enjoyed by others as well.
- ETC has also been proven effective in reducing the environmental burden.

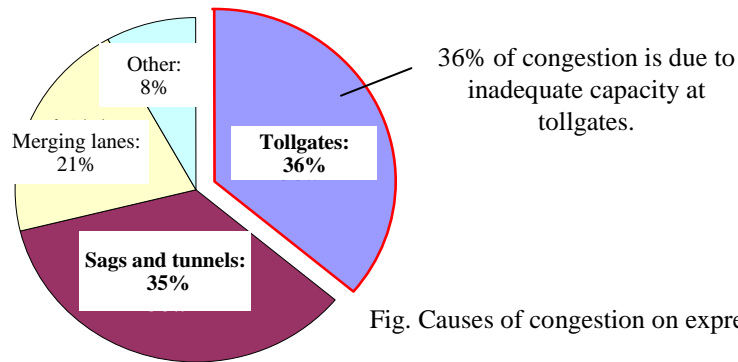


Fig. Causes of congestion on expressways



Fig. Congestion practically eliminated at Kawaguchi Toll Plaza

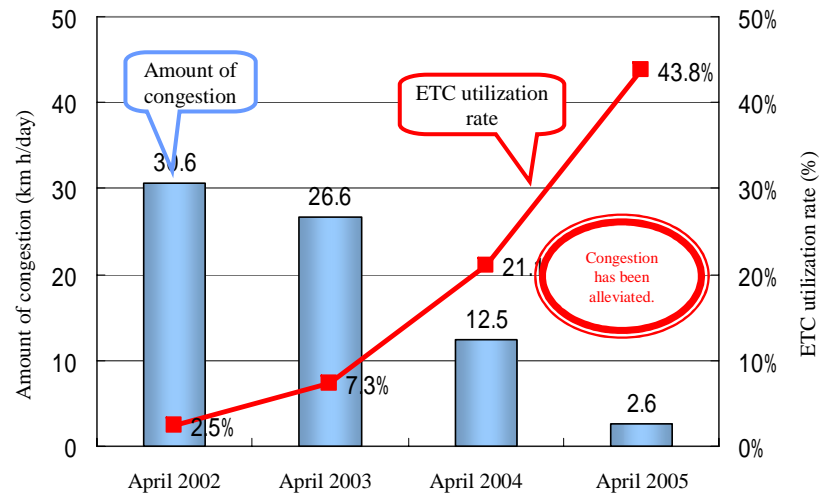
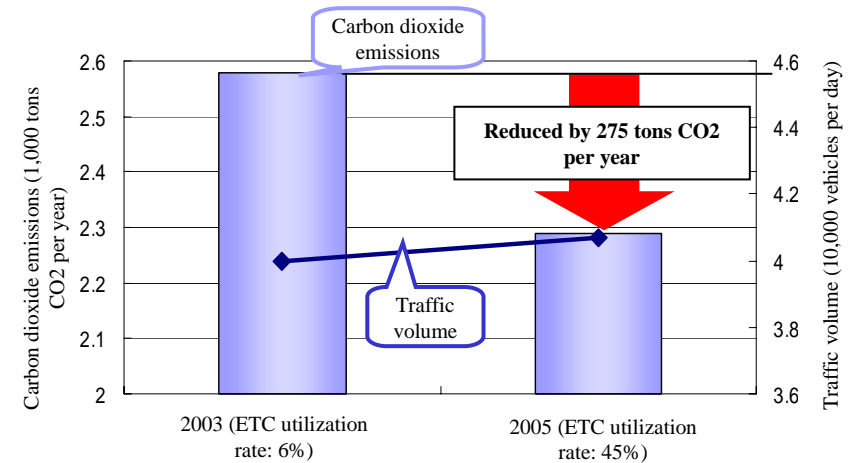


Fig. Trends in ETC utilization rates and congestion at tollgates on the main routes of Metropolitan Expressways



Conference on highway policy to prevent global warming (May 23, 2005)

Fig. Change in carbon dioxide emissions at Kawaguchi Toll Plaza

1. Spread of currently available services



3) Field trials of smart interchanges

- Field trials were conducted at 29 locations nationwide, contributing to shorter travel times for commuters, tourists, emergency vehicles, etc.
- A smart interchange opens a gateway to the expressway, providing a spark for revitalization of the community.
- At the request of communities enjoying the added convenience, field trials have been resumed or extended.



Roadside radio device (DSRC antenna)

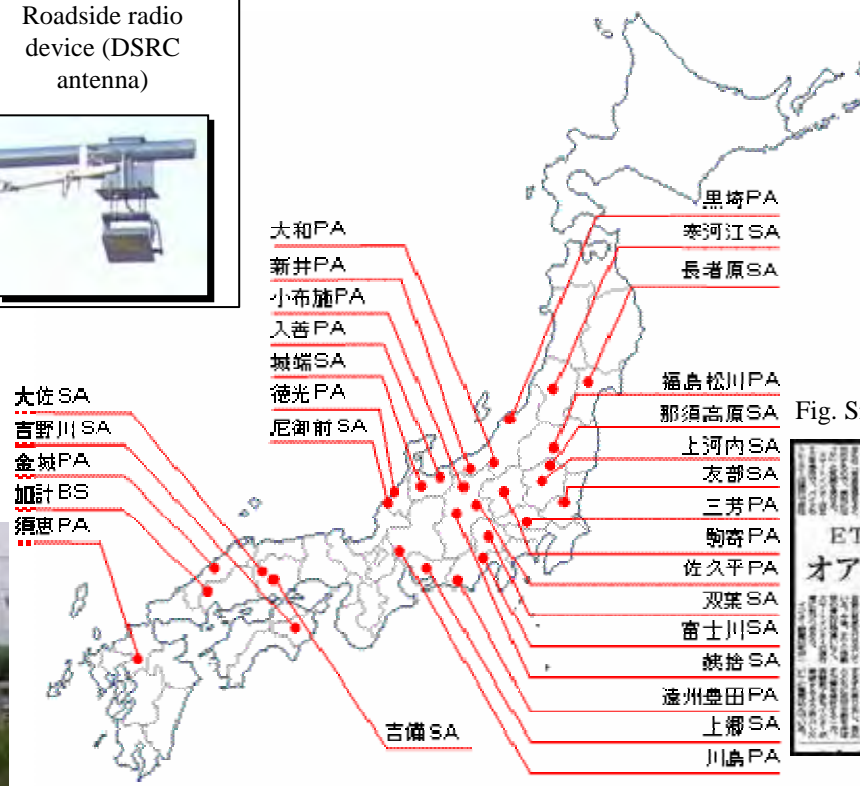


Fig. Smart interchange at Yoshinokawa Service Area

Fig. Smart interchange at Kamigo Service Area



Fig. Smart interchange at Komazaki Parking Area



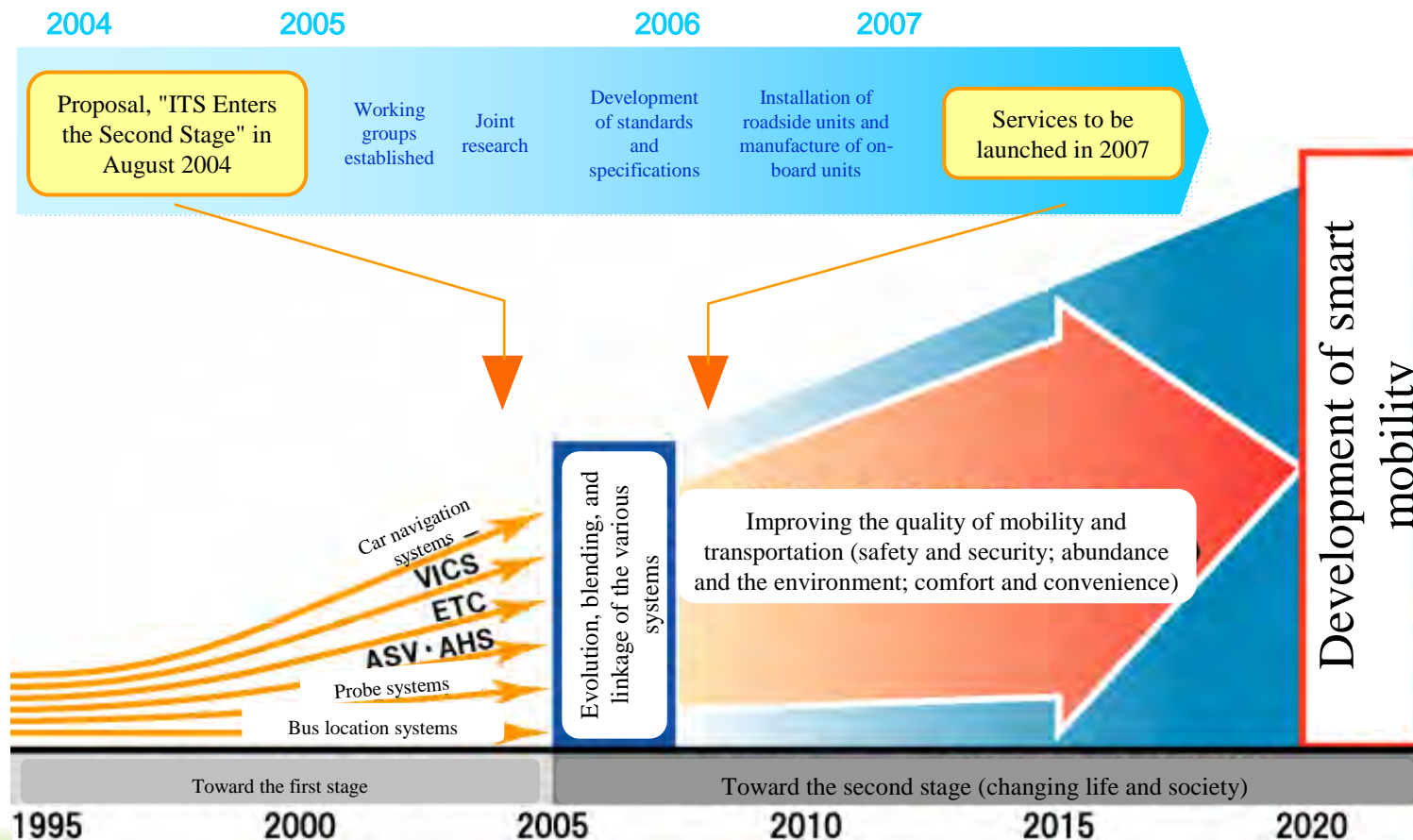
Source: November 26, 2004 Tokushima Shimbun

Fig. Local community reactions to smart interchanges

2. Promoting Smartway



- In the second stage of ITS, as various new services are deployed, ITS will become a part of life and society, contributing to the resolution of social issues and promoting social change.
- The Smartway Project Advisory Committee issued a proposal entitled "ITS Enters the Second Stage" in August 2004.
- In response to this proposal, working groups were established for study of specific issues with the goal of promoting realization of the proposal.
- Joint public-private research began in February 2005 with the involvement of 23 private firms selected through public recruiting.



3. Services to be launched in 2007



1) Basic approach

- For the sake of developing various services to meet the goals of Smartway, it is important to establish a common infrastructure for roadside units, on-board units, and communications, instead of using separate, independent systems for each type of service.
- 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 on-board unit is needed for each application.



Using multiple applications with a single ITS on-board unit

3. Services to be launched in 2007



2) Services to be launched in 2007

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

Timely driving support information:

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



Road traffic information is 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 help to revitalize the local community.



Road information is 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

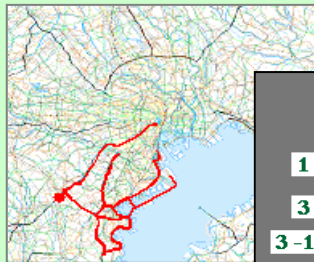
3. Services to be launched in 2007



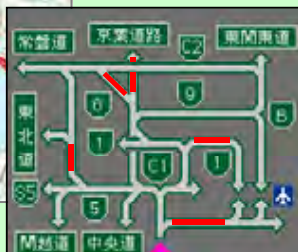
2) Services to be launched in 2007 (i) Services to provide information during road travel

- With VICS, using 5.8 GHz DSRC to handle high-volume telecommunications, information will be offered over a broader range than was previously possible.
- Voice announcements will be transmitted in a timely fashion to provide clearly comprehensible information and warnings to drivers, including senior citizens.

[Wide-area information supply]



C1	3 別料金
1 東京	2 時間以上
3 東名川崎	2 時間以上
3-1 横浜青葉	2 時間以上
4 横浜町田	



Providing information by voice



Traffic is congested by accident for 2km between Urayasu and Makuhari.



3. Services to be launched in 2007



- 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. (Methods for providing images will be studied separately, with attention to safety.)
- Probe data* which is transmitted from vehicles will be used to provide information on greater numbers of routes than in the past. (Specific methods will be studied in the future.)

* 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.

[Providing static image information]



[Providing information on multiple routes]



3. Services to be launched in 2007



2) Services to be launched in 2007 (ii) Information link services at rest areas, etc.

- When requested by users who have stopped at rest areas, service areas, and parking areas, information on nearby road traffic conditions and so on is provided to promote safety and security.
- Information on the local region, including tourist information, is also presented in an understandable manner.



Fig. Information link testing at Showa Rest Area
2005.5.3 ~ May 3-5, 2005 (Showa Rest Area)

3. Services to be launched in 2007



2) Services to be launched in 2007 (iii) Services for payment of public parking fees

- Cashless payment services allow drivers to pass smoothly through payment gates at public parking facilities.
- A new mode of cashless payment, using an ITS on-board unit along with a general-purpose credit card of the smart card type, will be deployed in addition to the existing mode of cashless payment using ETC on-board units.
- This will allow flexible pricing services such as point systems or discounted parking rates for customers of nearby establishments.

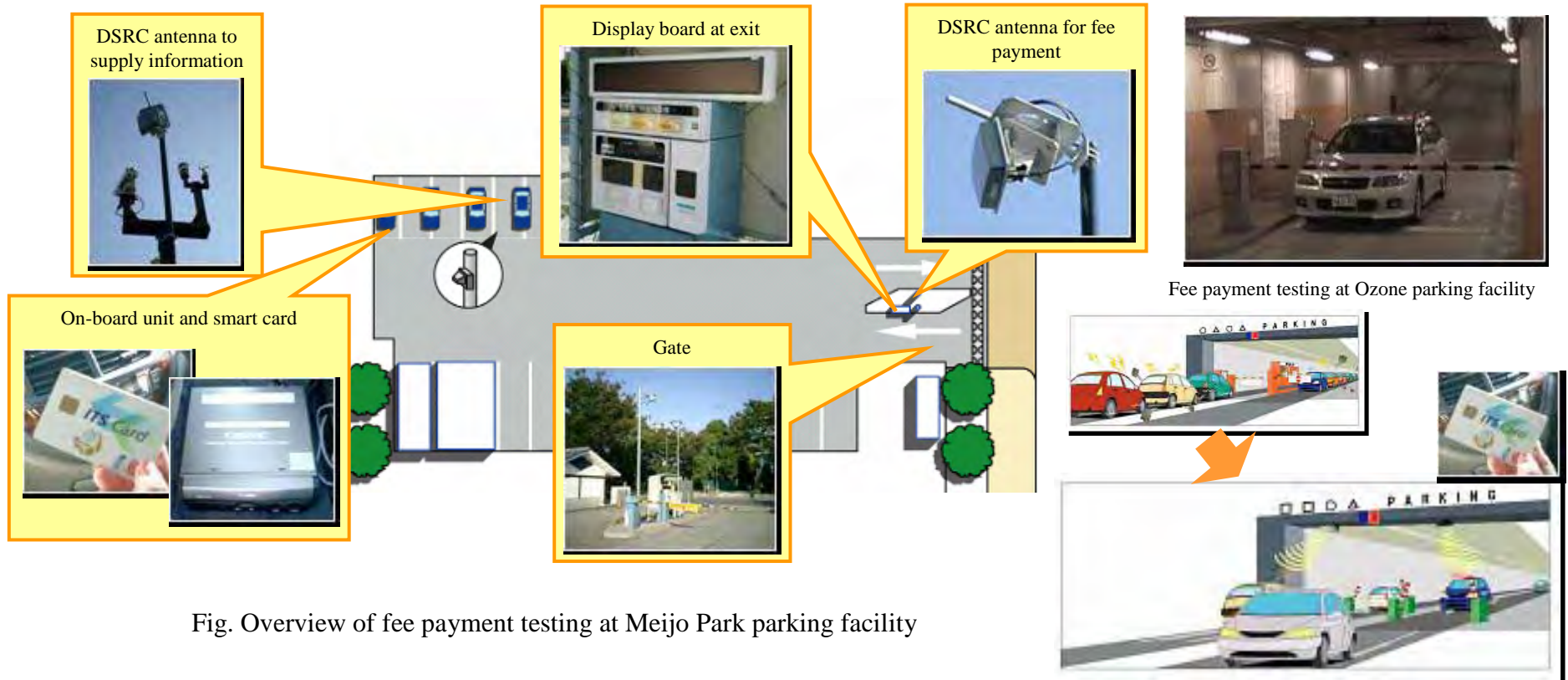


Fig. Overview of fee payment testing at Meijo Park parking facility

4. Efforts toward realization of services



1) Study on promoting the spread of DSRC and related research and development

- Continuous efforts are underway for cutting-edge technological research and development based on new concepts and perspectives, through collaboration among industry, academia, and government.

Organization	Established	Membership
DSRC Forum Japan	January 2004	About 200 private firms and related foundations
ITS Info-Communications Forum	July 1999	About 120 private firms



Fig.: General conference to establish DSRC Forum Japan
(February 2004)



Source: Highway Industry
Development Organization

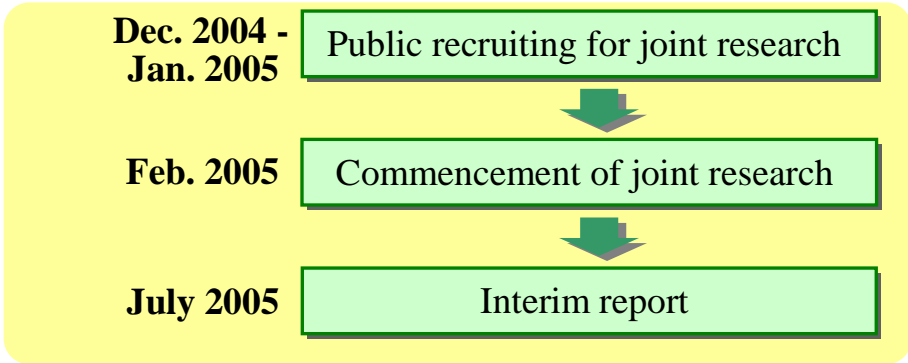
Fig.: DSRC testing by private companies

4. Efforts toward realization of services



2) Promoting joint public-private research

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



平成16年度第4回共同研究公募課題

国土技術政策総合研究所共同研究実施規定（平成14年3月28日国官技第378号、国総技第124号）に基づき実施する共同研究の平成16年度公募課題を次のように定めたので、その研究を共同実施する者を公募する。

平成16年12月17日
国土技術政策総合研究所長 浜口 達男

- 1 研究の項目
次世代道路サービス提供システムに関する研究
- 2 研究の題目及び申請手続きに関する詳細
国土技術政策総合研究所ホームページ
<http://www.nilim.go.jp/>

Companies participating in joint public-private research

Area of business	Name of company	Area of business	Name of company
Automobile manufacturers	Toyota Motor Corp.	Navigation system manufacturers	Aisin AW Co., Ltd.
	Nissan Motor Co., Ltd.		Clarion Co., Ltd.
Electronics manufacturers	Oki Electric Industry Co., Ltd.		Kenwood Corp.
	Sumitomo Electric Industries, Ltd.		Xanavi Informatics Corp.
	Toshiba Corp.		Denso Corp.
	NEC Corp.		Pioneer Corp.
	Japan Radio Co., Ltd.		Fujitsu Ten Ltd.
	Hitachi, Ltd.	Other	NTT DoCoMo, Inc.
	Fujitsu Ltd.		Tokico Technology Ltd.
	Matsushita Electric Industrial Co., Ltd.		Park 24 Co., Ltd.
Mitsubishi Heavy Industries, Ltd.	Fujitsu Laboratories Ltd.		
	Mitsubishi Electric Corp.		

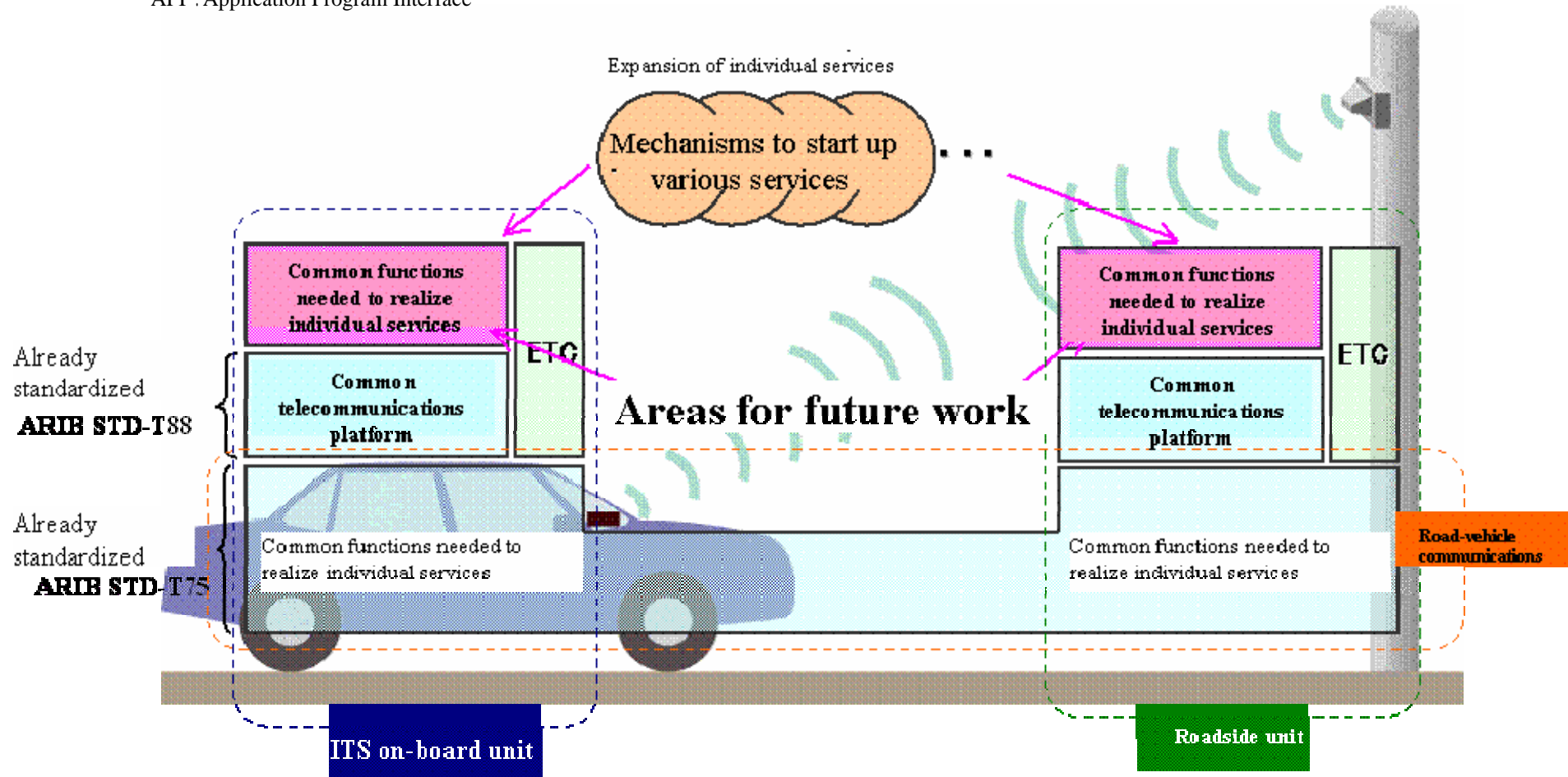
4. Efforts toward realization of services



2) Conducting cooperative research (areas to be addressed in research and development)

- The system for realization of next-generation road services consists of roadside units, ITS on-board units, and road-vehicle communications.
- The area of the basic application program interface (API) needs to be addressed in future research and development.

*API : Application Program Interface



5. Conclusion



Providing a strong impetus for all areas of ITS

- VICS, ETC, and other ITS services which have been developed separately will also be brought onto the common platform.
- 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.

