ITS in China:

Development States and Prospects

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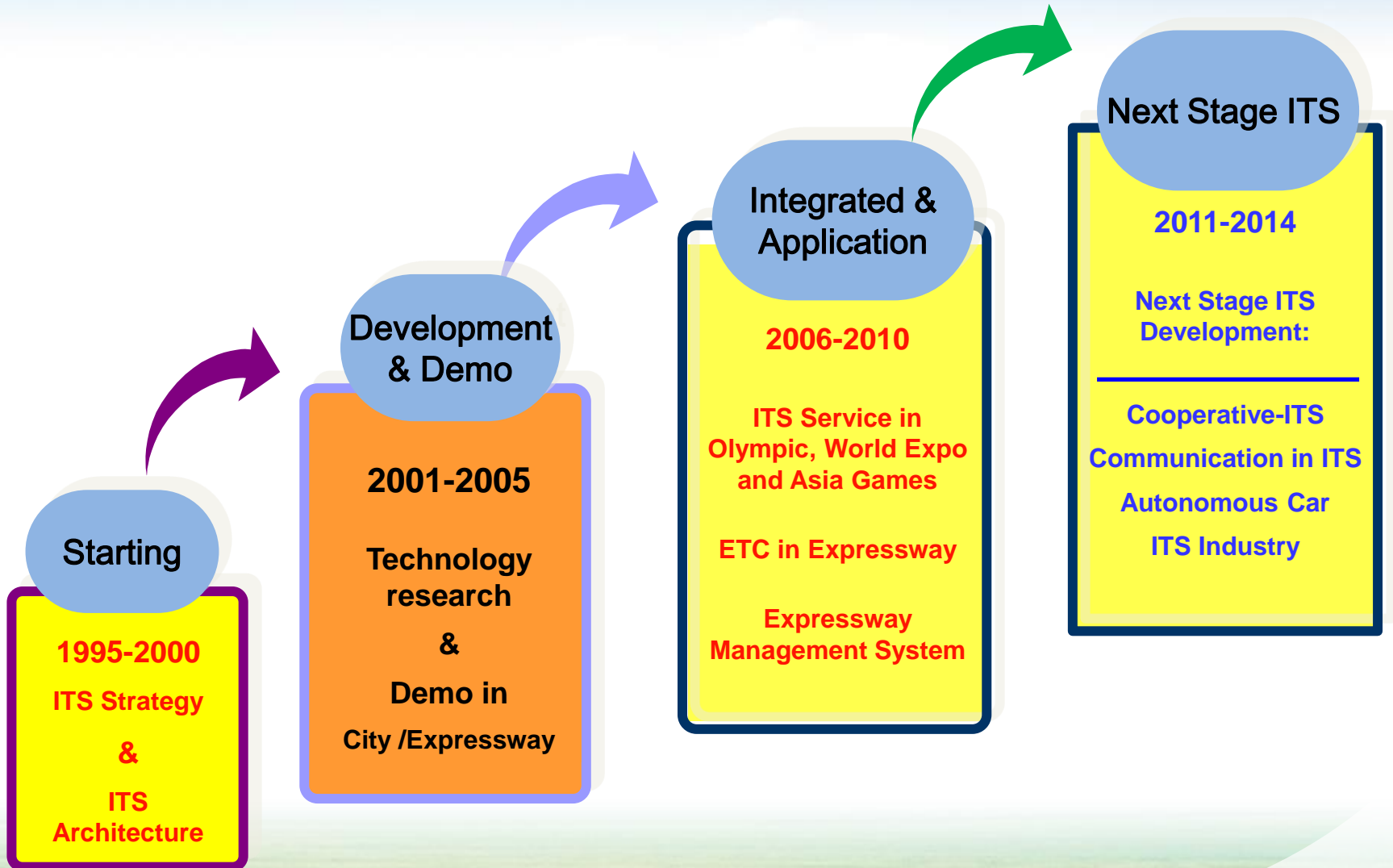
Content

1. **Review of ITS in China**

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1. Review of ITS in China

1.1 20-Year Look Back in China

❖ Top View of 20 -Year Picture Established by Planners, Managers, and Engineers

- Implementation of a National ITS Strategy

- Establishment of National ITS Architecture and National ITS Standard Framework

- Several ITS technologies have been applied in the country and created new industries

- National and local ITS application system promote safety, flexible, and environmentally safe movement of people and goods

- Enterprises have become the main role in the ITS development

ITS Historical Process in China

Starting

1995-2000

ITS Strategy

&

ITS Architecture

Development & Demo

2001-2005

Technology research

&

Demo in

City /Expressway

Integrated & Application

2006-2010

ITS Service in Olympic, World Expo and Asia Games

ETC in Expressway

Expressway Management System

Next Stage ITS

2011-2014

Next Stage ITS Development:

Cooperative-ITS

Communication in ITS

Autonomous Car

ITS Industry

1.2 ITS Development from 1995 to 2010

(1) ITS Start in China

- ◆ ITS became an important issue in transport development planning in 1995
  - ● Government was the only driving role
- ◆ ITS Development Item in MOT Plan
  - ● Establishing ITS Center
  - ● Establishing ITS Lab
  - ● Developing National ITS Strategic Plan (Begin in 1997)
  - ● Design ITS Research Plan

(2) Planning, Research & Demo (1998-2005)

❖ Highlights

- Development of National ITS Architecture
- Find out what works and what does not work – identify barriers to deployment
- Research and technology development
- Pilot project in cities and highways

❖ ITS Standardization

- Join ISO/TC204 (1995)
  - ISO/TC204 Chinese Domestic Committee (1998)
- National ITS Standard framework and plan
- National Standard Committee for ITS was set up in 2003 (SCA/TC268)

(3) Development and Deployment (2006-2010)

❖ ITS Technology Development Program

- Innovation and New technology for transportation
  - New method of data collection and processing
  - Traffic Safety
  - Intelligent Car

❖ Deployment

- ITS for urban traffic
  - Intelligent transport service for Olympic Games, World Expo, Asia Games
- ETC in Expressway
- National Expressway Monitoring System

❖ ITS Standardization

- 27 national ITS standards released
- 45 drafts of national ITS standard

1.3 Examples of ITS Application

(1) Traffic Information Service

- ❖ Data collection
  - Vehicle detector
  - Probe cars
    - GPS, Mobile phone
- ❖ Information service
  - Broadcast
  - VMS
  - Navigator
  - Website
  - Smart phone

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Probe Car

❖ Beijing: More than 60,000 taxies

❖ Shanghai: More than 20,000 taxies

❖ Guangzhou: More than 20,000 vehicles (taxi+bus)
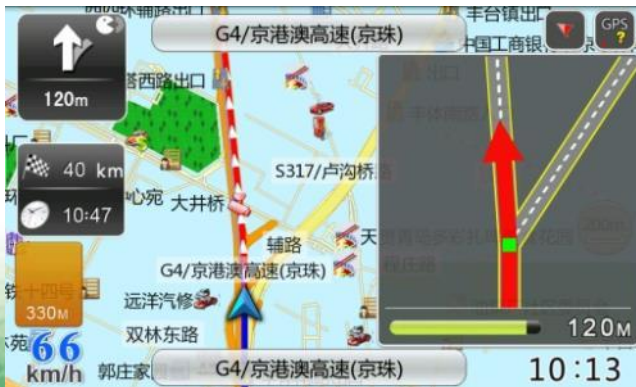
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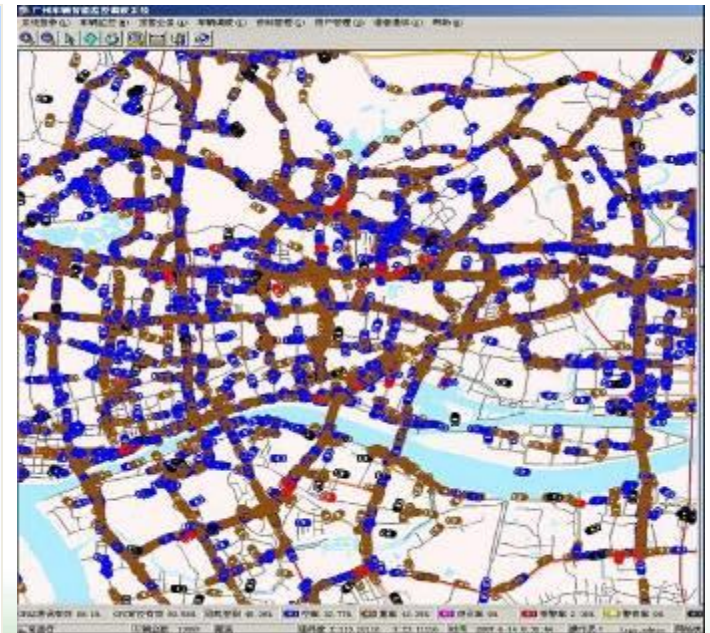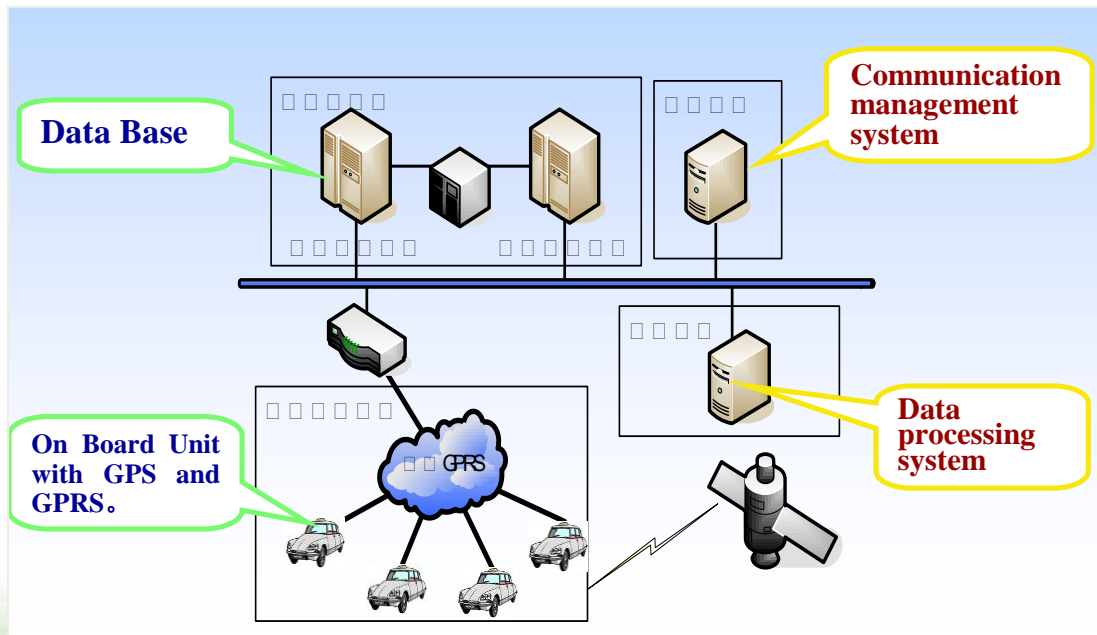
Traffic Information Service

Road operation states

Traffic information service in web

Traffic information service by navigator and smartphone and

Traffic Information via VMS

- An integrated system
- Cover urban area
- Example: about 500 VMS in Beijing

Beijing

Haikou

Beijing

Shanghai

Changsha

(2) Urban Traffic Management and Control

❖ City Traffic Center: More than 600 cities
❖ Traffic Signal System
  ▪ SCOOT, SCATS
  ▪ Hisense

❖ Monitoring Camera: 51 thousand

(3) Smart Bus System

❖ Smart Card: more than 350 million

❖ Bus Rapid Transit (BRT)

❖ Smart Dispatching System
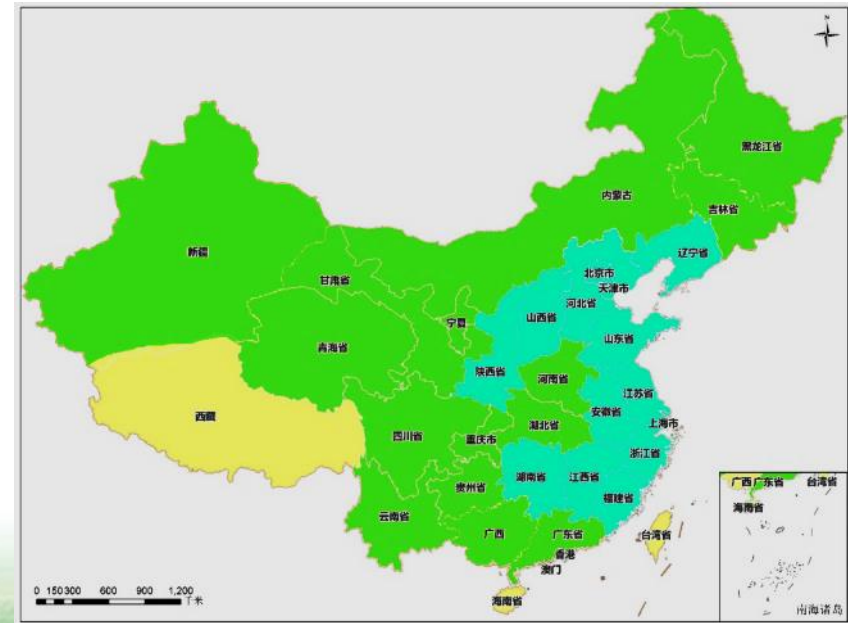
(4) ETC in China

❖ National ETC Standard : 2007

  ▪ Based DSRC Technology

  ▪ Frequency: 5.8 GHz

  ▪ Semi-Active (awakening) and two pieces OBU

❖ National Wide Deployment from 2010

❖ Now

  ▪ Cover area: 26 provinces

  ▪ Total ETC lanes: more than 7000
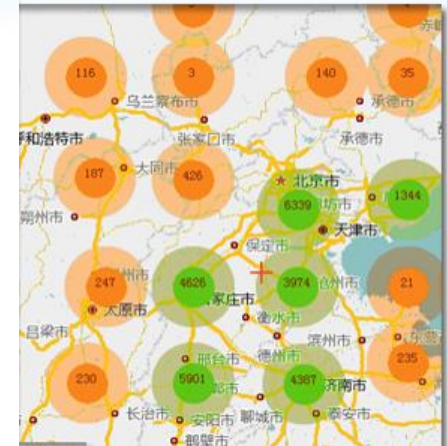
  ▪ ETC users: more than 15 million

(5) Commercial Vehicle Monitoring System

❖ National Platform

  ▪ Integrated 1000 GPS Service Companies

  ▪ Sharing information, Monitoring vehicle and driver, Management

❖ Online Commercial vehicle: 2 million

2. New R&D in Recent Years

2.1 Study of ITS Architecture Based Next Generation Mobile Communication

(1) Project Outline

- **Project Team**
  - RIOH, MoT
  - Research Institute of Telecommunications, MoII
  - Beijing University of Posts and Telecommunications
  - China Telecom group company
  - Datang Telecom Technology and Industry Group
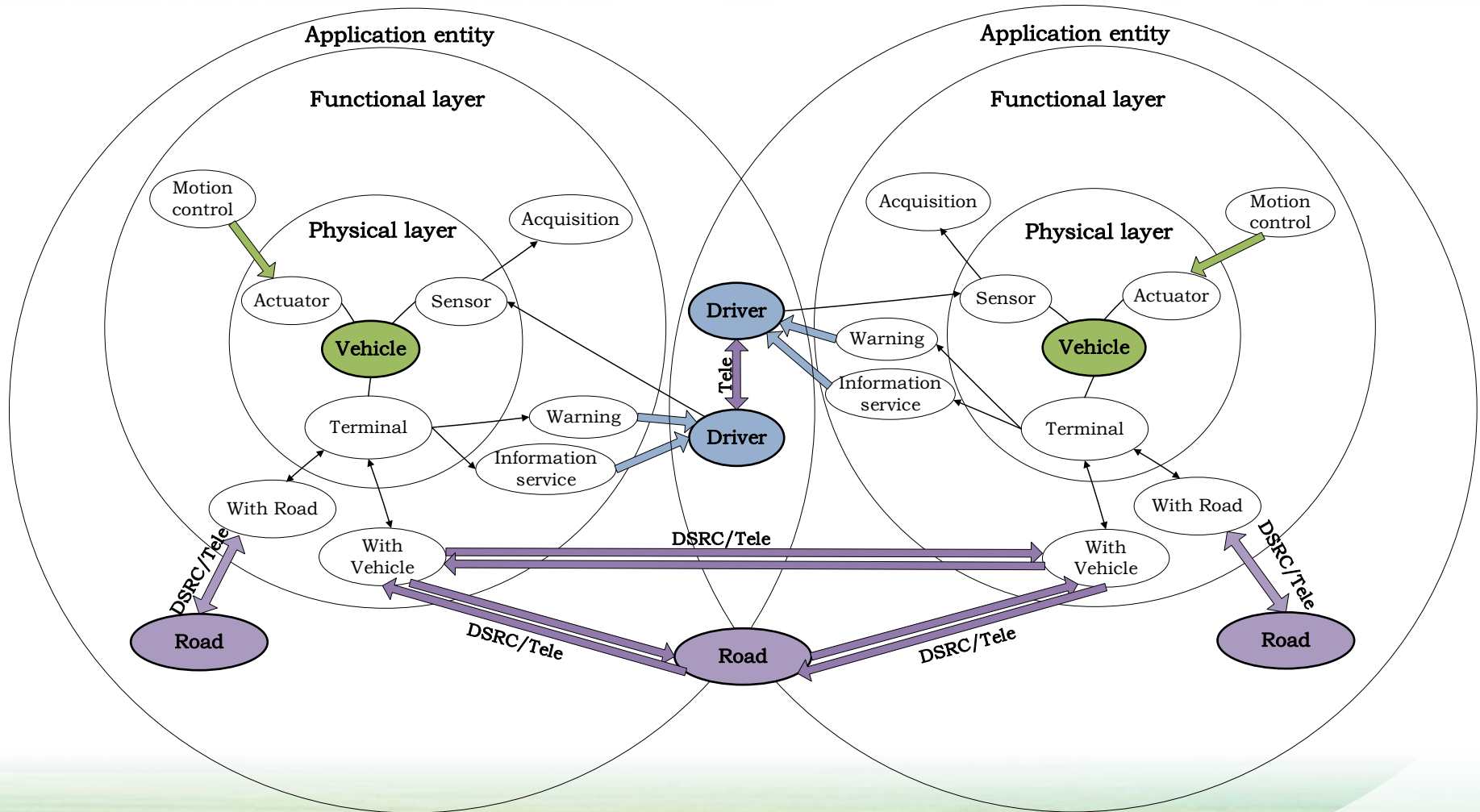- **Period of Project**
  - October of 2012 to June of 2014

(2) Main Results of the Project
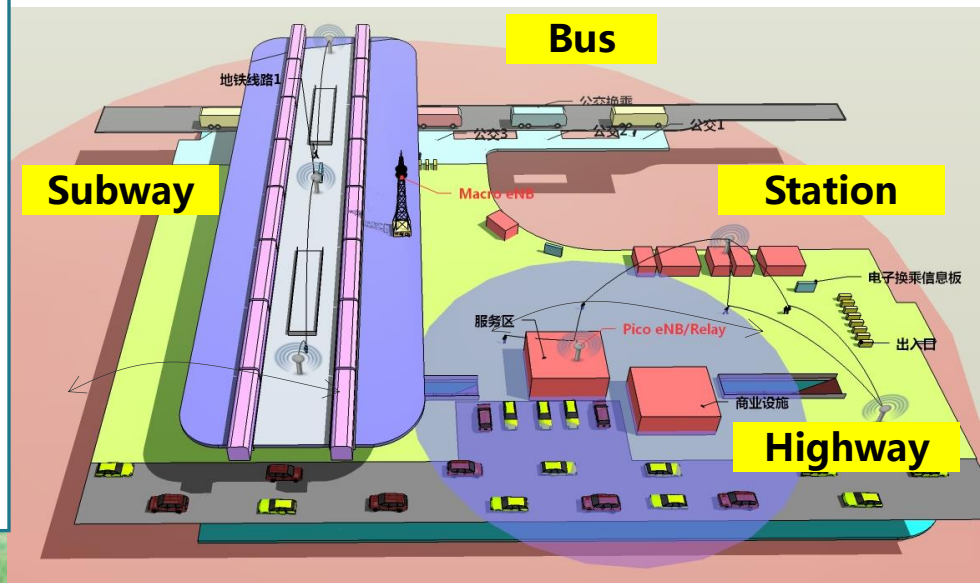
① Cooperative ITS Architecture

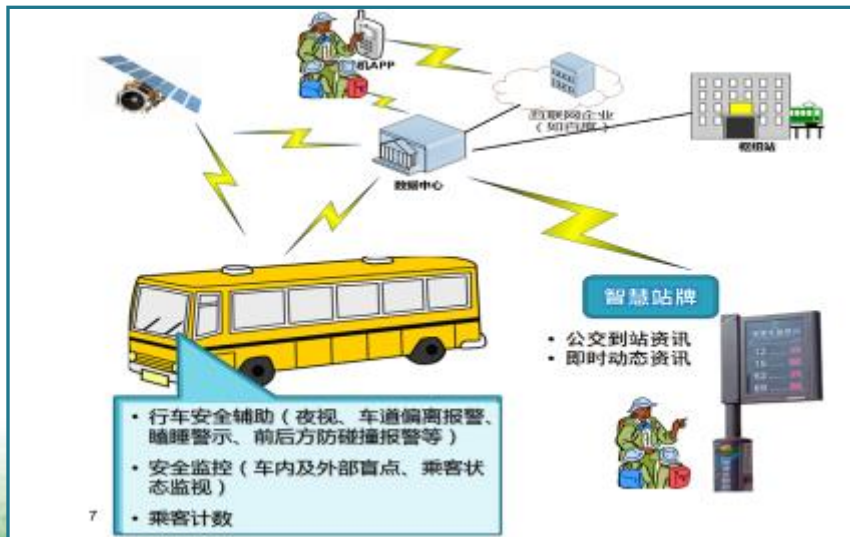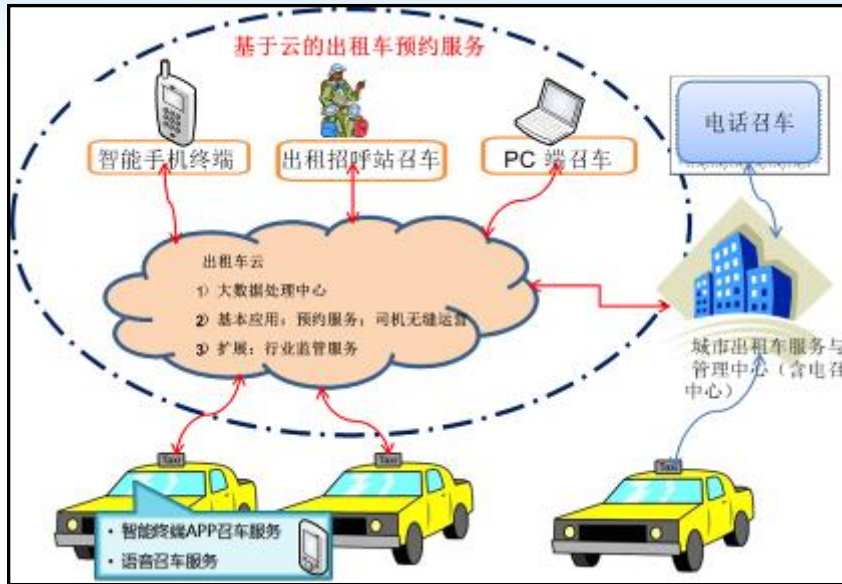● **Framework of Vehicle-Infrastructure Cooperation System**
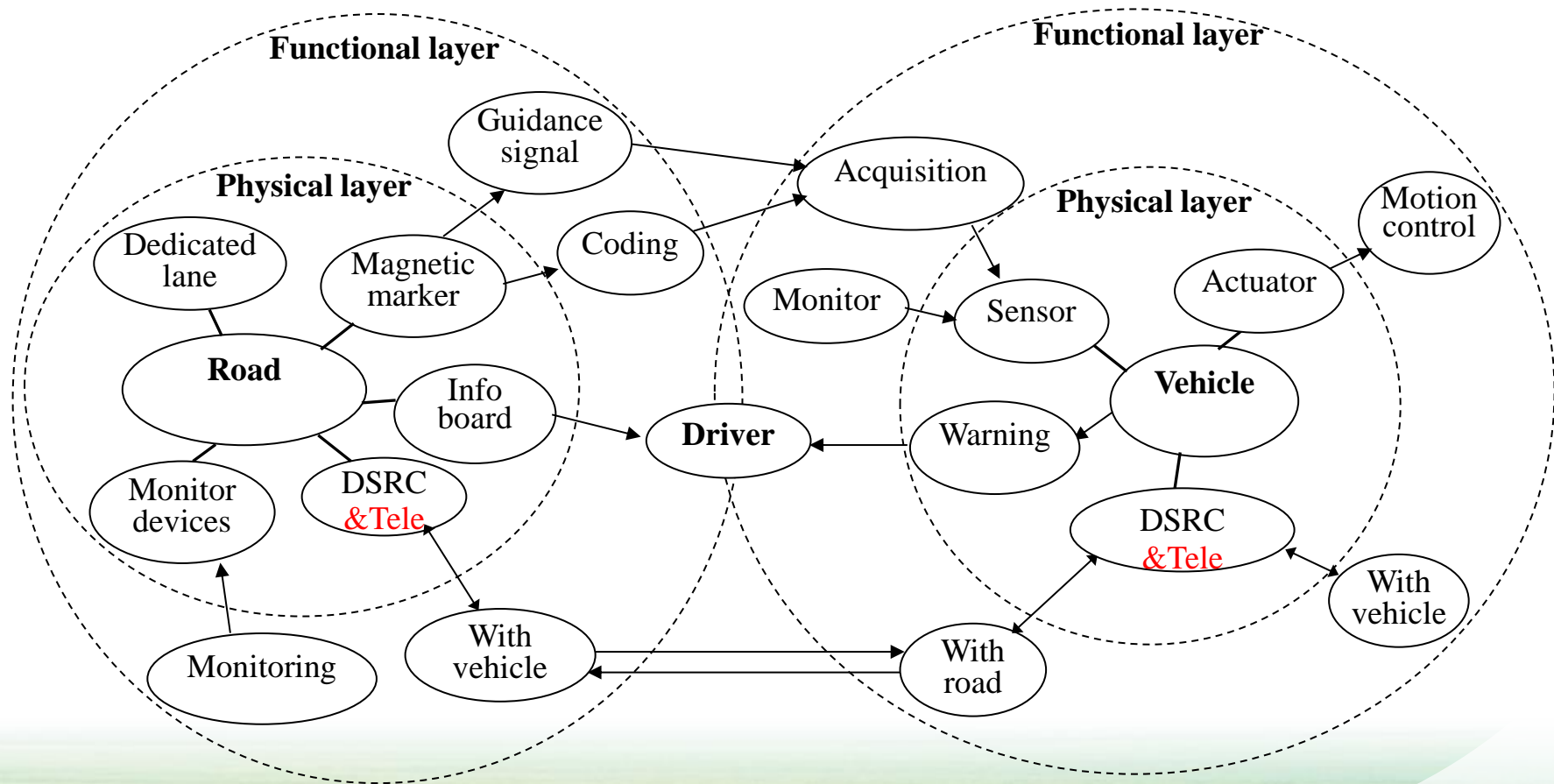
Framework of Vehicle-Vehicle Cooperation System

② **Scenarios**

- **For Vehicle Safety**

Safety Warning

Risk Avoidance

For Passenger and Freight Transport

For Integrated Use
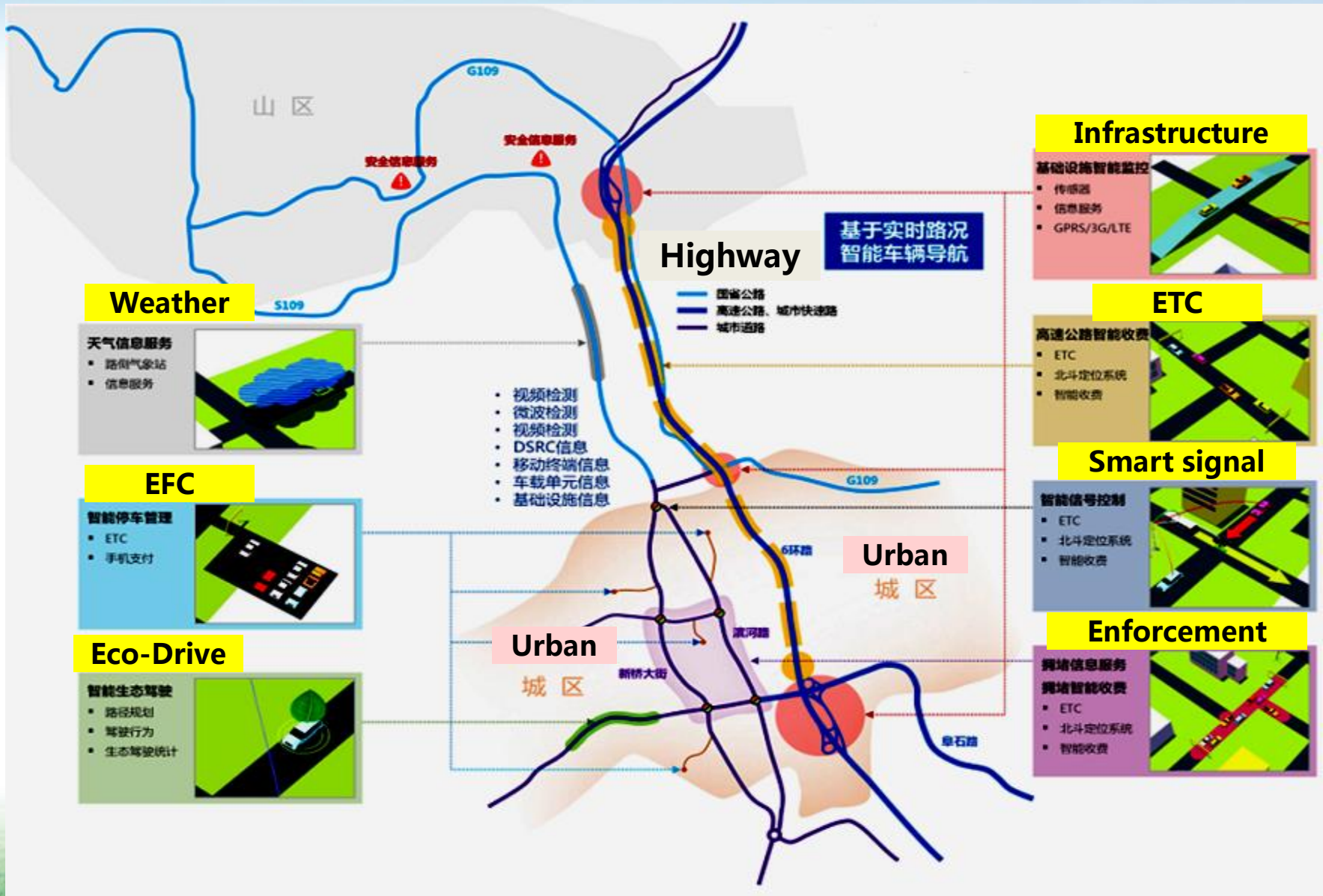
③ Communication in ITS

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

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DSRC for Cooperative ITS

Used for Vehicle to Roadside and Vehicle to Vehicle
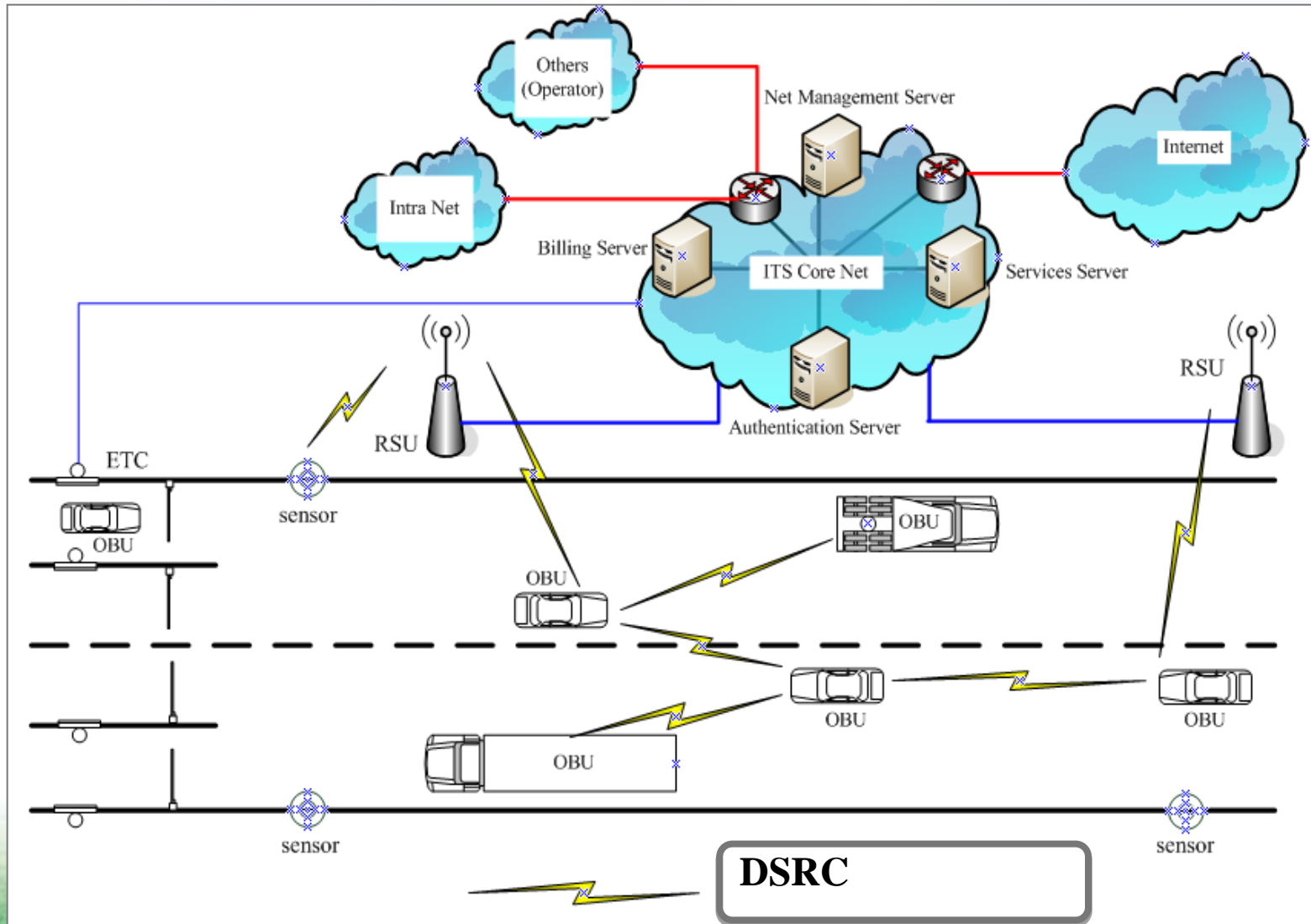
Coordinating DSRC and Mobile

C-ITS DSRC

- License Band for ITS System
- Design for transportation safety and special requirements from transportation industry.
- Coverage along road and highway
- Short delay, quickly response, ms
- Simple network architecture
- Private network

Mobile Networks

- License Band For Mobile Network
- For public service
- coverage everywhere
- Long delay, senconds
- Complicated network Architecture
- Provide transport information services, no need to change Mobile Network.

Modules in OBU:

Location Module（GPS/Big Dipper/GLONASS）+ 3G/4G(5G) Modem + DSRC(ETC/ C-ITS DSRC) + Connectivity（Wi-Fi/Bluetooth） + CPU + Memory (RAM/ROM) + other Chipsets (PMU/RF……)

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2.2 Vehicle and Infrastructure Cooperative System Technology

- On board system technology
- Road side system technology
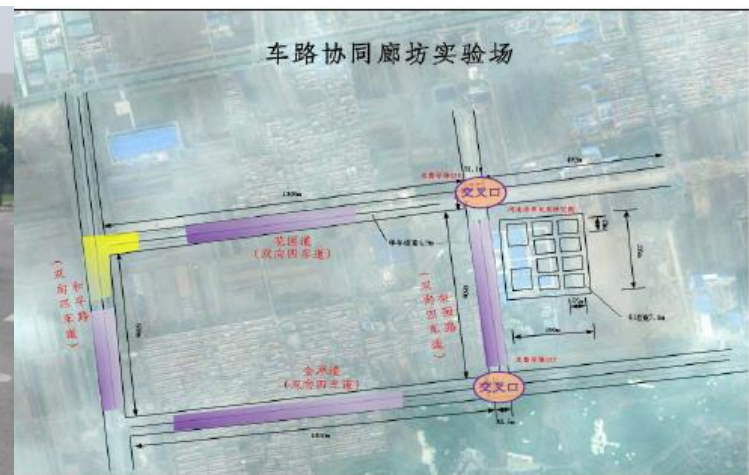- Communication and control
- Simulation
- Integration

National Research Project Supported by MOST

➢ **Cooperative Active Safety Control**

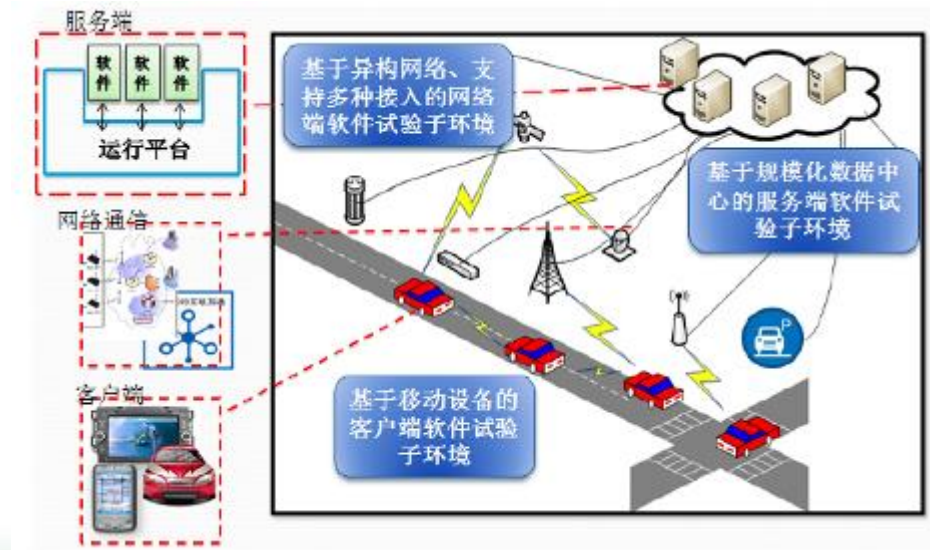Car following system via v2v communication

Vehicle Speed Guidance and Adaptive Signal Control

2.3 ITS Research based on Internet

- Based mobile internet
- Data management technology
- Software
- Service Technology

2.4 New Standard Plan in C-ITS

❖ Cooperative System, DSRC

- Part 1: General Technology Requirement
- Part 2: Physical and MAC Layer

Issued by Government

- Part 3: Network and Application Layer
- Part 4: Equipment Application

Finish in the end of the year

❖ Cooperative System, Application

- General Technology Requirement for Telematics Service of Vehicle Monitoring and Traveler Information

- Function Requirement of Vehicle Crash Warning

2.5 Security of C-ITS

(1) Research

❖ Security Technology in C-ITS

- Secure problem in different use scenes
- Essential security messages of vehicle and infrastructure
- Evaluation method for Security

❖ Credential management and authentication system (CMAS)

- Requirement of security certificates
- Define roles for management authority and auto manufacturers
- Governance structure of C-ITS Security

(2) Regulatory Authority and Facilities

❖ Management Center under the MOT (plan)

❖ National certificates management and authentication system

Has passed national authority certification in Feb of 2013

2.6 Autonomous Car R&D

❖ Chang An Auto

❖ Military Traffic Institute

3. New Strategy for ITS

3.1 New Policy and Strategy

(1) National Transport development Policy

❖ Transport Must support the *National Strategy* and Sustainable Development

- "One Belt, One Road" / Collaborative development of Beijing, Tianjin and Hebei

- "Internet Plus" Action Plan/"Made in China 2025 "

- Improving the quality and efficiency of transportation

- Improving safety and emergency management

- Developing green transport system

- Decreasing the usage of private car
  - More attention on *Public Transport*
  - More attention on *Improving Convenience by ICT*

(2) A New ITS Promoting Strategy

❖ Driven by Market
  ▪ Enterprises play the leading role
  ▪ The market points the way
  ▪ Enterprises, universities and research institutes work together
  ▪ Innovating new business models

❖ Technology Innovation Center in Enterprise

  (Support by government)

❖ Encourage enterprises to increase expenditures on research and development

❖ Encourage competition in the service market

3.2 ITS Technology Development

- ❑ Cooperative ITS, intelligent vehicle and intelligent service
- ❑ Integration of the internet and the transportation
- ❑ Application of the mobile communication in V2I and V2V
- ❑ Integration of new energy vehicle technology and ITS

3.3 Standardization

❖ **Key areas**
- Data Management
- Communication application standard
- Interoperability
- Cyber Security in ITS
- Cooperative ITS

❖ **New Mechanisms for ITS Standardization**
- **National Pilot Organization in Standard**
  - China National ITS Alliance
    - **Members**
      - More than 140 members to the end of last month
      - Most Members are from industrial community
  - Alliance Standard Working Group
    - C-ITS, Nomadic Devices in ITS, Security of Onboard Information Service, Intelligent Public Transport, Intelligent Car

Thank You !