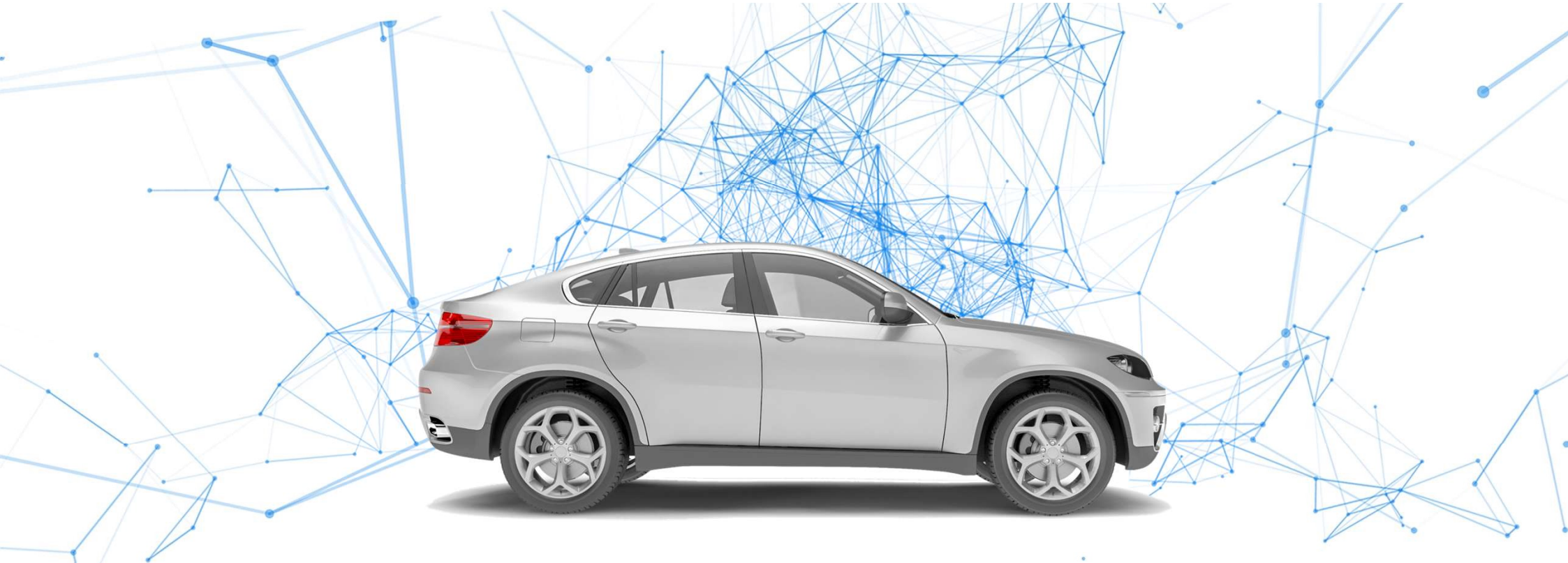


ETHERNOVIA

TRANSFORMING HOW CARS OF THE FUTURE ARE BUILT

IEEE802.1DG – CONFIGURATION PROTOCOLS | **2021-05-04**

IEEE contribution

ETHERNOVIA
TRANSFORMING HOW CARS OF THE FUTURE ARE BUILT

De/Centralized Configration

Preamble

- IEEE 802.1DG is aimed at “privately owned, potentially partially automated vehicles”, meaning:
  - The vehicle is started and shut-down multiple times a day
  - Start-Up time must be around 2 seconds (FMVSS-111)
  - As the vehicle is parked for about 95% of it’s lifetime, it needs to shut-down fast to save energy
    - Stand-by modes are difficult to realize
    - Power consumption during “parking” must be minimized
    - This is independent from ICE (preserve starter battery) or EV (conversion efficiency) propulsion
  - A failed start-up requiring maintenance is devastating to the user
- Goal: Allow for a parallel start-up of systems (ECUs, links, …)

Preable – Part 2

- If IEEE 802.1DG was aimed at “fleet owned, fully automated robo-taxi vehicles”, meaning:
  - The vehicle is started and shut-down once a day
  - Start-Up and shut-down times are almost irrelevant
  - The vehicle is operated for 40-50% of it’s lifetime
    - Stand-by modes can bridge usage gaps
  - While “parked” the vehicle is charging
    - ICE propulsion is not a use-case
  - A failed start-up is resolved by dispatching a different vehicle, maintenance is readily available (central parking)

Configration Protocols

Stream Reservation Protocol (SRP)

- IEEE 802.1Q-2018, chapter 35
- The SRP works using the
  - Multiple MAC Registration Protocol (MMRP), the
  - Multiple VLAN Registration Protocol (MVRP), and the
  - Multiple Stream Registration Protocol (MSRP)
- All based on the Multiple Registration Protocol (MRP)
  - Layer 2
  - Link-based Multicast 01:80:C2:00:00:2#
  - Different Ethertypes (22EA, 88F6, 88F5, 22E2)
- Use-case
  - Bandwidth reservation?
  - Path definition (multicast forwarding)?

Link Layer Discovery Protocol (LLDP)

- IEEE 802.1AB, P802.1ABdh, IEEE 802.3, IEEE 802.1CS
- Layer 2 (see below for switch to IP)
- Link-based Multicast 01:80:C2:00:00:0#
- Ethertype 0x88CC
- Define exact TLVs supported?
- Relation to: LRP, ECP
- Allows data transport over TCP
- extended LLDP in definition

Spanning Tree Protocols (xSTP)

- IEEE 802.1Q-2018, chapter 13
- Link-based Multicast 01:80:C2:00:00:00
- The IEEE STP/RSTP/MSTP uses LLC encapsulation (DSAP=SSAP=0x42), not Ethernet-II Frames (no Ethertype)
- For the Error-Case (link failure) only?
- Alternatives exist: Media Redundancy Protocol (MRP) IEC 62439-2.

Internet-Standard Management Framework (SNMP)

- IETF RFC 3410
- TCP/IP based over UDP
- Older versions allow broadcast discovery
- Securing messages with USM or TSM

Resource Allocation Protocol (RAP)

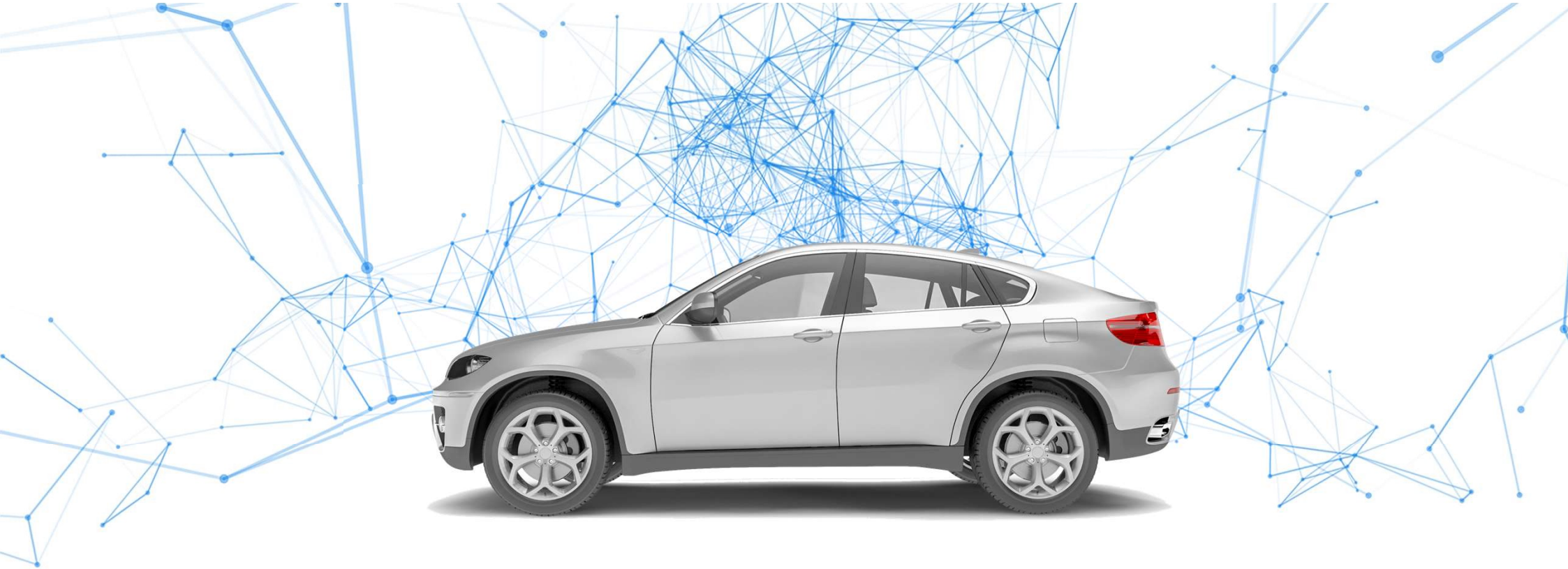
- IEEE 802.1Qdd
- Replaces SRP and related protocols?
- LLDP Discovery Mode

AUTOSAR and OPEN Alliance

- Internet Protocol (IPv4)
- DHCP
- ICMP
- ARP
- TCP
- UDP
- SOME/IP, SOME/IP-SD, SOME/IP-TP
- DoIP, UDS
- SecOC
- E2E profiles

Goal: Reduce number of choices!

- Make the implementation testable to a “minimum” set of features
- If we make elements “optional” we need to at least reduce the variance with these elements
  - The effort (detail) to specify an optional feature is almost identical to a mandatory one
- Should we strive to replace solutions which have a specification, are used in the automotive ecosystem, and already have test cases and tools/stubs?
- Should we focus on things teh current automotive TCP/IP stack does not support already?



THANK YOU

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