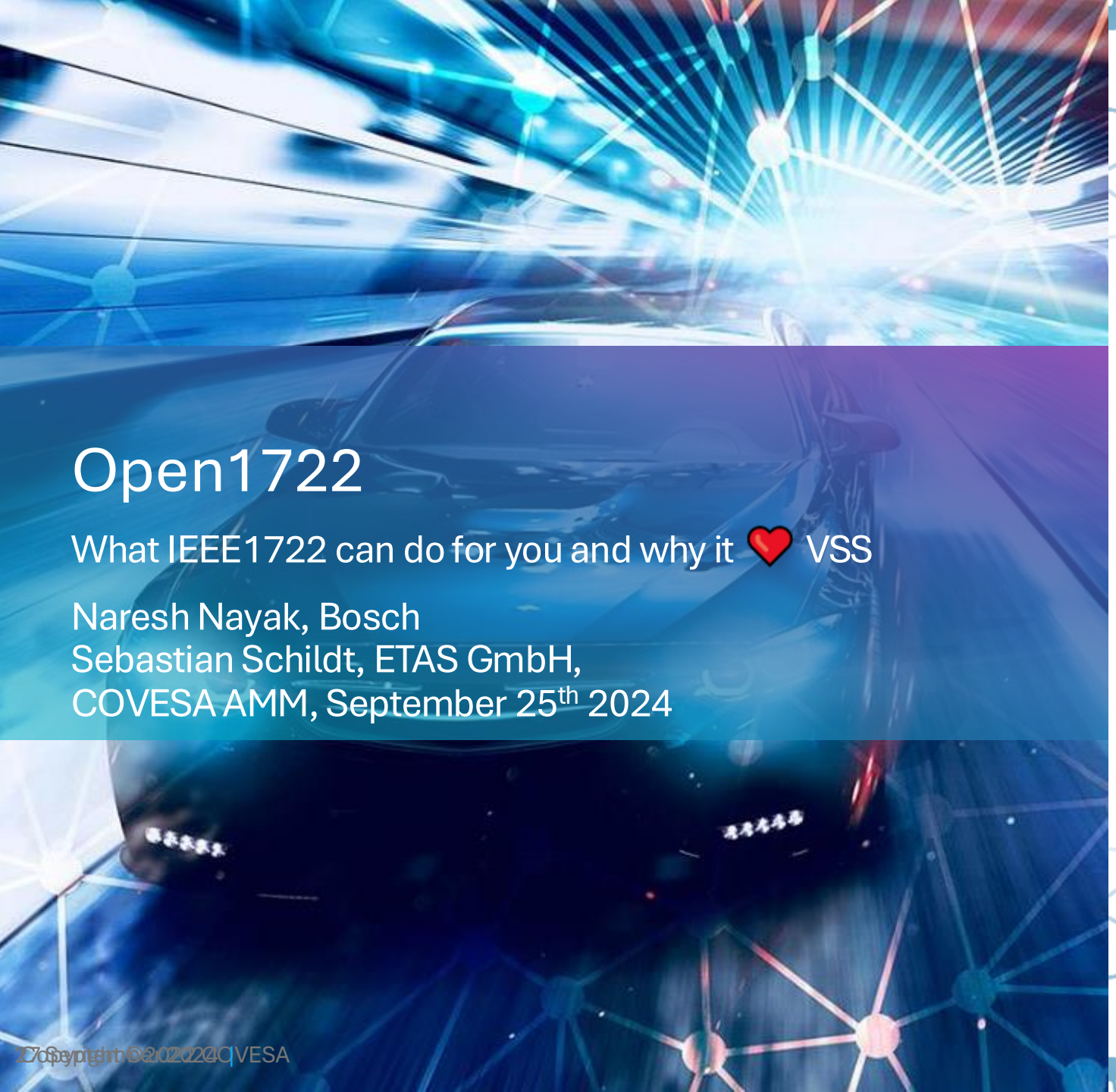

Open1722

What IEEE1722 can do for you and why it ❤️ VSS

Naresh Nayak, Bosch
Sebastian Schildt, ETAS GmbH,
COVESA AMM, September 25th 2024

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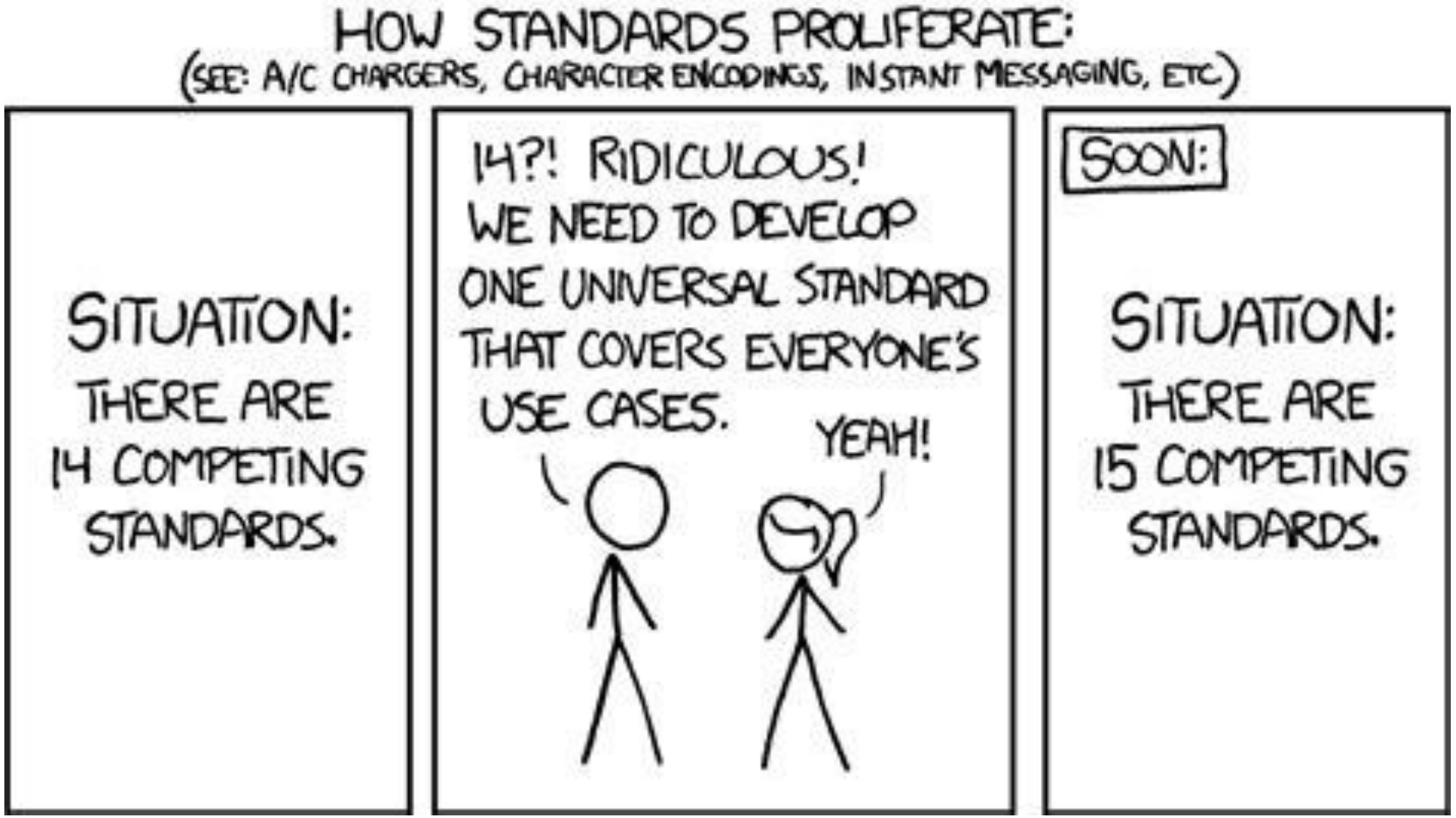
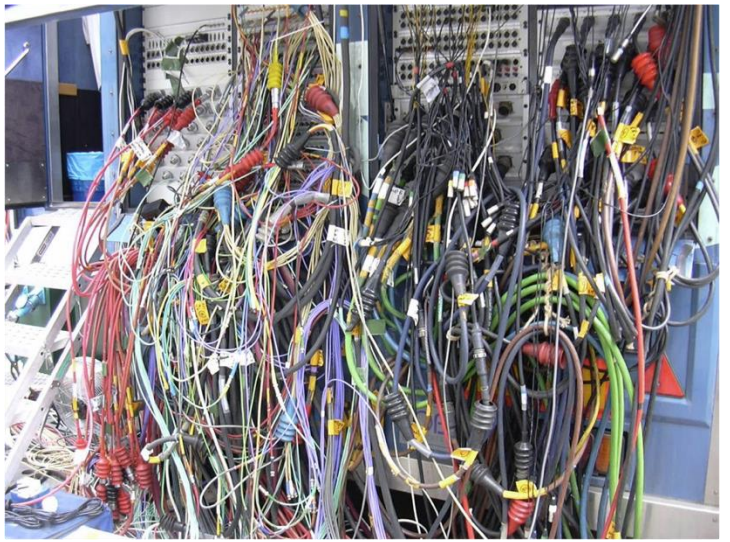
The story of IEEE 1722

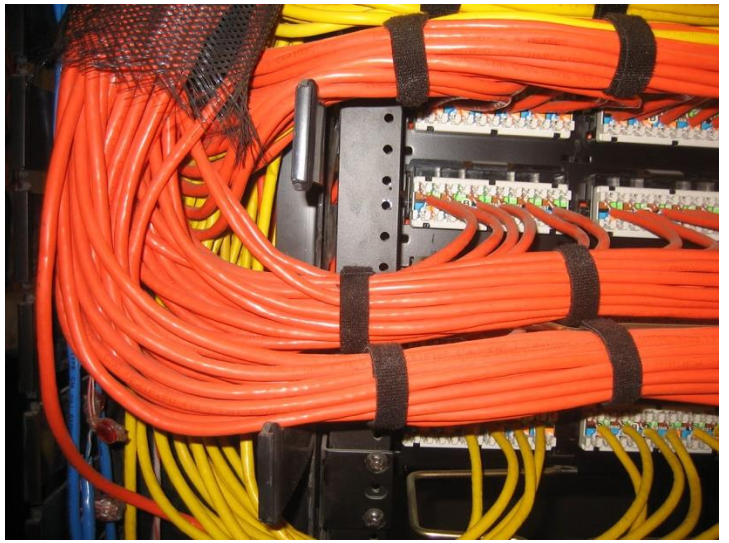


Origins of IEEE 1722

- IEEE 1722 one among many standards that together realize Audio/Video Bridging (AVB) networks
- AVB replace point-to-point links with a switched Ethernet network for audio/video domains
- IEEE 1722 specifies audio/video transport protocol (AVTP) for synchronized audio and video streams over Ethernet
- AVTP has native integration for AVB networks which later evolved into Time-sensitive Networking (TSN)



Before AVB



Why is IEEE 1722 interesting for automotive?

AVTP is already used (in production) in automotive

- Infotainment
- Rear-view cameras
- Audio Amplifiers
- Road noise cancellation (RNC)

IEEE1722 will extend the scope of AVTP adding new automotive features

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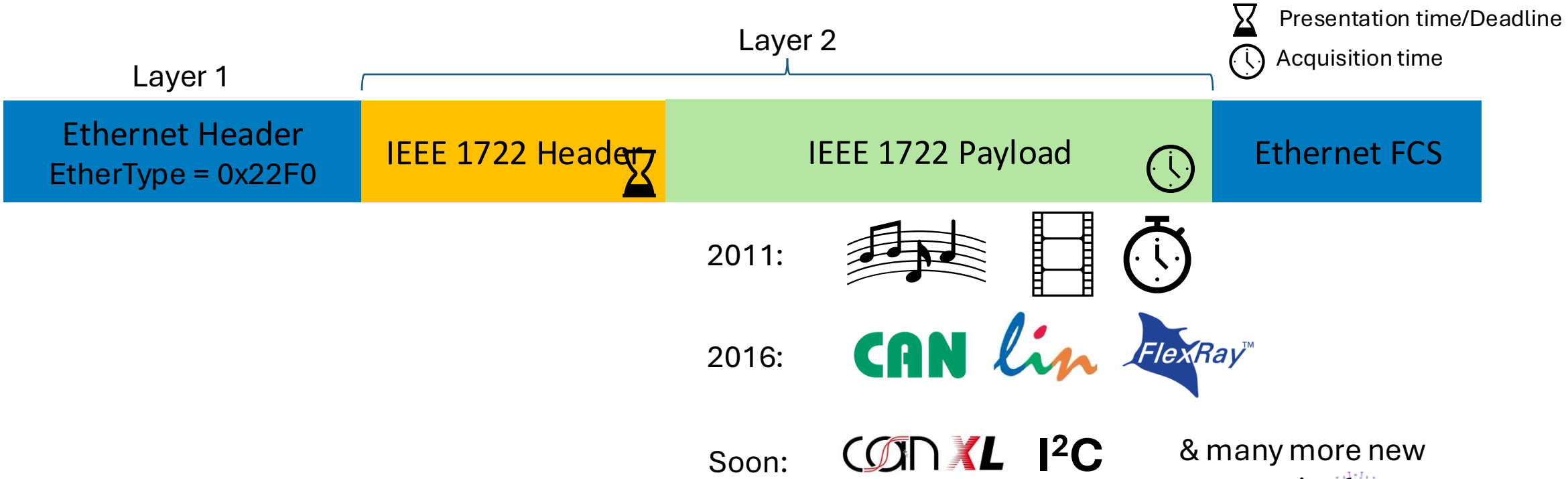
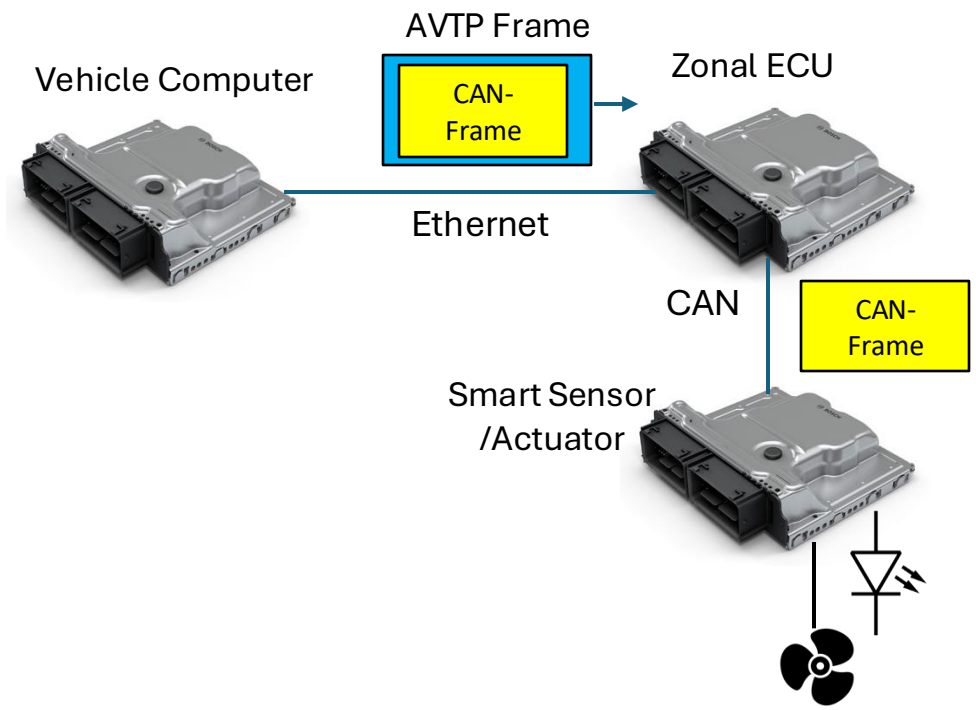
Communication using IEEE 1722

- AVTP is a layer 2 streaming protocol but can be also sent over UDP
- Follows a Type-Length-Value (TLV) like encoding scheme
- Batteries not included (e.g. no discovery, no auto-config or flow control etc.)

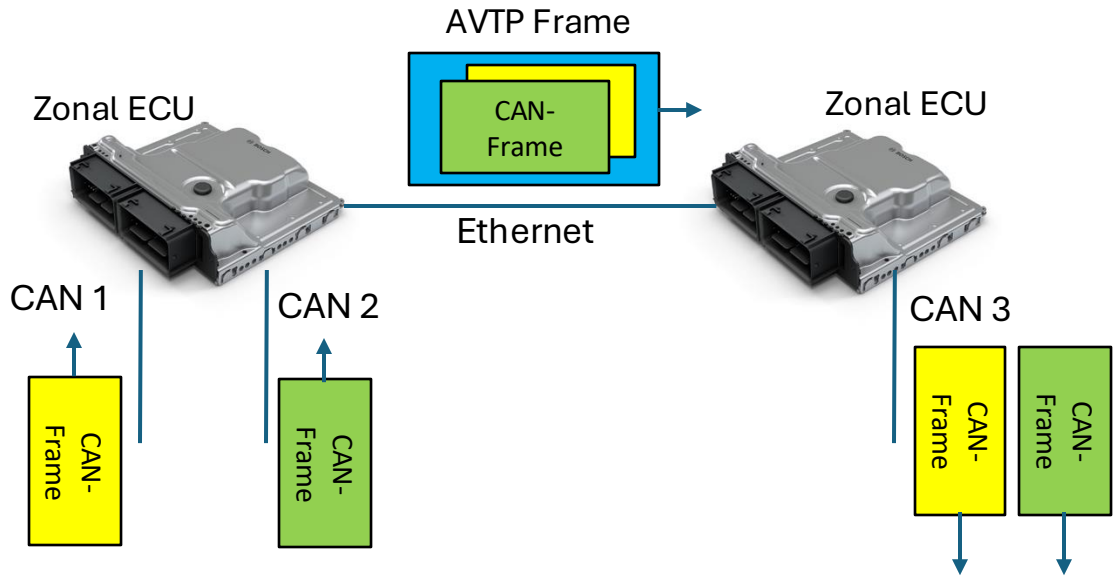


Usecase: Tunneling of fieldbuses

Interaction between Vehicle Computer & Smart Sensors/Actuators



Bridging CAN buses in different zones networked over Ethernet



Open1722 – A COVESA project

- An open-source reference implementation of IEEE 1722
  - Focus on control formats primarily
  - Currently in incubation but covers most formats from IEEE 1722-2016
  - Extensions from upcoming versions of the spec. will also be included

- Started out as a fork of AVNU/libavtp, an implementation of IEEE 1722 with focus on audio/video formats

- Available with the permissive BSD-3-Clause license

https://github.com/COVESA/Open1722

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VSS + 1722 = 👍?

Can it be done?

☑ **YES**

Should it be done?

☑ **YES**

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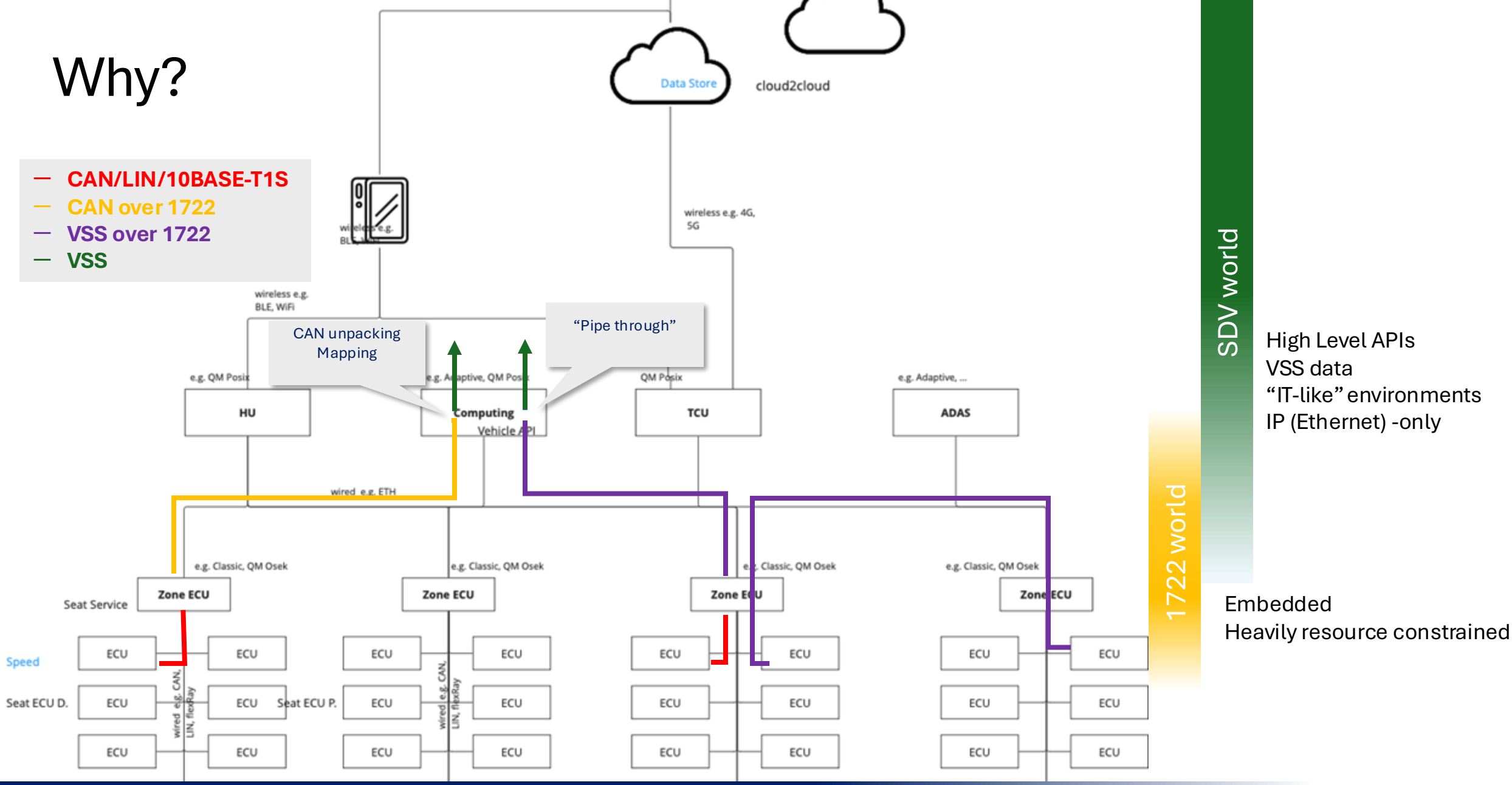
Why?

- CAN/LIN/10BASE-T1S
- CAN over 1722
- VSS over 1722
- VSS



High Level APIs
VSS data
"IT-like" environments
IP (Ethernet) -only

Embedded
Heavily resource constrained

IEEE1722 can be the most efficient path to connect deeply embedded to SDV

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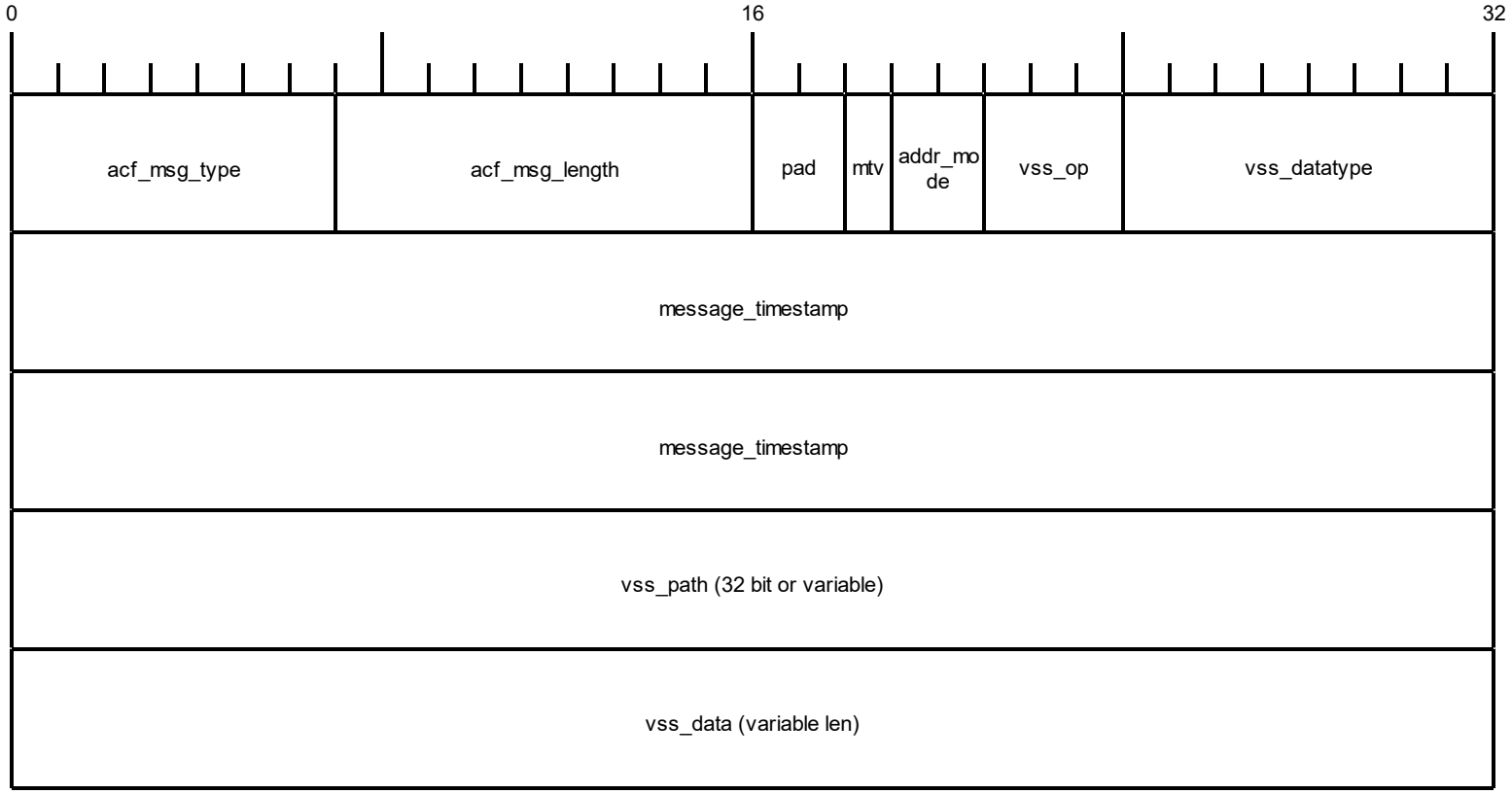
How

- Introduced new ACF Message Type “VSS” (0x42)
  - Currently unused (reserved)
- Follow pattern of other ACF Types such as CAN/LIN/MOST



- Support all primitive VSS datatypes
- Addressing with VSS Path (interop mode) or 32 bit ids (static mode)
- Supported in Open1722

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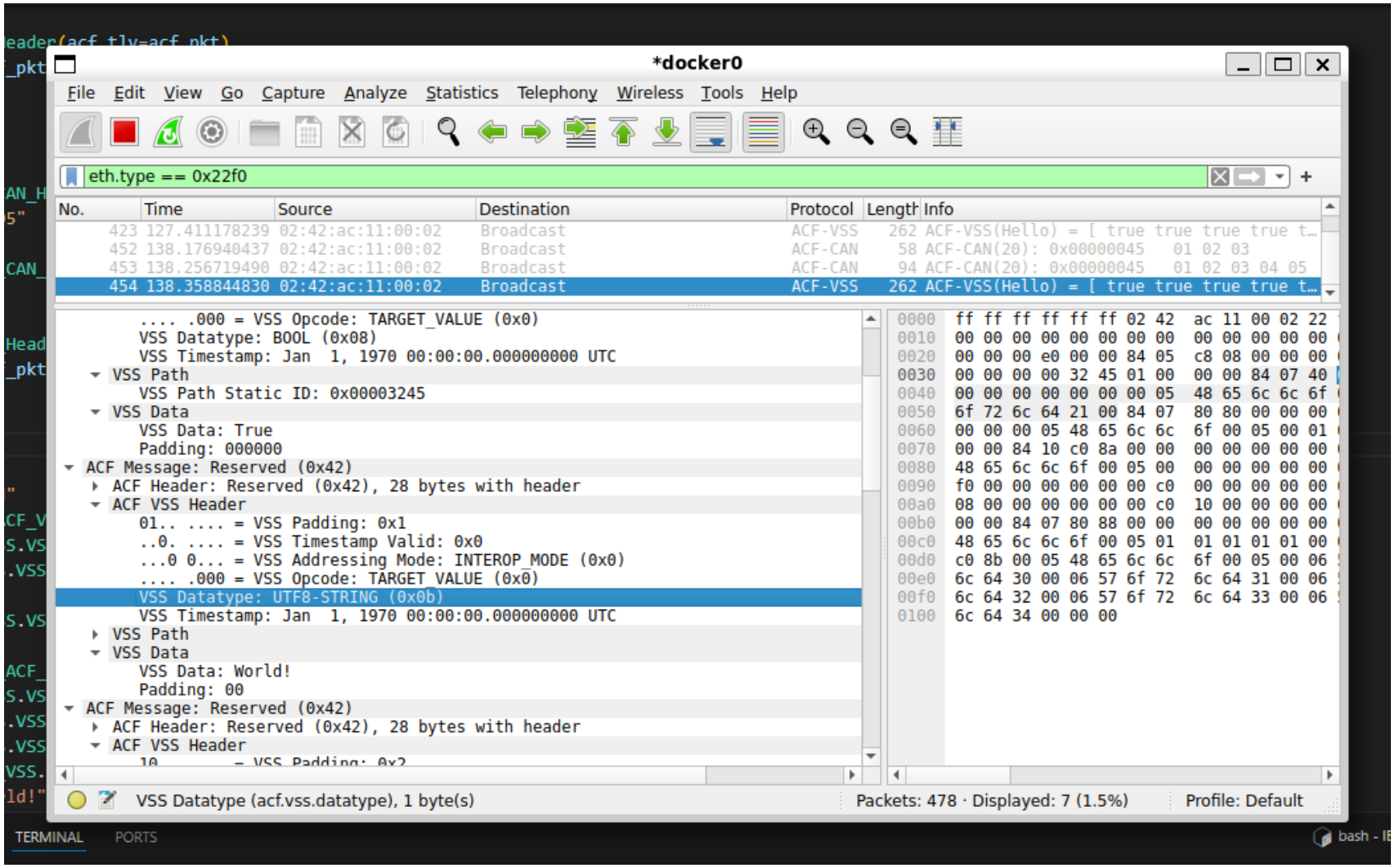
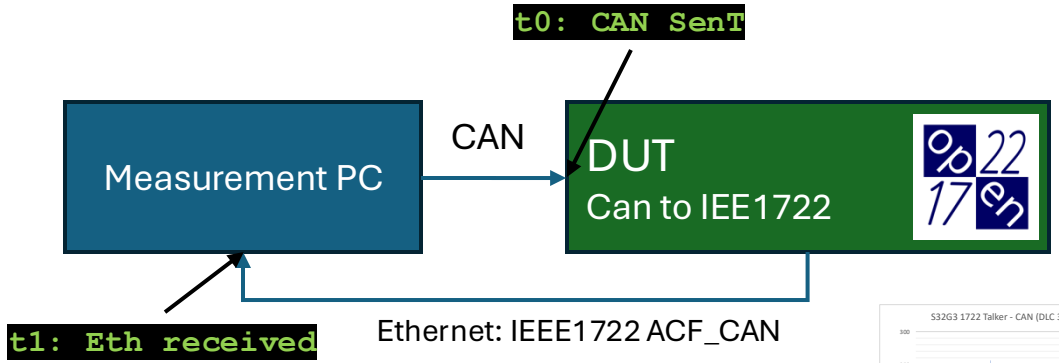
Open1722 in action



Open1722 performance



500kBit/s CAN
100 Mbit Ethernet
Vanilla Linux (no RT-premept)

S32G
(CortexA53)
+ Ubuntu

Avg: 63.6 uS

Portenta H7
(CortexM7)
+ Zephyr

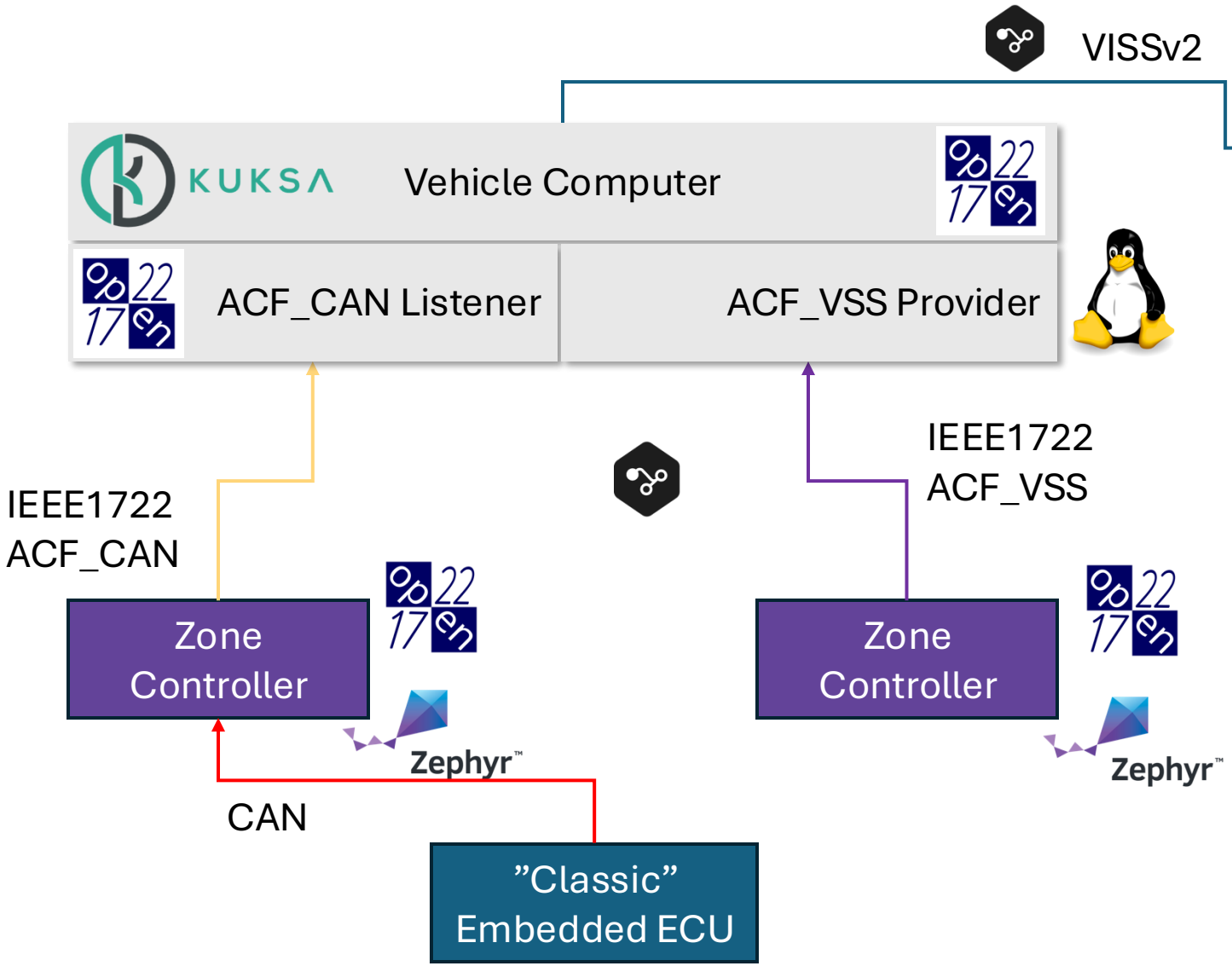
Avg: 41 uS

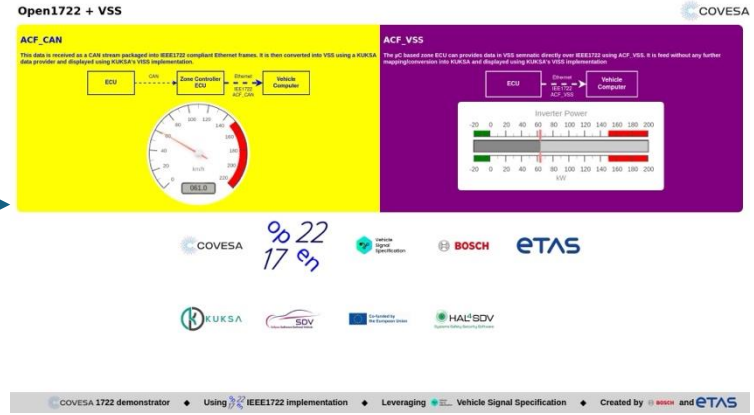

```
        Padding: 000000
▾ ACF Message: Reserved (0x42)
  ▸ ACF Header: Reserved (0x42), 28 bytes with header
  ▾ ACF VSS Header
      01.. .... = VSS Padding: 0x1
      ..0. .... = VSS Timestamp Valid: 0x0
      ...0 0... = VSS Addressing Mode: INTEROP_MODE (0x0)
      .... .000 = VSS Opcode: TARGET_VALUE (0x0)
      VSS Datatype: UTF8-STRING (0x0b)
      VSS Timestamp: Jan  1, 1970 00:00:00.000000000 UTC
    ▸ VSS Path
    ▾ VSS Data
      VSS Data: World!
      Padding: 00
▾ ACF Message: Reserved (0x42)
  ▸ ACF Header: Reserved (0x42), 28 bytes with header
  ▾ ACF VSS Header
```

Open1722 can also send VSS data

Same performance possible using ACF_VSS,
This is probably the best you can get performance –wise transmitting VSS data in a vehicle

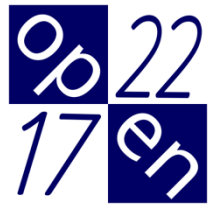
Open1722 COVESA Showcase Demo





Open1722: Next Steps

- Implementation of new data formats currently under standardization
- Publishing support for Zephyr to Github
- Seamless integration with the SDV world using VSS



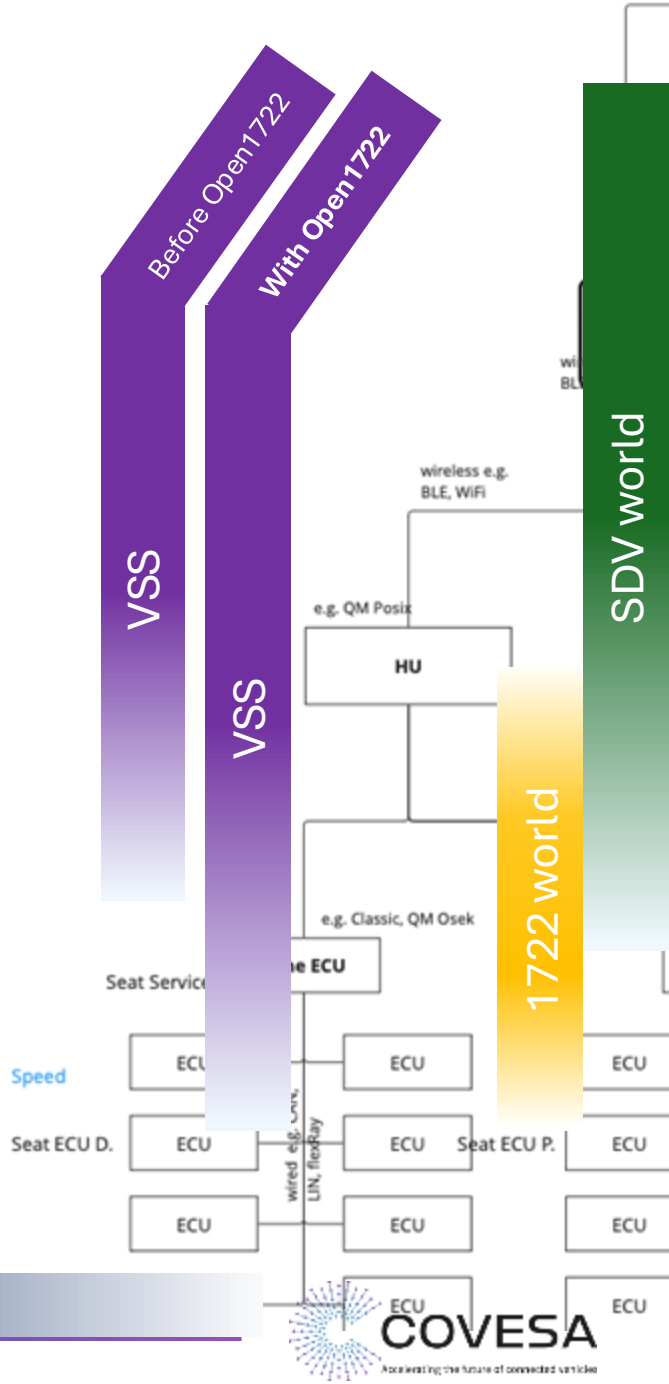
Summary

- IEEE1722 is an efficient L2 communication standard for automotive
  - supports various use cases, e.g. tunneling of other automotive relevant communication technologies (CAN, LIN, etc.)
- **Open1722** is a COVESA project implementing an Open Source IEEE1722 stack
  - VSS data can be efficiently transported over IEEE1722 using Open1722 ACF-VSS implementation

Join us!

Starred 18

https://github.com/COVESA/Open1722



(Open)1722 is an efficient way to enable VSS from embedded ECUs to SDV

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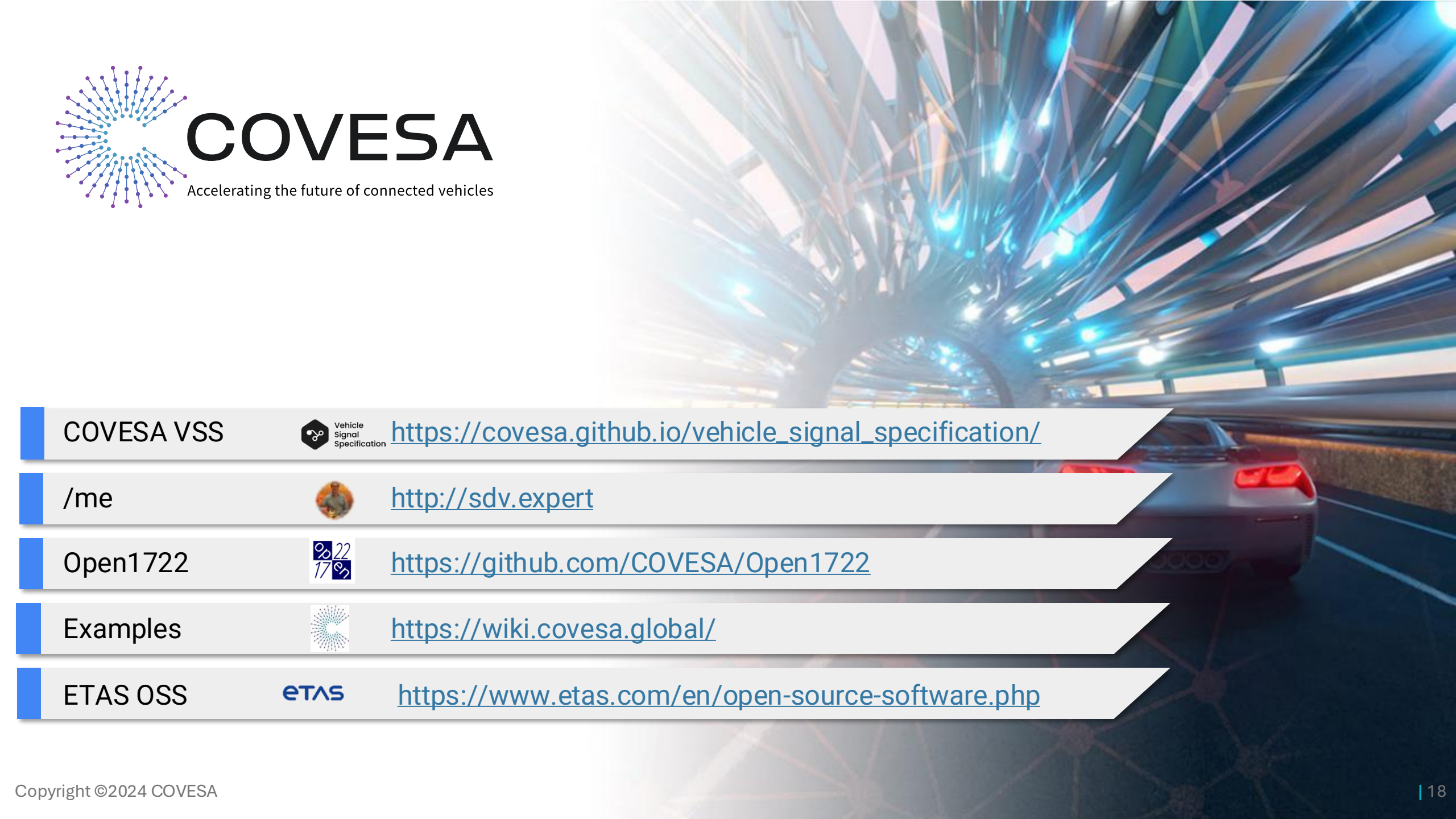

COVESA VSS	Vehicle Signal Specification	https://covesa.github.io/vehicle_signal_specification/
/me		http://sdv.expert
Open1722		https://github.com/COVESA/Open1722
Examples		https://wiki.covesa.global/
ETAS OSS	ETAS	https://www.etas.com/en/open-source-software.php