Cooperative Vehicle-infrastructure System

ACTIVITIES IN CHINA

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National Center of ITS Engineering & Technology, China
1. CVIS Development plan
2. CVIS applications
3. CVIS standardization
## CVIS Development Plan

### 2001-2005
- **Technology Development**
  - Intelligent control
  - Data Detection and processing
  - Bus Despatching
  - DSRC
  - Intelligent vehicle
- **Demonstration**
  - Traffic Management
  - Toll collection system

### 2006-2010
- **Integrated Application**
  - Large Event Transport Service
  - ETC & Expressway Management
  - Incident Management & Traffic Safety
  - Innovation and ITS Industry

### 2011-2015
- **Next Generation ITS**
  - Green ITS
  - ITS Based on Next Generation Information Technology
  - Transport Information Service
  - Road Network Management
  - Eco-ITS
  - Intelligent Control in City
  - Inter-model Transport
  - Cooperative system
2、CVIS Applications
2.1 ETC

（1）ETC as the representative application of ITS has improved infrastructure efficiency and service level in China.
• Cover 26 provinces and cities
• Users More than 600 million
• Customs service outlets over 3500
• Land requisition reduced more than 8000 mu

• Reduce infrastructure investment 200 billion Yuan
• Reduce carbon dioxide emissions 380,000 tons
(2) Support to achieve the electronic management of military vehicles based on the ETC system

• About 300,000 military vehicles has installed ETC OBE
• In nationwide
• Set standards dedicated
  ✓《Military vehicle use ETC testing requirement》
ETC is becoming a comprehensive service platform—ETC & Traffic information collection

- **2012/10~2013/2:** TIC based ETC-OBE feasibility test, in the Beijing-Tianjin-Tanggu expressway
- **2013/6~2014/1:** Build 24 collection stations in 3 crossed expressways in Beijing highway network.
- **2014/1~2014/6:** Continue expand collection stations more than 100, cover 300km. Evaluate the running state of the expressway network in Beijing
2.2 The operating vehicle network control system

To strengthen dynamic tracking and monitoring of vehicles in nationwide, and improve the transportation safety.
National tracking and monitoring platform has access

- 31 provincial sub-platforms
- 1000 operators’ vehicle monitoring sub-systems
- 22,700,000 operating vehicles.

Key standards

- JT/T794-2011 《GNSS system of operating vehicles – Technical specifications for vehicle terminals》
- JT/T796-2011 《GNSS system of operating vehicles – Technical specifications for platform》
- JT/T809-2011 《GNSS system of operating vehicles – Platform data exchange》
- JT/T808-2011 《GNSS system of operating vehicles – Terminal communication protocol data format》
2.4 Others typical study and research

(1) Cooperation of vehicle in merging area

Undertaken by RIOH, Approved by the Ministry of transport
Test in JINGJINTANG Expressway

Detect abnormal vehicle, avoid collision risk.

The test of safety warning include:
- illegal parking
- hypervelocity
- heavy traffic
- and other risk to the safety.

Use effect:
- Serious conflicts reduced 57%
- Non-serious conflicts reduced 20%
- Total number of collisions reduced 25%.
(2) Intelligent Vehicle – Infrastructure Cooperation systems

National 863 Program
Period: 2011 – 2013
Research team:
10 organizations
● Goal
  – Increase the vehicle safety and traffic mobility based on data sharing via wireless comm.

● Benefits
  – Enrich traffic data
  – Share traffic data in real time

● Results:
  – Cooperative active safety
  – New signal control
Brief Introduction: i-VICS
3、CVIS Standardization
(1) Standard general requirement

- Communications
  - Multi-mode
- Services
  - Safety
  - Mobility

Open platform

ETC

Safety warning

Information service

Multi-application Integrated

2G/3G/4G
WiMax
RDS
V2I comm can be DSRC or Tele
V2V comm can be direct mode or indirect mode
CVIS DSRC standard Reference Architecture

- Traffic Efficency (eg. ETC GB/T20851.4)
- Road safety (20130076-T-469-D)
- Other applications

C-ITS Applications

- ETC App support ETC App Layer (GB/T20851.3)
- C-ITS App support C-ITS App Layer (20130076-T-469-C)

DSRC Network (20130076-T-469-C)

TCP/IP/UDP Network

Network & App Layer

- ETC MAC Layer (GB/T20851.2)
- C-ITS DSRC MAC Layer (20130076-T-469-B)

ETC PHY Layer (GB/T20851.1)

C-ITS DSRC PHY Layer (20130076-T-469-A)

Access (PHY & MAC)
(2) China ITS Industry Alliance

2013/9/24 Initiated by 50 Large enterprises

The Alliance General Assembly

The expert consultation committee Alliance

Union Council

The Secretariat of the League

WG1: Cooperative ITS

WG2: Vehicle information service and safety

WG3: Mobile terminal information service

WG4: Intelligent Public traffic

WGX: ......
## WG1 Standards plan 2014

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<td>Cooperative ITS DSRC Part1: General technical requirements</td>
<td>2013~2014</td>
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<td>C-ITS: System framework model</td>
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<td>12</td>
<td>C-ITS: Participants information interaction interface specification</td>
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<td>13</td>
<td>C–ITS: The vehicle terminal front loading technical requirement</td>
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The recent work for Department of Transportation Authority in cooperative system area include:

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Cooperative Vehicle-infrastructure System based on DSRC

- Cooperative Vehicle-infrastructure System Communication framework and technical requirements
- Dedicated Short Range Communication (DSRC)
  - Media access control layer and physical layer
  - Network layer and Application layer
  - Equipment application

- Cooperative ITS-Dedicated Short Range Communication (DSRC) Part1: General technical requirements
- Cooperative ITS-Dedicated Short Range Communication (DSRC) Part2: Medium Access Control Layer and Physical Layer
Thank You!

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