5GAA Automotive Association

Pioneering digital transformation in the automotive industry

outline

- 5GAA in short
- Innovation with NR-V2X
- Liaison with 3GPP
- Preparation for deployment
- EU and US regulatory situation
- Next meetings

5GAA Automotive Association

5GAA brings together automotive, technology and telecommunications companies to work closely together 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

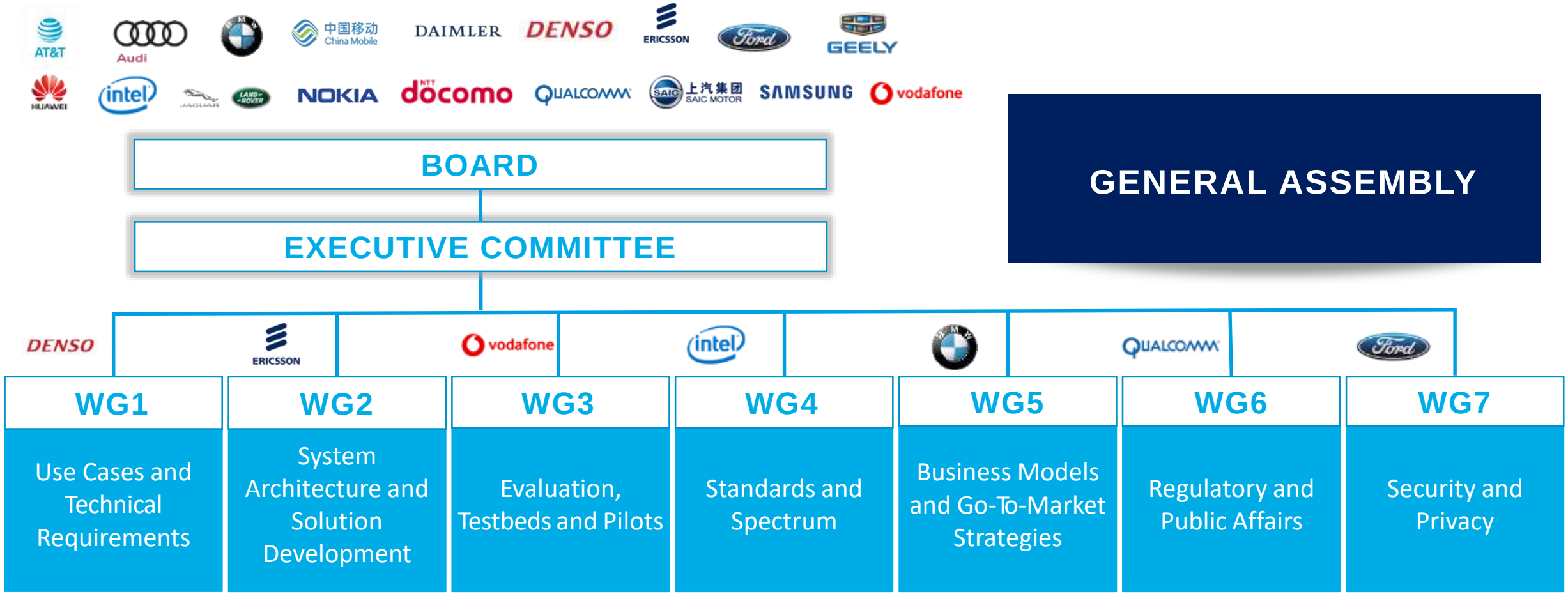
5GAA unites today 128 members from around the world working together on all aspects of C-V2X including technology, standards, spectrum, policy, regulations, testing, business models and go-to-market

5GAA Members

AIRBUS
Airgain
ALPS ALPINE
AMERICAN TOWER
ANALOG DEVICES
Anritsu
gemalto
GM
Gotell
HITACHI Inspire the Next
HONDA
SAMSUNG
SAVARI
SGS
SK telecom
applied
ASKEY
AT&T
Audi
HUAWEI
HYUNDAI MOTOR GROUP
MOBIS
infineon
intel
INTERDIGITAL
SKYWORKS
SoftBank
SUMITOMO ELECTRIC
swift
Baidu 百度
宝能
Bell
BlackBerry
BMW GROUP
juniper
KDDI
KEYSIGHT
KPIT
kt
TATA CONSULTANCY SERVICES
Telefonica
T
A1
TELUS
BOSCH
CETECOM
中国移动 China Mobile
lmt
LEAR
LG
LINKS
MAGNETI MARELLI
MARBEN
terranet
TIM
Valeo
VENIAM
verizon
China unicom
cisco
Cohda Wireless
commsignia
Continental
CTAG
MITSUBISHI ELECTRIC
molex
muRata
NAVINFO
Neusoft
NIO
VIAVI
vodafone
Volkswagen
ST Engineering
WNC
DAIMLER
DANLAW
DEKRA
DENSO
Deutsche Messe
Dt&C
NISSAN
NOKIA
noris network
docomo
OAKLAND UNIVERSITY
OKI
ZF
ZTE
EDI
edgecomet
EQUINIX
ERICSSON
Faraday Future
FET
orange
P3
Panasonic
PFU
proximus
PSA
FCA
FEV
flex
Ford
Fraunhofer
GEELY
qorvo
QUALCOMM
QUECTEL
GROUPE RENAULT
ROHDE&SCHWARZ
ROHM

as of September 2019

5GAA Organisational Structure



5GAA Working Areas

Joint Ecosystem

Create a joint ecosystem **car – smartphone - home**

Vehicle to Smart Device

V2X-based vehicle interface for smartphone controlled functions

Push V2N

Intense functional rollout of **V2N based applications** in order to reach broad penetration fast

Edge Computing

Mobile Edge Computing as one of the **key elements of the connected future**

New Radio

“Define the next step” - accelerate definition of **5G-V2X** based on 5G New Radio

Interoperability

Make sure that **cross OEM** cars and **cross operator** networks **can „speak“ with each other**

5GAA Automotive Association

5GAA Strategic Partnerships

5GAA and Public Authorities

Citta' di Torino

Colorado Department of Transportation

DGT Dirección General de Tráfico

GDOT Georgia Department of Transportation

Ministerie van Infrastructuur en Waterstaat

TRAFICOM Finnish Transport and Communications Agency

Ontario Ministry of Transportation

Current Cross-WG WIs

Maturity 2 XWIs:

XW1: NR-V2X (FORD)
XW2: MEC4AUTO (INTEL)
XW3: V2P (Qualcomm)

Maturity 1 XWIs:

XW4: STICAD on Functional Safety (Bosch)
XW5: TOD Tele-operated driving (Daimler)

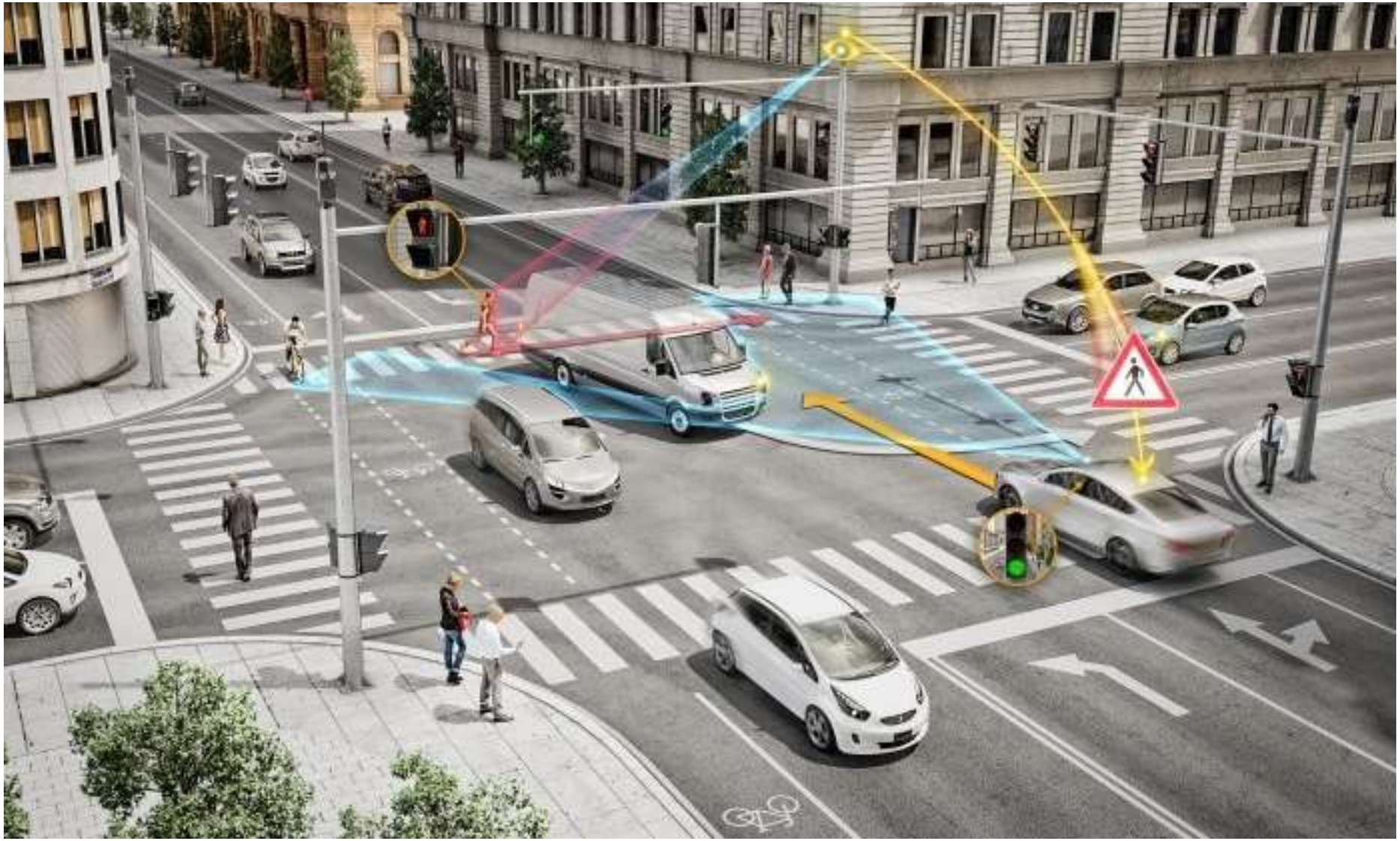
Maturity 0 XWIs:

XW6: C-V2X Use Case Roadmap and spectrum needs (VW)
XW7: NRI on V2X Network selection (Ericsson)

(Maturity levels according to number of F2F meetings)

Strong innovation push with NR-V2X

Enable complex interaction Use Cases (perception, negotiation, multi-lateral agreements)



Source: Continental

NR-V2X: enabler for complex interaction Use Cases

5GAA develops application-level groundwork for Next Generation (Rel-16 and beyond) services with use cases involving “complex message interactions” for assisted, automated, and autonomous driving scenarios.

What is a “complex interaction”?

In a complex V2X interaction, two or more participants exchange at least three messages, of which most depend on at least one of the prior messages.

Why are these important?

Complex interactions enable a new class of cooperative use cases, capable of improving traffic efficiency, safety, and convenience. 5G New Radio will provide the hardware capabilities, but a new set of protocols and messages is also required to support these scenarios.

Complex Interaction Example

When maneuvering at an intersection, vehicles identify partners for negotiation, discuss the order in which to go, come to an agreement, and execute accordingly.

Liaison Statements to 3GPP

Liaison Statements to 3GPP SA/RAN

- LS reply to 3GPP as an input to SA/RAN Rel-17 prioritization
  → 3GPP TSG SA/RAN 8 August 2019
- LS reply from 5GAA to LS on NR V2X Sidelink Operation
  → 3GPP TSG RAN4 21 August 2019
- LS reply to 3GPP TSG RAN on 3GPP Rel-17 and sidelink enhancements
  → 3GPP TSG RAN 21 August 2019
- LS reply to A-190116 application layer support for V2X services
  → 3GPP SA2 SA6 25 September 2019

Rel-17 features supported by 5GAA

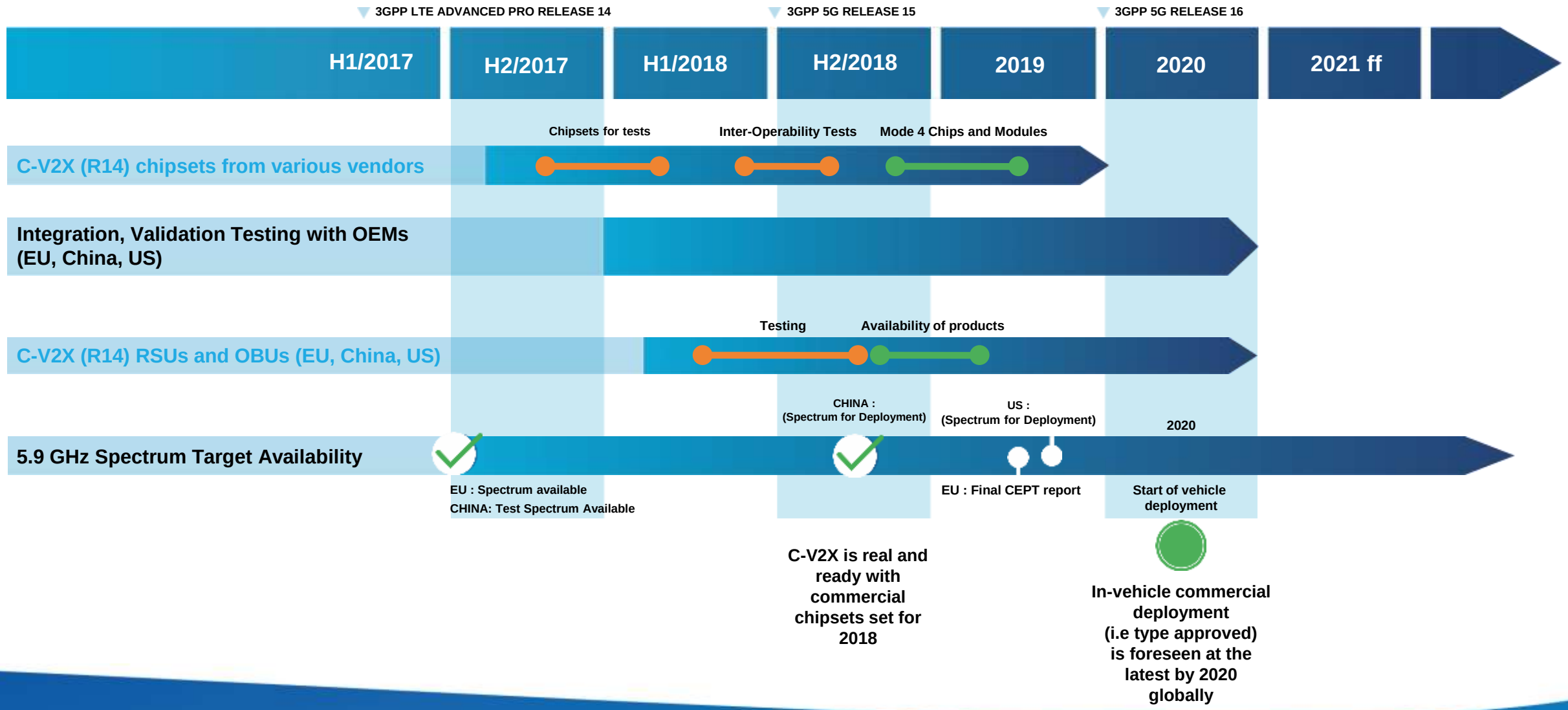
- Important that 3GPP has C-V2X continuous work in rel-17 and beyond
- UE Enhancement e.g. Power saving enhancement for UE of vulnerable road users, Discontinuous Transmission (DTX), …
- Sidelink evolution e.g. positioning level of accuracy, capacity enhancements, improve reliability, baseline for operation with 2TX/2RX antennas, mmWave bands (FR2), …
- Architecture gap closure and enhancement e.g. Uu Multicast, groupcast enhancement, network based positioning accuracy enhancement, etc …
- Minimization of drive tests (MDT) and Self-Organizing Networks (SON) automotive enhancement, e.g. Sidelink QoS Measurement report, …
- Prediction of the QoS parameters of the communication link (PC5 mode 1 +2 and Uu) by e.g. considering geographic information of the UE (route information), etc…

5GAA rel-17 requirements

- 3GPP should ensure robustness of the system e.g. high congestion, message sizes and trigger conditions (as defined in TS 22.185 and TS 22.186), effective and flexible Doppler compensation at high speed, recipient mixture (Unicast, Multicast, Broadcast), …
- 3GPP to keep rel-16 assumption on coexistence with other ITS Technologies in the same frequency band
- Proven support of KPIs listed in TS 22.186
- As Market Representation Partner of the Automotive industry the 5GAA will encourage the 3GPP effort on C-V2X

Preparing for deployment: Interoperability and conformance of C-V2X equipment

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



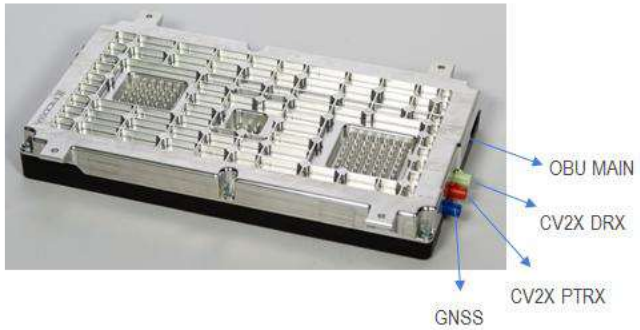
Commercial availability of LTE-V2X solutions in Europe

- Many hardware/sotfware solutions now commercially available for EU market: On-board Units (OBUs) or Roadside Units (RSUs) enabling both C-V2X direct short-range and long-range
- First Radio Equipment Directive (RED) Certification secured by Ficosa in June 2019.

commsignia **OBU ITS-OB4**

SAVARI™ **OBU MW2000**

FICOSA **C-V2X On-Board Unit**



HARMAN A SAMSUNG COMPANY **S5G1 TELEMATICS CONTROL UNIT**

commsignia **RSU ITS-RS4**

HUAWEI **LTE-V RSU5201**

SAVARI™ **RSU SW2000**

Towards a 5GAA C-V2X interoperability programme in collaboration with partner organisations

8-10 Nov 2018
3-layer interop event,
Shanghai

8-10 April 2019
5GAA plugfest event,
Berlin

30 Sep – 4 Oct 2019
OmniAir European Plugfest,
Malaga

22-24 Oct 2019
4-layer interop event,
Shanghai

2-6 Dec 2019
ETSI Plugtest™,
Malaga

Source: OmniAir Consortium

TESTING OFFERED

- Radio testing for C-V2X PC5 and DSRC
- Conformance testing against OmniAir specifications for DSRC
- Conformance testing against existing OmniAir specifications (draft) for C-V2X
- Testing against ETSI specifications for ITS-G5
- BSM Performance & Location Accuracy Testing for DSRC
- BSM Drive Comparison Testing for DSRC and possibly CV2X
- SCMS Security Certificate Testing (including new OmniAir security test cases
- Device Testing Availability for Certified DSRC Device with Stakeholder (limit two total)
- Private testing for selected C-V2X —for the first time— will be offered

EARLY TEST STATION PROVIDER COMMITMENTS

SCMS Security Certificate Providers
- INTEGRITY Security Services
- Penta Security

OmniAir Authorized Test Laboratories
- DEKRA
- SGS
- TTA – Telecommunications Technology Association- Korea

OmniAir Qualified Test Equipment Providers
- Keysight
- Spirent

OmniAir Member Test Providers
- KATECH
- Rohde & Schwarz
- SwRI
- Vector
- Wayties

Source: IMT-2020 V2X PG

LTE-V2X Security Demonstration and Verification Project

Guidance

IMT-2020(5G)Promotion Group
C-V2X Work Group

China Industry Innovation Alliance for the Intelligent and Connected Vehicles

5G Automotive Association

Time and location

October 22-24, Shanghai

Participants

- C-V2X terminal providers
- C-V2X chipset、module providers
- OEMs
- Security chipset providers
- Security service providers
- Universities and Research Institutions
- Test demonstration area and organization

- Realize LTE-V2X security authentication mechanism, demonstrate the maturity of China's C-V2X standard protocol stack
- On the technical level, show LTE-V2X security solutions, promote the establishment of a safe and reliable LTE-V2X scaled application environment

5GAA / ETSI MoU: First ETSI plugtest event

- Organised by ETSI CTI with strong support from 5GAA WG3
- Aim: fully test the European ITS stack standardized by ETSI
- Plans: Lab-based + testing track interoperability tests
- Place: most likely DEKRA premises in Malaga
- Joint organization of a half day workshop on Wednesday, 04 Dec 2019.

ETSI
@ETSI_STANDARDS

Save the date! The 1st Cellular-#V2X Plugtests event, organized by ETSI #TheStandardsPeople in partnership with #5GAA @5GAA_official, will be held in Europe from 2 to 6 December 2019. More information available soon

1:25 PM · Sep 9, 2019 · Hootsuite Inc

Still a challenge to find a one-stop shop for certification

- Automotive OEMs are traditionally not in favor of certification
- Mobile Network operators are traditionally driving the certification via GCF/PTCRB
- Certification for Device-to-Device sidelink may require other actors to drive test requirements:
  - OEMs for OBUs / Road operators for RSUs
- Omniair consortium is positioning itself to become C-V2X certification body in US, possibly in other parts of the world
  - Will automotive radios need to undergo both GCF and OmniAir certifications?

EU regulatory situation on C-ITS

C-ITS Delegated Regulation -Background

European Commission proposed in 2018 a Delegated Regulation on Cooperative-ITS:

- Ensure the compatibility, interoperability and continuity for Day1 services
- No deployment obligation: requirements would apply only if C-ITS services are deployed

Delegated Regulation was **only inclusive of ITS-G5 short-range communications** (EU terminology for DSRC).

5GAA expressed great concerns on the Delegated Act as adopted by the European Commission

5GAA opposed the adoption of such Regulation given that:

- It failed to establish a **technology neutral** and **forward-looking regulatory framework**
- Commission refused to amend the draft to include LTE-V2X for short-range and long-range communications on an equal footing with ITS-G5
- **Interoperability was not defined on a "mutual" basis** among C-ITS technologies but discriminating LTE-V2X by granting ITS-G5 an undue "first-mover" advantage

C-ITS Delegated Regulation was objected by Member States

On 08th July, **Delegated Regulation was objected** by a super-majority of 21 Member States representing 85% of EU population on the ground that:

*"While member states supported the objective of the delegated act, the vast majority of them expressed concerns of a **legal and technological nature**"*

- New European Commission taking office in October 2019 must decide the next steps for C-ITS regulatory framework while taking into account the objection motivations.

In the mean time, the existing regulatory framework remains in force:

- Deployment of C-V2X short-range communications in the 5.9 GHz via current spectrum regulation
- New initiatives building upon existing ITS framework e.g. "Safety Related Traffic Information" (SRTI) so called "Data Task Force"
- 5GAA will continue to engage in a positive dialogue with the European institutions to define a technology-neutral and future-proof regulatory framework for C-ITS.

US/FCC regulatory situation on C-ITS

U.S. Regulatory Background

- C-V2X operations currently not permitted in the 5.9 GHz band under the rules of the Federal Communication Commission (FCC)
  - **Implication: A change to FCC's rules will be required, or a waiver must be obtained, before C-V2X can operate in the 5.9 GHz band**
  - USTF filed a petition for waiver Nov. 2018 to allow operation of C-V2X in 5.905 - 5.925 GHz. 5GAA also filed a long term proposal to FCC in April 2019 for broader C-V2X operation incl NR-V2X.
  - FCC planning a notice of proposed rule making (NPRM) for 5.9 GHz band - release TBD.

Summary of 5GA actions in US

- **Federal Advocacy – good progress to enable CV2X operation in 5.9 GHz.**
  1. Get waiver approved for LTE-V2X (Rel-15)
  2. Establish broader allocation for C-V2X
- **State Advocacy – proactive engagement so far with different states**

  Colorado DoT: 100 mile highway equipped between Denver airport and ski resort area

  Georgia DoT: Commitment to equip thousands of intersections by local communities

  Other State DoTs: 5GAA members are engaging with other State DoTs to promote C-V2X deployment along with 5G

Ford maintains his commitment to deploy C-V2X on its new vehicle fleet by 2022, if regulations allow it.

What’s next

Next meetings

Next F2F WG meetings

- 5GAA WG 12th meeting Nov 11 – 14, 2019 Turin, Italy
- 5GAA WG 13th meeting Feb 03 – 06, 2020 Brussels, Belgium

Important events with 5GAA presence

- CES2020, Jan
- MWC Barcelona, Feb
- MWC Shanghai, June
- ITS World Congress, Los Angeles, Oct

5GAA Automotive Association

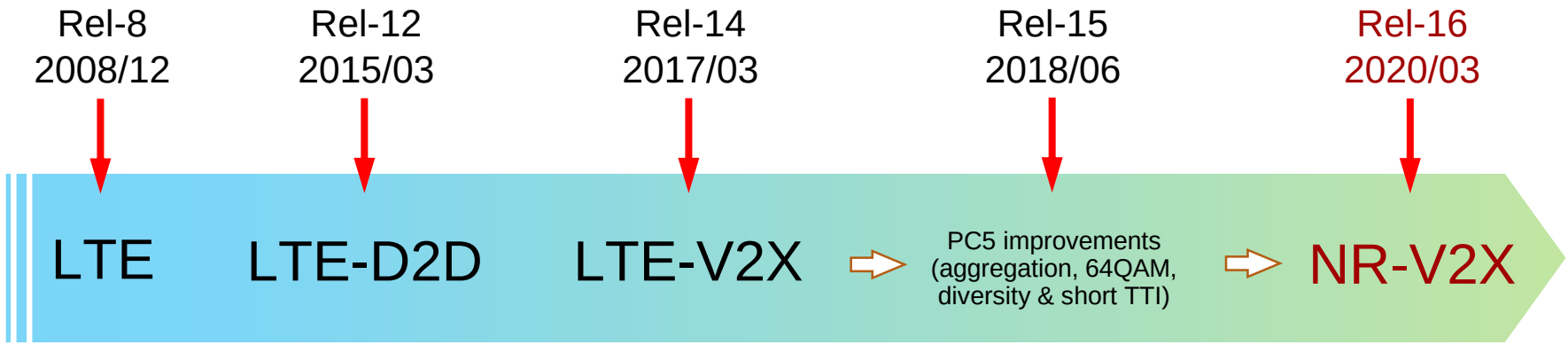
For more information please contact:

marcom@5gaa.org

www.5GAA.org

3GPP time plan: from LTE-V2X to 5G NR-V2X

- 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 automated driving.
- NR-V2X will complement, co-exist and support interworking with LTE-V2X i.e. operation of NR-V2X alone is not considered.



- NR-V2X study item started in June 2018.
- NR-V2X work item is being completed and expected by March 2020.