C-V2X Developments in China

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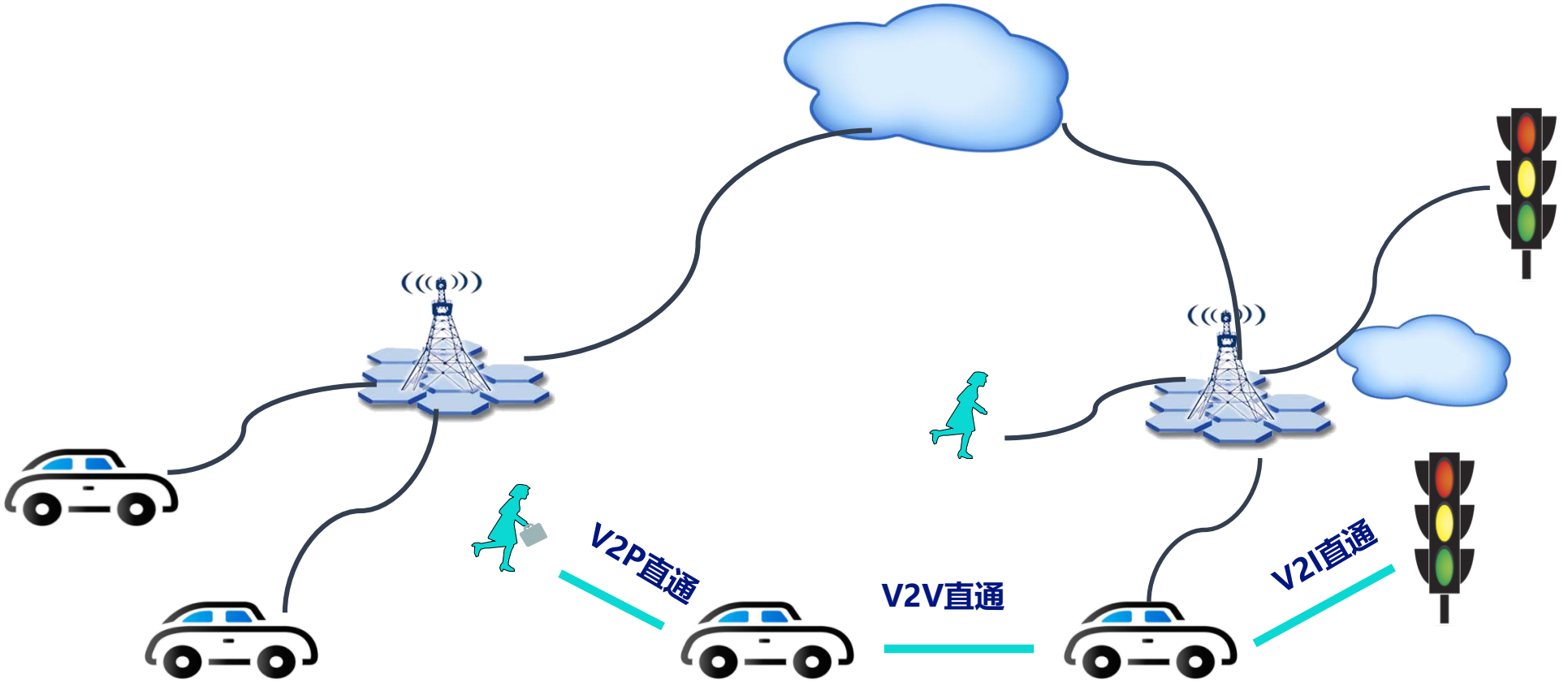
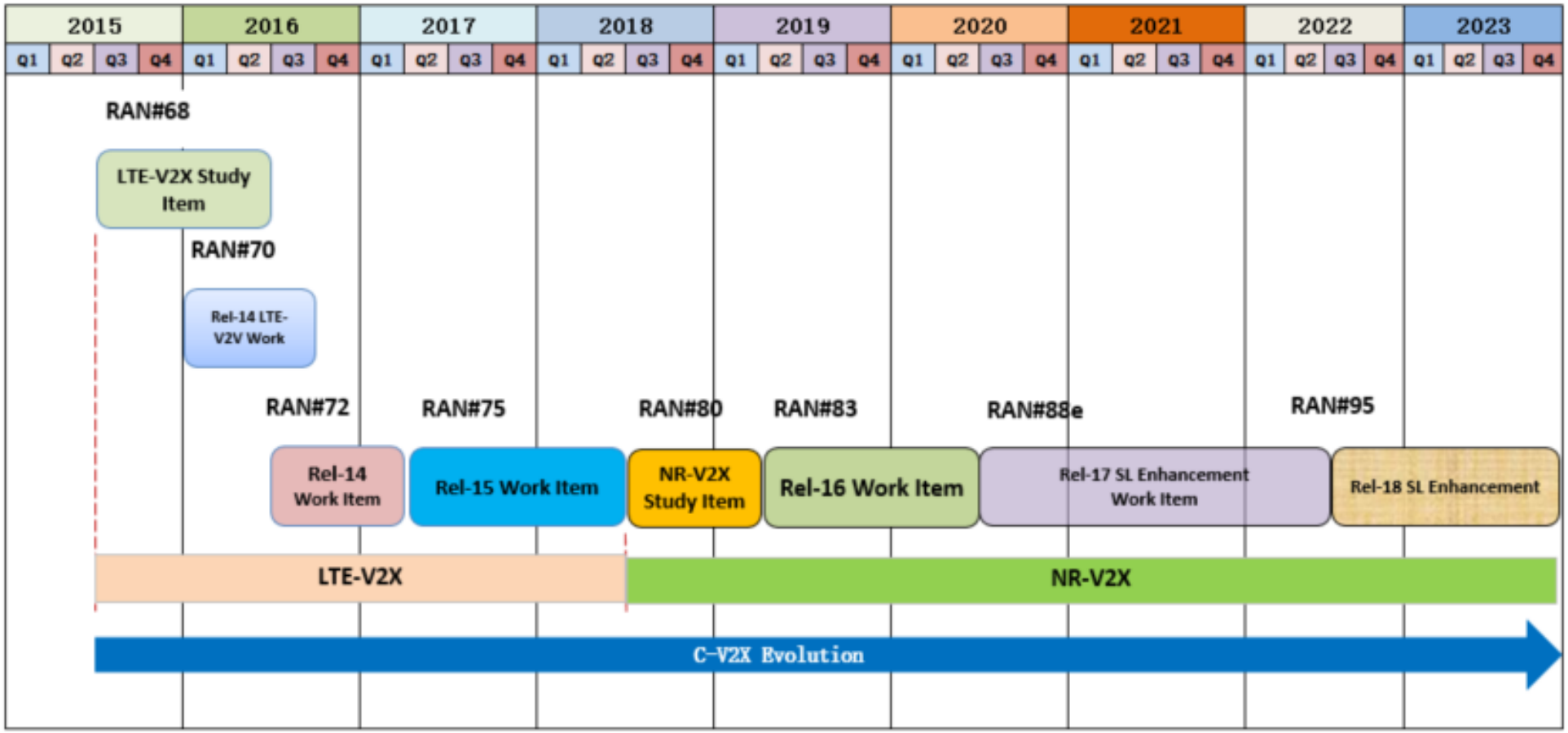
C-V2X Overview

C-V2X includes LTE-V2X and its evolution NR-V2X

C-V2X combines short-range medium-range and long-range communication to more effectively support diversified V2X applications

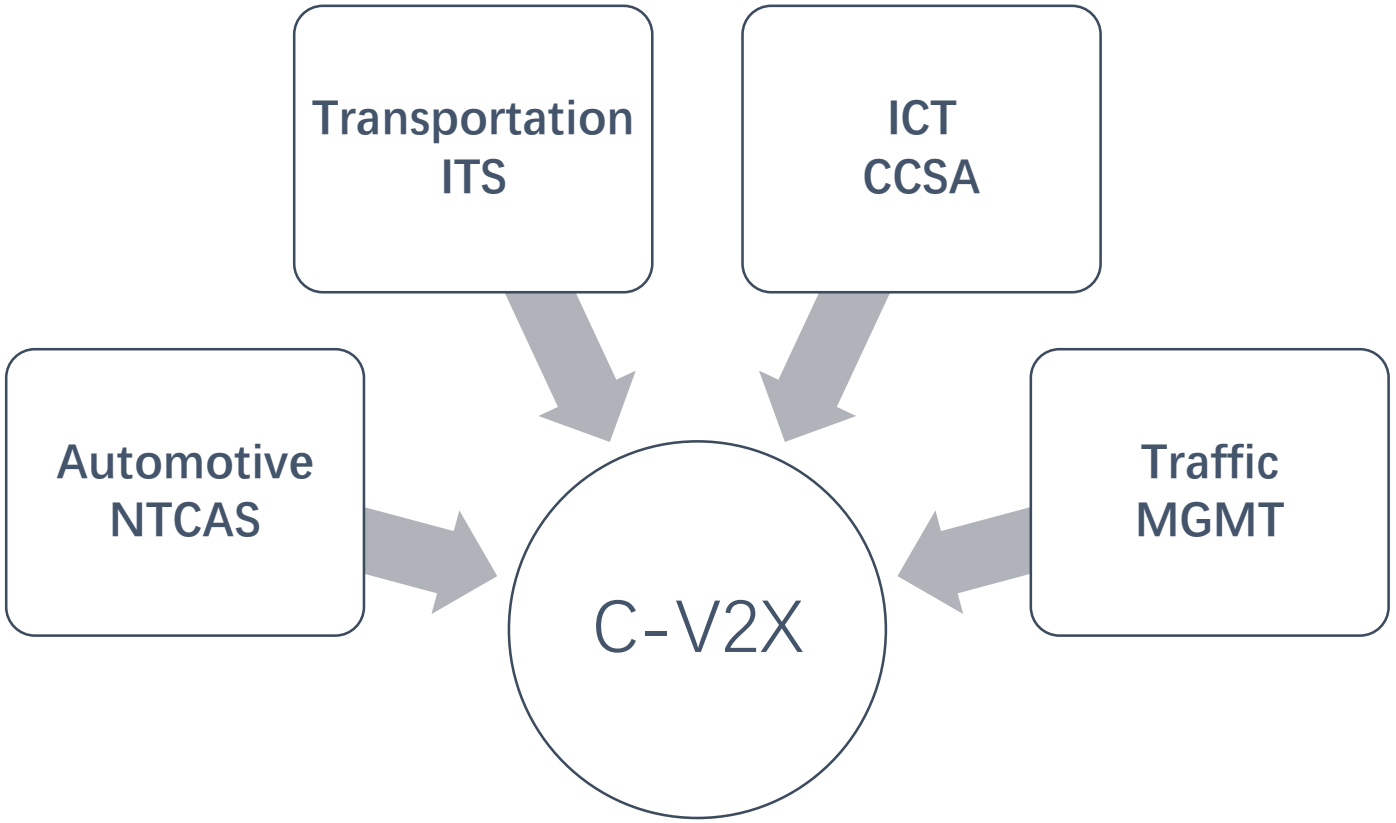


C-V2X Has Clear Evolution Roadmap

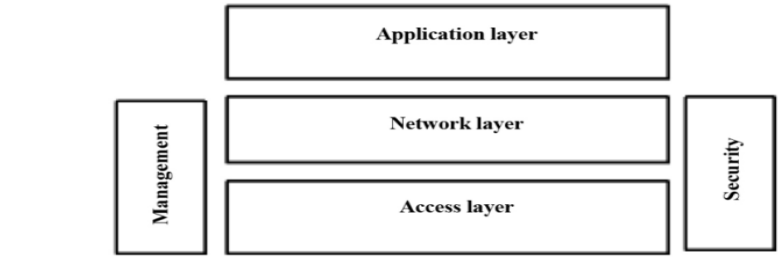


- LTE-V2X (R14~R15)： Support Basic Road safety and Driving Assist System
- NR-V2X (R16~R18): Support Advanced applications

C-V2X Cross Industry Coordination in China



Signed agreements to promote and cooperate on C-V2X STD



2018.11.17，XiongAn

SDOs and Alliances Active in V2X field

Name	Role	Supervised Ministry
CCSA	Defining transport layer standards	MIIT
C-V2X WG	Promoting C-V2X industrialization	MIIT
TIAA	Leading the discussion on V2X spectrum issues	MIIT
C-ITS/ITSC	Developing network layer standards	MOT
CAICV/CSAE	Formulating the application standards	MIIT
NTCAS	Sub-committee of ICV are built in 2018	MIIT

2022 Main STD WI——Communication Sector

SDO	WI	Status
CCSA	Technical requirements for Roadside Sensing / Computing Equipment for Vehicle-Infrastructure collaboration system	Ongoing
	Technical requirements and test method of Sidelink Positioning and Synchronization for LTE-based vehicular communication under out of GNSS coverage condition	Ongoing
	Technical Requirement of Authentication and Authorization System for C-V2X Vehicular Communication	Ongoing
	Technical Requirements of Vehicle Misbehavior Management for C-V2X	Ongoing
	Test methods of C-V2X PC5 network coverage performance	Ongoing
C-V2X WG	C-V2X and Driving Automation Fusion（SI）	Ongoing
TIAA/Future	Technical requirements for V2X information services based on sidelink and cellular dual-mode synergy	Ongoing
	China V2X Day-2 Advanced Application Feasibility Study （SI）	Ongoing

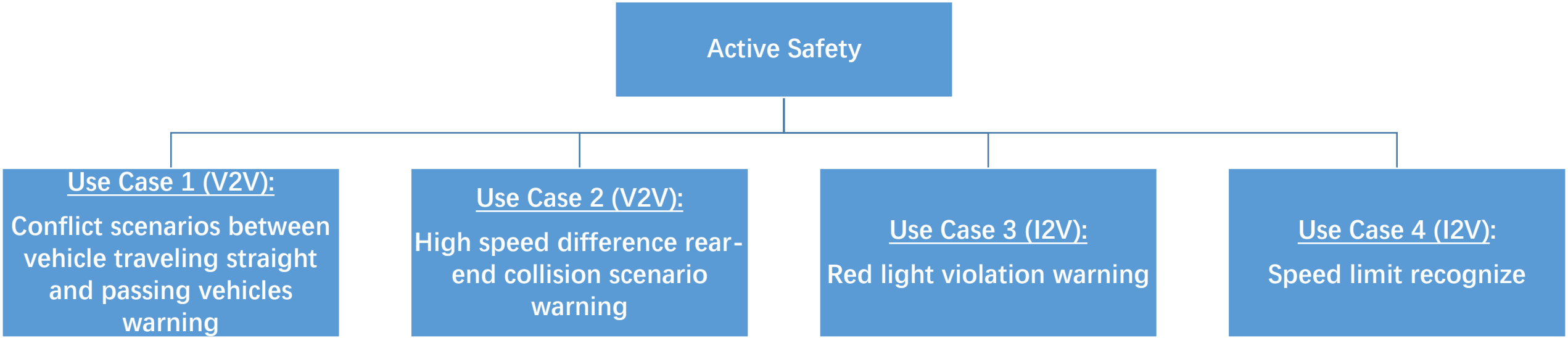
2022 Main STD WI——Automobile Sector

SDO	WI	Status
CAICV	Intention & Cooperation Standard	Ongoing
	CIDAS-based LTE-V2X deployment scenarios study	Ongoing
	Technical requirement of scenario database and specification of simulation	Ongoing
NTCAS	Technical requirements and test methods of vehicular communication systems based on LTE-V2X direct communication	Ongoing
	Performance requirements and test procedures of Application scenario of vehicles safety warning based on connected vehicle technology	Ongoing

2022 Main STD WI——Transport Sector

SDO	WI	Status
ITS	Performance requirements & testing approaches of commercial vehicle-communication system(V2X) terminal(JT/T)	For approval
	Technical requirements and test method for roadside integrated intelligent cooperative control device in cooperative vehicle-infrastructure system (GB/T)	For comments
	Technical requirements for information interaction of vehicle infrastructure cooperative system Series STD	Pre-study
C-ITS	Cooperative intelligent transportation system— data interface specification between RSU and central sub-system	Ongoing
	Cloud control basic platform of vehicle-infrastructure cooperative system	Ongoing
	Vehicle-infrastructure cooperation roadside sensing system	Ongoing

C-NCAP Current Status



- V2X is part of Active Safety ADAS Testing and Evaluation Research
- C-NCAP roadmap (2022~2028) was released in April 2022
- The roadmap does not specify any technology solution at this stage and V2X technology could be an option.
- The test protocols are under development.

C-V2X Interoperability and Verifications

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2021 C-V2X Cross-industry (Shanghai, Suzhou and Wuxi) Pilot Demonstration

- C-V2X Cross-industry interconnection practical activity
- 5G empowered intelligent driving

2022 C-V2X Security Verification activities Tianjin

- Verification done on 7.6-kilometer open road
- V2X communication security mechanisms were tested, 3 V2V scenarios and 17 V2I scenarios.

2021.10 C-V2X Demostration Shanghai,Suzhou, Wuxi

Shanghai： Day1 Mass Production Demonstration

Suzhou： Day1& Day2 Demonstrations

2022.4 C-V2X Security Verification Tianjin

MIIT Actively Promotes the Development of ICV Pilot Areas

	Name of Pilot Area	Status
1	Jiangsu(Wuxi) ICV Pilot Area	Approved
2	Tianjin(Xiqing) ICV Pilot Area	Approved
3	Huna（Changsha）ICV Pilot Area	Approved
4	Chongqing(Liangjiang) ICV Pilot Area	Approved
5	Shenzhen	Planning
6	Hainan	Planning
7	Hefei	Planning

- MIIT clearly stated, Connected Vehicles should be included as part of the new infrastructure to promote the large-scale deployment of C-V2X. And through the construction of pilot area, business models and applications could be explored and tested.

C-V2X Commercialization

Chongqing G5021 Intelligent Highway

Complex System

- Vehicles
- Roadside
- Cloud
- Map Positioning…

Complex Condition

- Tunnel, tunnel close to exit
- Bridge, Sharp curve…
- Foggy,crosswind…

Large Scale

- More than 128 kilometer with 100% C-V2X coverage
- 300+ RSU， 400+ Sensors deployed

NLOS sensing, low latency and high reliability communication to improve safety

Make C-V2X into Reality

Strengthen Industry Collaboration to Make C-V2X into Reality

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