

Roger C. Lanctot

Director, Automotive Connected Mobility

Roger Lanctot has 25+ years of experience as a journalist, analyst and consultant advising electronics companies, car companies, wireless carriers, Tier 1s and developers on product and market development and strategy.

He is currently Director, Automotive Connected Mobility, in the Global Automotive Practice at Strategy Analytics. He is a graduate of Dartmouth College and a frequent blogger and keynote speaker. Roger is a member of the TU-Automotive Hall of Fame and was selected as 2017 Tech Cars Best Analyst or Connected Car Celebrity.



5GAA C-V2X Workshop and Demonstration for North American Transportation Planning and Road Operator Communities



A 5G Perspective on Connecting Cars

STRATEGY ANALYTICS

Roger C. Lanctot
Director, Connected Mobility



Why 5g matters

- Lower latency communications
 - Device to device connections
 - Greater reliability
 - Network slicing
 - Layered, ubiquitous connectivity
 - True IoT – network of everything
- Auto Industry to wireless industry:
- New vehicle architecture(s)
 - New business models
 - New development strategy
 - New organizational structure
 - New priorities – privacy, security, autonomy
 - Changing vehicle ownership and usage

You've got our attention!



Telematics Market Status

• Gen 1.0

- Launched: 1996
- Objective: Monetize to consumers directly
- Findings: “Free-Trials” too short
- Result: Huge number of de-activated subscriptions



6 months
FREE!

+

Only \$10 per
month!

=

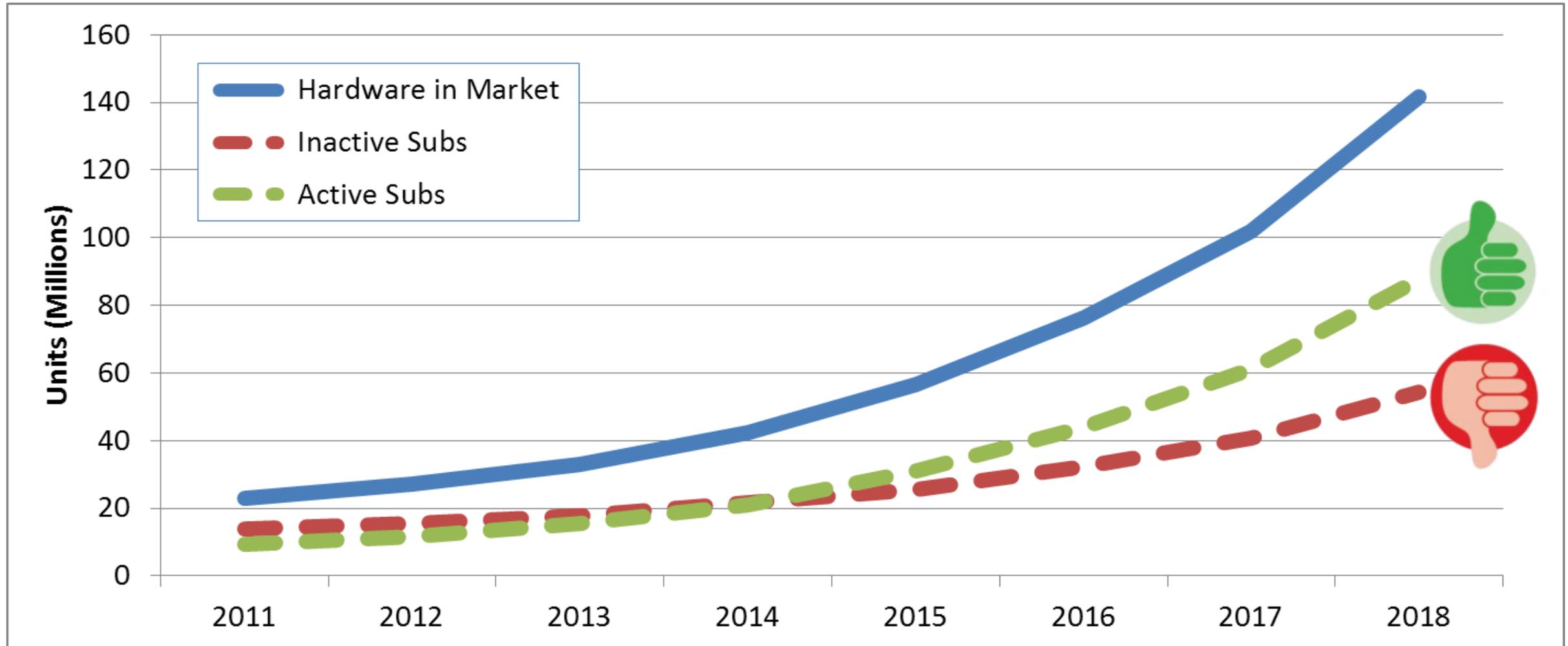
Market
FAILURE





Telematics Gen 1.0

IN-Active Subscriptions (Cumulative)

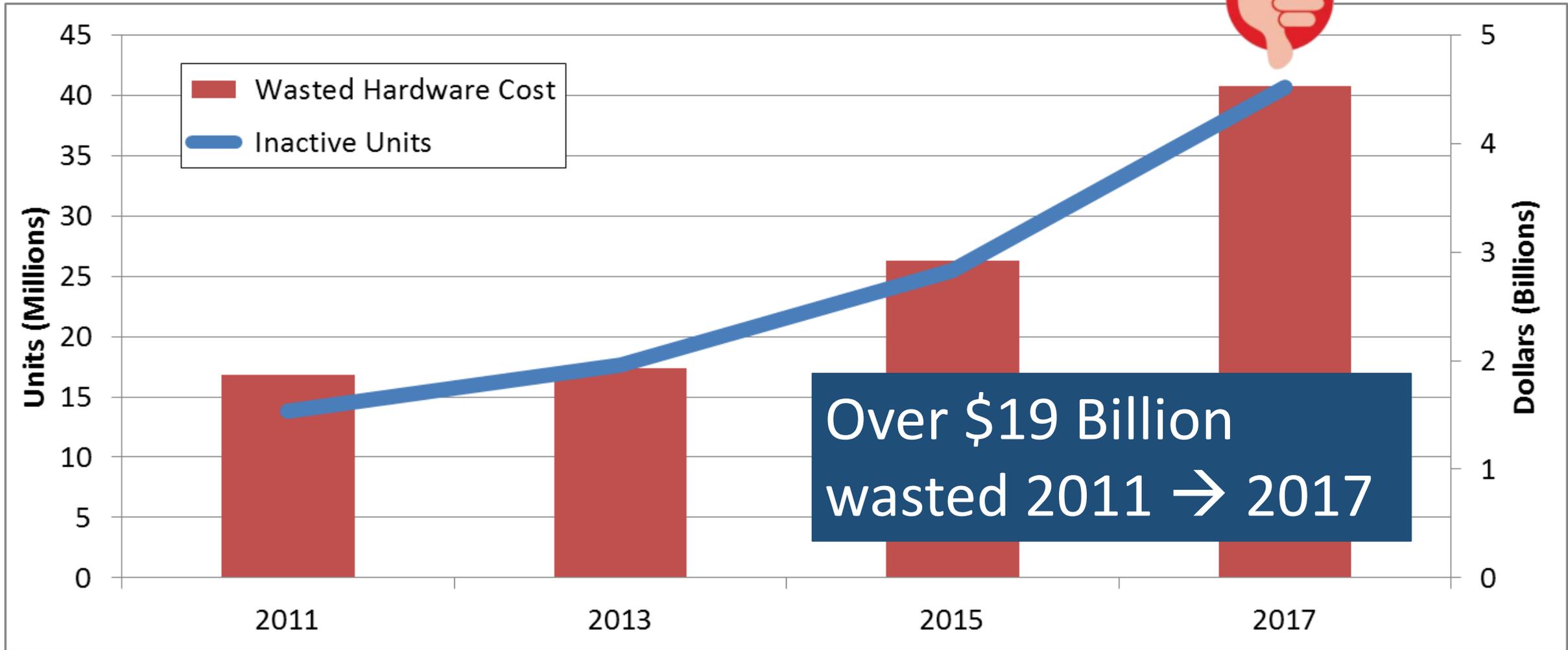


Source: Strategy Analytics Infotainment & Telematics Service



Telematics Gen 1.0

Inactive Subs = Dead \$\$\$

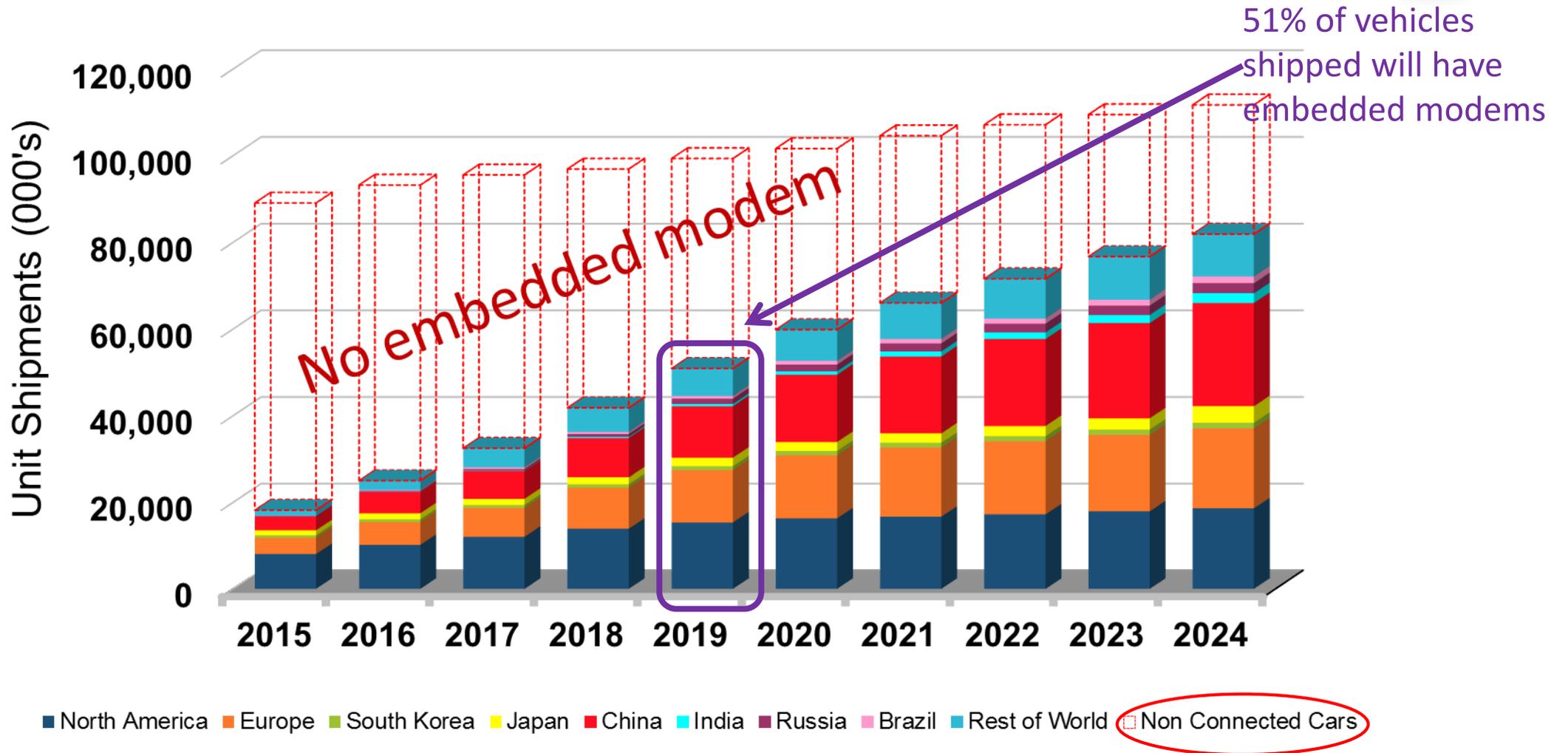


Source: Strategy Analytics Infotainment & Telematics Service



Automotive Embedded Modems

Global annual Shipments



Telematics 1.0





Let's make sure we agree

- Lower latency communications
- Device to device connections
- Greater reliability
- Network slicing
- Layered, ubiquitous connectivity
- True IoT – network of everything
- Equivalent to DSRC
- Mode 4 – no network necessary
- Trust but verify
- Application focused
- Not your father's wireless network
- Connects to infrastructure, other cars, mobile devices



Core 5g-enabled applications

- Autonomous driving
- Remote control
- Platooning
- Collision avoidance
- Inter-vehicle communications (V2V)
- Vehicle to infrastructure communications (V2I)
- Vehicle to pedestrian communications (V2P)
- Over-the-air updates



Regulators are requiring autonomous vehicles be equipped with remote control – it is likely that only 5G can delivery the necessary low latency for this application.



New value propositions

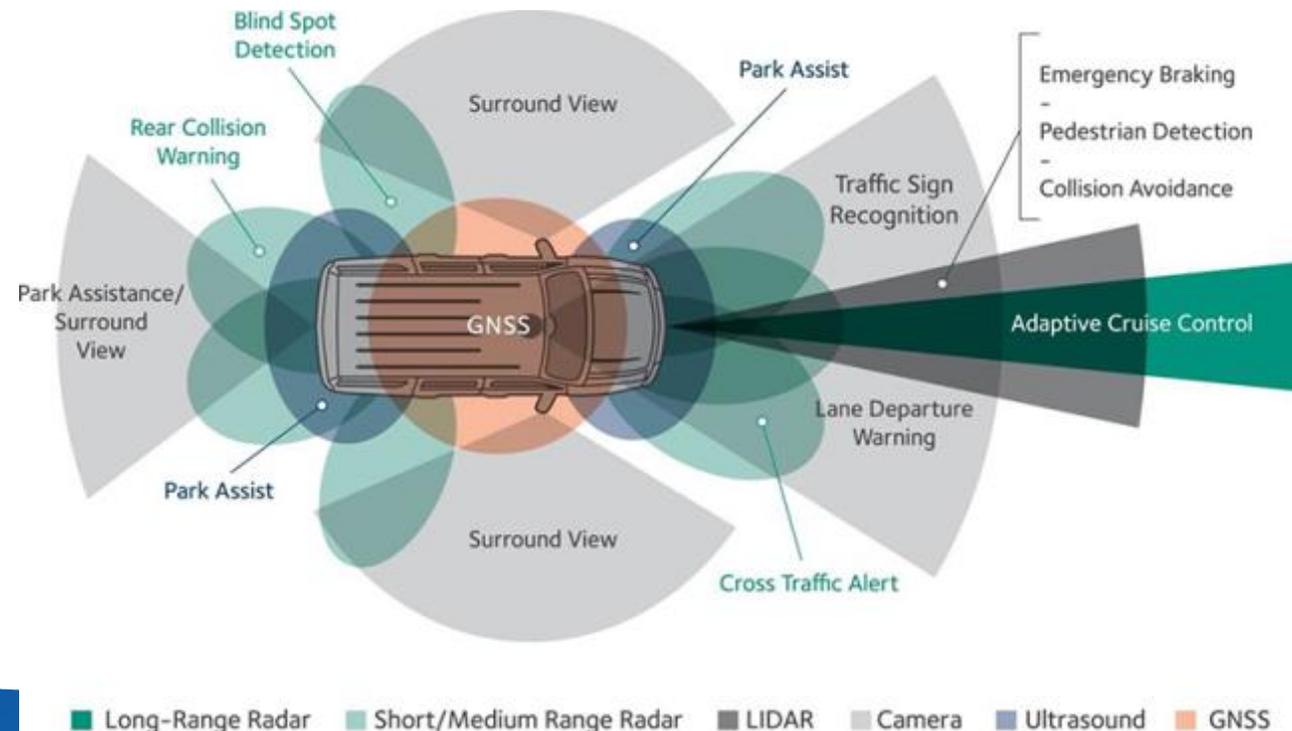
- Ubiquitous connectivity
- Inter-vehicle communication
- Data collection, aggregation, interpretation, sharing
- Monetization of data – data brokering
- Artificial intelligence
- Machine learning
- Neural networks
- Augmented/virtual reality
- Contextualized marketing
- OTA updates



Cellular becomes mission critical

Example is Safety - There is increasing reliance on:

- LIDAR, RADAR
- Cameras
- Contextual awareness with the objective of collision avoidance



...most of these systems have **COMPLEX** software...



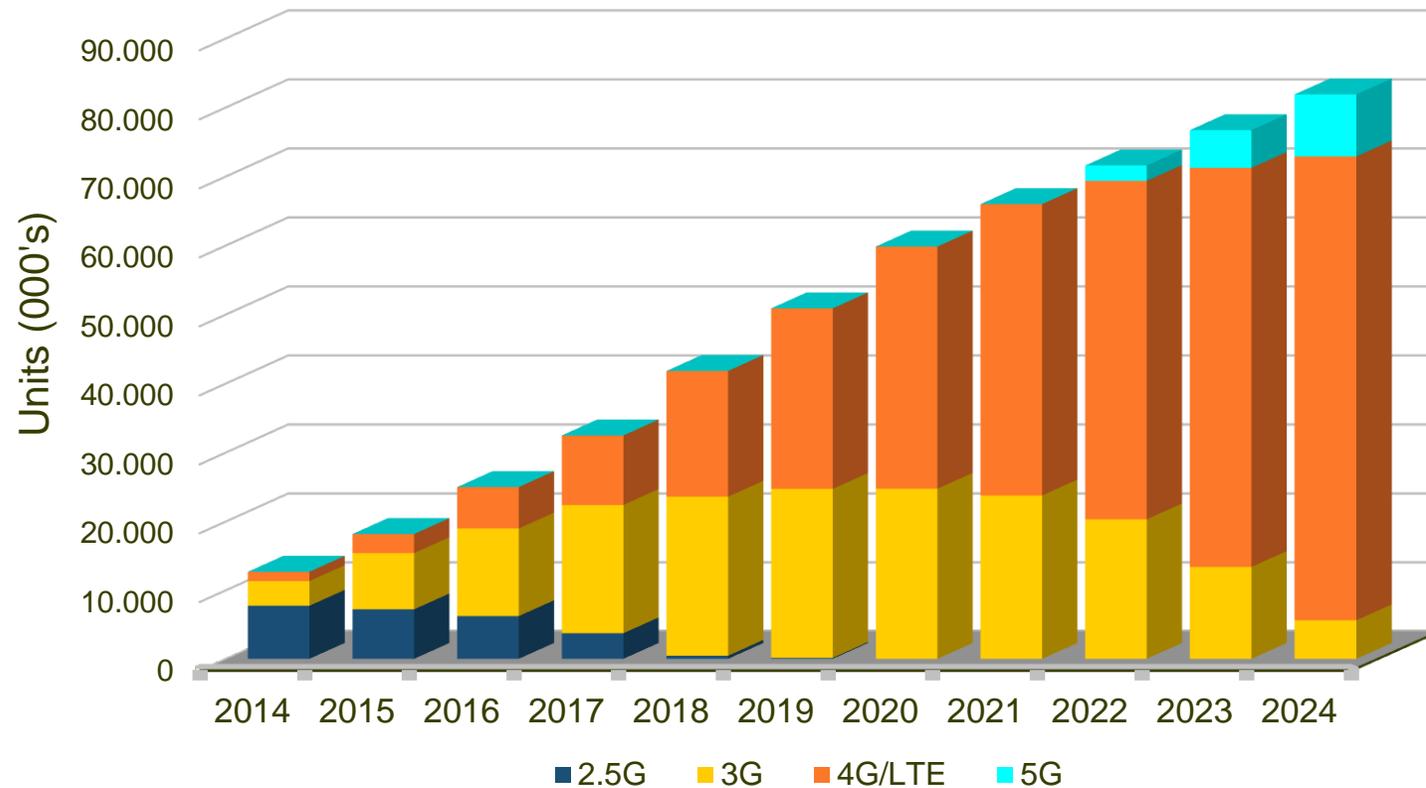
Cellular - no longer a cost center



OEM embedded Telematics Cellular Modem Shipments - Global



Telematics Forecast 2016 vs. 2024 (25 Mil. units → 82 Mil. units)



- 2.5G Network: 6.3 Mil units in 2016 to 0K units from 2020
- 3G Network: 12.7 Mil in 2016 units to 5.6 Mil units in 2024
- 4G/LTE Network: 6 Million units in 2016 to 67 Mil units in 2024
- 5G Network: 9 Million units in 2024



Cellular-based V2V arrives with C-V2X

Supporting rapidly evolving safety requirements and use cases

Continuous technology evolution to 5G while maintaining backward compatibility

Advanced safety C-V2X R15+ (building upon R14)

For autonomous driving in real world conditions

Basic safety 802.11p or C-V2X R14

E.g. day 1 use cases



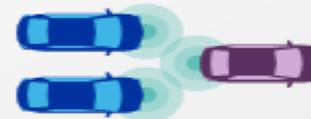
Forward collision warning and basic platooning

Enhanced safety C-V2X R14

Extending electronic horizon, providing more reliability and NLOS performance



Blind curve hazard warning



High throughput communications for sensor sharing



Partially to highly automated driving



Cooperative driving



Every car creates its own maps?



Beyond GPS

A HERE mapping car, sometimes mistaken for a Google Maps car, has \$80,000 worth of electronics mounted to the roof



Display screen and one-terabyte hard drive



MWC: “Qualcomm Drive Data Platform powers TomTom’s plans to crowdsource high-definition mapping data for autonomous driving”



Some would have you think it is easy

hundreds of **openpilot** users today



Driving with OpenPilot 0.3.7
gilan • 644 views • 1 month ago
Testing OpenPilot version 0.3.7 in a 2016 Civic Touring.



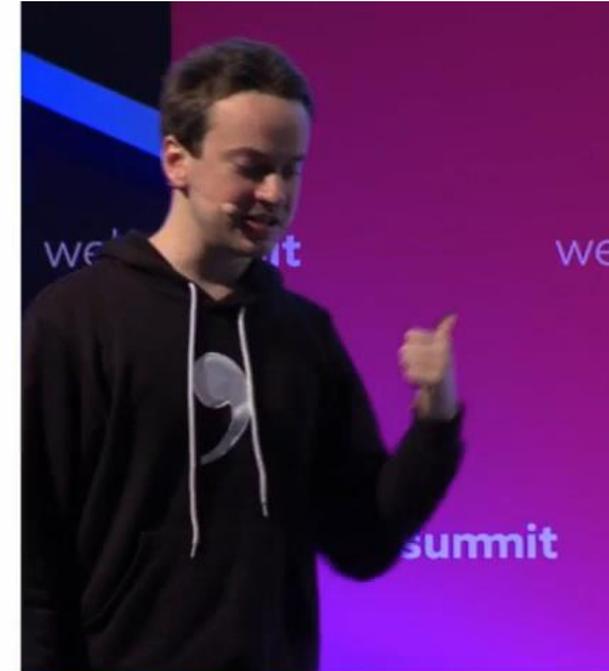
Openpilot 0.3.3
Jeffrey Peacock • 882 views • 3 months ago



Openpilot 0.3.2 at Night
Vasily Tarasov • 1.3K views • 4 months ago
Source code and installation guidelines for Chevy Volt 2017 Premier:
<https://github.com/commaai/openpilot/pull/104>.



Open Source self-driving car (Comma ai/openpilot) with a 2015 Honda CR-V Touring
John J • 1.8K views • 8 months ago
Courtesy of Comma.ai.



web summit



V2V/V2X

- Market development HIGHLY dependent upon mandates – C-V2X offers an organic path to market adoption
- 802.11-based approaches seen as having huge business model challenges by Strategy Analytics. Who will pay for new, automotive-specific infrastructure?
- LTE/5G approaches including C-V2X can overcome these issues
 - Latency-critical applications should rely on on-board sensors
 - Yes, network coverage is not universal – but it is a lot wider than a dedicated automotive network could hope to be in any reasonable timeframe
 - 5G peer-to-peer capabilities will allow V2V even without network coverage
- Smartphones and apps
 - Speed to market; Consumer familiarity
 - Ubiquitous usage/device ownership
 - Global Mobile Alert, Haas Alert, Ridar Systems



V2I: the missing piece

- To escape geo-fencing – automated driving will need vehicle to infrastructure communications
- Cellular is best positioned to enable V2I at low cost and within a short time horizon
- Cellular infrastructure can be reused as RSU, particularly for C-V2X



Global eco-system





Global eco-system



DAIMLER

DANLAW



DENSO



FEV

FICOSA



gemalto
security to be free

Hirschmann
Car Communication

HITACHI
Inspire the Next

HONDA



infineon



INTERDIGITAL



Global eco-system





Global eco-system

proximus

PSA
GROUPE

QUALCOMM

ROHDE & SCHWARZ

ROHM
SEMICONDUCTOR

SAIC
上汽集团
SAIC MOTOR

SAMSUNG

SAVARI™

安亭·上海国际汽车城
Anting · Shanghai International Automobile City

SK telecom

SKYWORKS

SMART
MOBILE
LABS

SoftBank

SUMITOMO
ELECTRIC

Telefonica

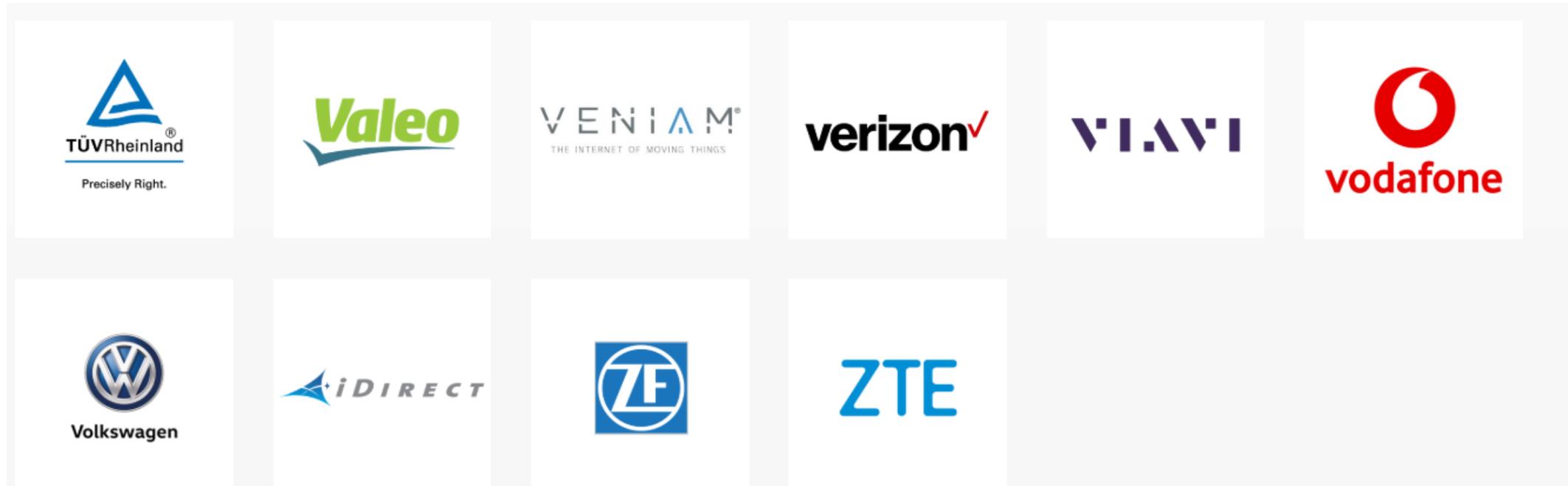
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A1 Telekom
Austria
Group

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Global eco-system





conclusions

- Ubiquitous connectivity is transforming how vehicles are used and owned
- Monetization of data will pay for connectivity
- Autonomous vehicles are already here – Cellular V2I is the essential application to open up autonomy in urban areas
- Privacy, security concerns must be overcome to enable this new connectivity environment
- Data sharing and inter-vehicle communications are in the process of being resolved today
- 5G collaboration between automotive and wireless industries is a game changer for solving these challenges



A thinking car





The car as browser



Automotive Infotainment & Telematics



THANK YOU
STRATEGY ANALYTICS

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