AUTOSAR ARXML for Ethernet Networks

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INTREPID CONTROL SYSTEMS

Vehicle Network Solutions
Versatile Product Family
Versatile Product Family

Vehicle Network Interfaces
- ValueCAN 4 Series
- RAD-Moon Series
- RAD-Galaxy
- RAD-Star 2
- neoVI FIRE 2
- neoVI Flex

Remote Wireless Data Logging
- neoVI ION
- neoVI PLASMA
- Wireless neoVI

Standalone Data Logger Support
- Supports LIN
- Supports CAN FD
- Supports Ethernet
- Supports BroadR-Reach
- Supports FlexRay
Vehicle Spy

Software for
Network Analysis
Simulation
Data Logger Setup
Automated QA

*software that supports all hardware

- Supports LIN
- Supports CAN FD
- Supports Ethernet
- Supports BroadR-Reach
- Supports FlexRay
Global Customers

Caterpillar
Jaguar
BAIC
SAIC
Ford
BMW
Toyota
John Deere

Harley Davidson
Dong Feng
TATA
PSA
GM
VW
Groupe PSA
FCA Group
DAIMLER
Intrepid Ethernet and CAN FD Products applications

**Common Use Cases**

- Automotive Ethernet Packet/Bus Analyzer L2 - L6 protocols
- Advanced (TB’s) of standalone Data logging, ML data, Deep Data Mining, Analytics, Reporting
- Scripting / programming – payloads/PDU’s/Signals, headers
- Client Server simulations
- Ethernet Gateway ECU’s analysis
- SOME/IP, DOIP, SOAD, XCPoE, AVB/TSN
- Camera, RADAR Tap, SerDes
- Media Convertors, Active Taps
- Master/Salve simulation for gPTP
- Many others..

**AI Enabled Data Acquisition Reference System**

Using the RAD-Gigastar as a media converter
Need for next Gen Ethernet Network Database description methods

- Ethernet Driving force for in-vehicle next generation architectures, tools needs to accommodate new architectures
- Vehicle part of Digital world
- Highly Automated Driving, V2X
- SW centric Vehicle Design
- Vehicle EE design emerge out of being only deeply embedded

- 16/32 bit microcontroller based classical, deeply embedded
- Fixed processing predetermined before deployment
- Feature enhancement nearly impossible after deployment

- Massive and Complex Data flow – stateful and stateless systems
- Static & Dynamic Discovery and deployment of Applications
- C++, POSIX, REST, SOME/IP, DDS, IPC, HTTPS ara::com
- E2E Protection - ASIL, Crypto, TimeSync, IPSec = Larger Data fields

<table>
<thead>
<tr>
<th>cameras</th>
<th>2D highres, video stream 8x 1-4 Mpixel/frame X 30 frames/s X 12-24 bits/pixel</th>
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<tbody>
<tr>
<td>lidar sensors</td>
<td>24bit/point 4X300K-3M 3D points/s</td>
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<tr>
<td>Radar sensors</td>
<td>object/target list</td>
</tr>
<tr>
<td>ultrasonic sensors</td>
<td>object/target list</td>
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<tr>
<td>GPS</td>
<td>Status/Control Signaling</td>
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Quick overview of Classical AUTOSAR & ARXML

- Interop between different toolchains
- Compete on Application – Collaborate on Infrastructure
- ARXML = .arxml defines a template which can be used to generate RTE, BSW

- Layered ECU software – Model based
- Decoupling of Application e.g Airbag Deployment Algorithm to the ECU HW and SW infrastructure
- SW and HW Independence – Application Layer -> Run Time Environment (RTE)-> Basic SW (BSW)
ARXML and Communication Networks

- ARXML is a file/artifact used to manifest/represent an Autosar based ECU configuration
- COM is a layer in Autosar ECU – that also is described in ARXML
DBC/LDF -> ARXML

• DBC files – Simple Classical static data structure description
• DBC files for CAN/CANFD – But, Automotive Ethernet description or FlexRay?
• LDF well suited for LIN and DBC for CAN
  e.g. Define a socket connection for a Switched Ethernet Backbone

Ability to describe COM architecture – Static and Dynamic nature of transactions seamlessly
ARXML for COM– collection of Autosar Packages

Packages can be constructed in different ways

Entity relationships are all described in Autosar Model

System Description / COMM Matrix -> System Extract -> ECU Extract
PDUs

- A collection of signals
- Primary unit in Autosar COM
- Client - Server Interface
- Sender - Receiver Interface
- Different layers in Autosar have different PDU’s
- They have properties of how they are triggered and many others
- They may belong to a frame or to a socket

EEA COM Tool PDUs viewer
ARXML for COM - Getting on-board

- Vehicle Network Engineers - Need to understand contents of the Autosar ARXML file.
- ECU test engineers - Need to perform testing using network analyzer tools such as VehicleSpy.
- Need to be able to add, delete and modify the network messages and save a new Autosar compliant ARXML file.
- System Engineers - Need to create test communication matrix to test on system or bench
- Engineers working on vehicle networks to make local changes in communication matrix for test purpose.

Intrepid EEA COM Tool
EEA COM – Easy to use Tool for Ethernet Database Description

Intrepid EEA COM tool is an easy way to get on board for Autosar ARXML

EEA COM - An Autosar based Modern Vehicle Network Communication Databases tool

VehicleSpy supports ARXML files with all the features like for DBC/LDF/FIBEX
Thank you for your time.