

CONNECTING THE MOBILITY  
WORLD WITH 5G-V2X

**5GAA**   
*Automotive Association*



**MWC19™**  
Barcelona



February 27, 2019

@qualcomm

Barcelona

Qualcomm

# C-V2X Ignites Automotive Connected Revolution

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Sr. VP, Product Management  
Qualcomm Technologies, Inc.







Precise positioning  
Lane-level accuracy  
anywhere, anytime



Wi-Fi  
For in-car experiences  
and car OEM services



Bluetooth  
For high quality  
voice and audio



4G/5G  
For car OEM services



4G/5G  
For driver  
and passengers



C-V2X Direct  
Communications  
For car-to-infrastructure  
communication



C-V2X Direct  
Communications  
For car-to-car  
communication

Car connectivity  
in the 5G era

Heterogeneous  
connectivity

Secure, virtualized  
wireless links

Advanced  
Positioning

Multi-environment  
implementation

4G/5G is referring to C-V2X network communications (i.e. V2N); C-V2X Direct Communications is referring to V2V, V2I, V2P



## AI-based roadside unit

### Smart RSU/Small cell

- 4G/5G small cell
- Integrated C-V2X support
- Infrastructure-to-vehicle (I2V)
- AI/perception and sensor fusion
- AI-based camera, radar, lidar
- Precise positioning and 3D HD mapping

### Smart connected cars

- 4G/5G support
- Integrated C-V2X support
- Precise positioning
- AI/perception and sensor fusion



Smart transportation infrastructure supported by our foundational technologies



Artificial intelligence



Mobile Edge Compute



Sensor fusion



Multimode 4G/5G



C-V2X Direct Communications



Precise positioning



Computer vision

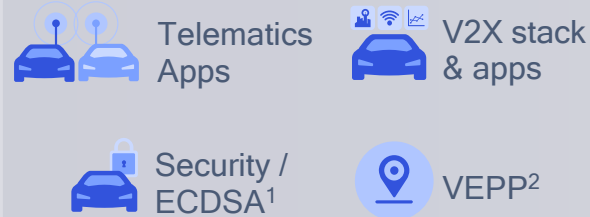


Power management

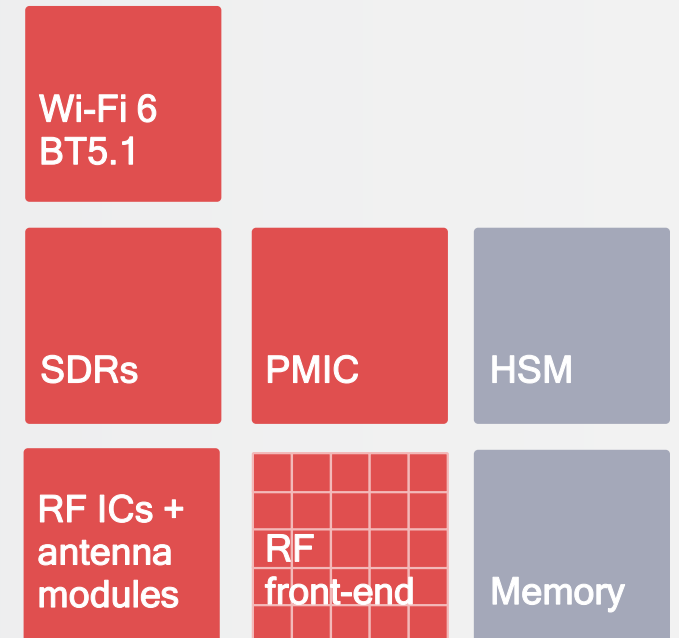
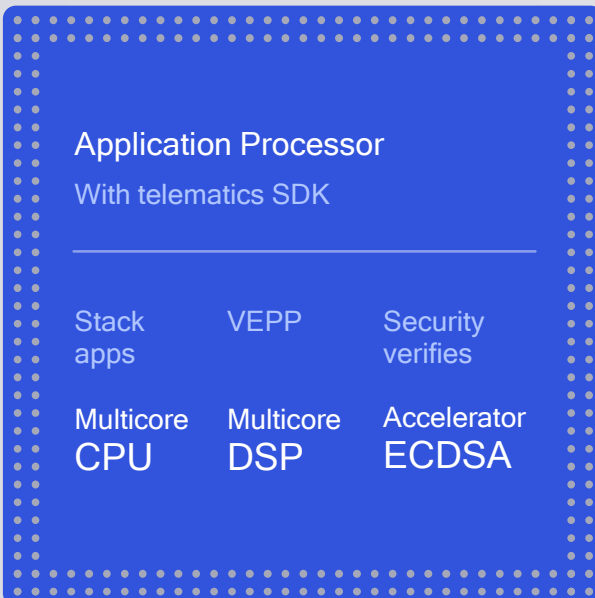


Security

# Qualcomm® Connected Car Reference Design, Gen 2



## Qualcomm® Snapdragon™ Automotive 4G/5G platforms





# Strong C-V2X momentum globally



Sep 2016



Founded

Jan 2017

ConVeX trial in Germany announced

Mar 2017



Rel-14 C-V2X spec finalized

MDM 9150

Sep 2017

First C-V2X chipset introduced

Jun 2018

1st US deployment in Denver

Oct 2018

Multi-OEM performance evaluation of C-V2X

Nov 2018



Reaches 100 members

Jan 2019

Cooperative driving live interactive demos in Las Vegas:



Feb 2017

Towards 5G trial in France announced

Oct 2017

San Diego Regional C-V2X trial with:



Apr 2018

First multi-OEM demo in D.C.



Jul 2018

Europe's first multi-OEM demonstration in Paris

Oct 2018



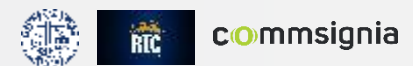
C-V2X functional and performance test report published

Nov 2018

China-SAE ITS Stack Compatibility

Jan 2019

Announcing C-V2X implementation in Las Vegas with:



Colorado DOT CDOT  
C-V2X Deployment  
Program



# Helping bring a comprehensive ecosystem together

Working across industries to forge sustainable relationships, unlocking new value



Software companies



Test equipment vendors

## Automotive



Vehicle OEMs



Tier 1 suppliers

## Transportation



Road operators



Traffic industry suppliers

## Telecom



Mobile operators



Telecom suppliers

## Internet/cloud



Cloud service providers



Map providers

Standards



Standards development organizations



Telecom and auto industry organizations



ITS organizations



# 5GAA Automotive Association

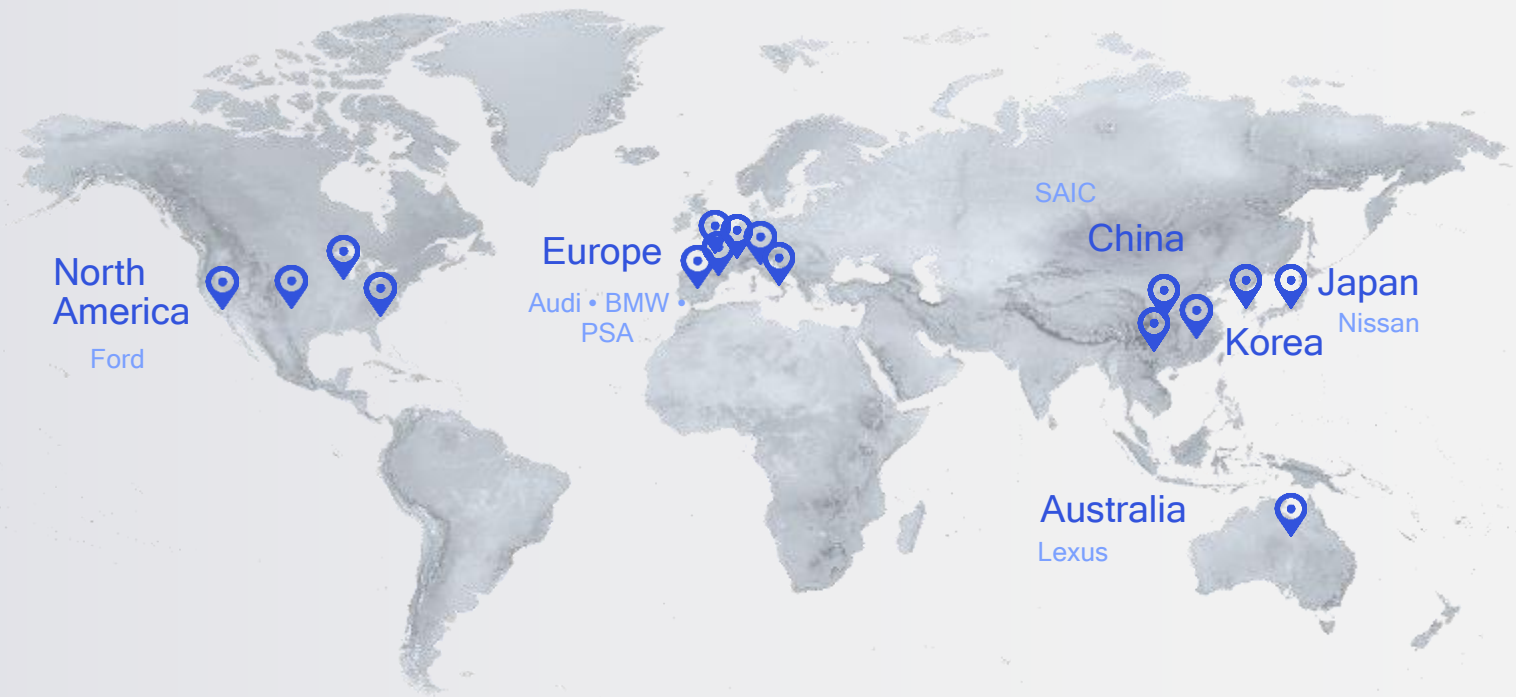
Airgain · Alpine Electronics · Analog Devices · Anritsu EMEA Ltd  
AT&T · Audi · BAIC · Beijing University · Bell Mobility · BMW · Bosch  
CATT · Cetecom · China Transinfo · China Unicom · CMCC  
Continental · Daimler · Danlaw · DEKRA · Denso · Deutsche Telekom  
Ericsson · FEV · Ficoso · Ford · Fraunhofer Gemalto Hirschman Car  
Hitachi Automotive US · Honda · Huawei Infineon · Intel · Interdigital  
Jaguar · Land Rover · Juniper · KDDI · Keysight · KT · Laird Tech · LG  
Murata · Nissan · Nokia · NTT DoCoMo · OKI · Orange · P3 Group  
Panasonic · Proximus · PSA · Qualcomm · Rohde & Schwarz · Rohm  
SAIC · Samsung · Savari · SIAC · SK Telecom · Skyworks · Softbank  
Sumitomo · Telefonica · Telekom Austria · Telstra · TÜV · Valeo  
Veniam · Verizon · Viavi · Vodafone · Volkswagen · ZF · ZTE

## Key participants

driving global C-V2X activities with  
Qualcomm Technologies

Ford	ZTE	Kapsch
PSA	Quectel	SWARCO
BMW	Lear	Genvict
Daimler	Valeo	Nebula
SAIC	WNC	R&S
China Domestic OEMs	CMCC	Datang
Continental	AT&T	Ficoso
Bosch	DoCoMo	And more ...
LG	CMRI	
	McCain	

# Driving C-V2X global presence



Tremendous traction across regions and broad industry sectors

From standards completion to independent field testing to early commercialization



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