ITS Update in China

Xiaojing Wang
Chief engineer, RIOH, Ministry of Transport
Director, China National ITS Center
Chairman, China ITS Industry Alliance
Contents

1. Review of ITS in China
2. R&D in Recent Years
3. New Stage of ITS
1. Review of ITS in China
1.1 ITS Development 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
2011-2015
Next Stage ITS Development:
Cooperative-ITS
Communication in ITS
Autonomous Car
ITS Industry
1.2 Applications Examples

- **City Traffic Center:** More than 600 cities
- **Traffic Information Services Have Become Popular**
  - Smart phone, Navigator, Website, VMS, Broadcast, ……
- **ETC: The National ETC Network Has Been Built**
  - More than 12,000 ETC lanes have been built
  - 31 million ETC users
  - ETC usage rate in Beijing: about 40-45%
- **The Use of GNSS Big Data Smart**
  - Data fusion of GNSS and Statistical Data
- **Network Reservation Taxi/Car Service**
  - Taxi hailing, Express, Private car service, ……
  - DiDi: more than 10 million orders per day
  - Uber: Reservation car service in 60 cities
2. R&D in Recent Years
2.1 Cooperative ITS Development

(1) Cooperative system for Highway Ramp Safety (2012)
In Beijing-Tianjin Expressway
(2) Technology Study on Vehicle and Road Cooperation

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

2011-2014
Cooperative Active Safety Control

Car following system via v2v communication
Vehicle Speed Guidance and Adaptive Signal Control
2.2 Automated Vehicle Research

(1) Research in cognitive computing of visual and auditory information

Supported by National Natural Science Foundation (2011-2014)

- Tsinghua University
- Beijing Institute of Technology
- National University of Defense Technology
- Xi'an Jiao Tong University
- Tongji University
- Beijing Union University
- … …
(2) AV Development in Internet Companies

- **Baidu** (from report of Wang Jin)
  - AI and Information Processing
    - Deep neural network
    - Digital Map
    - Big Data and Cloud Computing
  - AV, cooperate with BMW

- **LeEco** (from report of Ding Lei)
  - “SEE”: Super Electric Ecosystem
    - Internet for Car
    - Telematics
    - Autonomous Car
    - Smart Car
(3) Recent Automated Vehicles Test in Opened Highway

(August 29, 2015)

- Zhengzhou to Kaifeng Highway
  - 70 km, Normal traffic

- Organizations
  - Chang An
  - Yu Tong
  - Beijing Auto
  - Tsinghua University
  - Wuhan University of Technology
  - Military Traffic Institute
(4) ChangAn Automated Vehicles Test

◆ 12 to 16 of April, 2016

◆ Form Chongqing to Beijing, Several Expressway Section Test

◆ Test Content:
  • Automatically avoid pedestrians
  • Curve acceleration
  • Automatically pass the narrow road
  • Automatic car following, overtaking and accelerating
2.3 Study of Communication in ITS (2012-2014)

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
Schematic Diagram for Communication in ITS

- **User**
- **Infor. Serv.**
- **C-ITS**
- **ETC**
- **TCP**
- **UDP**
- **L2/UDP**
- **4G/5G**
- **WAVE/GB-DSRC**
- **STD/GB/CEN**
- **Network Layer**
- **Switch**
- **Interface**
- **QoS**
- **Security**
- **Connect QoS**
3. New Stage of ITS
3.1 The National Policy and Plan

- The 13th Five-Year national economic and social development plan

  - New industry development: ITS industry
  - Transportation: Low carbon, intelligent, safety
    - Application of advanced information and equipment
    - Intelligent connecting transportation
    - Intelligent transport management system
    - Public transport information service system
    - Intelligent multimodal transport
    - Related areas:
      - Energy-efficient transport tools
      - Transport safety
      - Emergency disposal and rescue
Transport Information Technology Application Plan (Ministry of Transport)

- Improving the quality and efficiency of transportation
- Improving transport safety and emergency management
- Developing green transport system
- Supporting intelligent public transportation

"Internet Plus" Action Plan

- Communicating Vehicle for Logistics and Travel

Made in China 2025 Strategy

- Intelligent/Connected Vehicle Development
3.3 Development and Deployment

(1) Service and Management Application and Demonstration Projects (MOT plan)

- Passenger ticket service system
- Update of transport logistics public information platform
- Transportation open data resources sharing platform
- Traffic and transport operation coordination center (TOCC)
- Road dangerous goods transport safety management system
- New generation of traffic and transport control network demonstration project
- Cooperative ITS demonstration on commercial vehicle
(2) Transport management and service based on new telecommunication and mobile internet

- 4G
- DSRC (Ultra high speed wireless LAN)
- 5G or LTE-V
(3) **Intelligent and Automated Vehicle Development**

**Vehicle Communication Technic focus on:**
- Simple, cheap and useful technology and device
- No regulatory barriers
- Warning, drive assistance and information service

**Cooperative System**
- Expressway Demo
- Public Transport Demo
- Intelligent Logistics Demo
- City Demo

**Automated Vehicle**
- Nationan Plan
  - Autonomous Vehicle
  - Intelligent Vehicle
(4) Integration of EV and AV (New National Tech R&D Project)

- Framework Development of Intelligent EV
- Driver Assistant Tech Based EV
- Autonomous EV
- Test and Evaluation
- Demo for Intelligent EV
(5) EV, AV and ITS Integration

◆ National DEMO Projects: New transport Control and Operation System

• Function
  – Interactive transport services
  – Intelligent driving
  – Dynamic adjust system parameters and management mode
  – Integrated system of EV and ITS
  – Integrated system of infrastructure and vehicle

• Support by new technology
  – Cyber-Physical System
  – Big Date
  – Cloud Computing
  – M2M
  – V2V, V2I, V2X
  – … …
(5) Intelligent Car FOT

- Highway (MOT Plan)
  - Intelligent Highway Demo
  - Cooperative ITS for Commercial Vehicle

- City Road
  - MII: City Demo
    - Yizhuang district of Beijing, Zhejiang, Chongqing, Shanghai
  - MPS: City Demo
    - Vehicle electro-ID test in Beijing, Tianjin and Hebei

- Proving Ground
  - Intelligent Car Test Area in RIOH Proving Ground
Thank You!