Vehicle data oriented architecture – 1 kilometer view
(a.k.a. Car2Cloud)

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What do we* need to solve?

*The automotive industry

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Enable the <u>full</u> data-oriented connected vehicle architecture

A) Enabling easy interoperability of parts, flexibilility and choice

B) Developing common solutions and software

C) Enabling access to all data we want to exchange

D) Controlling access to data

E) Enabling user privacy and data security

F) Clarifying responsibilities

G) Facilitating business opportunities and contractual agreements

H) Agreeing on names, roles, responsibilities

… what else?

Areas to solve

1) **Reference architectures for data exchange**

2) **Data Model / representation**

   - Identifier (Family/Path/Name), Data Type, purpose, unit, quality/reliability/sampling frequency, validity and lifetime, ownership, privacy sensitivity, relationships to other data, ...

   - E.g. VSS / Vehicle Signal* Specification (*extended to all types of *Vehicle Data*)

3) **Data protocols for requesting data (low to medium speeds)**

   - "On-demand", and automated, data requests, e.g. REST principle

   - Service and application developers "API"

   - E.g. W3C Vehicle Information Service Specification, generation 2

4) **Data protocols and software architecture for Big Data**

   - High-bandwidth data streams, high-volume processing, requires different solutions

   - Over time taking steps to the future **"Vehicle cloud computing"**

Areas to solve (2)

5) Nomenclature, terms, names, definitions, contracts...

- So that we understand each other in Technology <u>and</u> Business conversations

6) Use Cases & Requirements

→ only to drive the other work areas in the right direction

All of the above is, as always, open for discussion (feedback welcome).

Looking forward: Future architectures

In the discussion of future vehicle electrical architectures we have studied a a 5-level ladder, which was also presented at the GENIVI All Member Meeting in May 2019.

This view of electrical architecture evolution is now becoming a shared industry view.

Slightly different names may be used, but the transformation is roughly as follows:

Ad-hoc → Distributed → Consolidation→ Zonal → Vehicle Cloud computing

The current trend in car production is Centralizing/Consolidating, but it is fairly quickly replaced by Zone Architecture thinking in the next generation

Connectivity is already applied gradually, on the Distributed, Consolidation and Zonal levels, but the shared view of that connected architecture is only beginning.

The 5th architecture is an ambitious view of the next step in the evolution (next slide).

"Vehicle Cloud Computing"

The 5th level architecture is a future vision in which communicating software parts run flexibly on highly communicating computing units, that may be located in the vehicle or in fixed infrastructure (*possibly even migrate between them*). Together, those computing units make up the vehicle cloud.

This is an ambitious vision that will take several years to realize, but the 5th level electrical architecture is a logical extension of the data-driven connected vehicle architecture. Therefore the work we do now is likely to include incremental steps toward that future.

(as interpreted by me...)

Thank you!

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