



Car 2 Cloud

Connected Vehicle Data Architectures

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Car 2 Cloud BoF



Connected Car and Cloud

Variants of V2X, Connected Car, Cloud and IoT for the car



- **Safety related C2C, C2I, C2N or in the US V2V, V2I and V2N**
 - Based on dedicated radio technology
 - Limited standardized data protocol
- **Car status related connected car systems**
 - Based on standard mobile radio IP connection
 - Car maintenance and Comfort oriented function
 - Target is the individual car or driver
- **Automotive IoT**
 - Based on standard mobile radio IP connection
 - Heterogeneous car data and sensor information
 - “Big Data” style of data usage to generate new services

Connected Car and Cloud

Radio technology standardization organisations



- C2C-CC - Car-to-Car Communication Consortium www.car-2-car.org
 - Objective: Development and contribution to C-ITS standardization, demonstration of technical and commercial feasibility
 - Technology: (pWLAN / 802.11p; dedicated band at 5.9 GHz)
 - Standardization Body : ETSI
 - Partners: 80 members w/ 17 vehicle manufacturers, 39 suppliers and 30 research organizations
 - Foundation in 2007
- 5GAA - 5G Automotive Alliance
 - Objective: Evolve, test and promote communication solutions, to support their standardization and accelerate their commercial availability
 - Technology: (C-V2X/5G)
 - Standardization Body : 3GPP
 - Partners: > 40 members, founding members
 - Foundation 09/2016

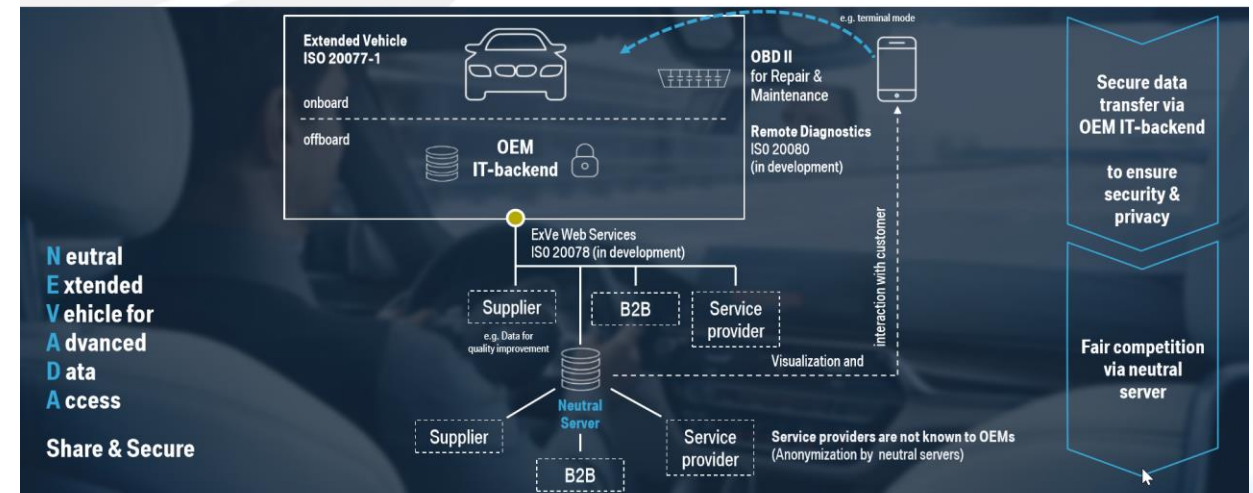
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ISO 20078-80 Extended Vehicle (ExVe)

- Standard for collecting car status data
- Maintenance use cases.
 - Remote Diagnostic Support
- Access for 3rd part and aftermarket service supplier via Neutral Server (VDA concept)
- Rules for data access still open

The screenshot shows the Mercedes-Benz Remote Diagnostic Support API page. The header includes the Mercedes-Benz logo and navigation links for API, SUPPORT, PRICING, INSPIRE, and WHAT'S NEW. The main content area is titled "/ Remote Diagnostic Support" and contains a description: "Using this product, you can remotely access the diagnostic data of a connected Mercedes-Benz vehicle and integrate it into your app - e.g., to identify an anomaly before it becomes a problem." Below this is a "BUY" button. A sidebar on the left lists "OVERVIEW", "DEMO", "DOCS", and "PRICING". The main content area also features "Remote Diagnostic Support API 1.0" with a "DOWNLOAD SWAGGER FILE" link. It provides "Tryout URL: https://api.mercedes-benz.com/remotediagnostic_tryout/v1" and "Production URL: https://api.mercedes-benz.com/remotediagnostic/v1". A note at the bottom states: "The Remote Diagnostic Support API will provide the possibility for 3rd party applications (e.g. ADAC, ATU, etc.) to access vehicle diagnostics data remotely on behalf of the Daimler customer. To use the endpoints you need a valid vin/fin (vehicleid)."

NEVADA – SHARE & SECURE COMBINES THE EXTENDED VEHICLE WITH NEUTRAL SERVERS TO GUARANTEE FAIR COMPETITION AND NON-DISCRIMINATION.

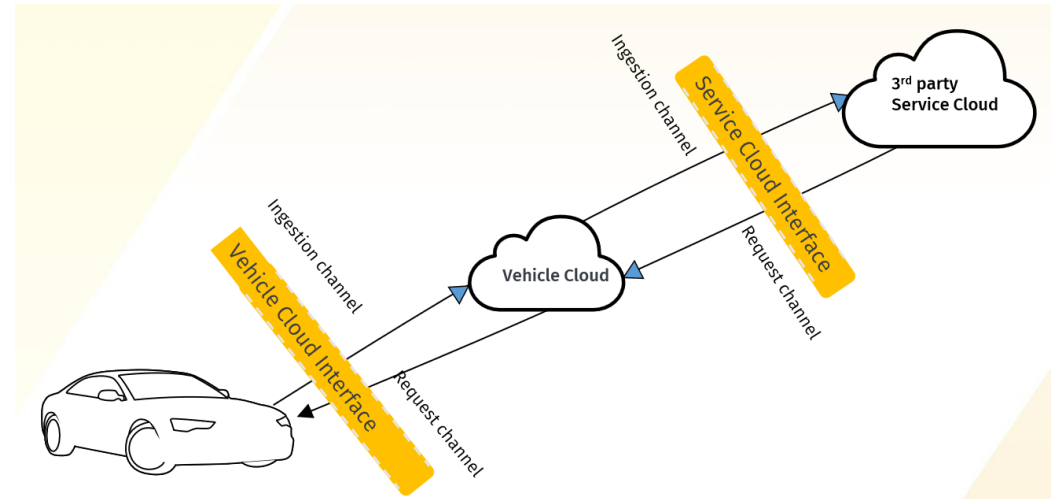


A Neutral and Secure Approach for Accessing In-vehicle Data for 3rd Party Services | BMW Group | April 18th, 2018

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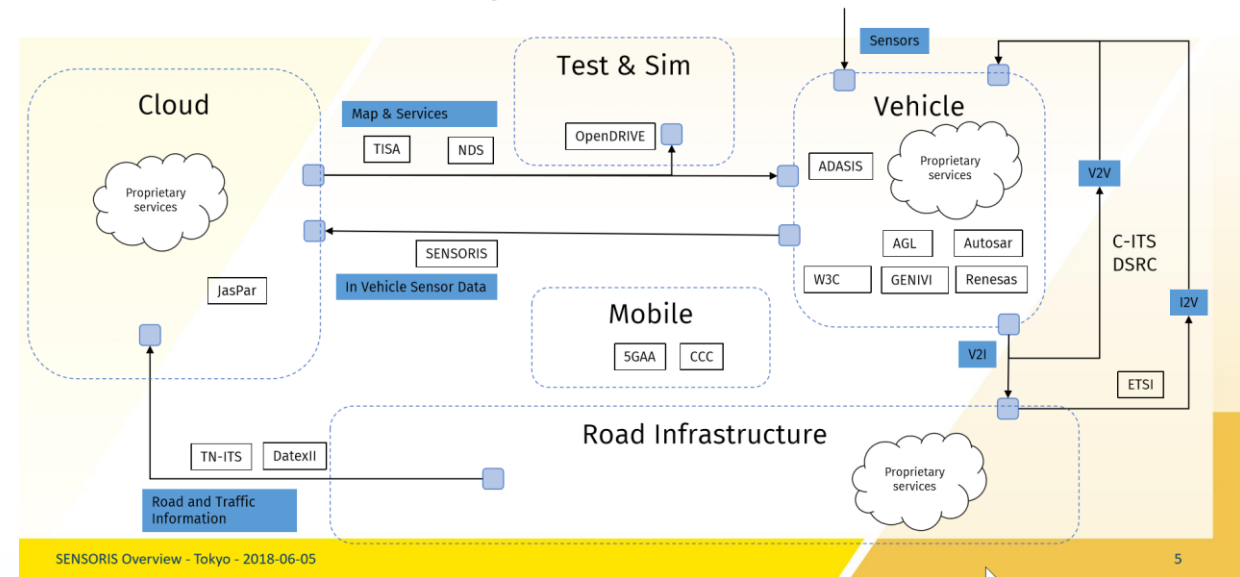
Connected Car and Cloud **SENSORIS**

- Standard for collecting car data and sensor data.
- Focus on vehicle surrounding:
 - Street signs
 - Lanes
- Capability to distribute sensing task to car fleets.



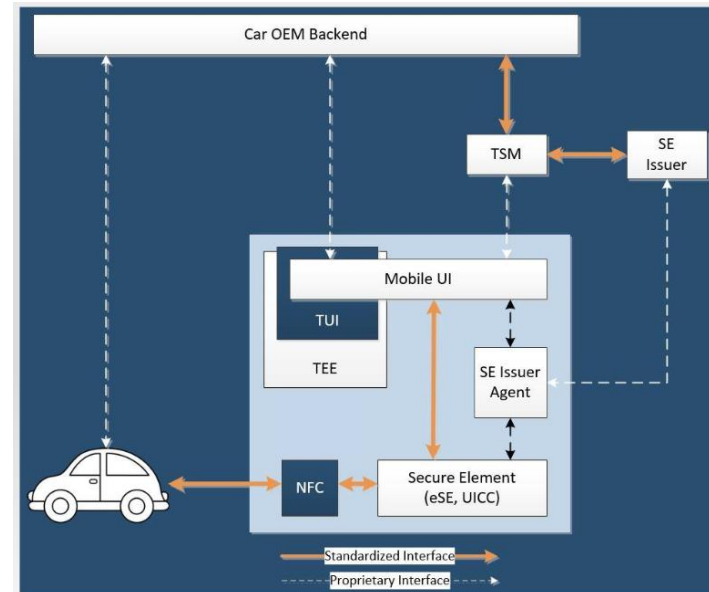
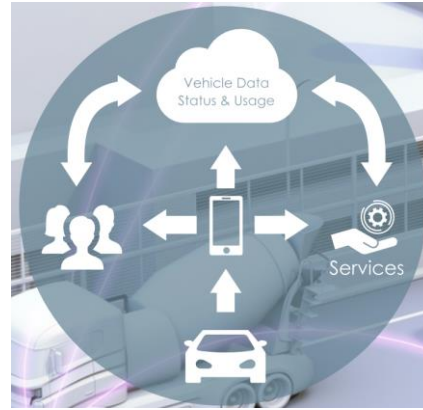
Automotive Ecosystem

SENSORIS



Connected Car and Cloud CCC

- Used to be Mirrorlink
- They added
 - Car Data
 - Digital Key
 - Car sharing



Source:

www.carconnectivity.org

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Protocol, Data and Application oriented organisations To be analysed



- SENSORIS (Protocol for sensor data, Vehicle surrounding and internal car data)
- Automat Project <http://automat-project.eu/>
- W3C (Vehicle Signal specification) / existing GENIVI cooperation for VSS
- ISO 20078 Extended Vehicle (ExVe)
 - Use cases, Aftermarket data access
- CCC (Mirrorlink, Car Data, Digital Key) <https://carconnectivity.org/>
- Open Connectivity Foundation (OCF) <https://openconnectivity.org>

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SW for V2X and IoT oriented organisations

- Eclipse Kuksa
 - System SW components for Vehicle IoT solutions for the vehicle and the cloud.
- Autosar
 - SW supporting safety features and automated driving.
 - Based on C-ITS



Connected Car and Cloud

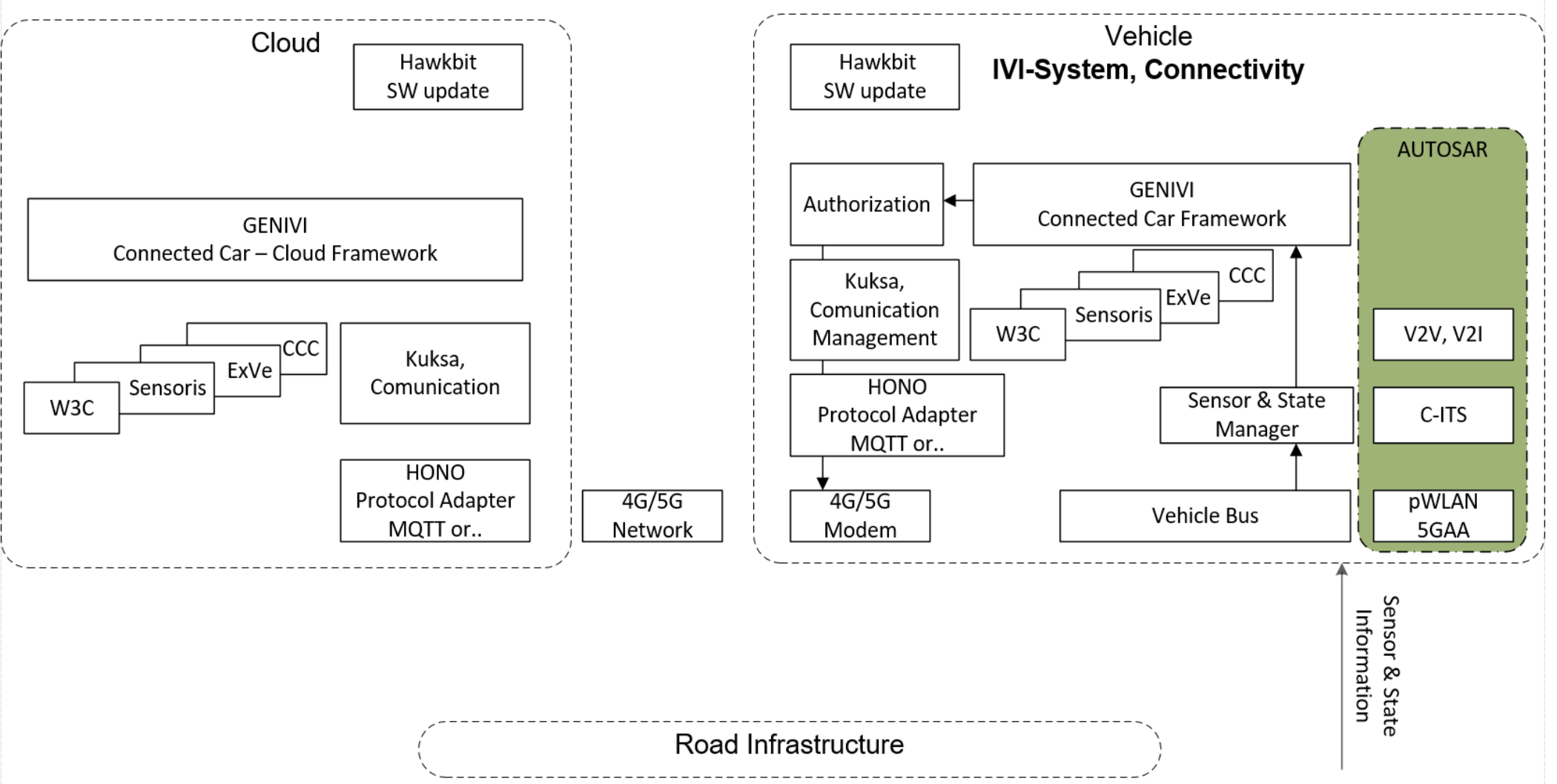
What about GENIVI ?



- Possible fields of action
 - SW Architecture and SW components integrating non-safety C2X / IoT for in-car & infrastructure
 - Framework which facilitates the integration of open and closed APIs from different organisations
 - Reuse of existing SW components from the Eclipse Kuksa project
 - Based on standard mobile radio IP-links
 - Cooperation with Eclipse Kuksa, Sensoris, W3C
 - Perspective: CCC, ExVe

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Exemplary SW Reference architecture



Header of section

Draft Workplan & sprint planning with 2 month iterations



Kick-off and call for participation GENIVI AMM MAI '19

- Project Backlog filling and Definition of done Mai '19 and June '19

ANALYSIS PHASE (from Jul '19)

1. Sprint

- Analysis of existing data and signal specifications
- Review of other project charters and architecture

2. Sprint

- First requirement collection
- Business case selection

3. Sprint

- Analysis and definition of architecture building blocks
 - E.g. authorization, protocol adaptors, cloud and vehicle architecture

Dec 19: Retrospective

- Verified Overview/Reference System Architecture
- Selection of prototype scope

Header of section

Draft Workplan



DESIGN PHASE

1. Sprint

- Identification of communication and interface structure

2. Sprint

- Selection of possible SW and communication technologies for the building blocks
- Requirement update

3. Sprint

- Definition of reference System and SW Architecture

Jul '20 Retrospective

Definition of prototype architecture

Header of section

Draft Workplan



IMPLEMENTATION PHASE

1. Sprint

- Selection of prototype building blocks
- Selection of prototype platform

2. Sprint

- Implementation or Integration of mandatory components

3. Sprint

- System Test

DEC '20 Retrospective

Prototype testing and presentation (CES Jan 2021)

Thank you!

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<http://projects.genivi.org>

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