


Autotalks Company Introduction

November 2019



Autotalks At A Glance

An aerial view of a multi-lane highway curving through a dry, open landscape. Several cars are visible on the road, each surrounded by a yellow circular range indicator. A network of white lines connects these cars, representing V2X communication. The scene is overlaid with a semi-transparent white text box.

Autotalks provides the only global V2X communication processor for a better, increasingly connected and safer world.



Company Overview

Autotalks

Overview Of Autotalks

World's Leading V2X Chipset Provider



Mission



Dramatically reduce road accidents

Products



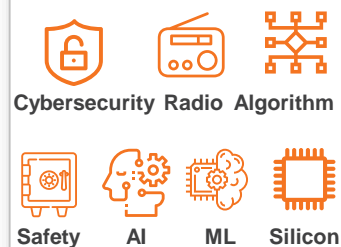
V2X solution for vehicles and smart infrastructure

Global Solution



Supporting all V2X standards: DSRC and C-V2X

Team Expertise



Innovative and committed, with deep domain expertise

Offices

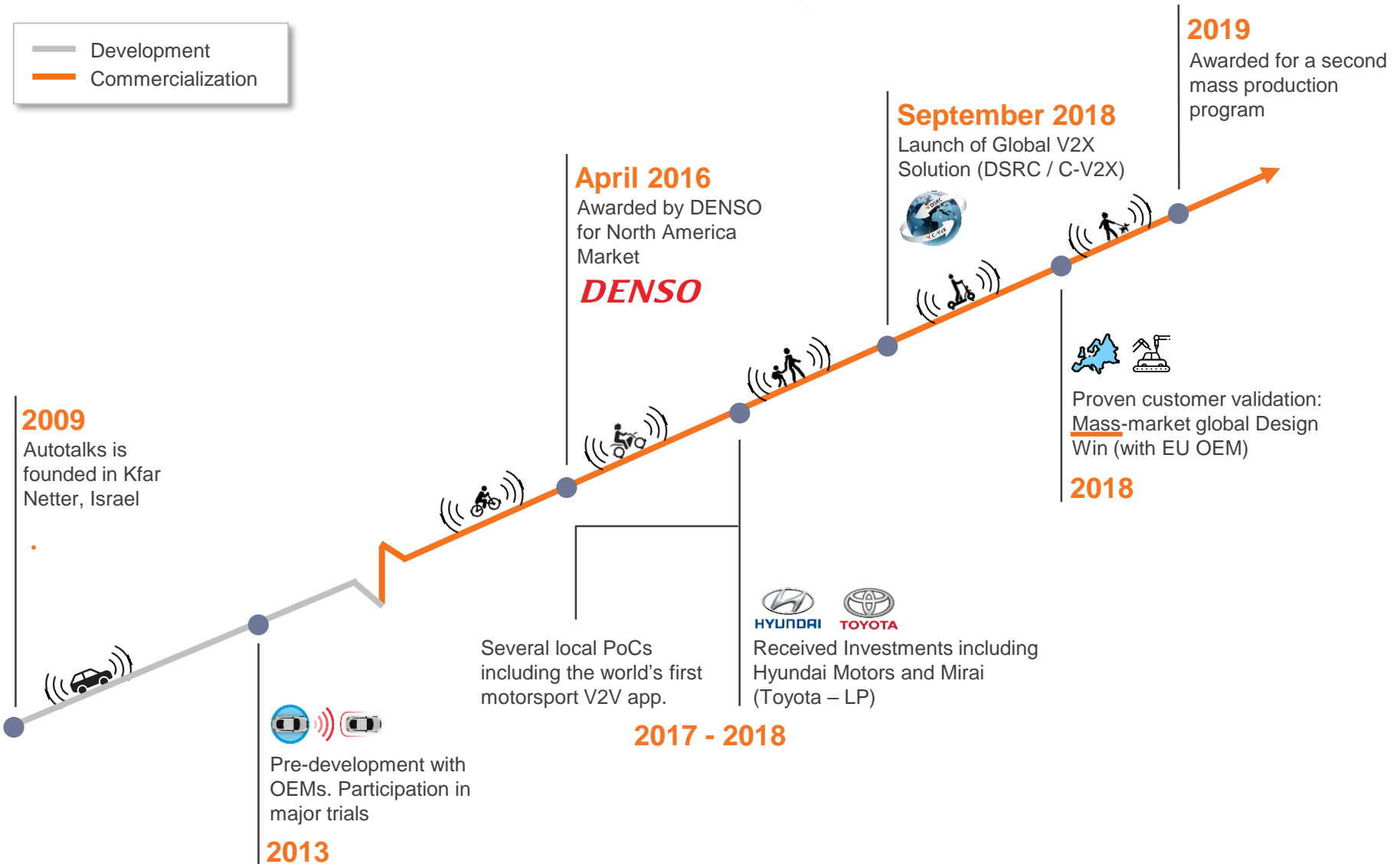
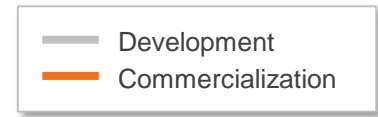


Global presence

With the Support of Leading Investors

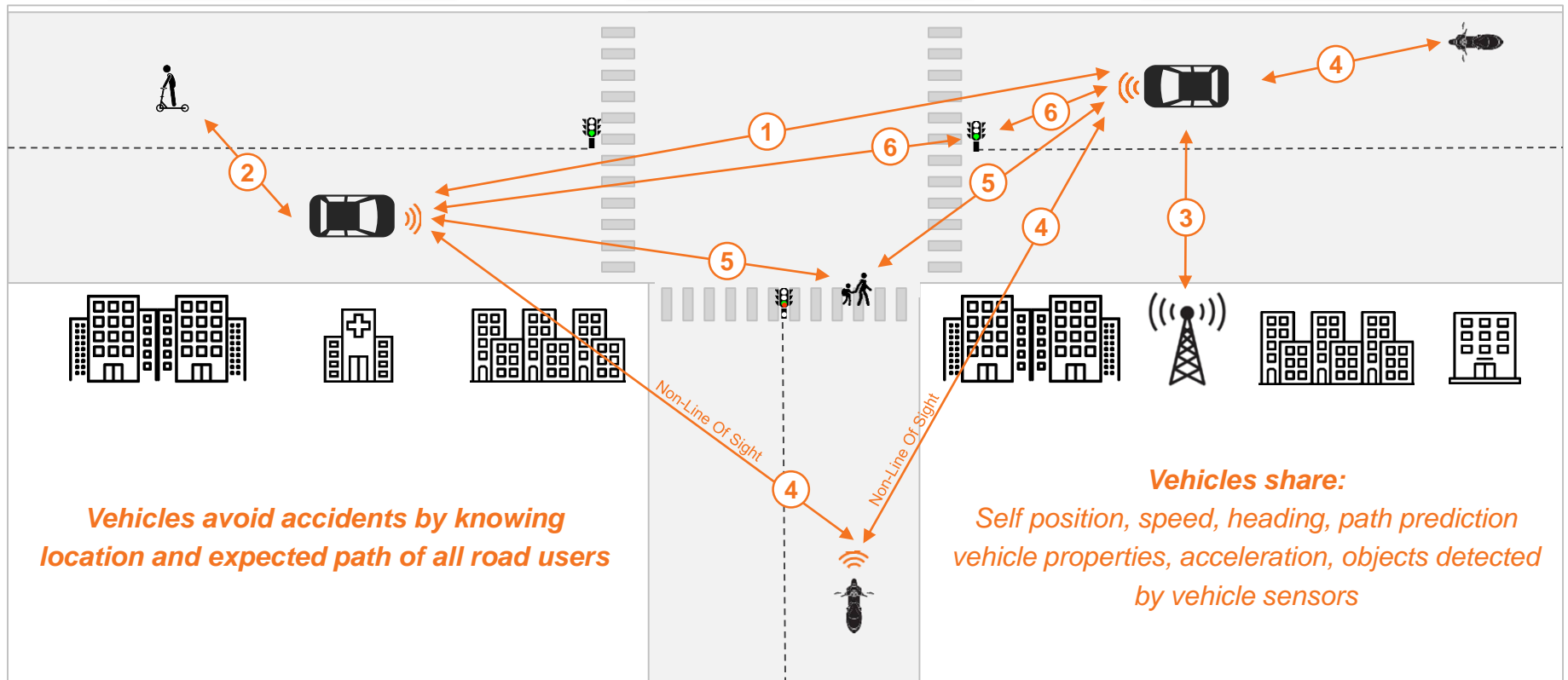
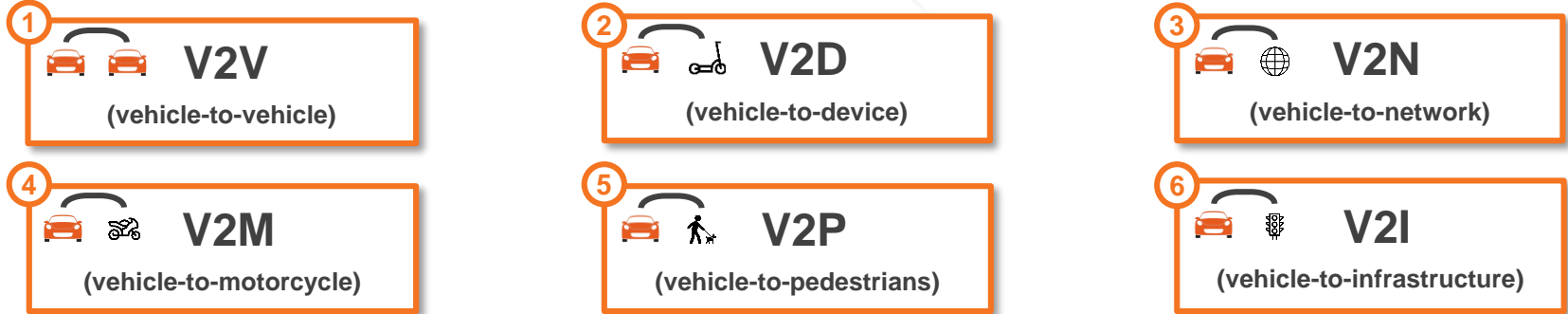


Autotalks Timeline



What is V2X?

What Is V2X?



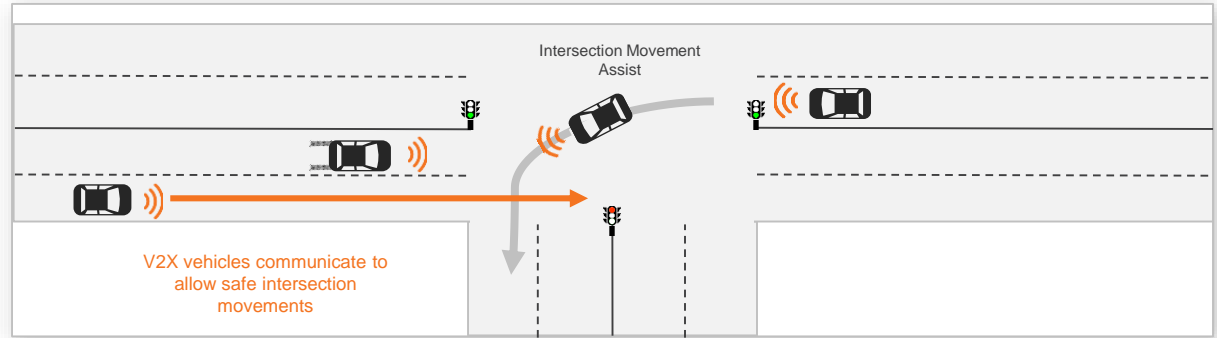
Evolution of V2X

Day

1

Driving Awareness

Left Turn Assistance
Smart infrastructure
Truck platooning

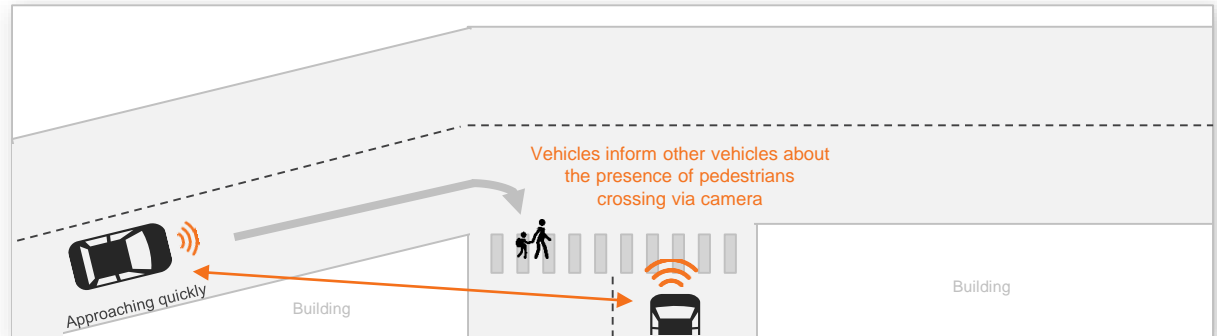


Day

2

Cooperative Perception

Know what other cars sense

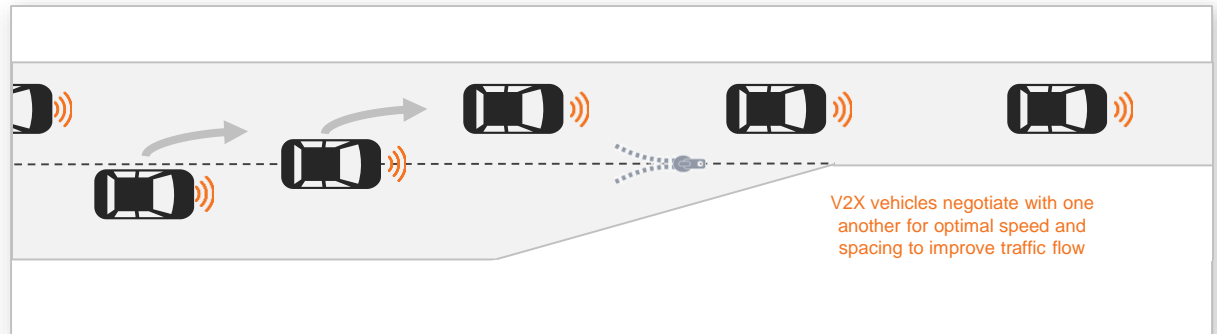


Day

3

Coordinated Maneuvering

Prevent most traffic jams
Enable high autonomy level

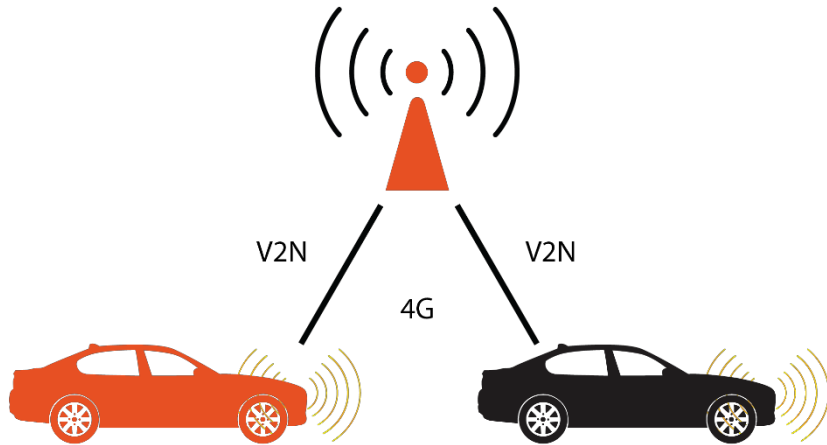


The Hybrid Model for Vehicle Connectivity

V2N

Network Communications

LTE/5G for V2N operates in licensed cellular spectrum



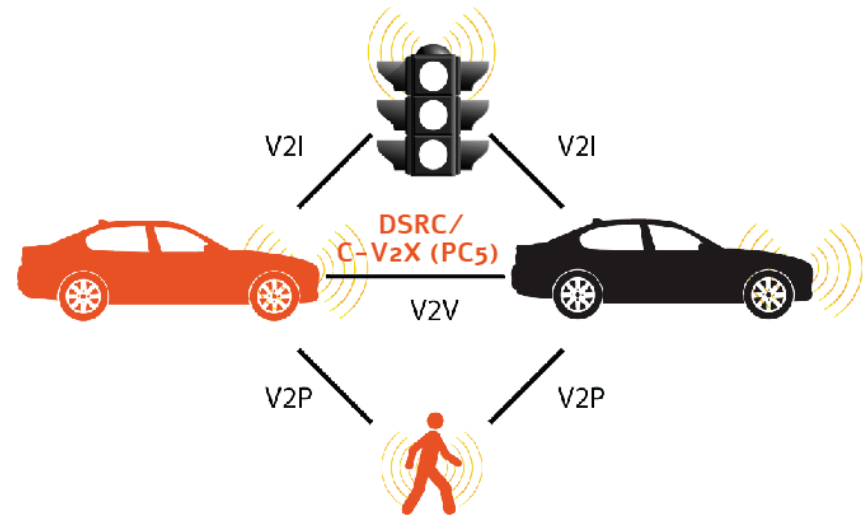
V2N – Vehicle to Network

Infotainment - non mission critical → non secure, non real-time, taken from consumer market

V2X

Direct Communications

DSRC / C-V2X (PC5) for V2X operates in the ITS band (5.9 GHz)



V2X - Vehicle to Everything

Safety – mission critical → cybersecurity, reliable, real-time, low latency, automotive grade

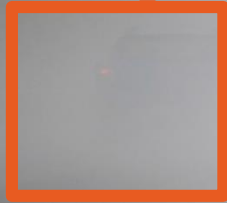
DSRC / C-V2X is independent of cellular network

Why V2X?



Why Predict When You Can Know?

Car in adjacent lane



Car braking ahead



Anthony Levandowski (Ex Google self driving car guru) : “Cars still do dumb things even with perfect information about what is around them. **The real problem is predicting what others**—including cars and pedestrians—**are going to do**. Even if you can see it, it’s not enough. You need to have proper reasoning. In other words, a **“fundamental breakthrough” in AI is necessary to move self-driving car technology forward**. The existing, state-of-the-art [software] is not sufficient to know how to predict the future of objects around the vehicle.”

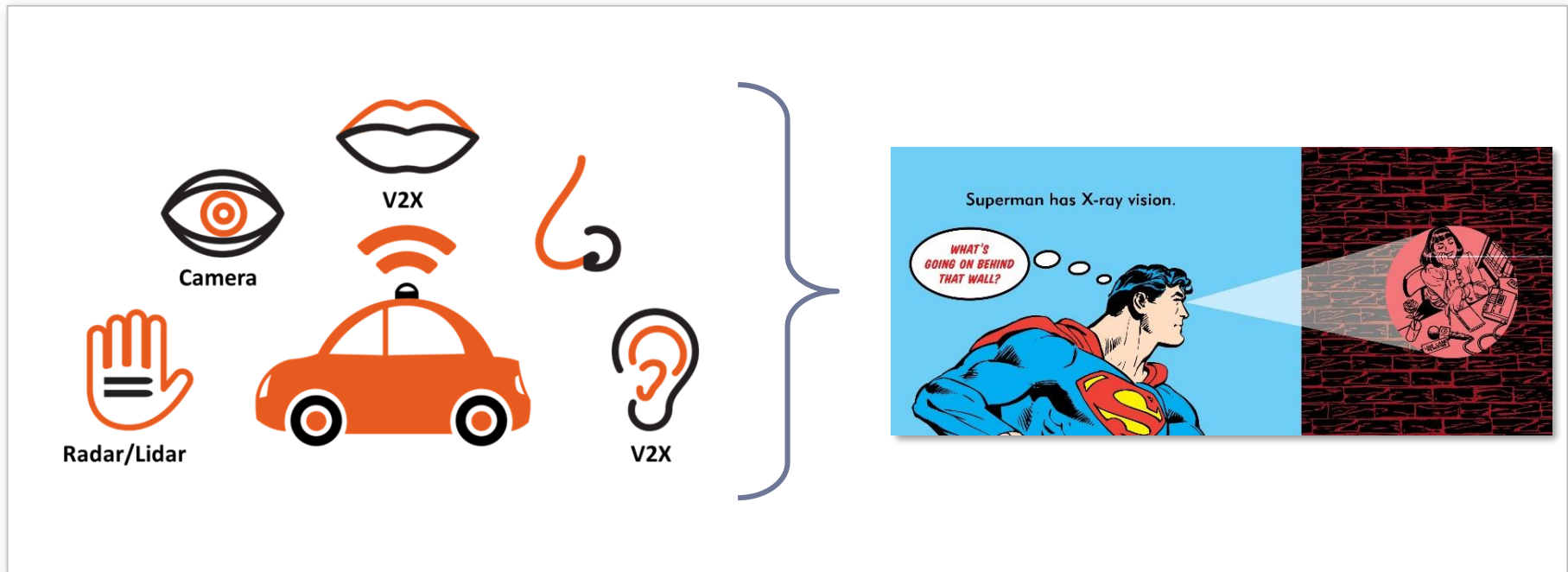
Where is a motorcycle? (source: Honda R&D)



V2X Powers Safety & Autonomy

V2X enables efficient, predictable and affordable autonomous driving

- Coordination (road sharing, merging)
- Cooperation (efficiency, platooning)
- Complements other sensors (the only “non line-of-sight” sensor)
- Identify Vulnerable Road Users (pedestrians , bikes , motorcycles)
- Traffic light status by infrastructure communication



Selected V2X Use Cases

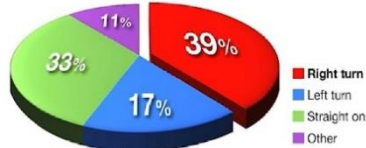
V2X Today and Tomorrow



Real-Life Value of V2X: Toyota's Deployment in Japan (>100K Vehicles)

Effectiveness of ITS Connect

In Japan, approximately 40% of accidents at signalized intersections—more than any other type—involve drivers turning right



The number of accidents caused by cars at signalized intersections in Japan (2011)
Source: ITRADA Information No.85

“ITS Connect” would reduce the risks of collisions when making a right turn by approximately 40%*

* Preliminary estimates under current testing conditions
Based on data collected in Tokyo and Aichi at nine different intersections from April 2016 to March 2017

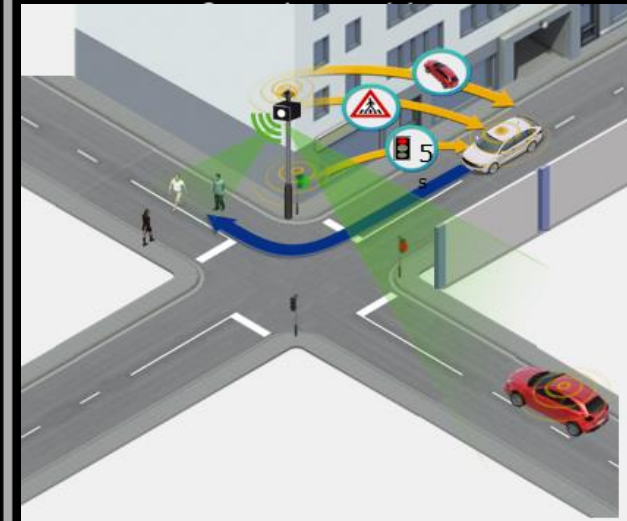
Video footage of near misses involving vehicles not equipped with “ITS Connect” making right turns



Video footage of a safely executed right turn involving a vehicle equipped with “ITS Connect”



Genuine footage from a privately owned vehicle



- Main intersections in Tokyo equipped with Camera + V2X
- Camera detects pedestrians crossing / vehicles approaching
- Alerts of possible collision is sent to car equipped with V2X
- High value for every vehicle with V2X

Motorcycles

- **Motorcyclists' risk of a fatal crash is 35 times greater than a light vehicle driver**
- In over 1/3 of accidents, the vehicle driver did not see the approaching motorcycle
- Demo with Bosch and Ducati in May 2017
- Autotalks joined CMC (Connected Motorcycle Consortium) in early 2018
- Engaged with multiple OEMs and performing live field tests

Autotalks Launched B2V Communication Solution

7 June, 2017

Bosch is now testing the Bike-to-Vehicle technology from Autotalks. According to the World Health Organization, 23% out of traffic fatalities are motorcycle riders

Autotalks from Kfar Netter, Israel, expands its V2X (Vehicle-to-Everything) wireless communication solutions, with the



Trucks and Platooning



Fuel Saving: V2X enables Cooperative-Adaptive Cruise Control (CACC) / Platooning
Safety: Long range V2X sensor enables NLOS detection and coordination

Enabling Autonomous Shuttles

- **Navya is powering autonomous shuttles in Singapore, France, New Zealand, and more.**
- Scenarios: university, airport shuttle, delivery shuttle, short commutes
- Navya's Autonomous shuttle use V2I for passive and active traffic light communication
- Autotalks V2X chipset is used to enable these Autonomous shuttles

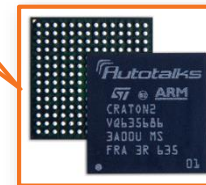


- Three autonomous driverless and electric shuttles operating in three different tracks in order to cover the district of La Défense in Paris which hosts more than 500,000 visitors daily!



Vulnerable Road Users (Pedestrians, Kids, Elderly)

- In 2016, 5,987 pedestrians were killed in traffic crashes in the United States alone
- Pedestrians are 1.5 times more likely than passenger vehicle occupants to be killed in a car crash on each trip
- Autotalks partnered with RoyalTek in 2017 to create innovative solutions for vehicle to pedestrian (V2P) use-cases





Market Overview

Regulatory Environments Supportive For V2X Deployment

USA

- FCC to allocate 20MHz for C-V2X
- Additional 10MHz would be allocated to DSRC or C-V2X Rel. 16
- Ford and GM announced deployments

China

- Chinese government calls for massive C-V2X deployment
- Initial ramp from 2021

Europe

- European Commission (EC) suggested rules for deployment of Cooperative Intelligent Transport Systems (C-ITS) on Europe's roads and supporting DSRC
- VW Golf 8 launched with ITS-G5 (DSRC)
- Road operators are on-track for large-scale deployments in parallel
- NCAP plans to include V2X in vehicle safety scoring in 2024



Japan

- Japan has been using DSRC over the past 5 years to offer V2I-based applications
- Toyota deployed over 200K vehicles benefiting from smart infrastructure in Japan

Korea

- MOLIT is pushing DSRC technology for ITS
- Korea mobile operators are pushing for C-V2X
- Multiple local deployments of DSRC: Seoul C-ITS, Jeju, National Highways, etc.
- Dual-mode systems will be deployed in Seoul

Source: Frost & Sullivan.

Top Global OEMs Are Implementing V2X



VW Golf 8 launched with ITS-G5 (DSRC) in October 2019.

Wide-scale 2nd generation V2X project is in progress.

Long term commitment to DSRC.



Toyota launched V2X services in Japan in 2015, over 200K vehicles deployed with DSRC in Japan



上汽集团

“In 2020, SAIC-GM will begin implementing connected vehicle (V2X) technology that will connect vehicles to other vehicles and infrastructure.”



“...committing to deploy C-V2X in all of our new vehicle models in the United States beginning in 2022.”



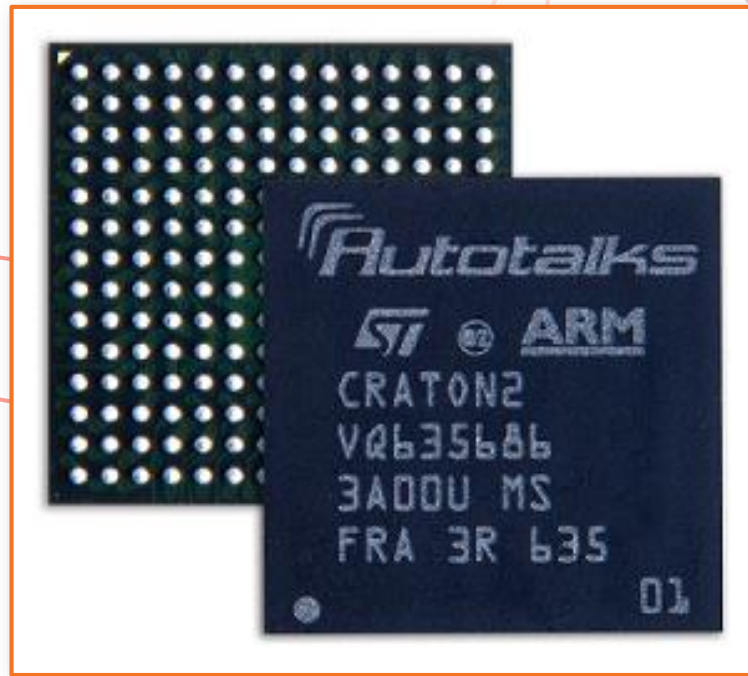
GM will build DSRC on-board units into a high-volume Cadillac crossover model starting in 2023, with deployment to expand to all Cadillac models thereafter



Geely plans to launch the first domestically mass-produced 5G and C-V2X-enabled vehicles in 2021

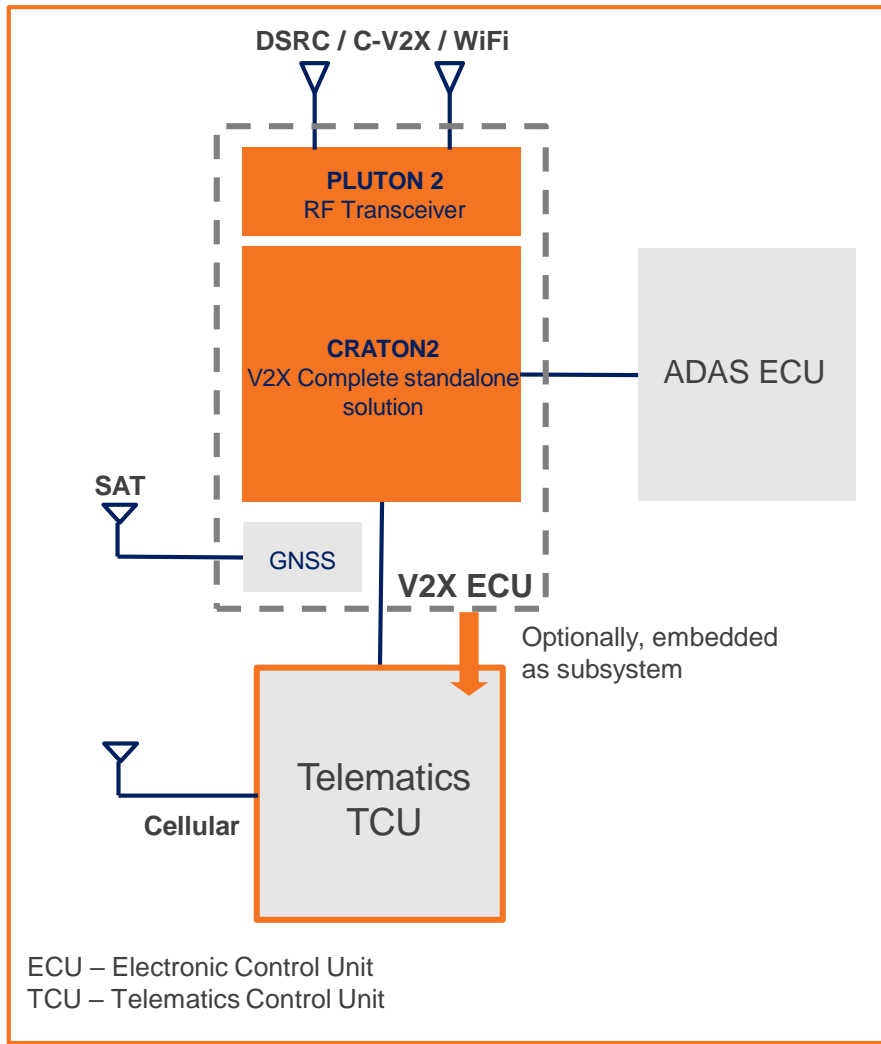


Manufacturing members of ACEM agreed on September 29, 2014 that they will introduce at least one of their powered two-wheeler models with C-ITS functionality by the year 2020

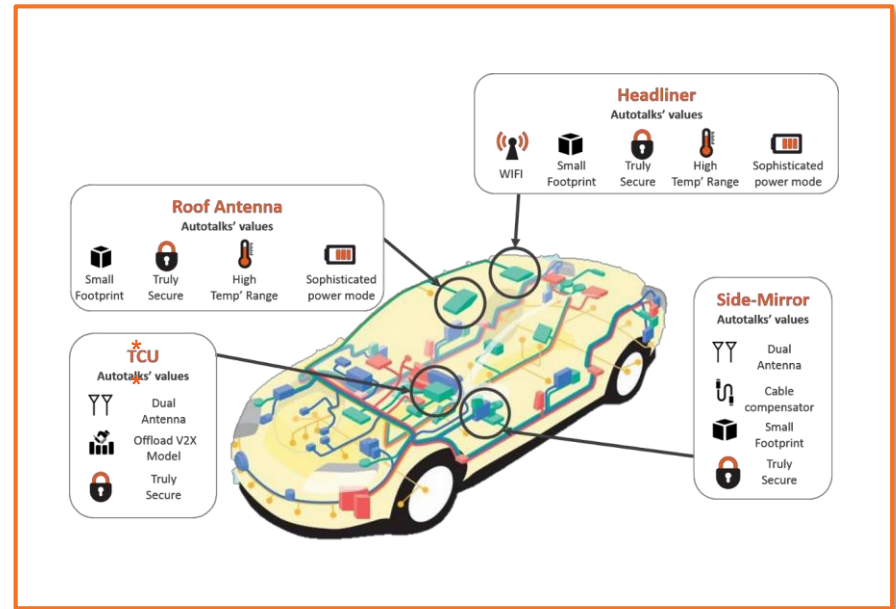


Product Overview

Autotalks' Deployment-Ready Solution



- Autotalks implements a complete solution for all V2X use cases
 - Standalone or integrated in other ECUs (i.e. Telematics)
 - Placed anywhere in vehicle (antenna, headliner, in-vehicle)
- Mature 2nd generation solution



Strong multidisciplinary technology that poses a high barrier to entry

The Only Global V2X Solution



Autotalks offers the only global V2X Communication Processor

-  The only **truly global platform** addressing: China, Japan, US , EU markets
-  Dual mode V2X: **DSRC or C-V2X (PC5)** modem
-  Truly **safe, mature, secure and certifiable**
-  **Decoupled from** cellular modem (agnostic)
-  Leveraging **production grade software**
-  Deployed in **over 10 Tier1 V2X platforms** and promoted for OEMs RFQs, demos and field trials

The Best V2X Cybersecurity Solution

Multi Layer V2X protection

- All messages are authenticated ('verify-all') for minimizing surface of attack
- Hardware Security Module stores high amount of sensitive data
- Cryptographic-agility ensures sustainable security for decades to come
- Reliable misbehaviour detection of bad actors



'Verify All'



'Firewall'



'Misbehavior Detection'



'Secure Signing'



Autotalks V2X solution is recognized (both car makers and Tier-1s) as the most advanced CYBERSECURITY solution in the market

Technology Lead & Innovation

Truly Secure

Isolated Multilayer
Cybersecurity Platform



Artificial Intelligence

Road understanding based on
V2X signals



Positioning

Lane-level accuracy based
on Geo-Beacons



Urban Canyon

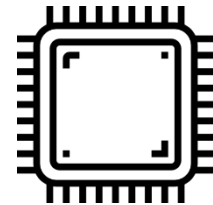
Out-of-vehicle WiFi

Zero-added cost for OTA
updates, mobile offload,...



Automotive Grade

AEC-Q100 Grade 2, ASPICE,
IATF 16949, ISO26262 ASIL-B



Architected for Autonomous Driving





Autotalks