

New Technology , New Era


把握动向，走自主发展的路

— 近年ITS发展热点与新一代中国ITS发展战略

国家智能交通系统工程技术研究中心

王笑京

2011年11月5日

- 
- The background of the slide is a composite image. On the left, there is a vertical strip showing a paved road stretching into the distance under a blue sky with white clouds. The rest of the background is a blurred, semi-transparent image of a car's interior dashboard and steering wheel, overlaid with a faint, glowing green circuit board pattern.
- **International Development**
 - **Next Generation ITS in China**
 - **Cooperative systems Research**

The background of the slide is a composite image. On the left, there is a vertical strip showing a paved road stretching into the distance under a blue sky with white clouds. The rest of the background is a blurred, semi-transparent image of a car's interior, specifically the dashboard and steering wheel area, with a circuit board pattern overlaid on it.

I. International Development

- **World Congress on ITS (2008 and 2011)**

1. 2008 (15th World Congress)

■ Environment

◆ TS: 11, SS: 9 (Total: 20)

■ Traffic Safety (safety + security + cooperative system)

◆ ES: 3

◆ SS: 26 (Total: 29)

■ Communication in ITS

◆ ES: 2, SS: 7

◆ TS: 18, Science: 4 (Total: 31)

■ Vehicle and Electronics

◆ TS: 14

◆ Science: 5 (Total: 19)

■ Infrastructure and Traffic Management

◆ SS: 44

◆ Science: 7 (Total: 53)

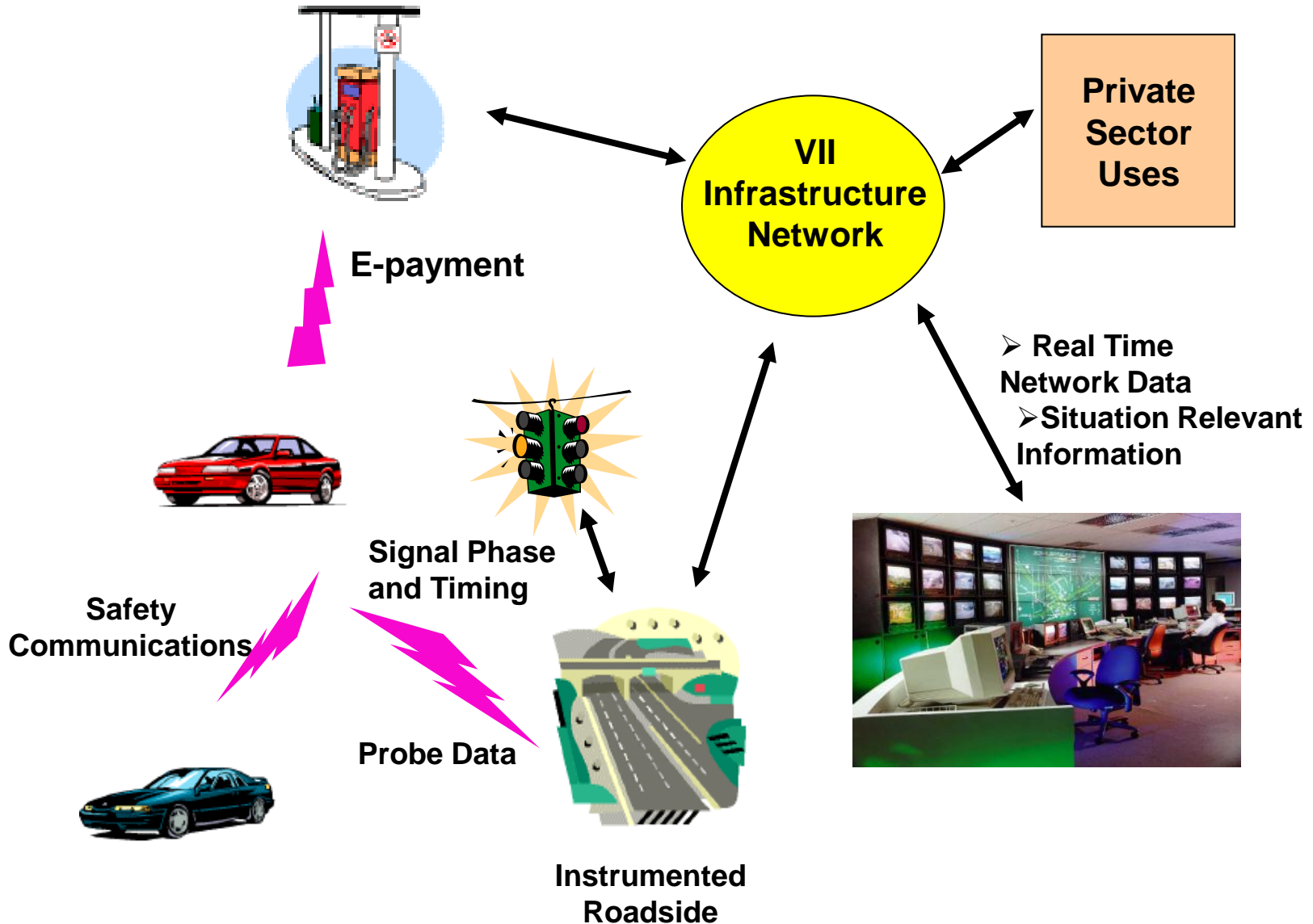
ES: Executive Session,

SS: Special Session

TS: Technical Session,

Science: Science Session

(1) VII



VII Demo in Congress



VII演示区域：纽约11街



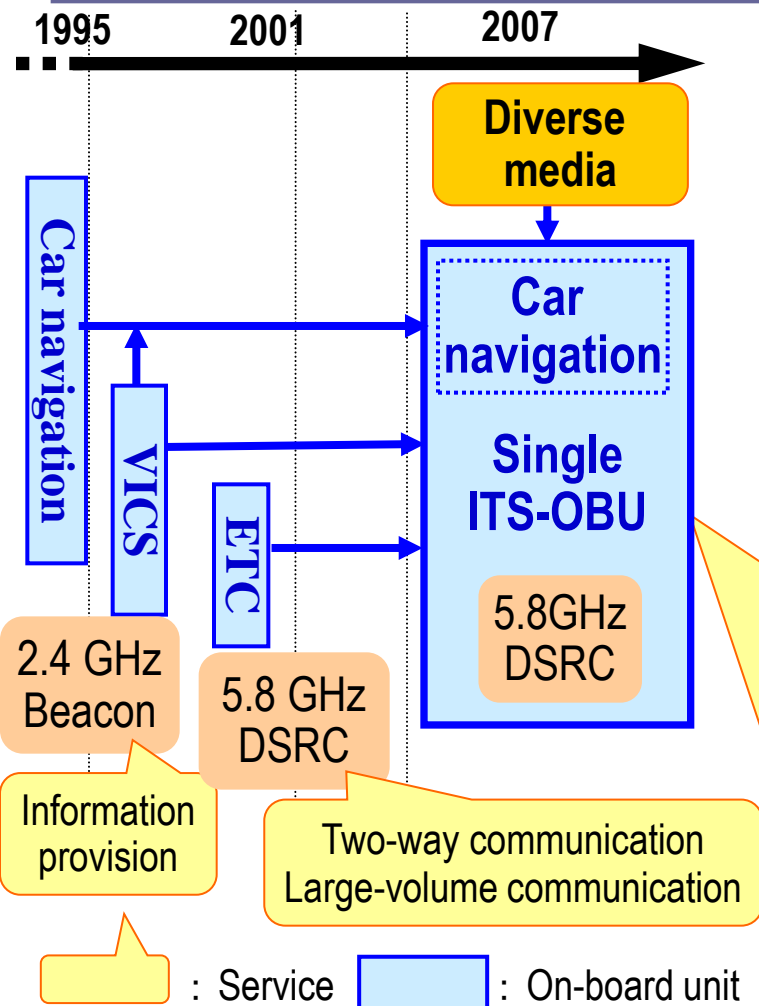




(2) Smartway

- Realize Various Services through a Single OBU

- A single ITS on-board unit (OBU) will provide various services according to establishment of common platform



Providing information on assisting safe driving



Wide range traffic congestion information



Providing information on conditions ahead



Parking lot payment



Smartway 2007 - Field Test

- Two Types of On-Board Unit (OBU)

Voice ITS OBU



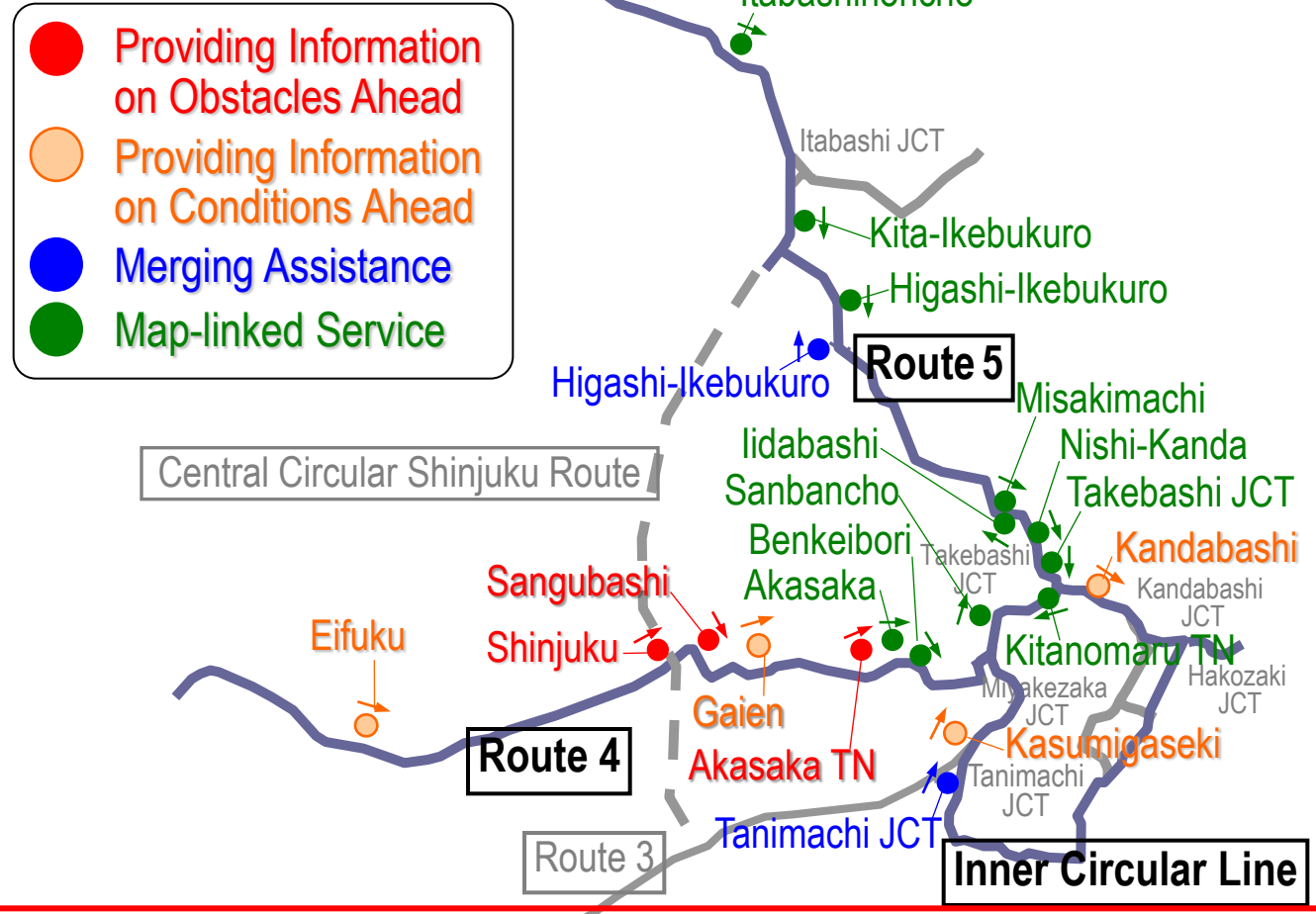
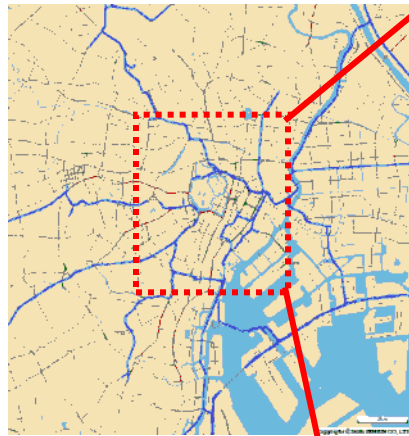
Car Navigation Correlated ITS OBU



Smartway 2007 – On-road Proving Tests and Demonstration on the MEX

Location of On-road Proving Tests

- On-road tests are conducted on the Inner Circular Route, Route 4, and Route 5 of the Tokyo Metropolitan Expressway

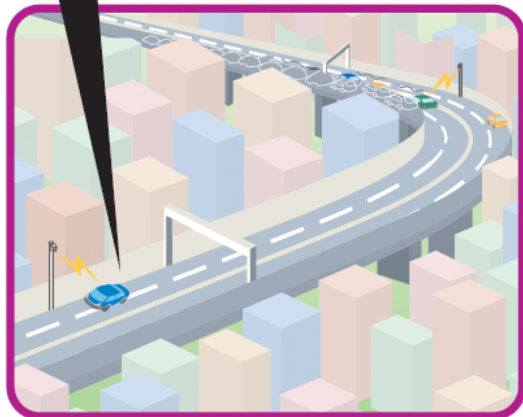


Smartway 2007 – On-road Proving Tests and Demonstration on the MEX

Lineup of Services (1/2)

Providing Information
on Obstacles Ahead

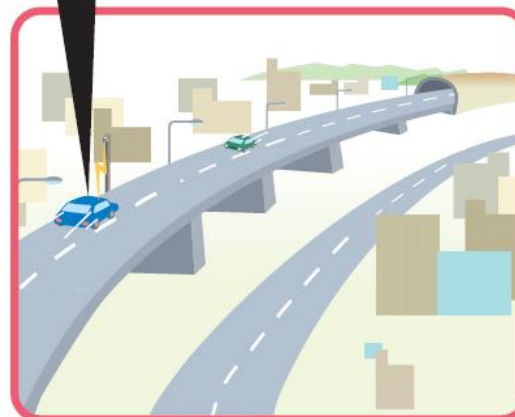
Audio + Visual



Providing information on **stopped vehicles or congestion tail beyond a curve with poor visibility** by visual and audio

Providing Information
on Conditions Ahead

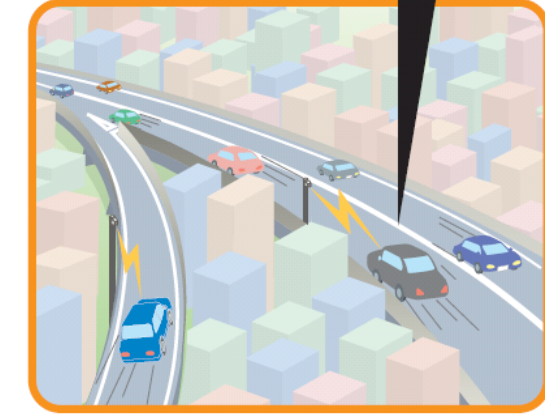
Audio + Visual



Providing information on **road condition ahead** by visual and audio

Merging Assistance

Audio + Visual



Providing information **on existence of merging vehicles** by visual and audio just before the merging section

Smartway 2007 – On-road Proving Tests and Demonstration on the MEX

Lineup of Services (2/2)

Map-linked Services to call attention or provide information

Smart Parking

Internet Connection

Audio + Visual



Warning based on **digital map data** stored in car navigation units according to vehicle speed



Parking fee payment services using **ETC**. ITS OBU allows to use credit card



Internet connection for parked vehicles at Parking Area

(3) Future Plans

- Nationwide Deployment Plan of Smartway Services

- On-road tests and trial operation will be conducted at regions throughout Japan from FY 2008

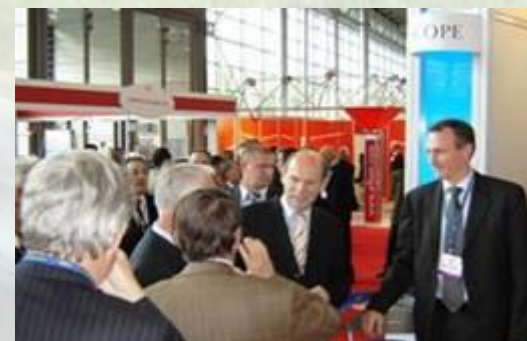
			FY 2006	FY 2007	FY 2008	FY 2009 and on	
Deployment of Services	Metropolitan Expressway (MEX)			Smartway 2007 ▼			
	Three major metropolitan areas (Mainly Expressways)			On-road tests on MEX	Trial operation on MEX		
	Other Areas	Expressways			On-road tests on three major metropolitan areas, etc	Operation (Three major metropolitan areas, etc.)	Nationwide deployment
		National Highways					
Private-sector utilization						Automatic fee payment at ferries, parking lots, etc.	
						Providing information on family restaurants, convenience stores, road stations, etc.	
						Internet connection, etc	

(3) EU—The i2010 Intelligent Car Initiative

The i2010 Intelligent Car Initiative will build on the work of the eSafety initiative and follow a three – pillar approach



Intelligent Car Initiative



Working Groups

- eCall Driving Group
- Traffic Information...
- Road Map



Projects

- Prevent
- CVIS
- GST



Awareness Actions

- studies
- “Intelligent Car Event”
- campaigns



Cooperative Vehicle Infrastructure Systems

Coordinator: **ERTICO**

Total budget: € 41 Million

EC contribution: € 22 Million

Consortium: 60 partners - 12 countries

Core Technologies



Cooperative systems for Road Safety

Coordinator: **Fiat Research Centre**

Total budget: € 38 Million

EC contribution: € 20,5 Million

Consortium: 51 partners - 12 countries

Safety Criticality



COOPerative systEmS for Intelligent Road Safety

Coordinator: **Austria Tech**

Total budget: € 16,8 Million

EC contribution: € 9,6 Million

Consortium: 37 partners - 14 countries

Road-Operators View

Integrated Projects of the FP6

Start/End dates: 01/02/2006 → 31/12/2010

2. 2011(18th World Congress)

■ Sustainability (Environment)

◆ Total Sessions: 37 (20)

■ Safety

◆ Total Sessions: 22

■ Cooperative Mobility

◆ Total Sessions: 27

■ Next Generation Traveler Information

◆ Total Sessions: 18

■ Vehicle and Electronics

◆ Total Sessions: 14 (19)

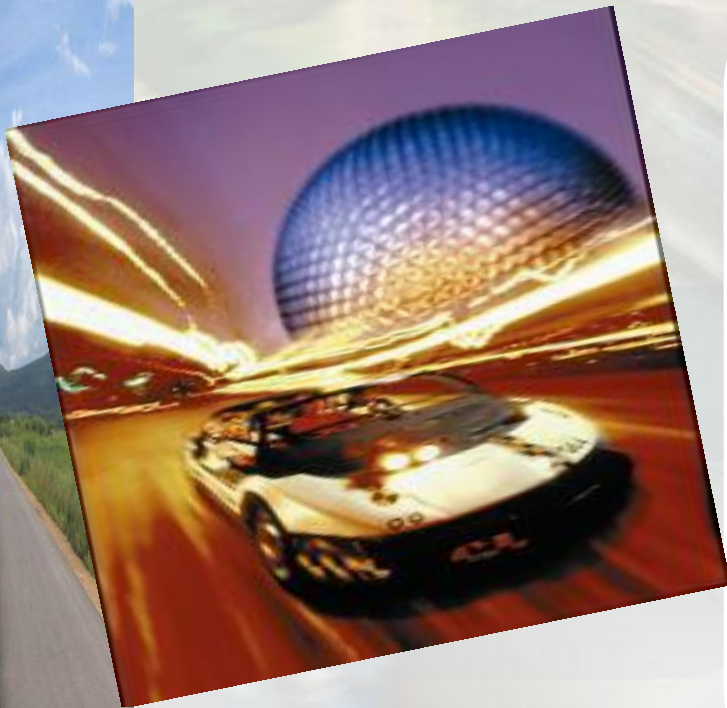
■ Infrastructure and Traffic Management

◆ Total Sessions: 44 (53)

67(60)

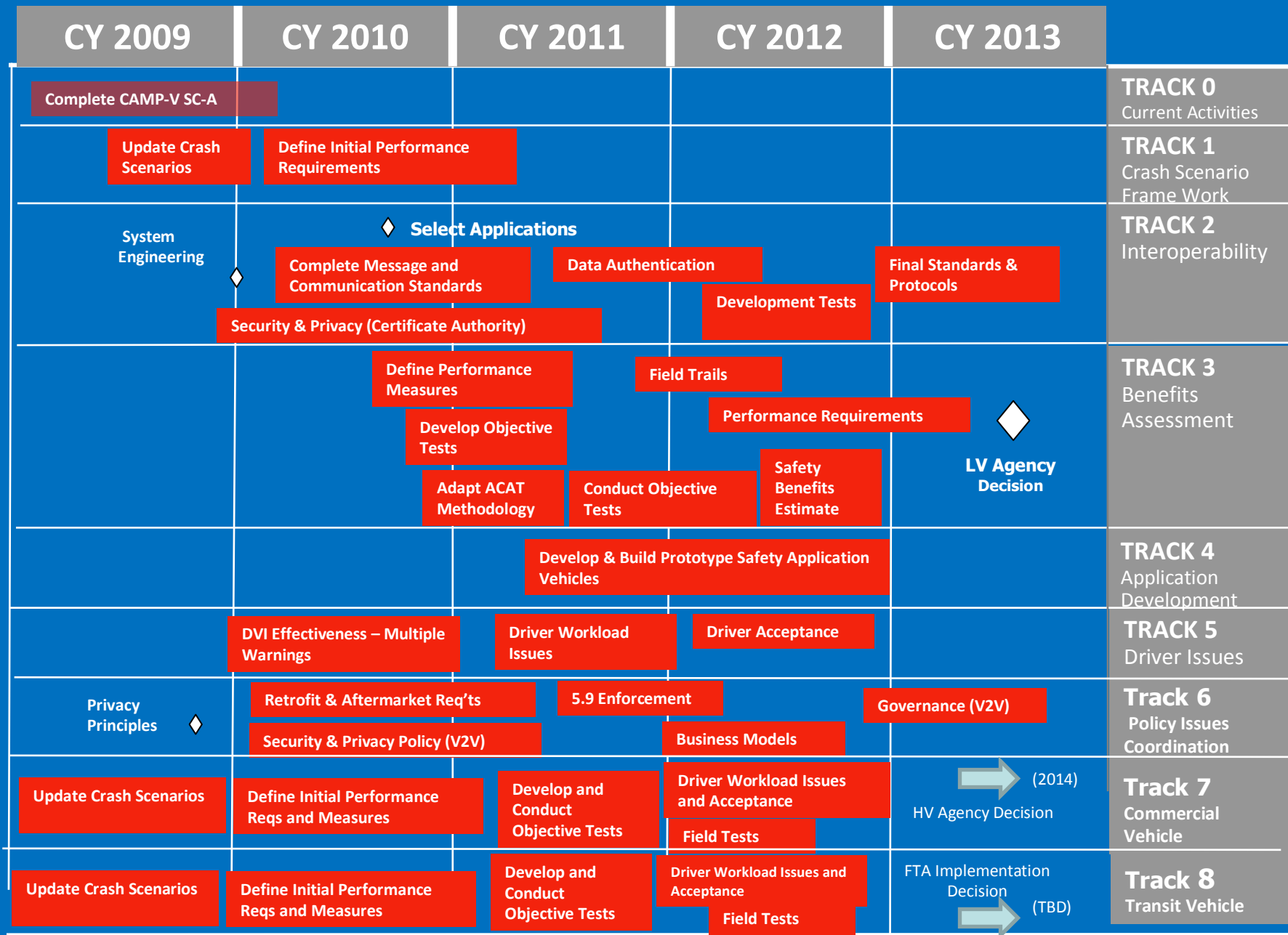
(1) IntelliDrive

Technology demonstrations

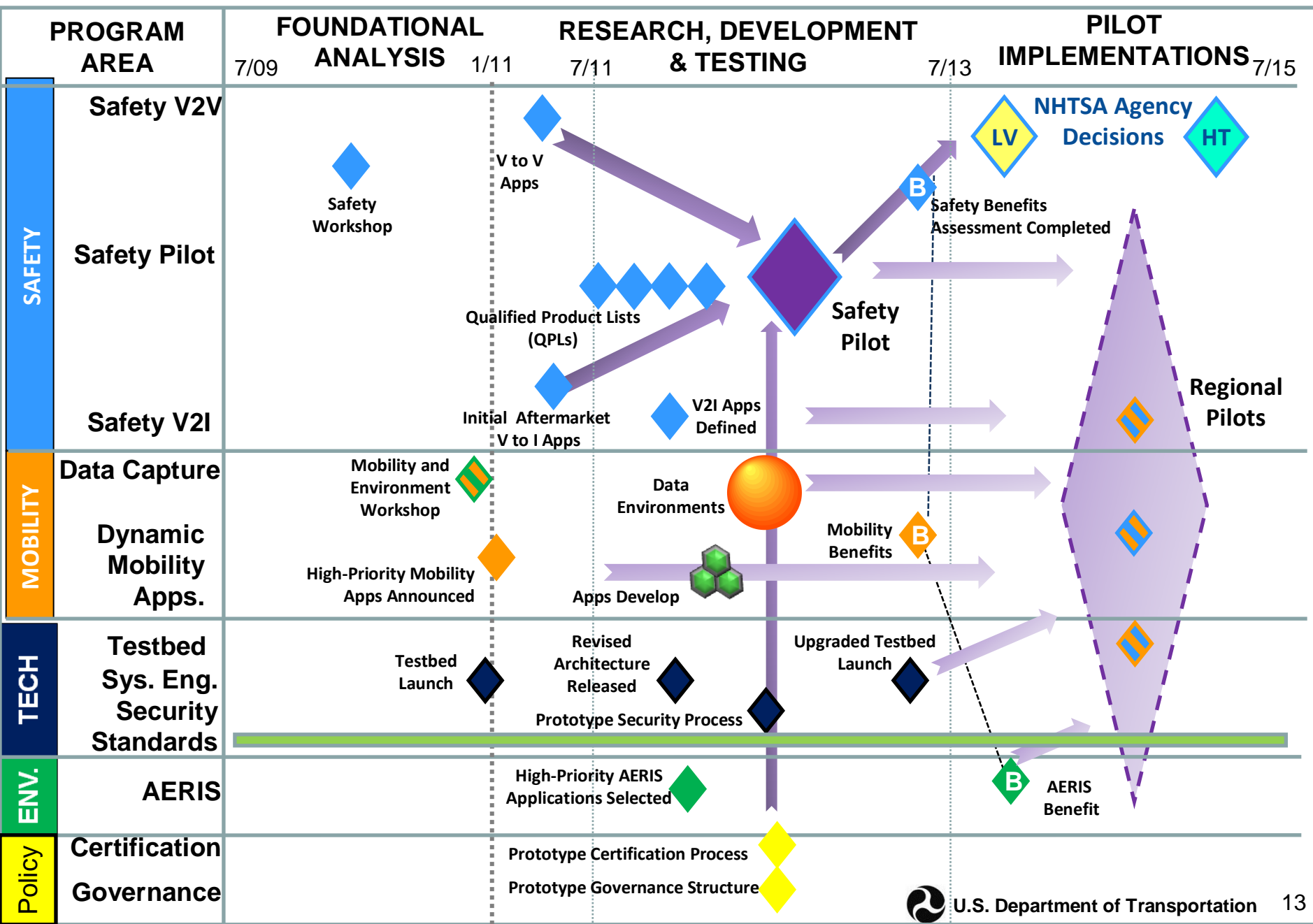


- **IntelliDrive (Connected Vehicles)**
- **Vehicle Miles Traveled (VMT & others)**
- **Next Generation Traveler Information**
- **Transportation Air Quality Solutions**
- **Regional Congestion Pricing**

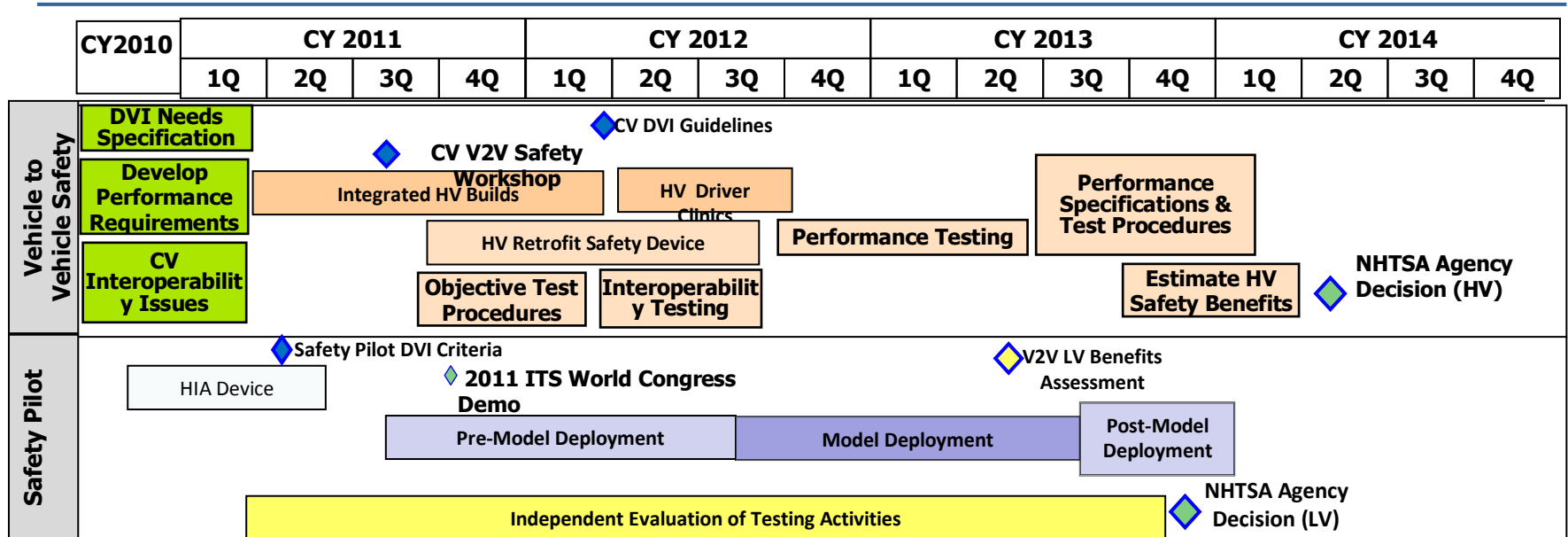
Vehicle to Vehicle Safety Application Research Plan



Major Milestones



Commercial Vehicle V2V and Safety Pilot Roadmap



Research Completed to Date

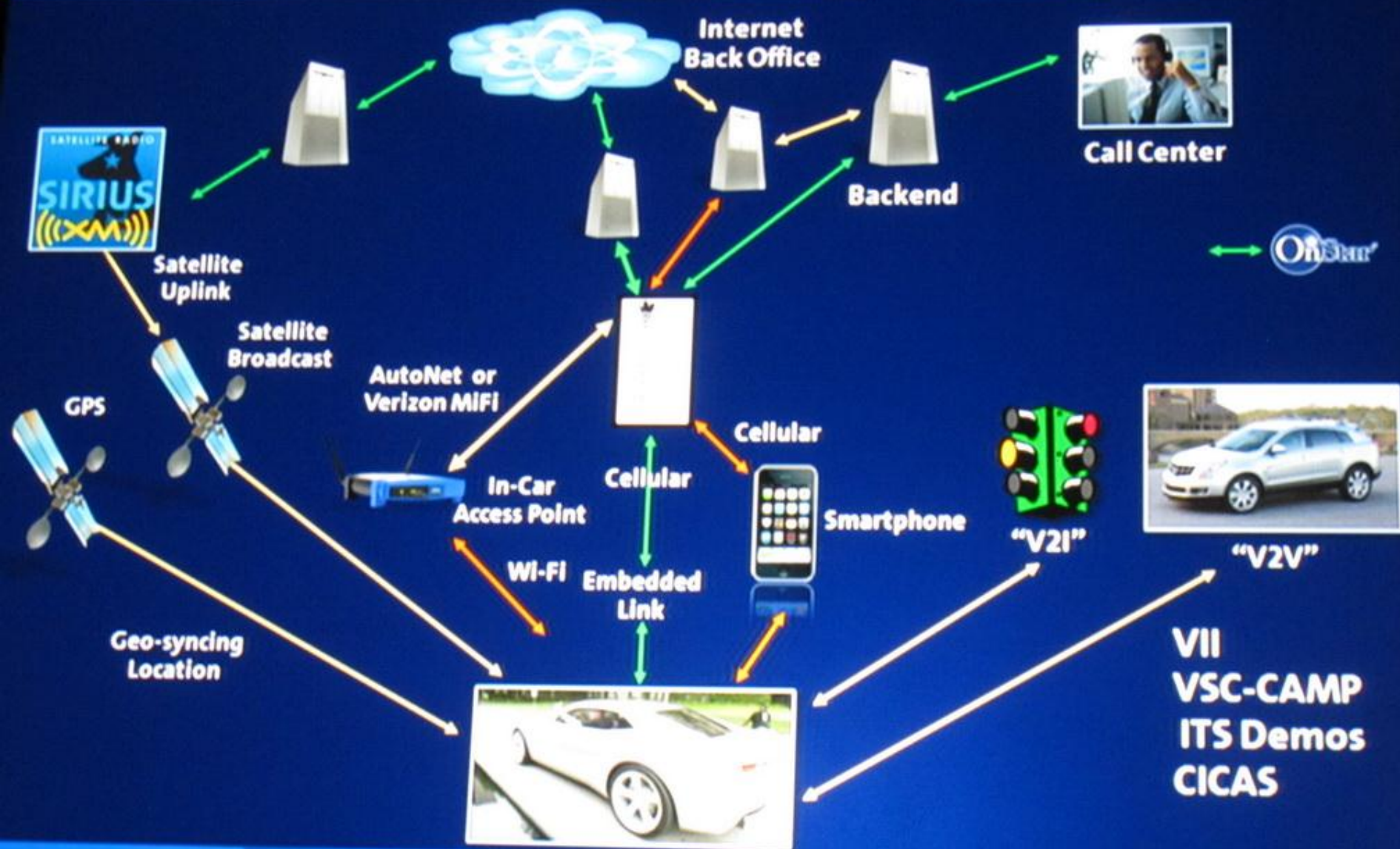
- DVI Needs Identification
- Performance Requirements
- CV Interoperability Issues

Upcoming Research

- Prototype Truck Tractors
- Safety Pilot
 - Driver Acceptance Clinics
 - Model Deployment



VEHICLE IS PART OF A "CONNECTED" ECO-SYSTEM



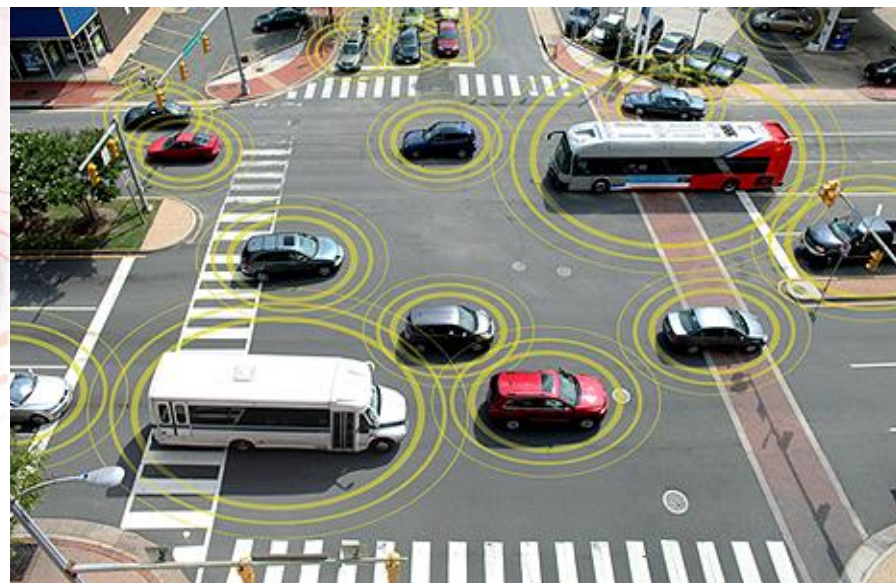
18th ITS WORLD CONGRESS CONNECTED VEHICLE TECHNOLOGY DEMONSTRATION



U.S. Department of Transportation



SAFETYPILOT







ITS Program of DOT

SAFETYPILOT

- Tests V2V and V2I safety and mobility applications
- Data can be used to determine effectiveness
- Helps ensure that the devices are safe
- Helps to support a NHTSA rule making decision in 2013

Form: Director Kirk Steudle, P.E.

Vehicles to be Equipped

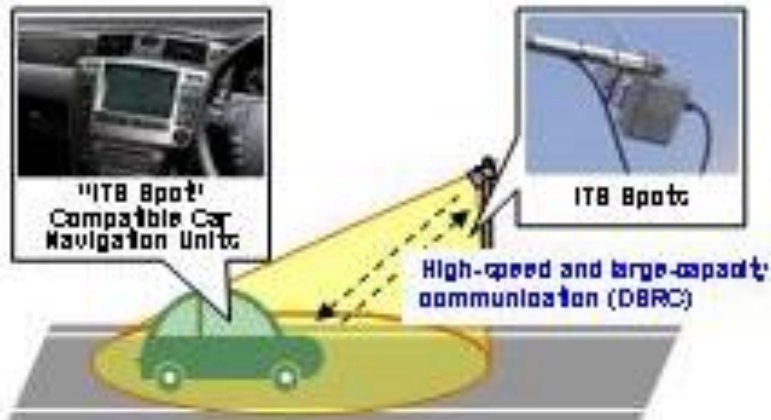
Connected Vehicle Device	Vehicle Type	Vehicle Source	Total Units in Model Deployment
Integrated Devices	Light vehicles	CAMP	64
Integrated Devices	Commercial trucks	Battelle team	3
Vehicle Awareness Device	Light vehicles	UM employees	2200
Vehicle Awareness Device	Local truck fleet	Con-way, Sysco	50
Vehicle Awareness Device	Light/Medium duty	University fleet	100
Vehicle Awareness Device	Transit vehicles	AATA, UM Buses	100
Aftermarket Safety Device	Light vehicles	UM employees	300
Retrofit Device	Local truck fleet	Con-way, Sysco	16
Retrofit Device	Transit vehicles	AATA, UM Buses	3
		Total	2836

(2) Smartway

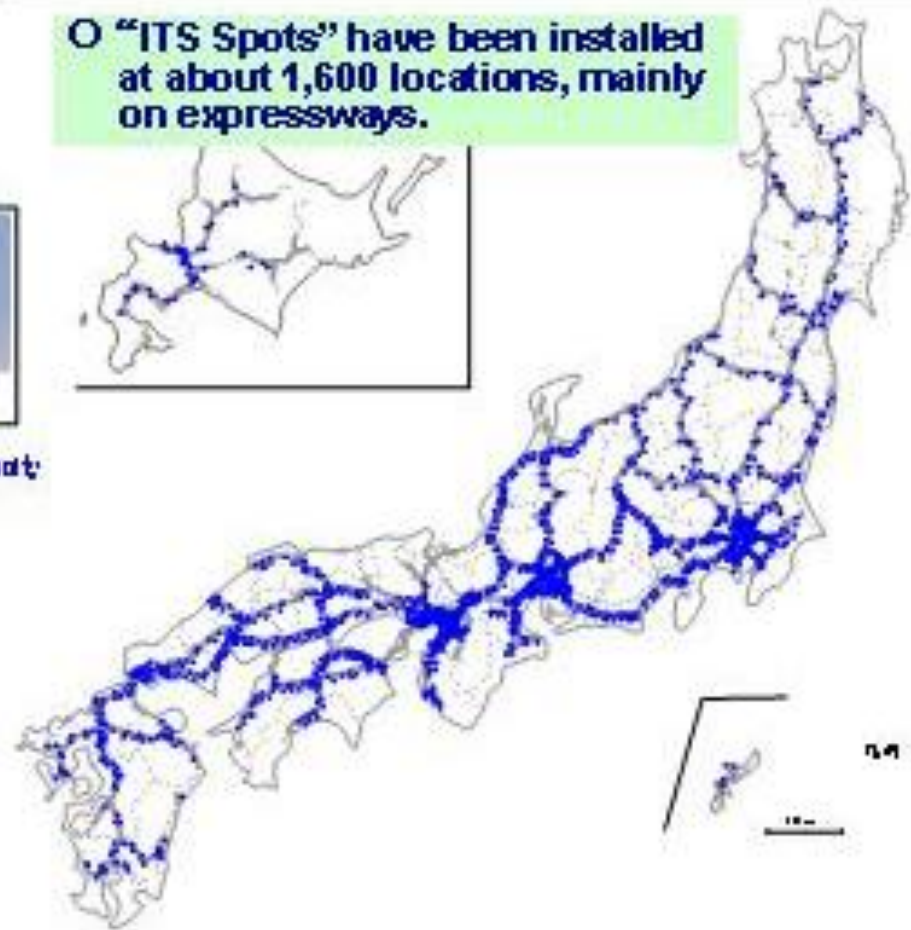
Deployment of "ITS Spots"

- "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.



“ITS Spot” Compatible Car Navigation Systems

Toyota Motors
(Sold beginning October 2009)



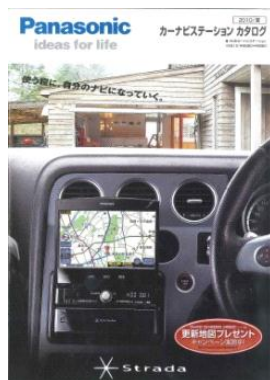
Nissan Motors
(Sold beginning June 2011)



Pioneer
(Sold beginning October 2009)



Panasonic
(Sold beginning March 2010)



Mitsubishi Electric
(Sold beginning October 2009)



Mitsubishi Heavy Industries
(Sold beginning March 2010)

三菱重工 コムス

2010年3月11日 発行 第 4012号

アンテナ分離型DSRC車載器「MOBE-1000」を新発売
「スポット通信サービス (DSRCサービス)」に対応



【MOBE-1000】

Alpine
(Sold beginning July 2011)



In 2011, “ITS Spots” were installed at about 1,600 locations mainly on expressways, and started service throughout Japan in August, 2011.

(Three basic services)

Dynamic Route Guidance

- Receives wide range congestion data.
- Car navigation systems intelligently select routes.

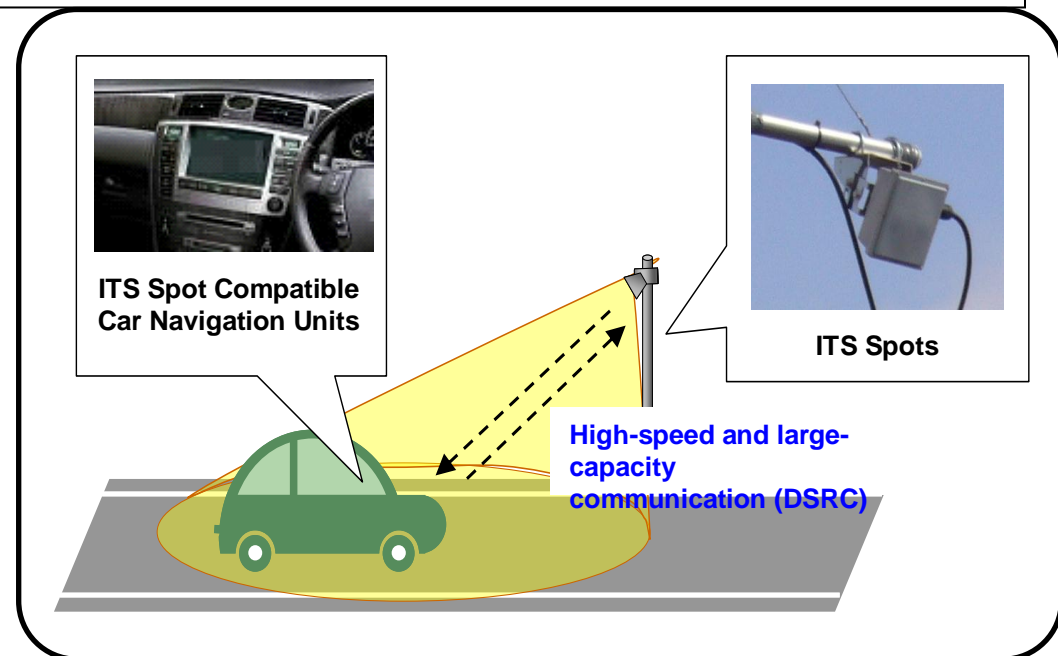
Safety Driving Support

- The system arouses drivers' attention in advance of danger so they do not experience near misses.

ETC

- Also ETC are available with “ITS Spot services”

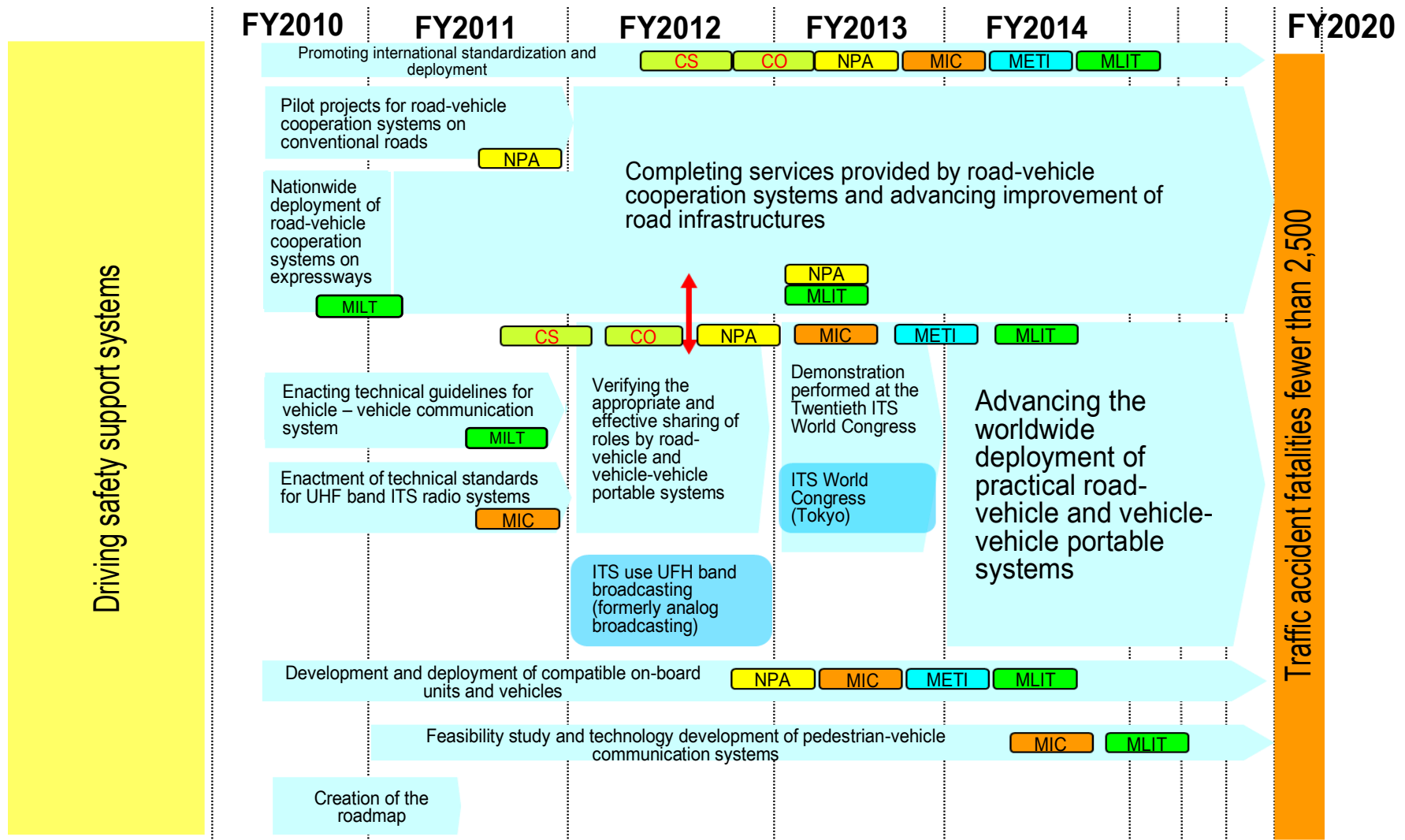
- Connecting some models to the internet permits provision of regional sightseeing information.
- The public and private sectors are cooperatively testing services in order to offer payment settlement, tourism, and logistics related services.



ITS Roadmaps

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

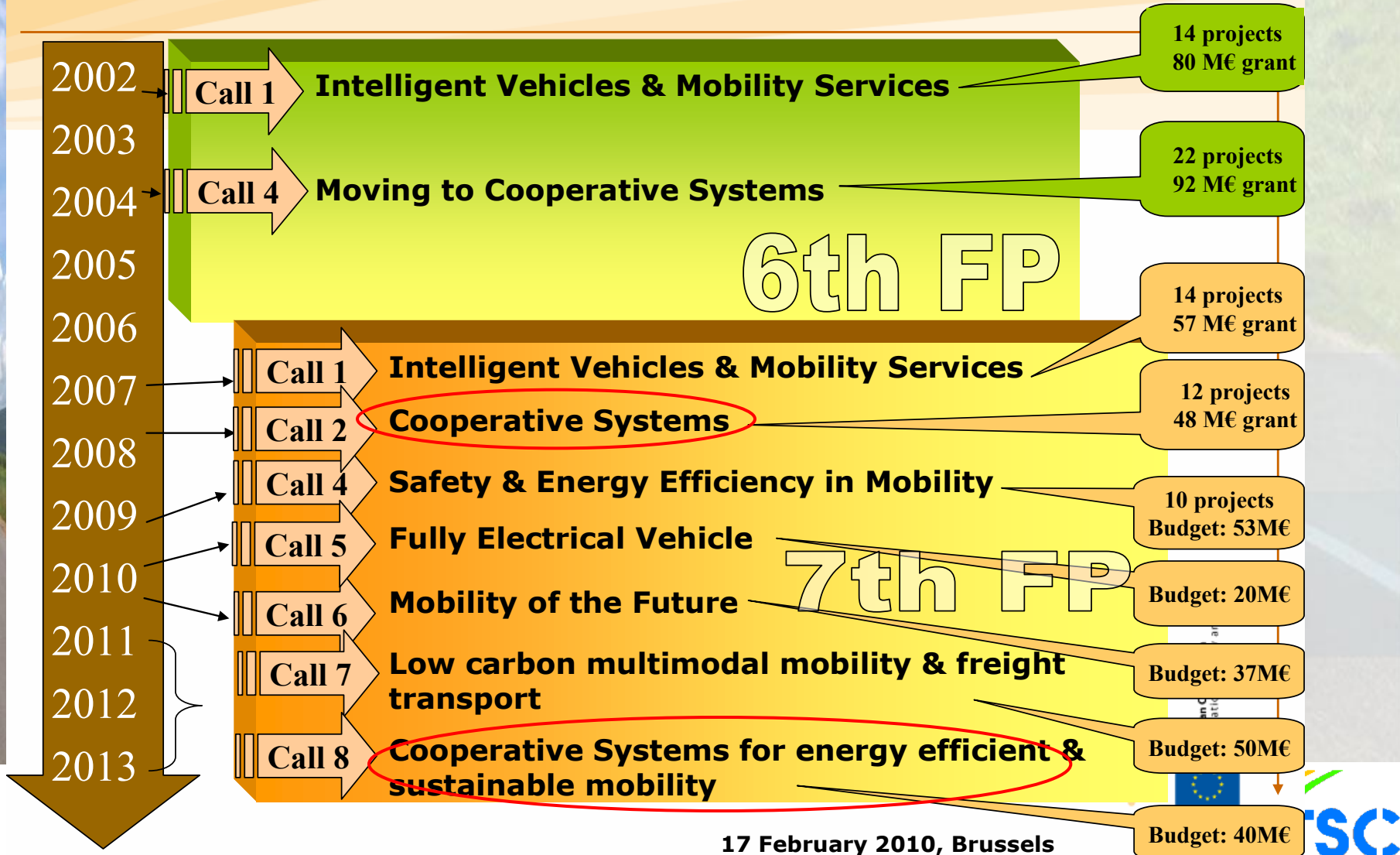
• Promoting disaster, crime, and accident countermeasures



(3) EU

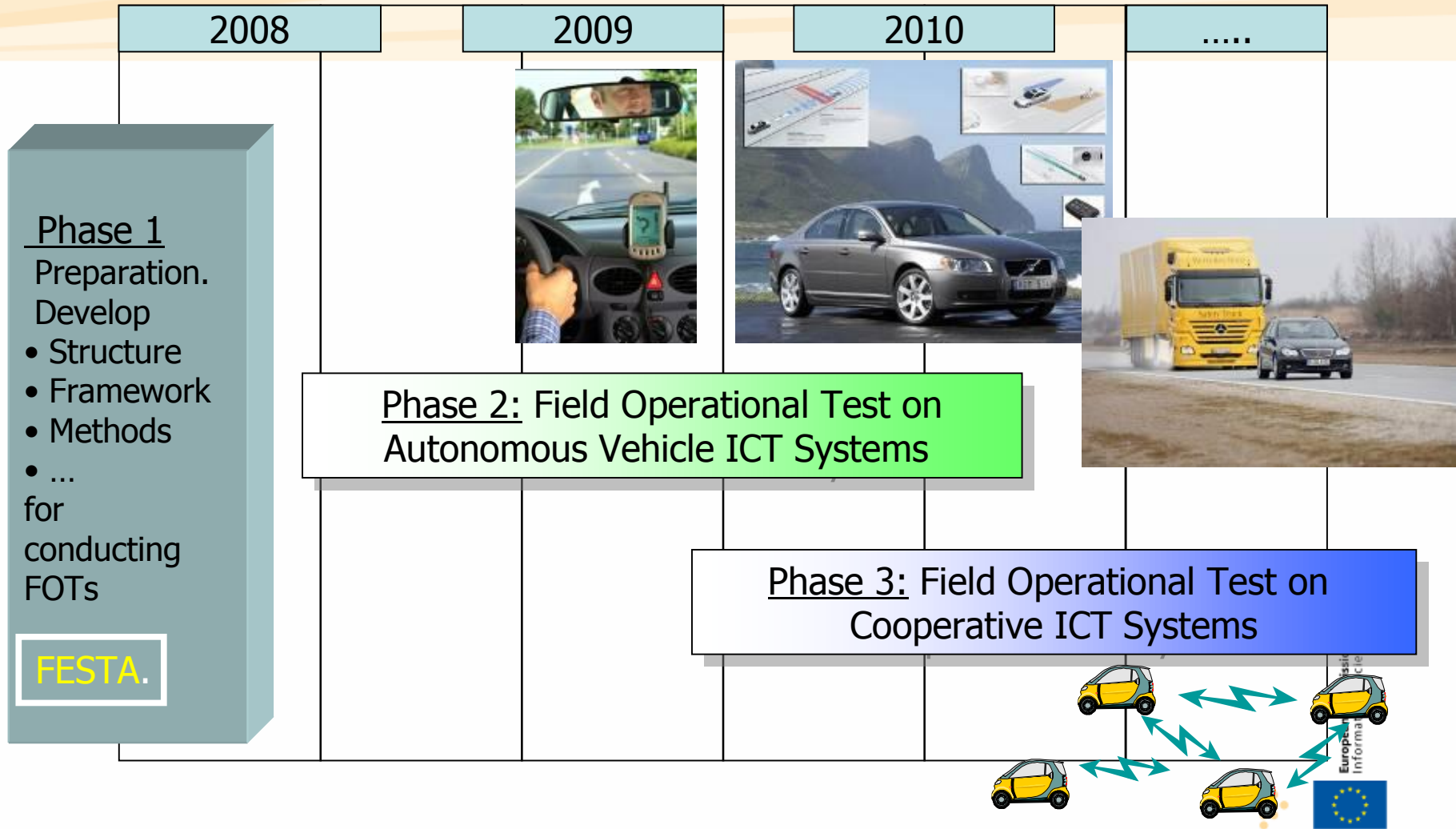


Addressing the Challenges RTD in the 6th and the 7th FP



Deploying Cooperative Systems

The Role of FOTs



3. Inspiration from Developed Countries

■ Traffic and Congestion are still focus of ITS.

But: New Topics

■ Environment and Energy are new topics

■ Safety

- ◆ Intelligent Vehicle

- ◆ Cooperative System

■ Communication in ITS

- ◆ Connected Vehicle

- ◆ V2V, V2I

- ◆ 3G, 4G, WiFi



■ Different Development Strategy and Different Path

◆ US: IVHS→IVI→VII→IntelliDrive

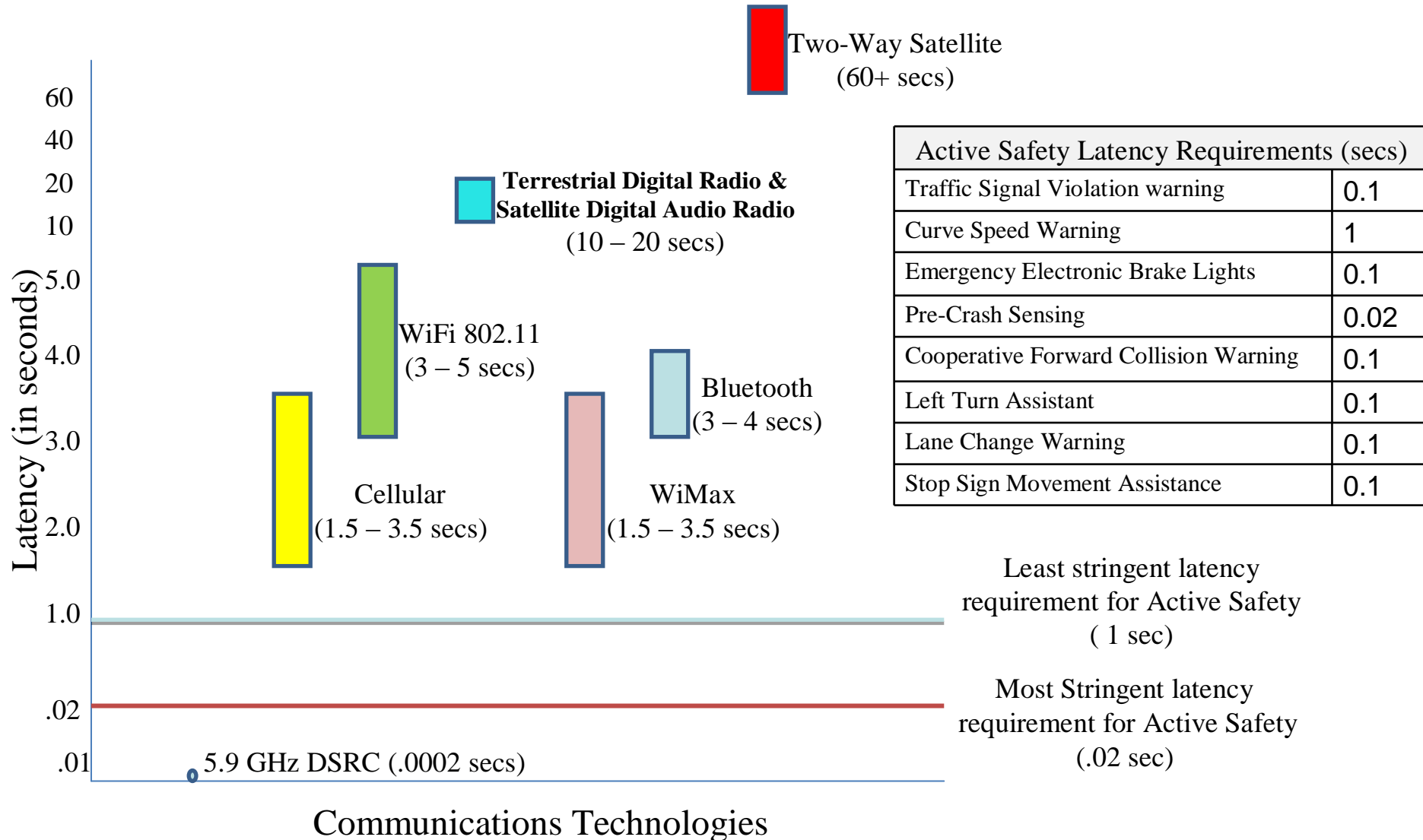
◆ Japan:
ETC&VICS&ASV→Smartway→Cooperative

■ Different Effects

◆ US: Research and Research

◆ Japan: Development and Application

Latency vs. Communications Technologies For IntelliDriveSM

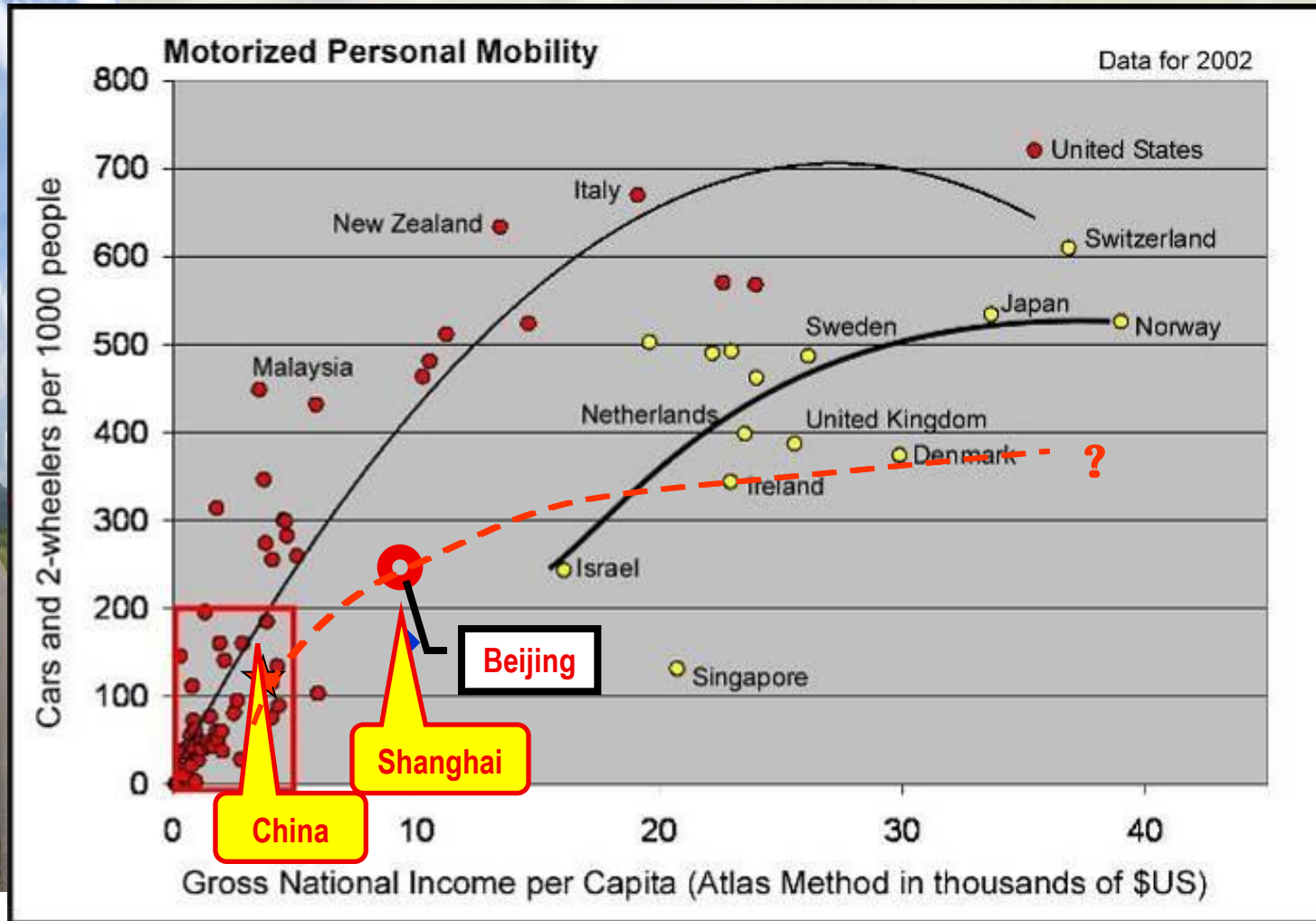




II. Next Generation ITS in China

1. Economy and Transport in China

■ Economy, Population and Vehicle ~ Restriction



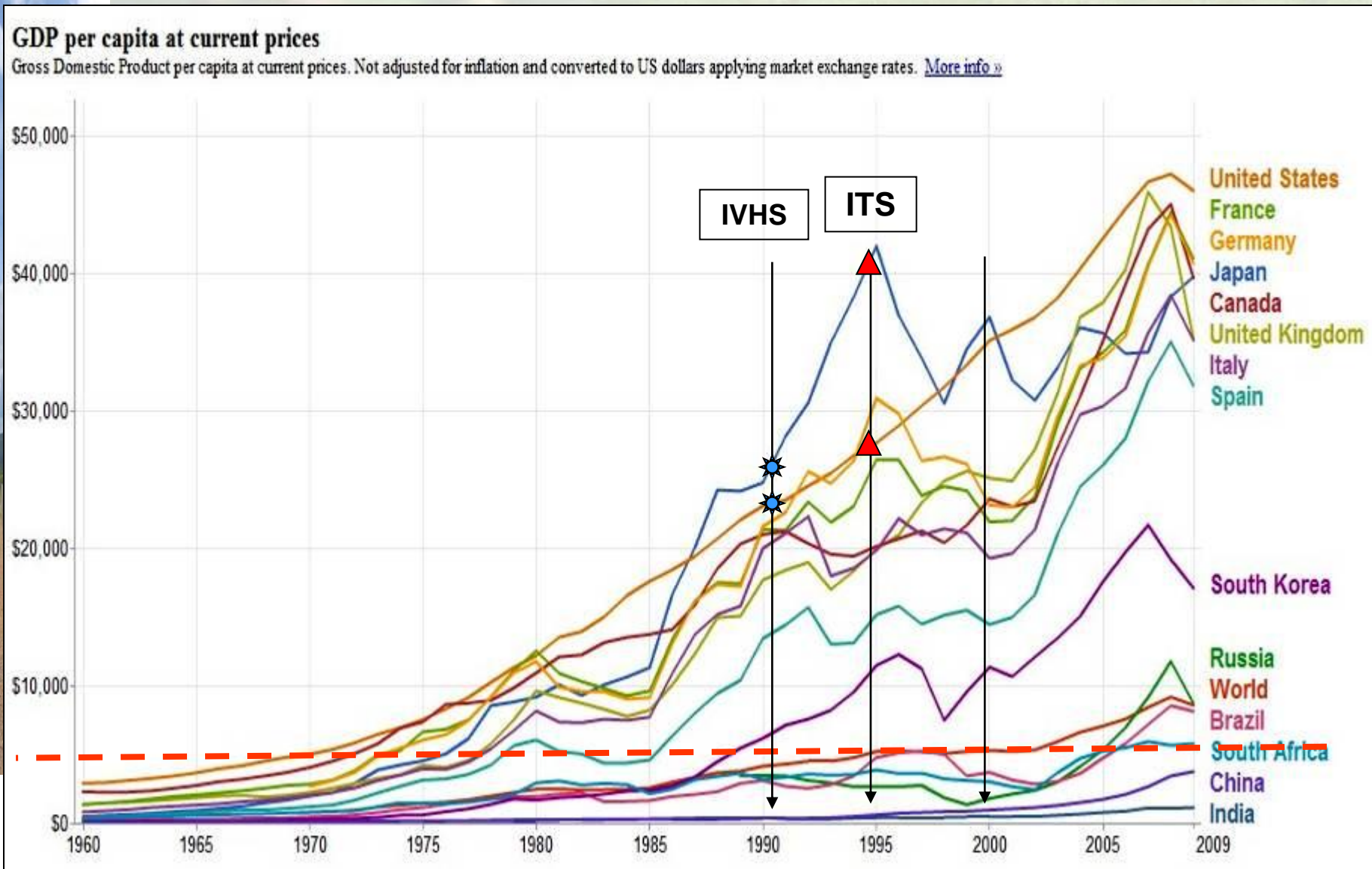
中国2010年人均GDP (\$) :

■ 北京:10600

■ 上海:11280

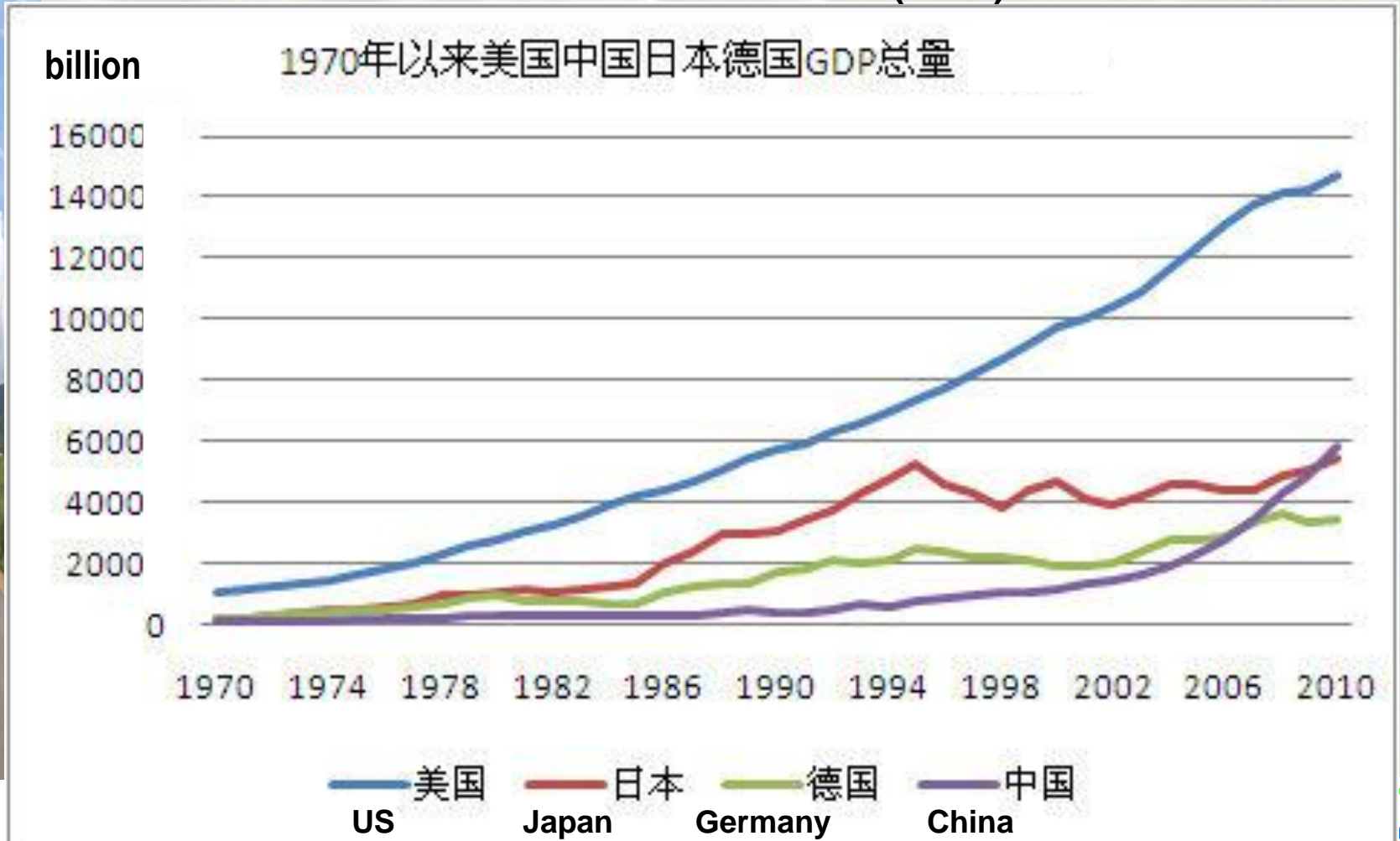
■ 全国: 4500

■ We Must Find Own Path on ITS



■ We could do some thing

China GDP: 6120 billion USD (2010)



2. New Technology, Many New Tools

■ Next Generation Information Technology Could Provide New Tool for ITS

◆ Next Generation Telecommunication

- DSRC
- 3G, 4G and LTE
- Advanced Wireless LAN

◆ Next Generation Internet

◆ New Sensor and Sensor Network

◆ Intelligent User Devices

◆ Next Generation Radio Broadcast

■ A Huge User Grupe

- ◆ Internet Population: 457 million
- ◆ Mobile Phone User: 860 million
- ◆ 3G User: 47 million

■ ITS is a part of the Market of New Industry

3. Development Strategy

- **Support Modern Transportation in China**
- **Support New Communication Industry in China**
- **Find Own Path**

ITS Service Object Must Change

服务对象 (Service object)	
过去 10 年 (Past 10 Years)	未来 5~10 年 (Next 5~10Years)
小汽车 Cars	公共交通 Public Transport
管理和运营 Managers/ Operators	出行者 Travelers
	交通安全 Traffic Safety
	农村交通运输 Rural Area
	综合交通 Inter-model Transport

4. Next 5 Years Plan

2001-2005

- **Technology Development**
 - Intelligent Control
 - Data Detection and Processing
 - Bus Despatching Technology
 - DSRC
 - Intelligent Vehicle
- **Demonstration**
 - Traffic Management
 - Toll Collection System

2006-2010

- **Integrated Application**
 - Large Event Transport Service
 - ETC & Expressway management
 - Incident management
- **Innovation and ITS Industry**
- **Road Safety**

2011-2015

- **ITS Technology**
 - ITS based on Next Generation Information Technology
 - Cooperative system
- **ITS Application**
 - Transport Network Perception & Surveillance
 - Transport Information Service
 - Intelligent Public Transport Management
 - Traffic Safety
 - Eco ITS
 - Inter-model Transport



(1) Public Transport

- ◆ Intelligent Public Transport Management and Service

(智能化公交管理与服务体系建设)

- ◆ Multi-modal Passenger Transit Center Management and Service

(综合枢纽管理与服务)

- ◆ Transfer Information Service System

(换乘信息系统)



(2) Urban Transport Coordination

◆ Urban Transport Operation Coordinating and Management

(城市交通运行协调管理系统)

- 统筹城市公交、轨道交通、出租汽车、客运枢纽、路网及停车管理等业务领域，整合多源交通数据，实现城市路网运行状态监测、城市交通运行协调和应急事件处置决策


◆ Parking Guide and Management System

(停车管理和停车诱导系统建设)



(3) Transport Safety and Emergency Management

- ◆ Subway and Light Rail Transport Safety management System
(轨道交通安全监控与应急处置系统)
- ◆ Highway Network monitoring and Incident Management
(公路网运行监管与应急处置系统)
- ◆ Commercial Vehicles Monitoring and Management
(重点营运车辆运行监管与服务系统)



(4) Traveler Convenience and Information Service

◆ The Spread of ETC

(ETC推广应用)

◆ Travel Information Service System

(出行信息服务系统)

- NG-Broadcast,

- NG-Internet

- 3G, 4G

◆ Highway Weather Report System

(公路气象服务系统)



(5) Demonstration Projects

- ◆ Highway Network monitoring and Incident Management
(公路网运行监管与应急处置系统)
- ◆ Travel Information Service System
(公路出行信息服务系统)
- ◆ Public Transport City Demo
(公交城市示范)
- ◆ Passenger Transfer Center Service System in Urban Area
(城市客运枢纽信息服务系统)
- ◆ Taxi Service System
(出租车服务管理系统)



■ (6) ITS Standardization

- ◆ Standard
(标准制定)
- ◆ Data Collection, Management and Exchange
(数据采集、数据管理与交换)
- ◆ Supervising the Usage of ITS Standard
(加强应用监管)
- ◆ Test of Equipments and Systems
(设备和系统检测)
- ◆ Cooperation
(合作)
 - Cooperate with Other SAC/TCs
 - Cooperate with ISO, ITU and ETSI



(7) Research

- ◆ **Cooperative System**

(车路协调技术)

- ◆ **Eco-ITS**

(生态智能交通技术跟踪与研发)

- ◆ **Communication in ITS**

(新一代移动通信在ITS中的应用研究)



III. Cooperative System Research and Development

1. Communication in ITS

National Project

1. Communication Architecture for ITS

1-1 Study of Need for Communication in ITS

1-2 Study of Communication Technology Using Scene in ITS

1-3 Development of Communication Architecture for ITS

2. Communication Technology in ITS

2-1 Evaluation of Key Communication Technology in ITS

2-2 Demo of Communication in ITS

2-3 DSRC Development

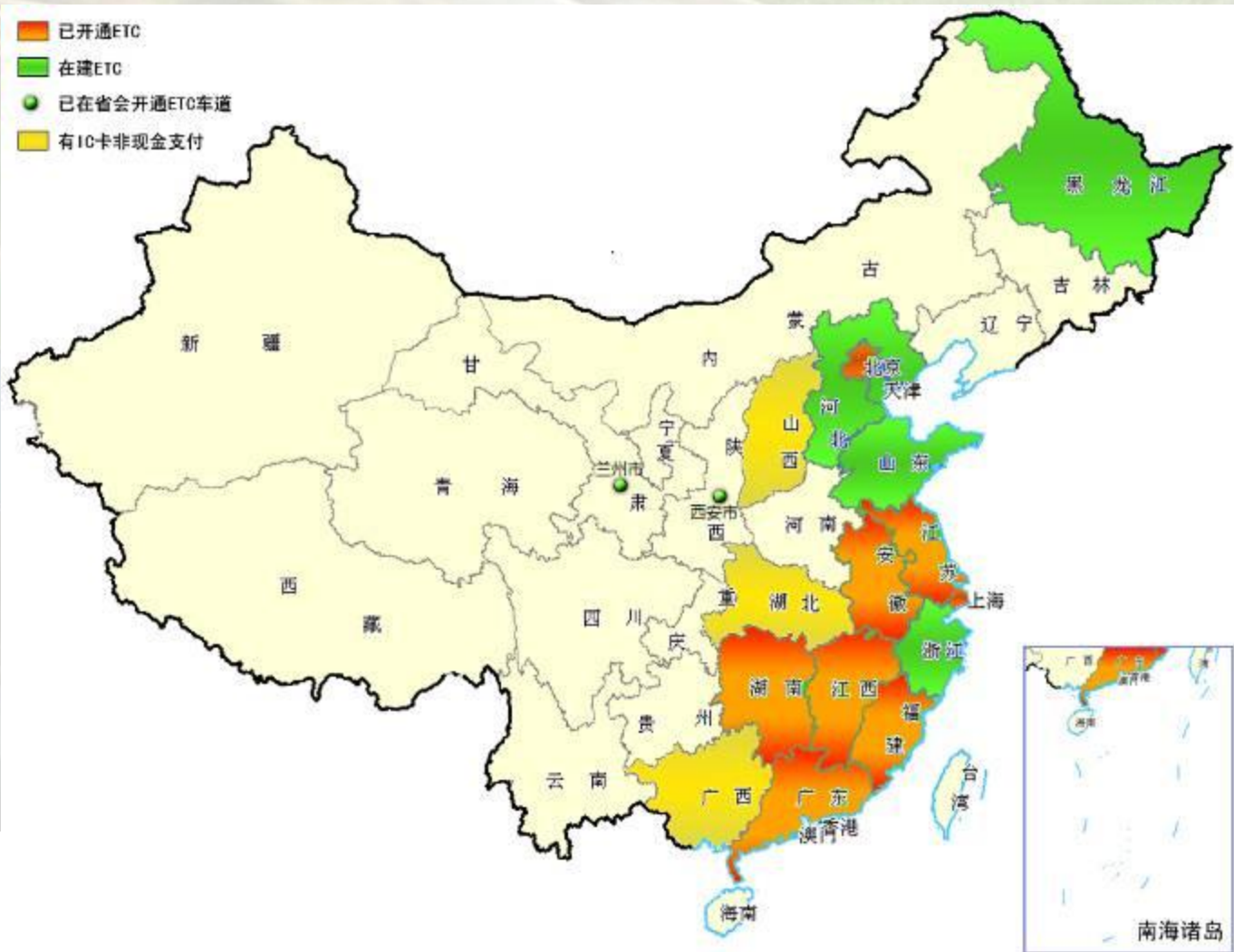
2. ETC (DSRC) Deployment

- ◆ Development and Test from 1998
 - Province Demo: Guangdong, 2004
- ◆ National ETC Standard : 2007
- ◆ National Expressway ETC System Deployment (2007~2009)
 - Must adopt China National Standard
 - Beijing, Shanghai, Jiangsu, Anhui, Jiangxi, Hebei, Tianjin, Zhejiang
- ◆ National Wide Deployment from 2010



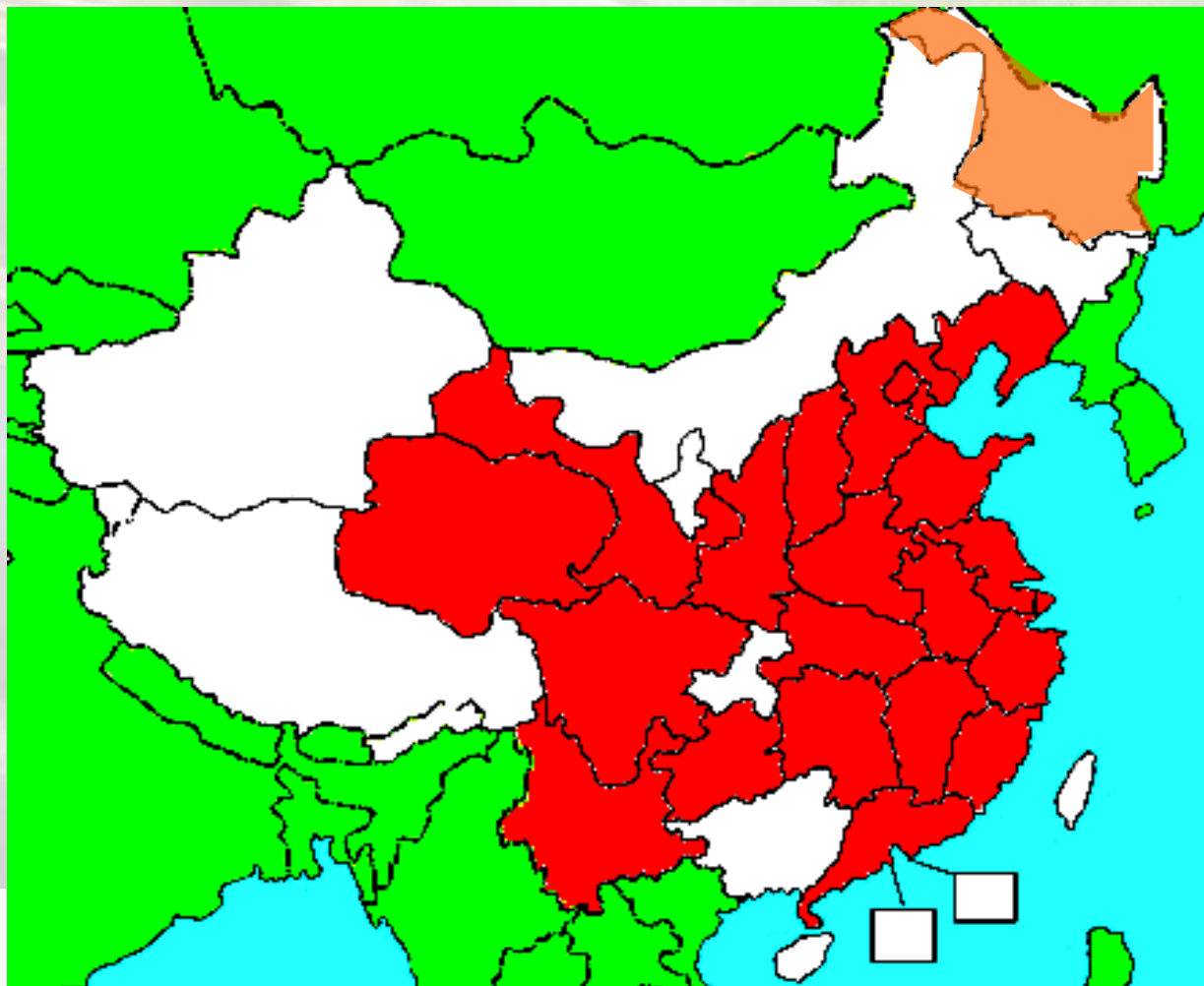
◆ To the End of 2009:

- ❑ ETC opened in 13 province, covered 10,000 km expressway
- ❑ Users: more than 700,000



◆ To the end of September, 2011

- ❑ ETC service opened in 19 provinces
- ❑ More than 2,500 ETC lanes have been built
- ❑ More than 2.3 million ETC users



■ Example:

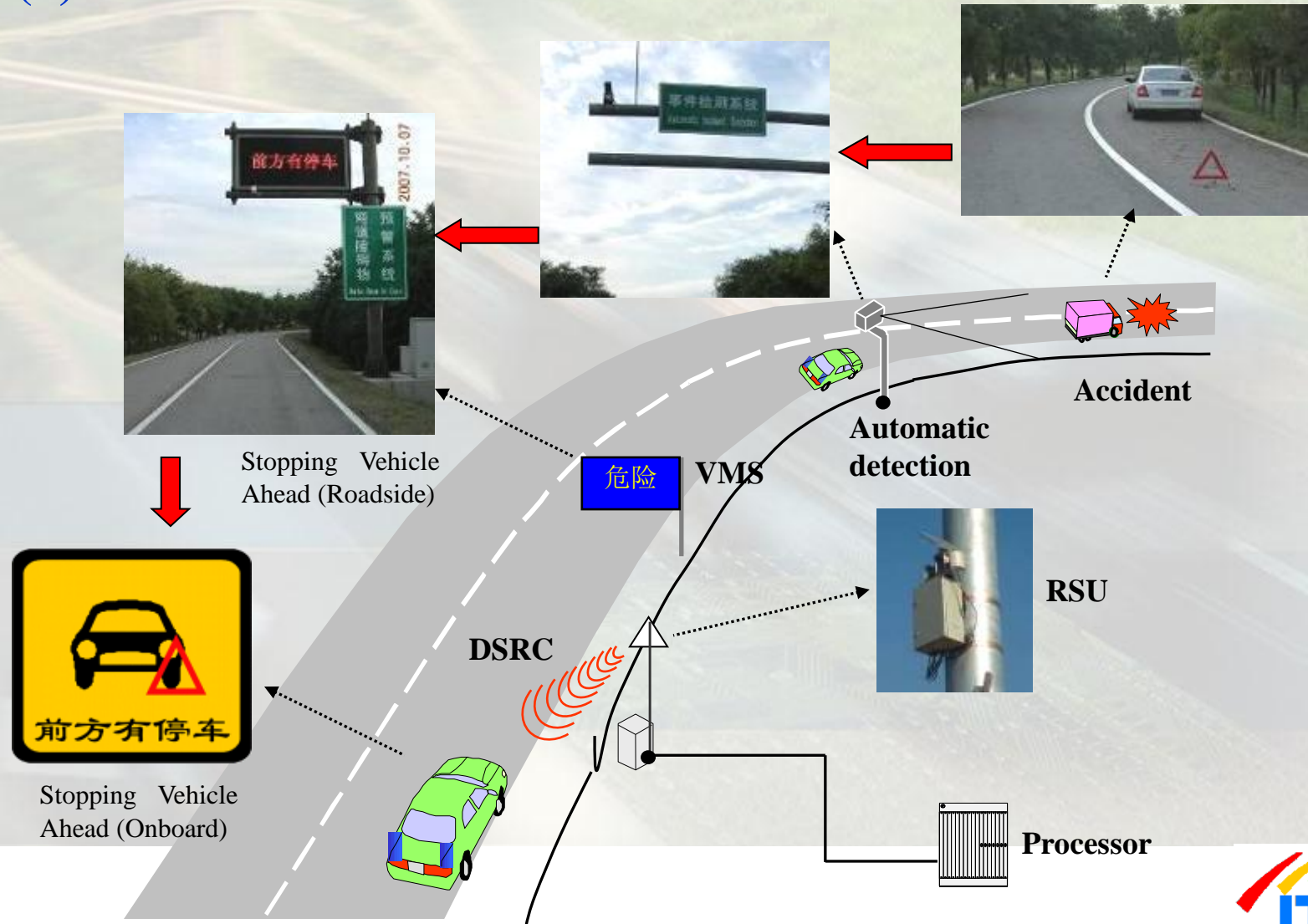
◆ ETC in Beijing

- ❑ Opened in the Nov. of 2008
- ❑ 365 ETC lanes
 - ◇ ETC lanes cover all toll stations
- ❑ Service station: 26
- ❑ More than 3000 ATM can recharge for ETC
- ❑ More than 550,000 ETC Users
- ❑ Utilization rate: 22% (as of August , 2011).



3. New Road-Vehicle Cooperative System Based DSRC

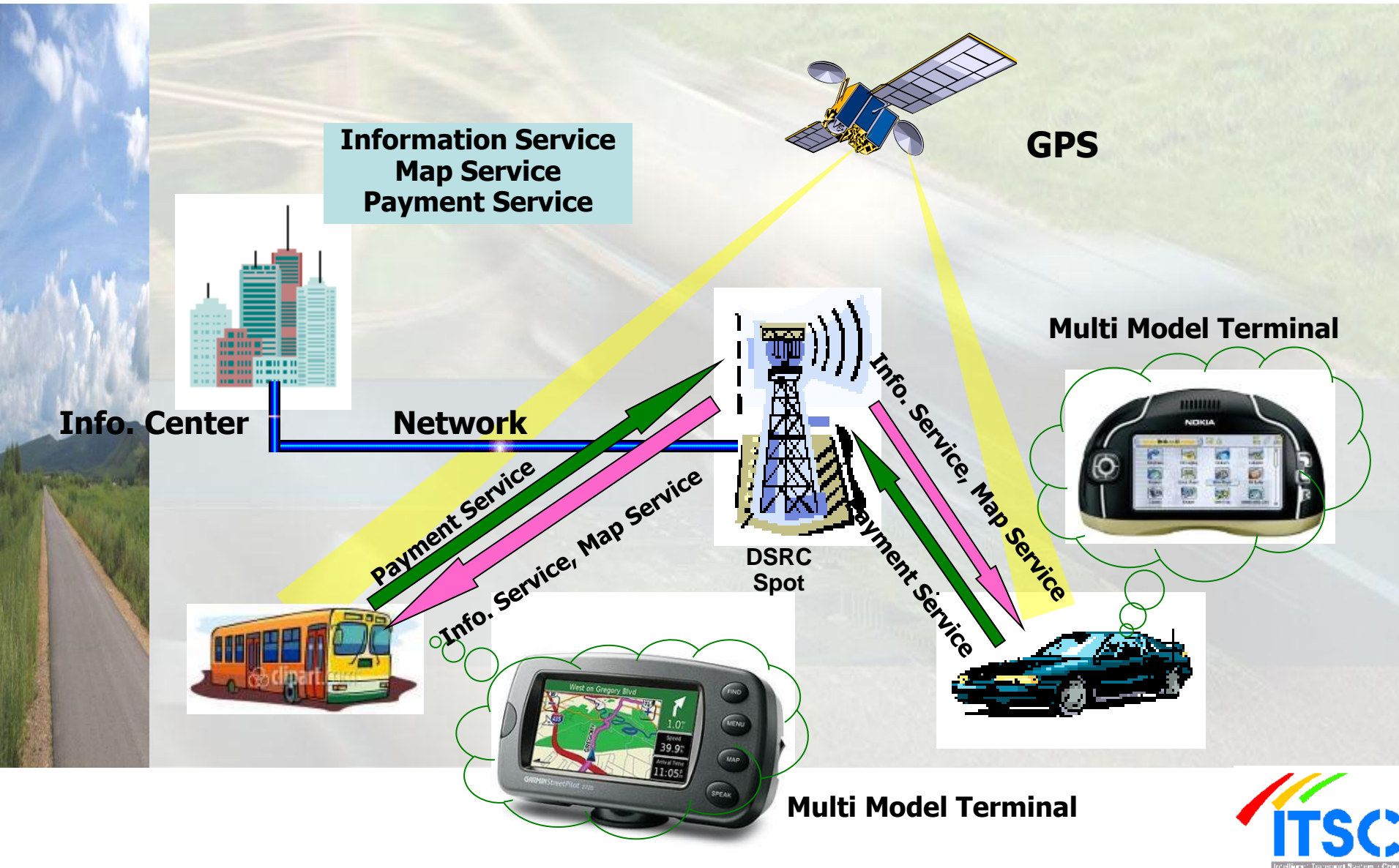
(1) Test Bed in RIOH of MOT



Research for V-V & V-I Communication



(2) DSRC (ETC Platform) for Cooperative System



Beijing

大羊坊收费站

马驹桥收费站

Expressway Demo

路侧稽查

路侧稽查

廊坊收费站

路侧稽查

路侧稽查

泗村店收费站

杨村收费站

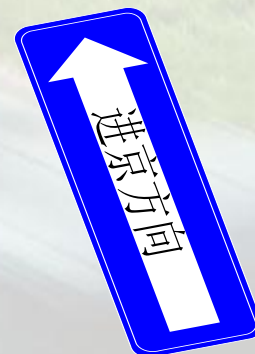
宜兴阜收费站

天津机场收费站

路侧稽查

路侧稽查

塘沽西收费站



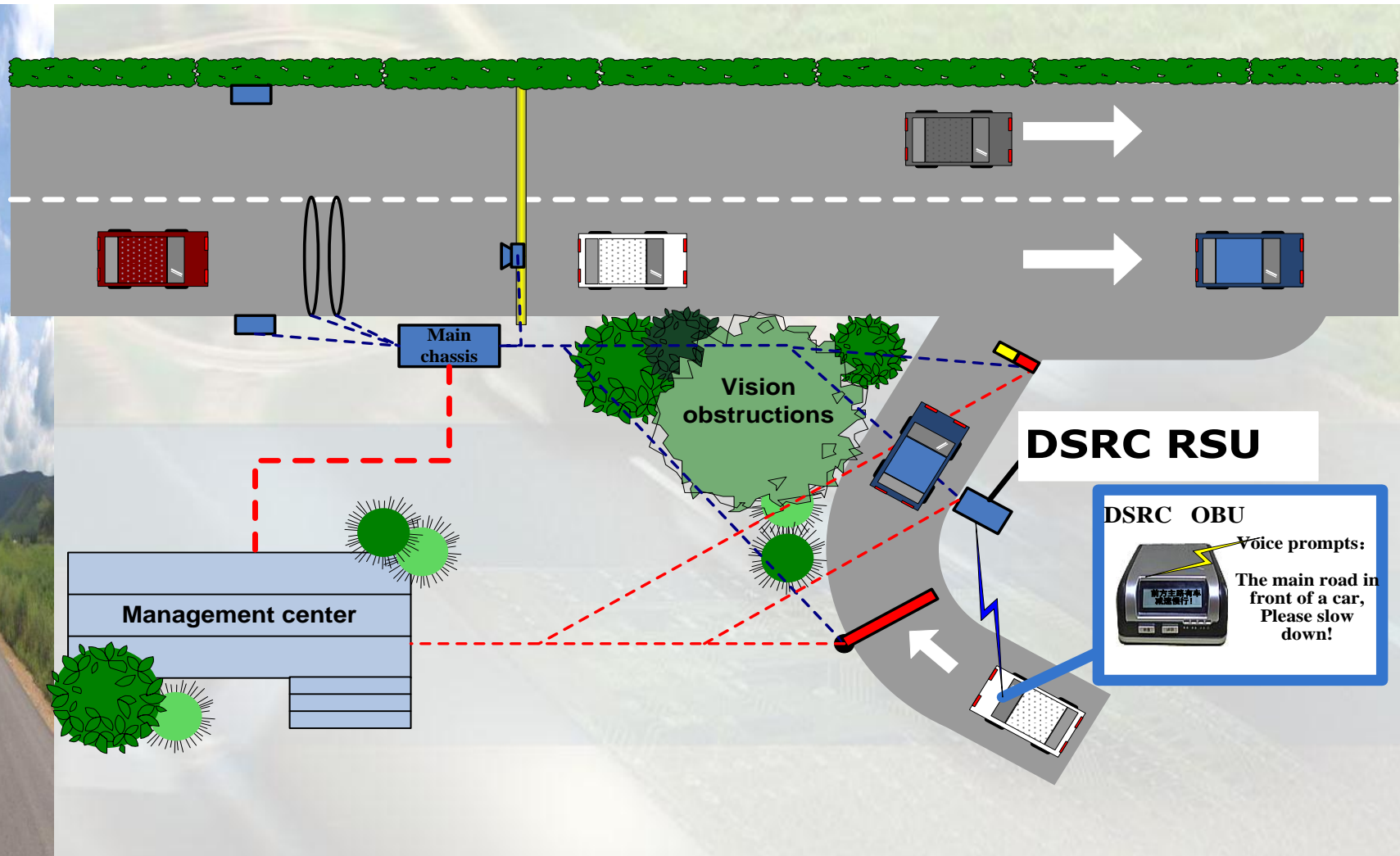
OBU and RSU





(3) Merging Support

(in Beijing to Tianjin Expressway)



National Road Safety Technology Action Plan

4. Other Research

■ V2V and V2I Technology Research

- ◆ 7 Universities
- ◆ 2 Research Institutes
- ◆ 1 Auto Company

■ Cooperative System for Intersection

- ◆ Tongji University (Shanghai)

■ Cooperative System for Traffic Control

- ◆ Technology University of Hunan (Guangzhou)

■ Intelligent Highway System

- ◆ Research Institute of Highway, MOT

The background is a collage of four images: a blue sky with white clouds on the left, a green landscape with a road on the bottom left, a blurred highway with a car on the top right, and a green circuit board on the bottom right.

谢谢！