

# The Role of Communication Technologies in Connected and Automated Vehicles

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2015. 7. 28

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1. Introduction of CAICT
2. Chinese Relevant Policies and Measures
3. CAICT Related Work

# Organization Structure

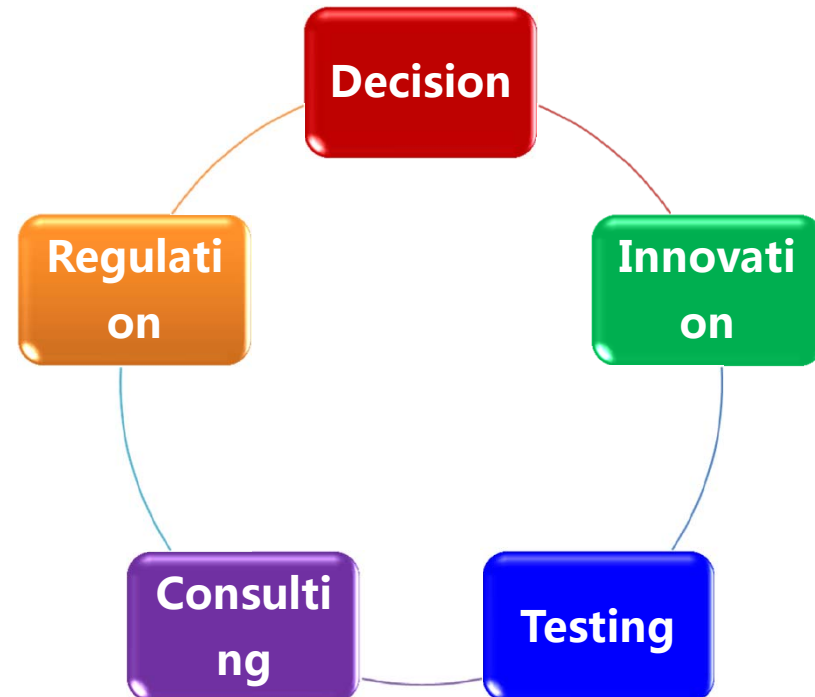
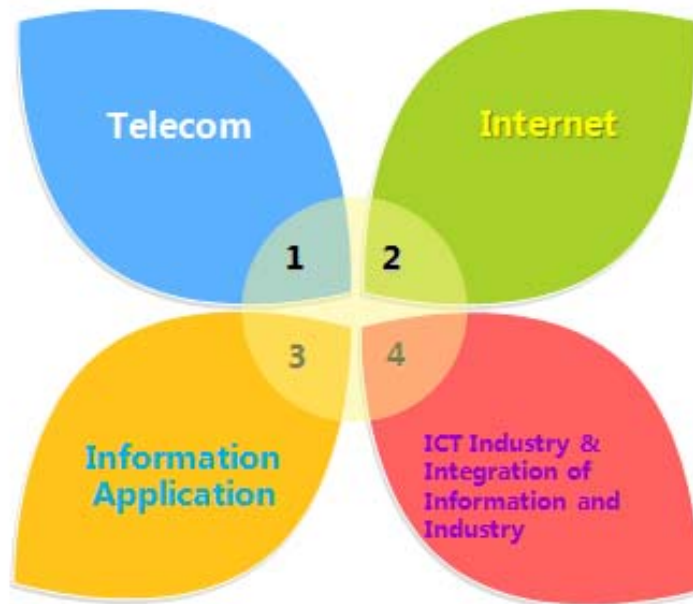


# Think Tank for Government and Platform for Industry

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- A major supportive organization of MIIT and the pillar research academy in the ICT field in China
- Special role in both domestic and international standardization
- Authoritative house in test and certification
- Comprehensive consulting institution in ICT market



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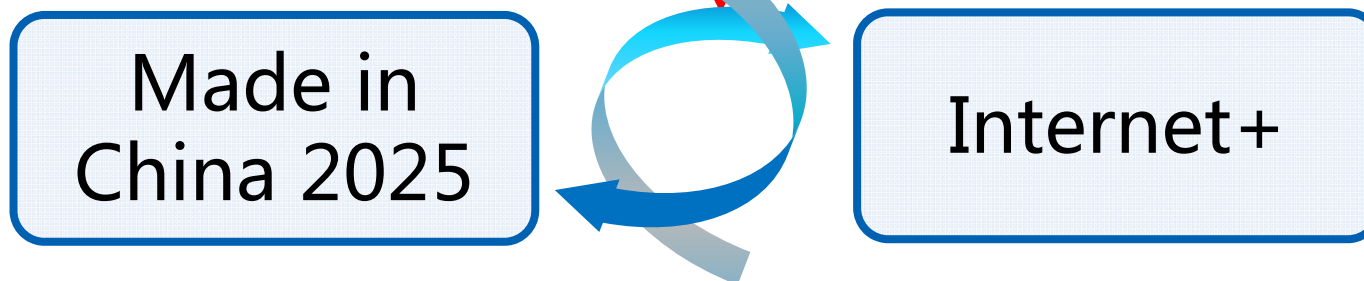
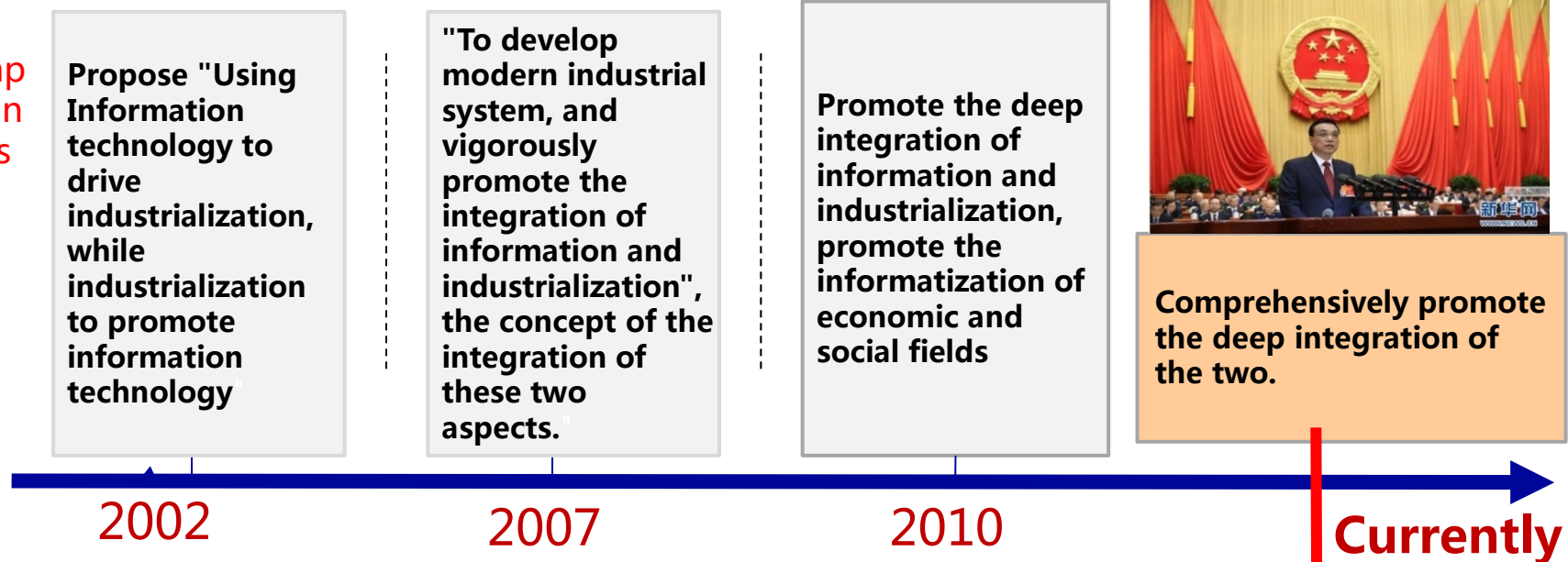
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# The overall situation of Chinese relevant policies and measures

China attaches high importance to the integration and development of new information technology and advanced manufacturing

Roadmap and main contents



# “Internet+”

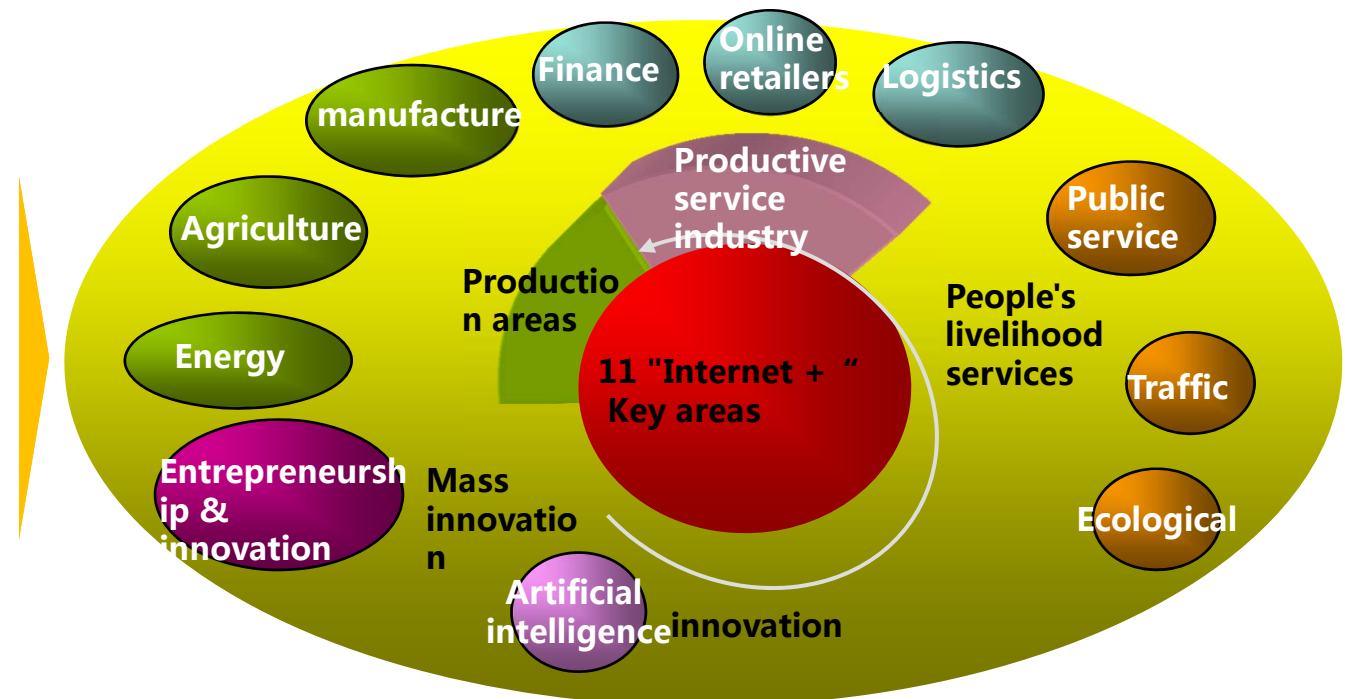
The key direction of "Internet+" action

“Internet+ ” Guideline put forward 11 special actions, covering production, human living, innovation and others. “Internet +” Traffic put forward the application of Connected Vehicles technologies; “Internet +” Artificial intelligence put forward the product R&D and application of intelligent aided driving, environment awareness and smart vehicle device.

Key economic areas

Important human living areas

Entrepreneurship & innovation



# “Made in China 2025”

"Made in China 2025 "is adapt to global a new round of science and technology revolution and the industrial revolution trend, to accelerate the development of Chinese manufacturing industry, **to provide new impetus to the development of China and the global strategic partnership to develop and prosper.**



Promote the integration of information and industrialization	Intelligent manufacturing development strategy	Intelligent manufacturing equipment and products
	Intelligent manufacturing process	Deepen the application of the Internet in the manufacturing field
		Internet infrastructure construction



# Relevant Projects and Funding



中华人民共和国工业和信息化部

Ministry of Industry and Information Technology of the People's Republic of China

## 2012, Mega Projects III

- 5-4 : "Research on Wireless IoT Technologies for ITS" ; 5-7: "The General Technologies for Mobile Vehicles IoT"

## 2016, Mega Projects III

- 1-12 : " Research and Demonstration of 5G Technologies for Automated Vehicles" ; 2-10 : " Standardization and Development on LTE-V Wireless Technologies"



中华人民共和国国家发展和改革委员会

National Development and Reform Commission

- 2010 High-tech Industrial Project "Demonstration for ITS basing on IoT Technologies"
- 2013 High-tech Industrial Project, (6) Innovation and Demonstration on Broadband wireless Technologies; (7) Innovation and Demonstration on Big Data Technologies



中华人民共和国科学技术部

The Ministry of Science and Technology of the People's Republic of China

- 2011, 863 Project "Key Technologies for C-ITS" (2011AA110400)
- 2012, 863 Project "Key Technologies for Connected Vehicles (2012AA111900)
- 2014, 863 Project "Traffic Control Technologies for City ITS" (2014AA110300)

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# Policies and National Projects

From 2011, start the systematic study on Connected and Automated Vehicles, including policies, standards and high technologies. Also we undertake lots of government support and national projects.

## **Policies and government Support :**

- MIT Action Plan of 《Innovation and Development of Connected Vehicles 2015-2020》
- 2014, Newsletter 《 Innovation and Development of the New Generation Connected Vehicles 》

## **National Projects :**

- 2016, Mega Projects III, 1-12 : " Research and Demonstration of 5G Technologies for Automated Vehicles" ;
- 2016, Mega Projects III, 2-10 : " Standardization and Development on LTE-V Wireless Technologies"
- 2013 High-tech Industrial Project, "Research and Demonstration for Transportation Big Data in Mobile Networks"
- 2012, Mega Projects III, 5-4: "Research on Wireless IoT Technologies for ITS" ;
- 2012, Mega Projects III, 5-7: "The General Technologies for Mobile Vehicles IoT"
- 2012 High-tech Industrial Project, "Demonstration for ITS basing on NGNI"

# Standards and Impact

## International Standards

- ISO TC204 《PWI13111 the use of nomadic & mobile device to ITS service provision for travelers》

## National Standards

- National Standard 《Cooperative intelligent transportation systems—Dedicated short range communications— Part 1: Architecture and technical requirement 》
- National Standard 《Cooperative intelligent transportation systems—Dedicated short range communications— Part 2:Physical Layer and MAC Layer technical requirement 》
- National Standard 《Cooperative intelligent transportation systems—Dedicated short range communications— Part 3:Network Layer and Application technical requirement 》
- National Standard 《Public Mobile Network—Vehicle Gateway technical requirement 》
- National Standard 《Public Mobile Network—Vehicle Gateway testing method》

## Industry and Alliance Standards

- Two CCSA Standards
- More than ten C-ITS Alliance Standards



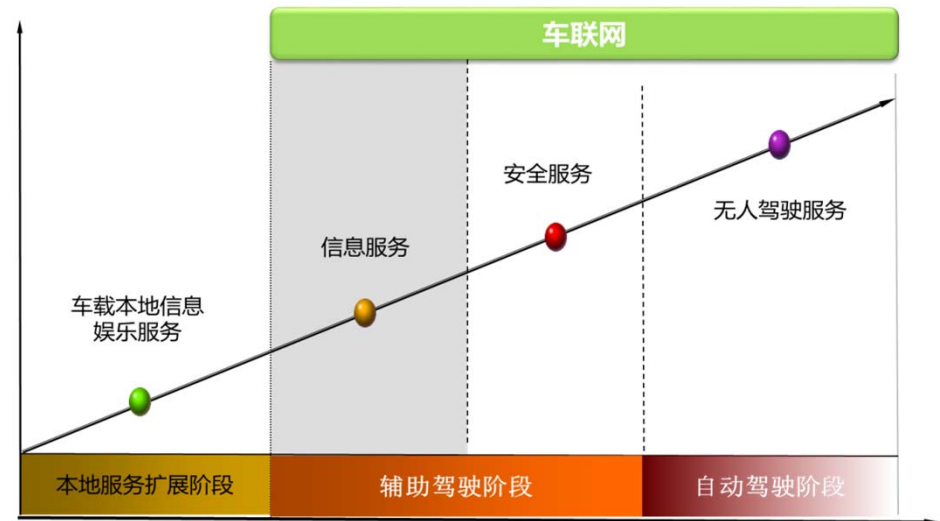
- Chair of TC10 CCSA
- Working Group of LTE-V, promoting LTE-V technologies, standards and industry
- Member of ITS

# LTE-V/5G : New Requirement from Connected and Automated Vehicles

## Safety from passive to active



## Automated is the future of Vehicles



## Connected and Automated Vehicles take the new requirements for Wireless Communication Technologies

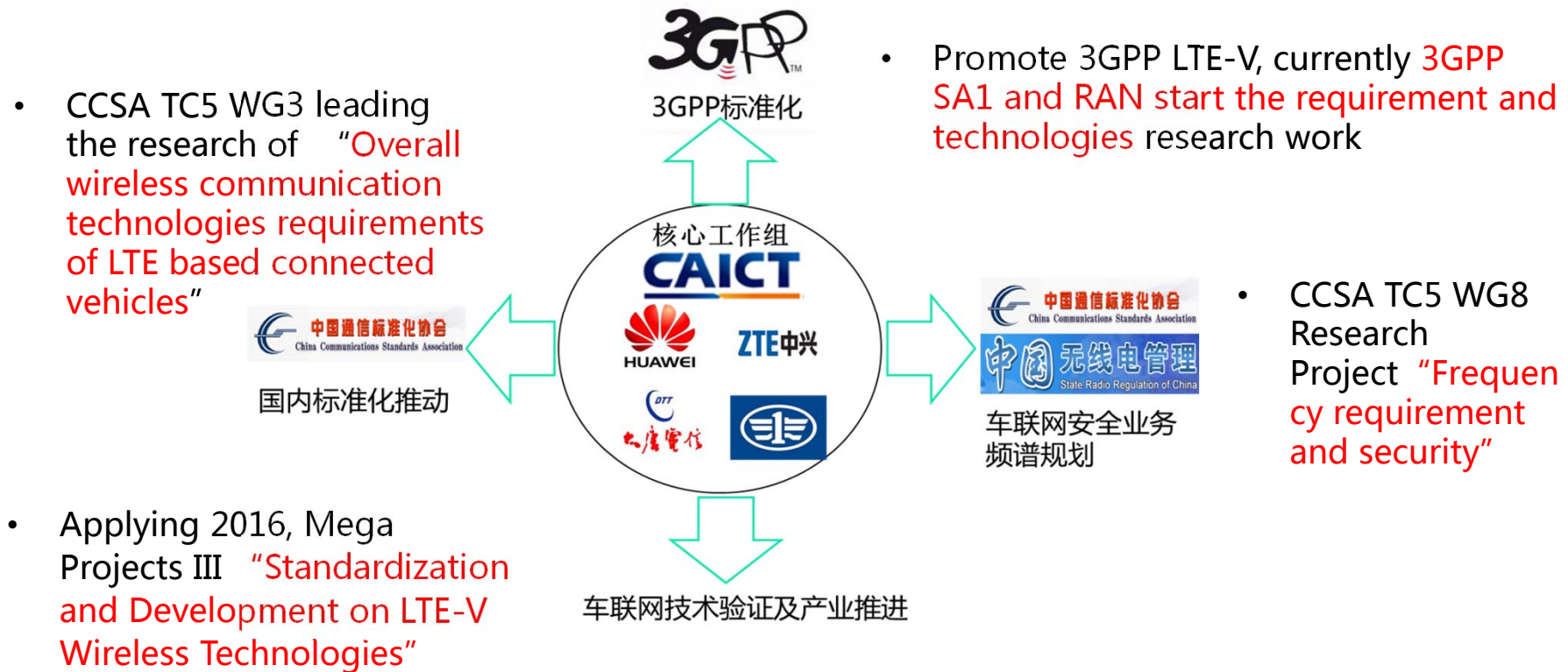
- Sensor can only support short range (usual 10m) safety
- IEEE 802.11p not suitable for China Traffic environment
- Current wireless communication technologies are not enough for Connected and Automated Vehicles
- The advantage of LTE technology and industry

**Aided Driving : LTE-V**

**Automated : 5G**

# LTE-V Technologies and Industry Development

Lead the LTE-V Working Group , promoting LTE-V technologies, standards and industry. Currently, Huawei, ZTE, Datang and FAW are the core member , and Qualcomm, Ericsson and Tsinghua are main participants, to be extend

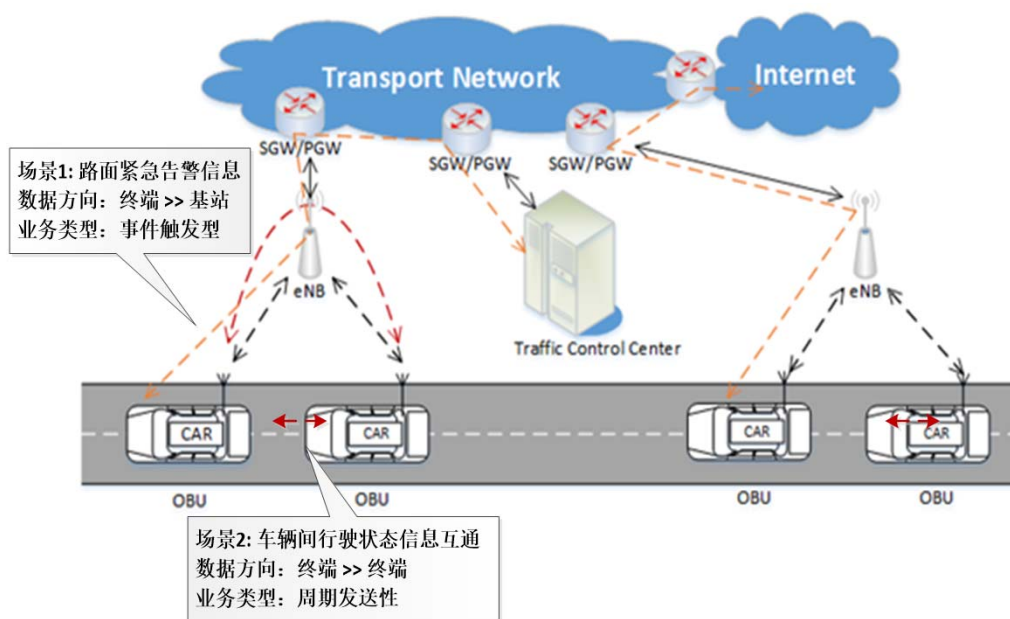


Our Lab has already had the ability for 802.11p testing, now we can working on the setting up of the LTE-V based wireless communication testbed



# Innovation of 5G and Automated Vehicles

Connected and Automated vehicle is the most important scenario of 5G, and **low latency and high reliability** of 5G are the key support



## 5G Main Technical Index

User Mobility	a) low speed: 3km/h b) medium speed: 60km/h c) high speed: 120km/h d) super speed: 240km/h
Latency	End-to-end delay 5ms
Reliability	Air interface more than 99.999%

## Actions on promoting Automated Vehicles with 5G

- Lead the group of IMT-2020 , promote the research of the key technologies of 5G
- Applying the 2016 Mega Projects III project " Research and Demonstration of 5G Technologies for Automated Vehicles" ;
- Undertake the programming of 5G integration innovation experiment, including 5G and automated vehicles

# Testing

## 1 Hands-free car audio

- VDA
- ITU-T P.1100
- ITU-T P.1110

## 2 Location and Navigation

- Beidou
- GPS
- Glonass

## 3 DSRC

- Mirror Link:device、 server、 app
- WIFI:a\b\g\n\ac
- BT\USB

## 4 Wireless Communication

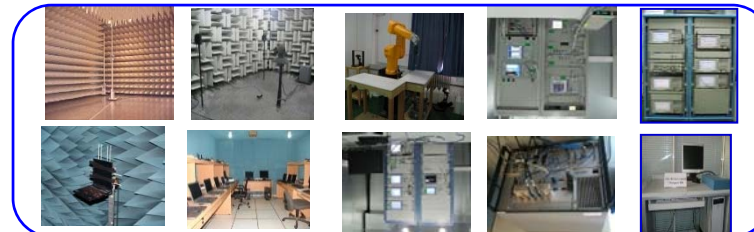
- 2G\3G\4G
- RF\PROTOCOL\USIM\RRM

## 5 EMC、 User experience

- EMC
- Software
- Screen

## 6 Others

- Customization solution
- Recommendation





# Cooperation and Platform

CAICT eager to lead or join in the organization and alliances, cooperation with others together to promote the development of Connected and Automated Vehicles  
CAICT, RIOH and Tsinghua setup the joint service platform for new technology testing



中国智能交通产业联盟  
China ITS Industry Alliance

中国智能交通产业联盟



中国车联网产业技术创新战略联盟



车载信息服务产业应用联盟



国际车联网联盟  
( Car Connectivity Consortium )



# Thanks for your attention

**CAICT** 中国信息通信研究院  
China Academy of Information and Communications Technology

(工业和信息化部电信研究院)

