5G deployment for V2X and CAD: It starts today to be ready tomorrow!

Maxime Flament, CTO, 5GAA

12 Oct 2018

Driving Connected Mobility Forward

5GAA brings together the automotive and telecommunication industries to develop end-to-end connectivity solutions for future mobility and transportation services

AUTOMOTIVE INDUSTRY

Vehicle Platform, Hardware and Software Solutions

TELECOMMUNICATIONS

Connectivity and Networking Systems, Devices and Technologies

5GAA unites 100+ members* from around the world working together on all aspects of C-V2X and 5G including technology, standards, spectrum, policy, regulations, testing, business models and go-to-market

*as of Oct 2018


Airgain
ALPINE
AMERICAN TOWER
ANALOG DEVICES
Anritsu
envision:ensure
AT&T
Audi
BAIC GROUP
Bell
BlackBerry
BMW GROUP
BOSCH
CETECOM
CHINA TRANSINFO
China Mobile
China unicom
Cohda Wireless
commsignia
Continental
The Future in Motion
DAIMLER
DANLAW
AUTOMOTIVE MADE SMART
DEKRA
DENSO
Dt&C
ERICSSON
Faraday Future
FAREASTONE
FEV
Ford
Fraunhofer
GEELY
gemalto
security to be free
GM
Gotell
果通科技
Hirschmann Car Communication
HITACHI
Inspire the Next
HONDA
HUAWEI
HYUNDAI
MOTOR GROUP
iDIRECT
infineon
intel
INTERDIGITAL
JAGUAR
LAND ROVER
JUNIPER NETWORKS
KDDI
KEYSIGHT TECHNOLOGIES
kt
Laird
LEAR CORPORATION
LG
MITSUBISHI ELECTRIC
Changes for the Better
muRata
NAVINFO
Neusoft东软
NIO
NISSAN MOTOR CORPORATION
NOKIA
noris network
NTT docomo
OKI
orange
P3
Panasonic
proximus
PSA GROUPE
QUALCOMM
ROHDE&SCHWARZ
ROHM SEMICONDUCTOR
SAIC MOTOR
SAMSUNG
SAVARI
SGS
Anting • Shanghai International Automobile City
SK telecom
SKYWORKS
SMART MOBILE LABS
SoftBank
SUMITOMO ELECTRIC
Telefónica
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TELUS
TERRANET
TÜVRheinland
Valeo
VENIAM
verizon
VIAVI
vodafone
Volkswagen
VOLVO
WNC
Wistron NeWeb Corp.
ZF
ZTE

5GAA Organisational Structure

BOARD

EXECUTIVE COMMITTEE

GENERAL ASSEMBLY

WG1	WG2	WG3	WG4	WG5
Use Cases and Technical Requirements	System Architecture and Solution Development	Evaluation, Testbeds and Pilots	Standards and Spectrum	Business Models and Go-To-Market Strategies

Current and Forthcoming Ecosystem Partnerships

ngmn the engine of broadband wireless innovation

GTI Global TD-LTE Initiative

EATA

ETSI

IMT-2020

3GPP A GLOBAL INITIATIVE

5G IA INFRASTRUCTURE ASSOCIATION

VDT Alliance

CEPT ECC Electronic Communications Committee

ENSEMBLE

Connected Motorcycle Consortium

TIAA

Electronic Communications Office of Latvia

5G IMT The Fifth Generation Mobile Communications Promotion Forum

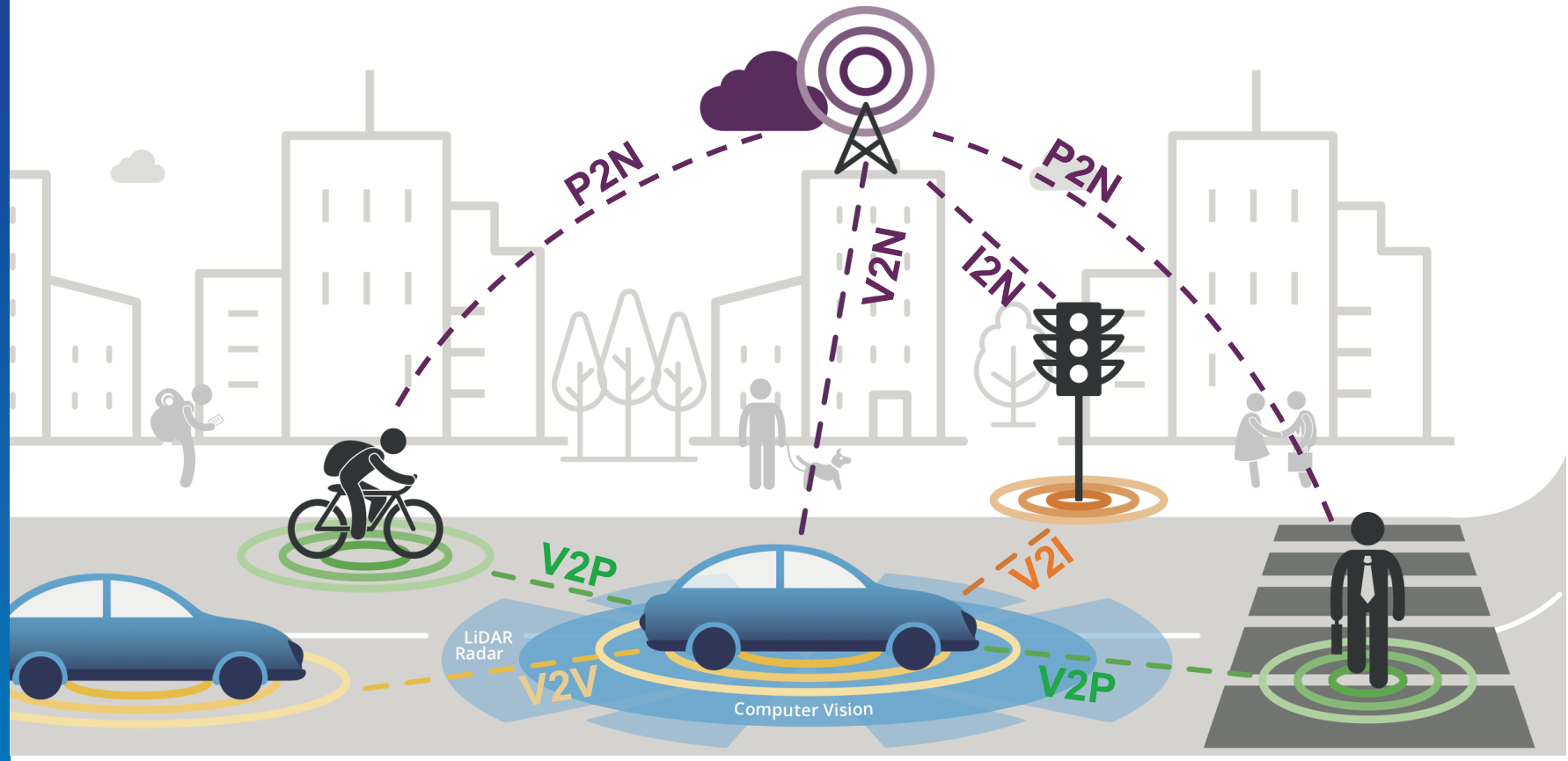
C-V2X is a comprehensive road safety and traffic efficiency solution that allows **vehicles** to communicate with

- **Other vehicles (V2V),**
- **Pedestrians and Cyclists via smartphones (V2P),**
- **Road Infrastructure (V2I),**

supported by the

- **Mobile network (V2N, P2N, I2N)**

to guarantee **full coverage** and **continuity of services**.

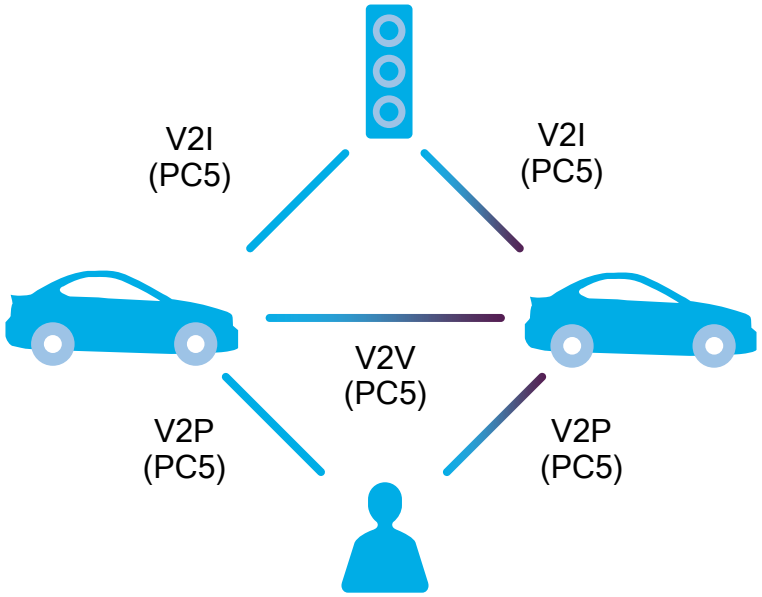


5GAA Automotive Association

C-V2X has two complementary communication modes

Direct (= Sidelink)

V2V, **V2I**, and **V2P** operating in ITS bands (e.g. 5.9 GHz) independent of cellular network

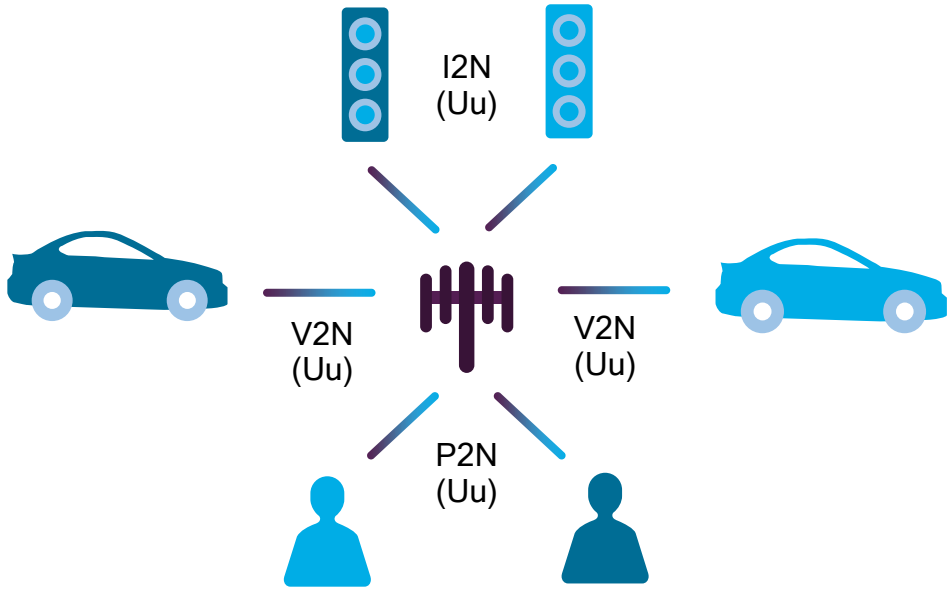


Short range (<1 kilometer), location, speed

Implemented over “PC5 interface”

Network (= Up/Downlink)

V2N operates in traditional mobile broadband licensed spectrum

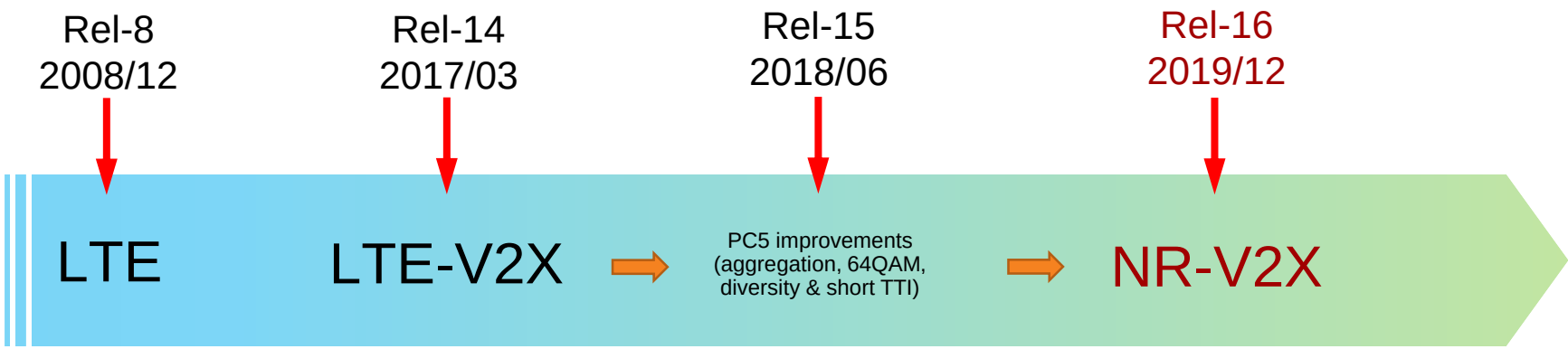


Long range (>1 kilometers). e.g. accident ahead

Implemented over “Uu interface”

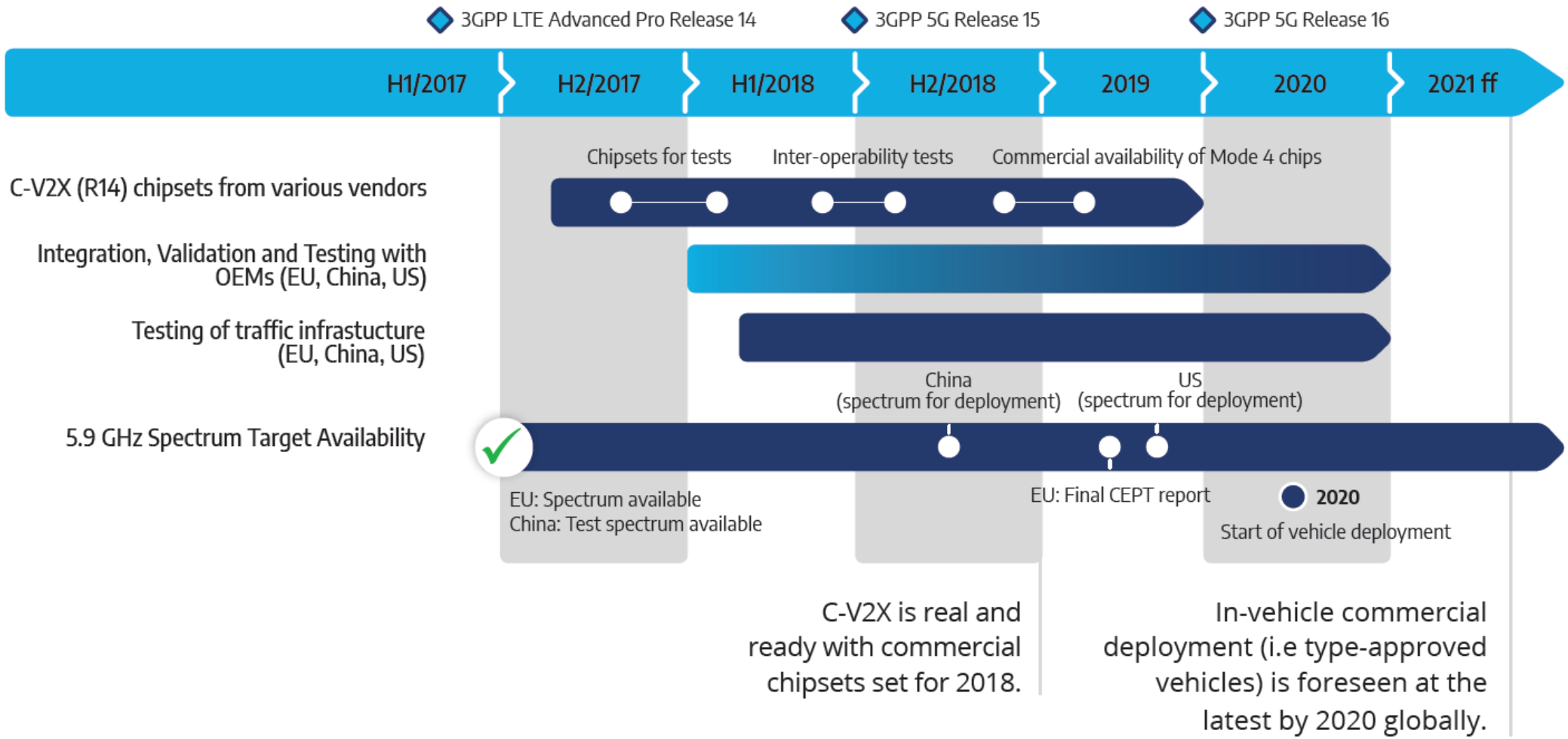
3GPP time plan

- Current version of C-V2X is called LTE-V2X as part of 3GPP Rel-14 & 15
- NR-V2X as part of Rel-16 comes as an improvement to support autonomous driving
- NR-V2X will complement and co-exist with LTE-V2X i.e. operation of NR-V2X alone is not considered.



- NR-V2X study item started in June 2018.
- Subsequent NR-V2X work item by December 2019.

Timeline for deployment of Release 14 C-V2X (V2V/V2I) products



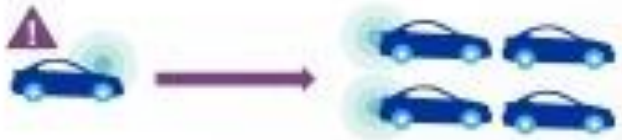
V2X enables a broad and growing set of use cases

Much more than collision avoidance

Forward collision warning

Do Not Pass Warning (DNPW)

Blind intersection



Queue warning

Curve speed warning

Cooperative adaptive cruise control & platooning

Vulnerable Road User (VRU) alerts

Discover parking and charging

Traffic signal priority and optimal speed advisory

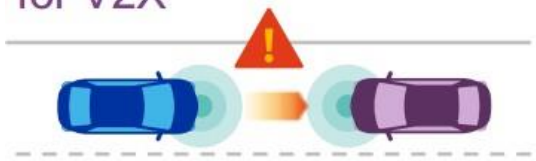
Emergency vehicle alert

Source:Qualcomm

Evolution to 5G,
while maintaining backward compatibility

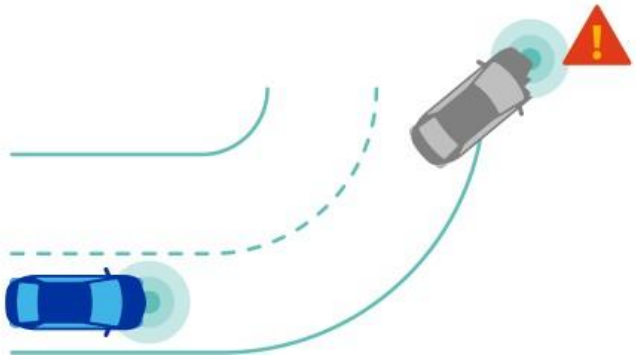
Basic safety
802.11p or C-V2X R14

Established foundation for V2X



Enhanced safety
C-V2X R14/15

Enhanced range and reliability



Advanced safety
C-V2X R16 (building upon R14)

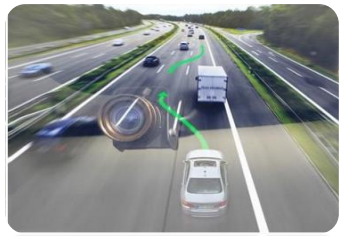
Higher throughput

Higher reliability

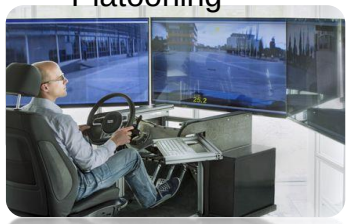
Wideband ranging and positioning

Lower latency

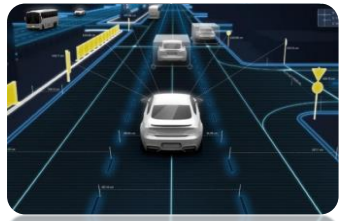
Vehicle Platooning



Cooperative Operation, Sensor sharing



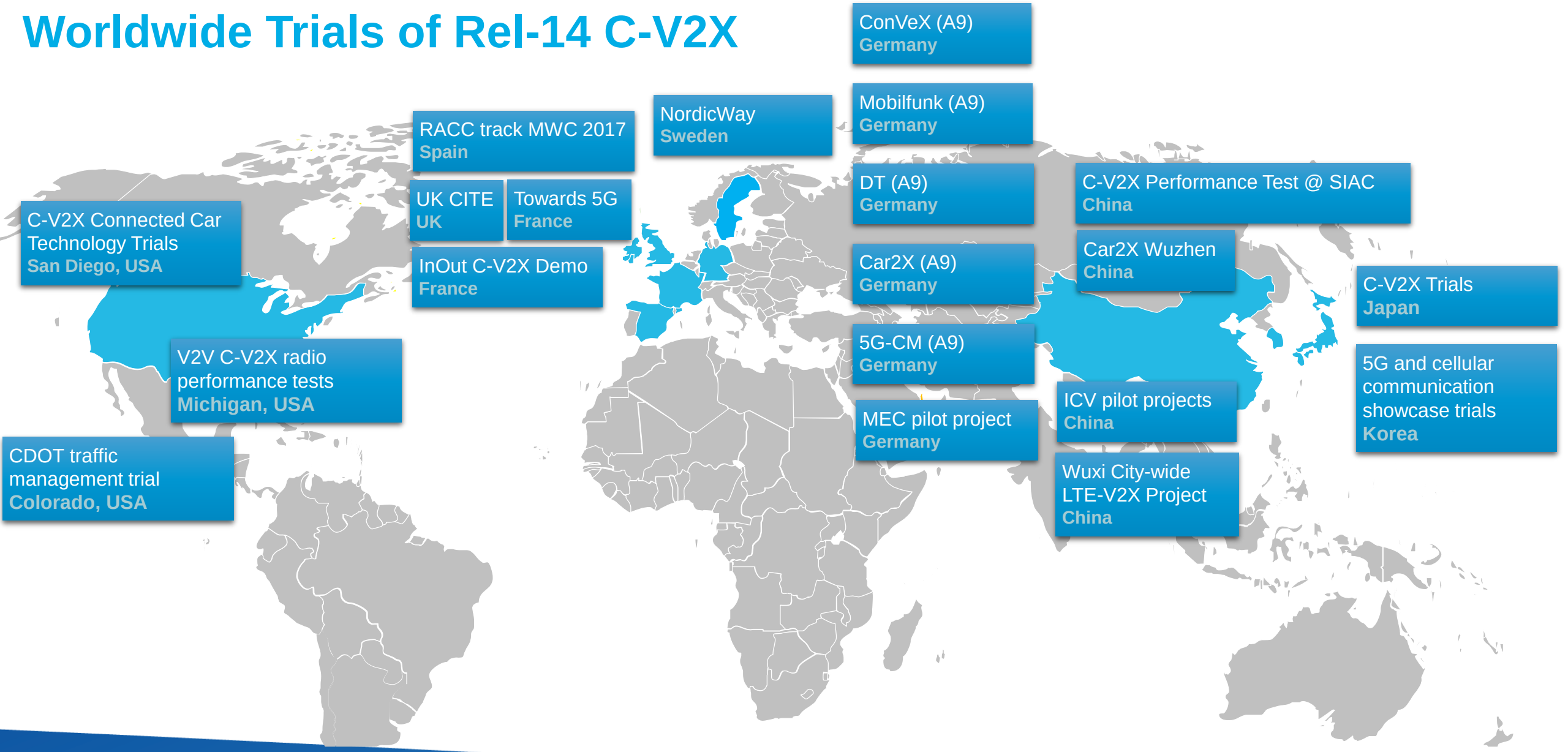
Remote Driving



Advanced Driving

Source:Qualcomm

Worldwide Trials of Rel-14 C-V2X



Thank you!