Understanding AUTOSAR ARXML for Communication Networks

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E/E Evolution in Automotive

- All Innovations will happen in EE, it will shape the future of car
- Vehicle part of Digital world
- Highly Automated Driving, V2X
- SW centric Vehicle Design
- Vehicle EE design emerge out of being only deeply embedded

cameras

2D highres, video stream

8x 1-4 Mpixel/frame X 30 frames/s X 12-24 bits/pixel

lidar sensors

24bit/point

4X300K-3M 3D points/s

Radar sensors

object/target list

ultrasonic sensors

object/target list

GPS

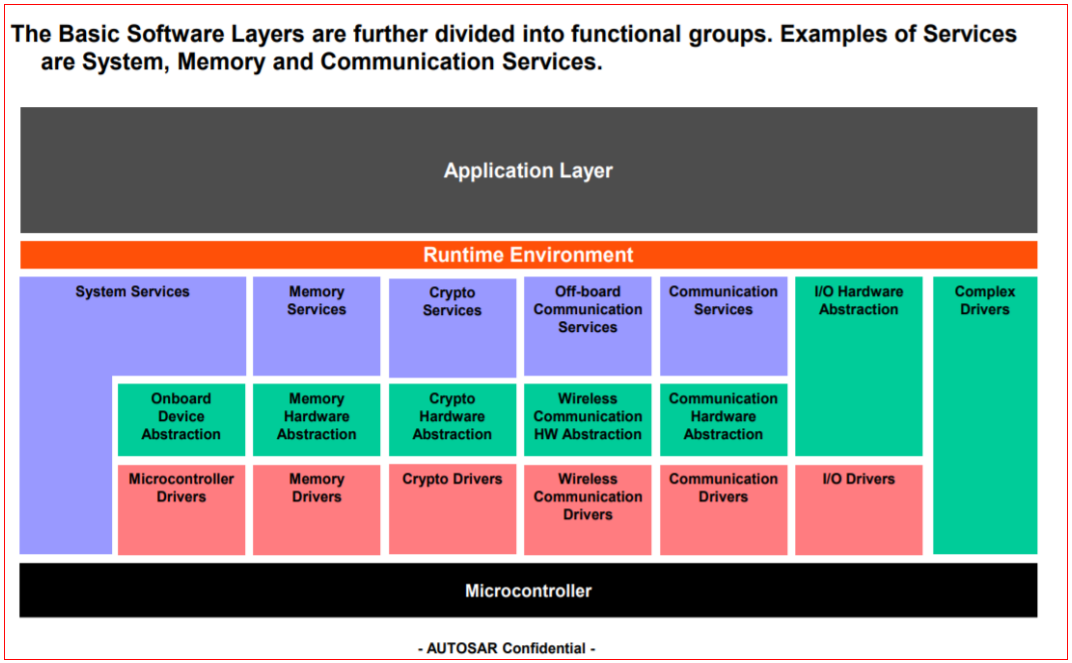
Status/Control Signaling

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

IVN world has changed

- 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

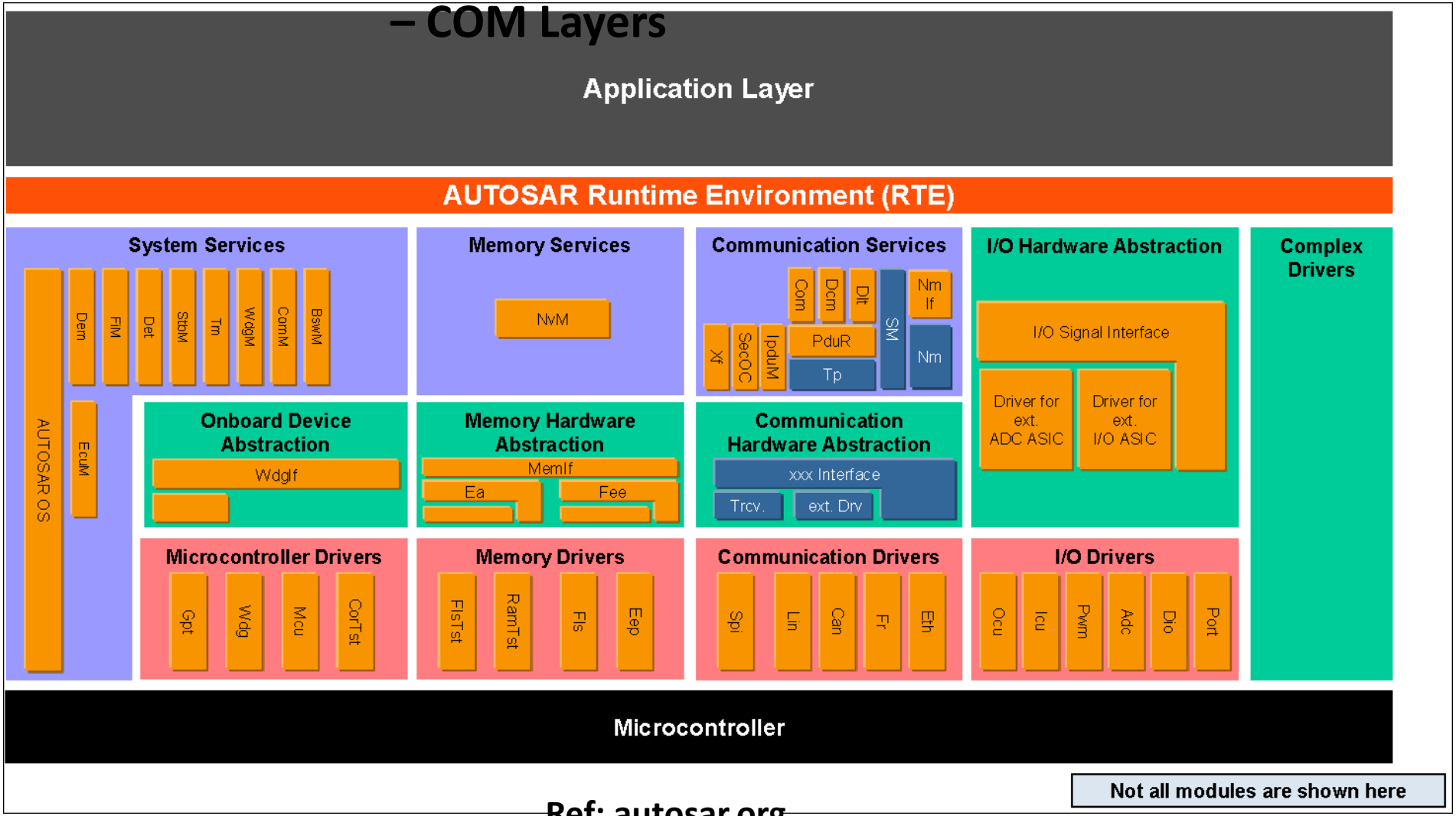
Quick overview of Classical AUTOSAR & ARXML



- 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 = VFB (Virtual Function Bus)
- SW and HW Independence – Application Layer -> Run Time Environment (RTE)-> Basic SW (BSW)

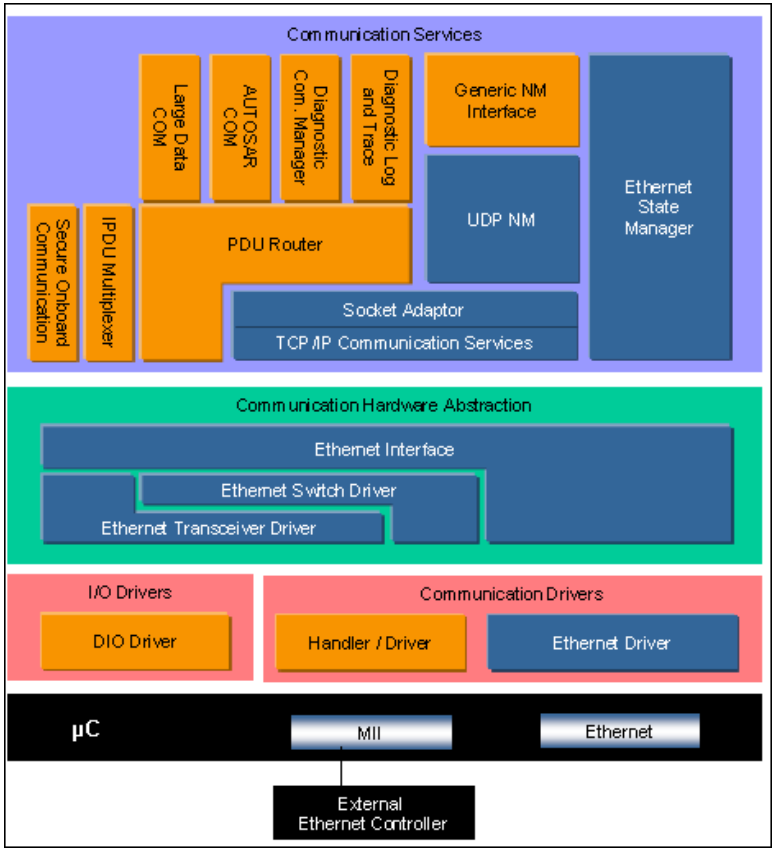
Quick overview of Classical AUTOSAR & ARXML – COM Layers



Ref: autosar.org

ARXML and Communication Networks

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



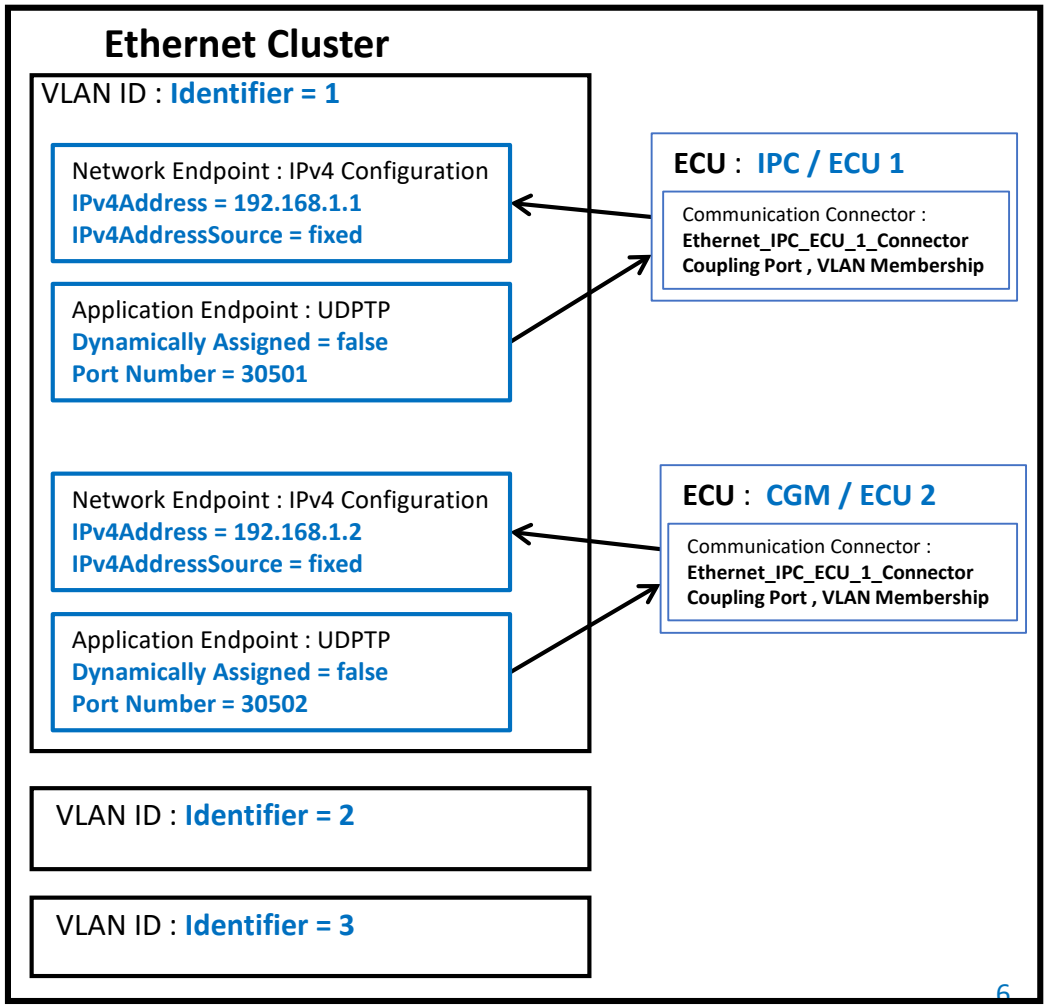
Ref: AUTOSAR.org

Autosar COM stack for TCP/IP

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



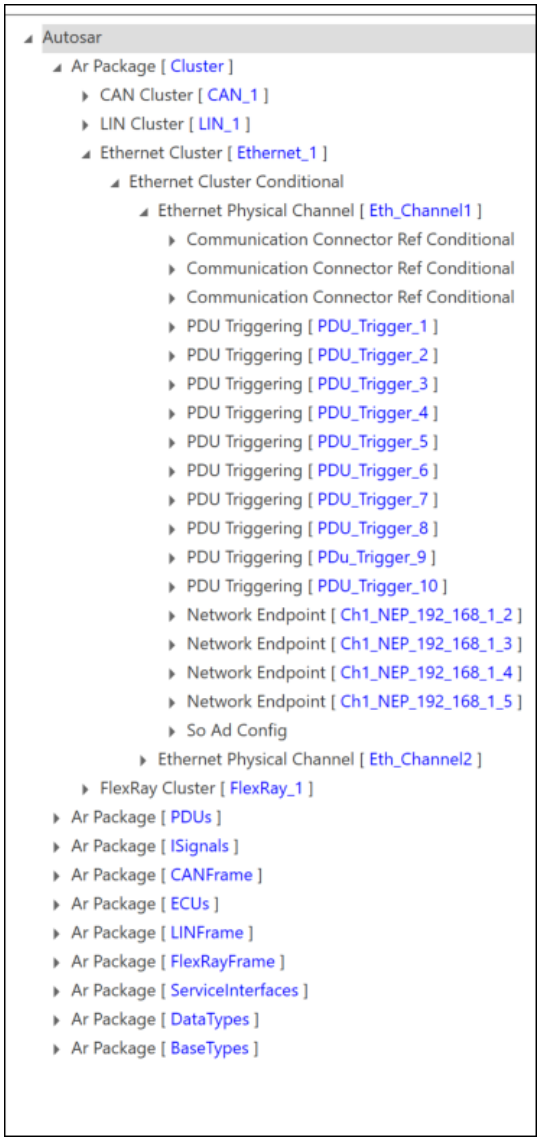
➢Ability to describe COM architecture – Static and Dynamic nature of transactions seamlessly

ARXML for COM– collection of Autosar Packages

Packages can be constructed in different ways

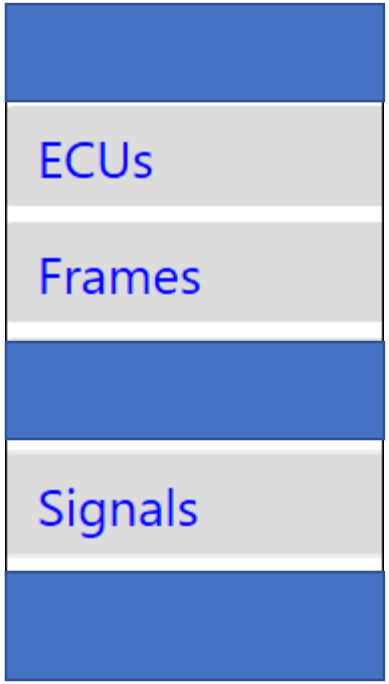
Entity relationships are all described in Autosar Model

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

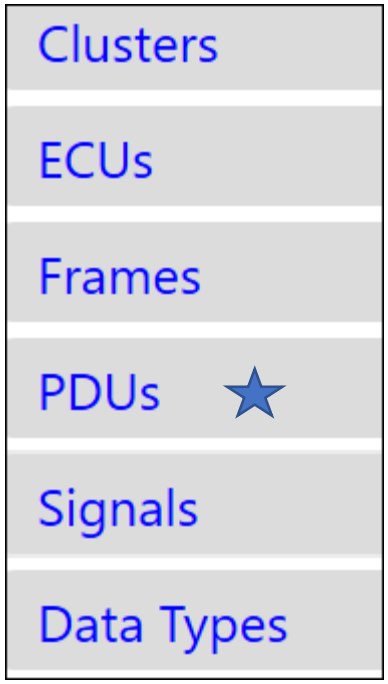


EEA COM Tool Tree View

ARXML for COM – Basic things to be aware off



DBC

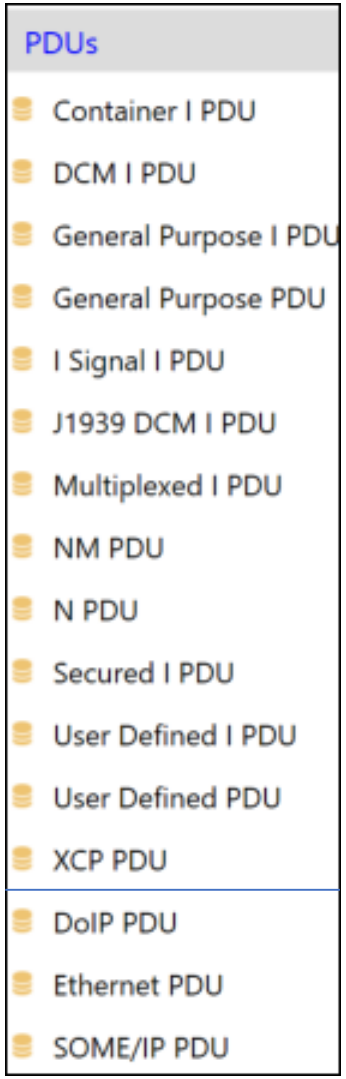


ARXML

PDUs

- Clusters
- ECUs
- Frames
- PDUs ★
- Signals
- Data Types

- 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

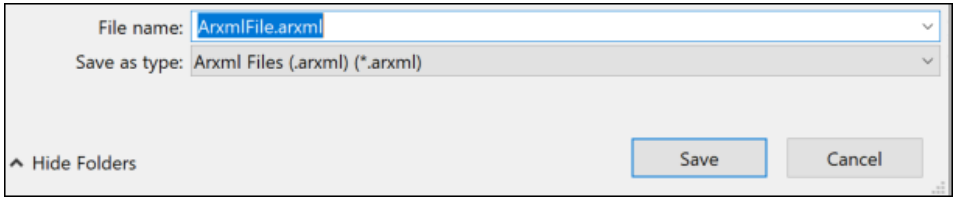


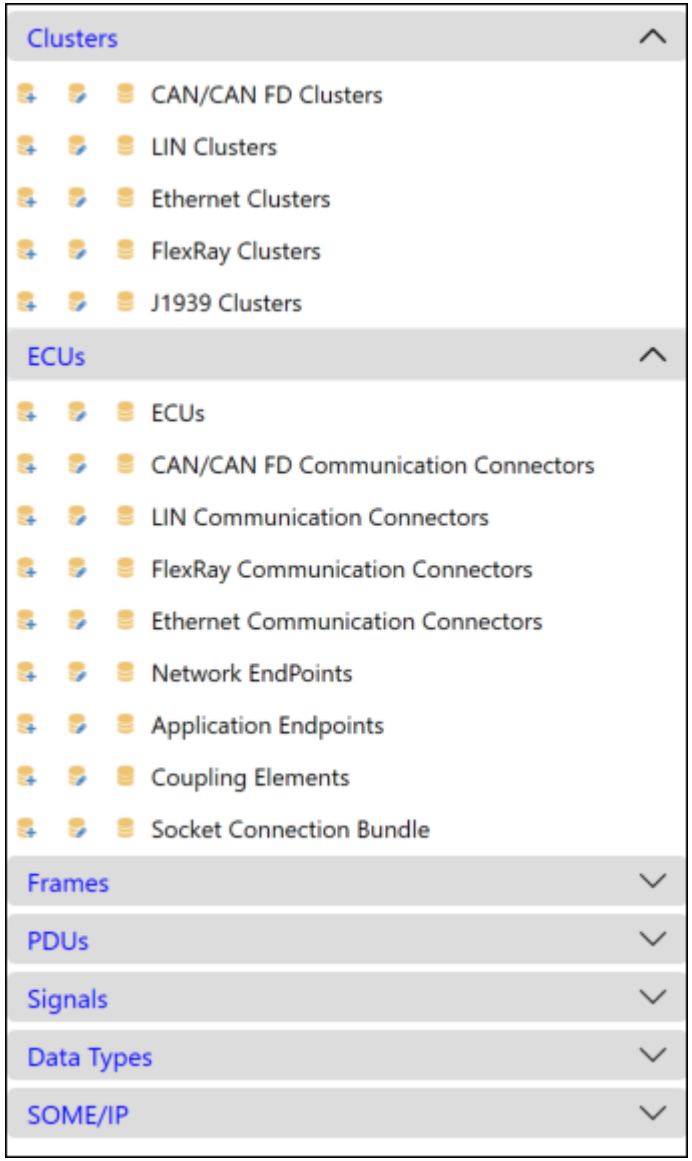
EEA COM Tool PDUs viewer

ARXML for COM - Getting on-board

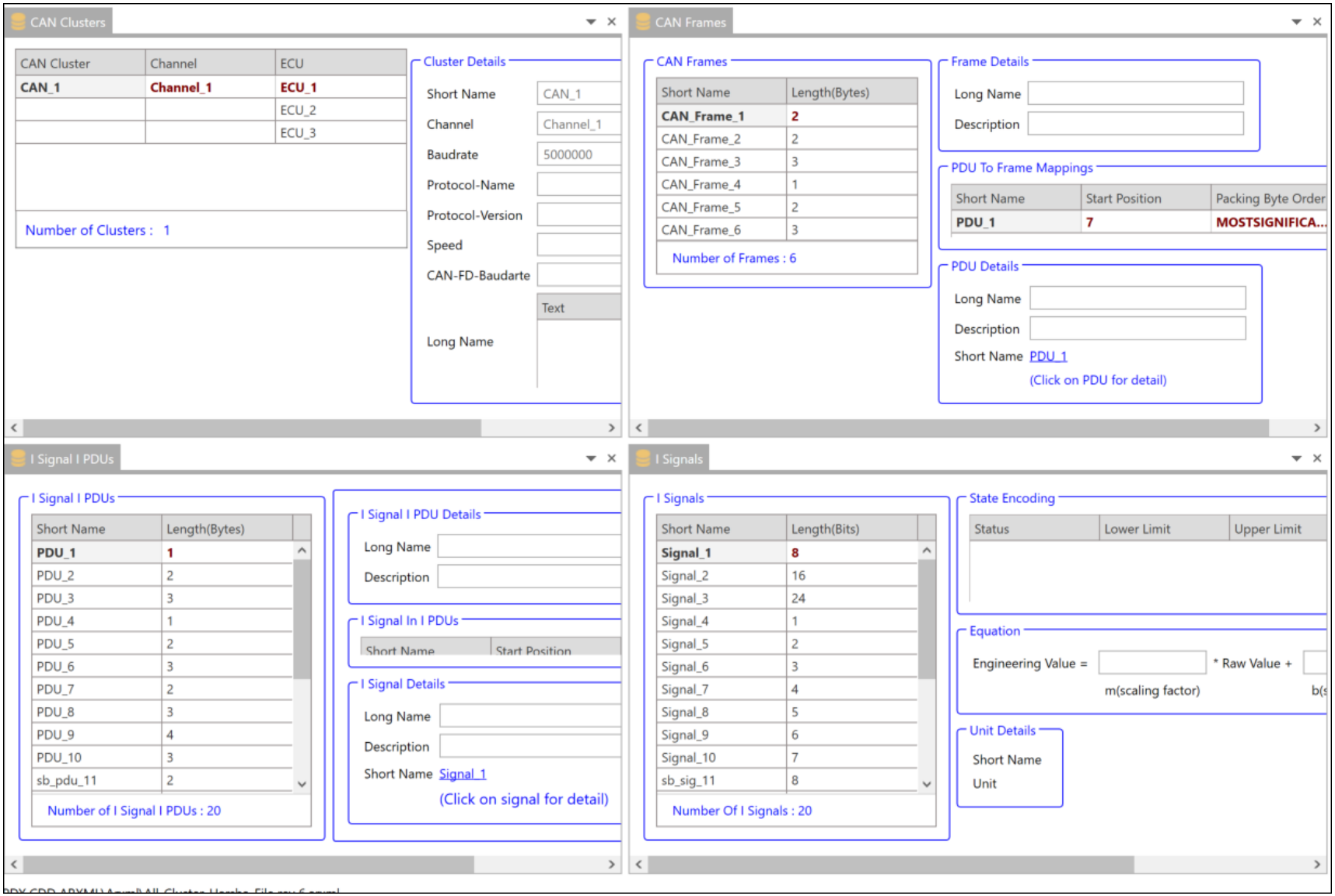
- Vehicle Network Engineers - Need to understand contents of the Autosar ARXML file.
- ECU test engineers - Need to perform testing using network analyzer tools such as VehicleSpy.
- Need to be able to **add**, **delete** and **modify** the network messages and save a new Autosar compliant ARXML file.
- 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 any purpose - avoid loop back to Network Architectural teams to re-generate the Communication Matrix for even small test changes.

Intrepid EEA COM Tool

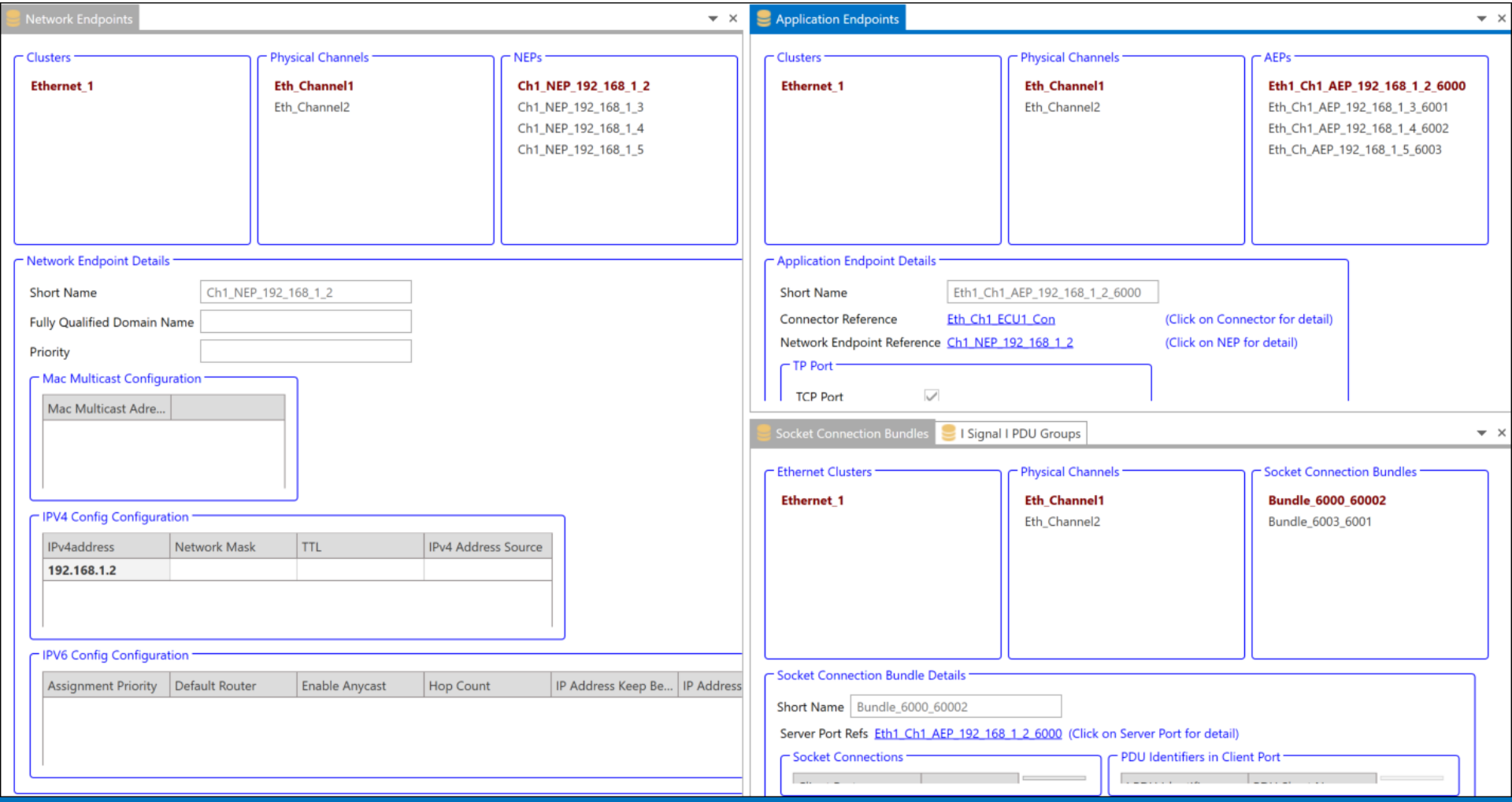




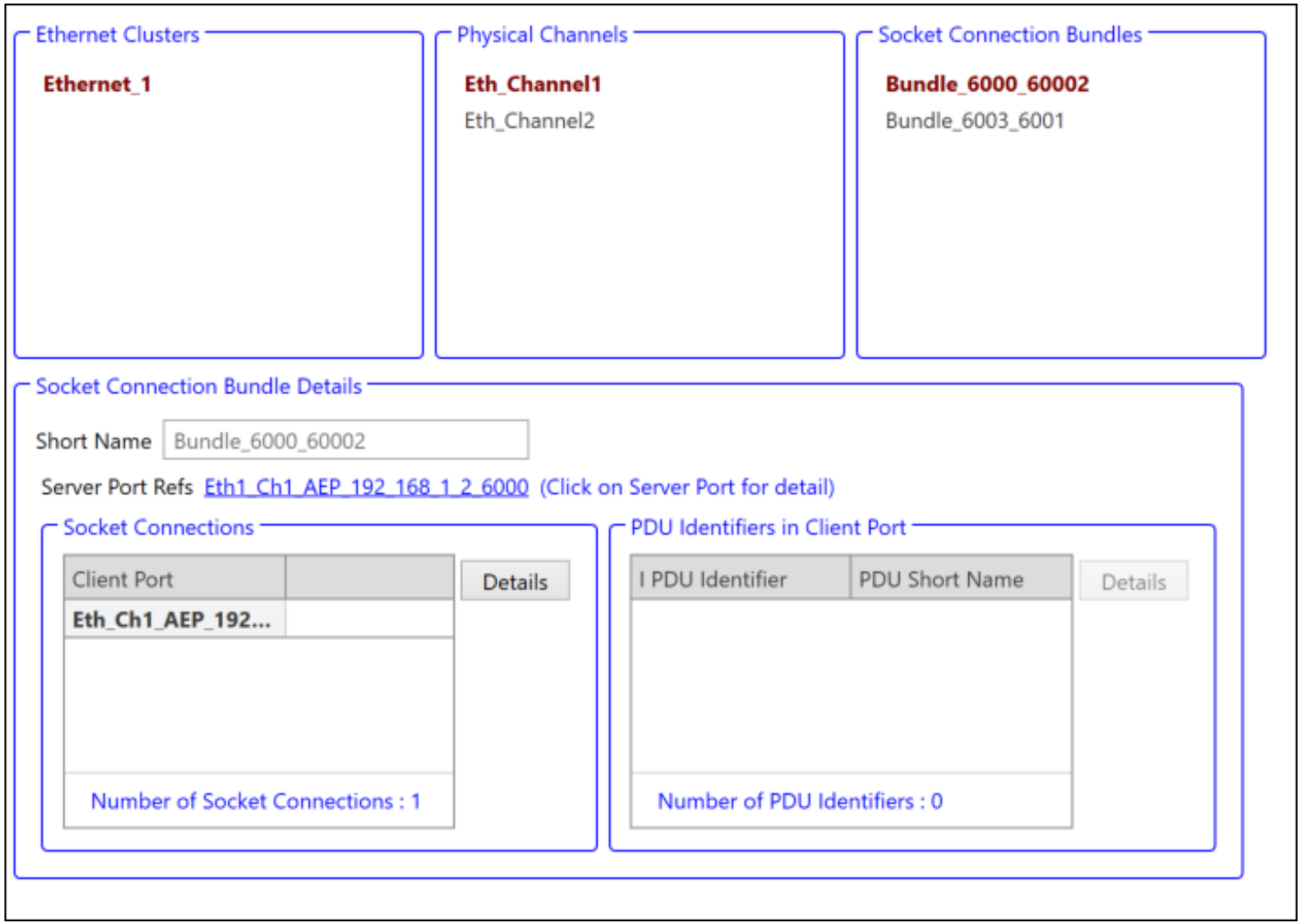
ARXML for COM – Clusters, Frames, PDUs, Signals



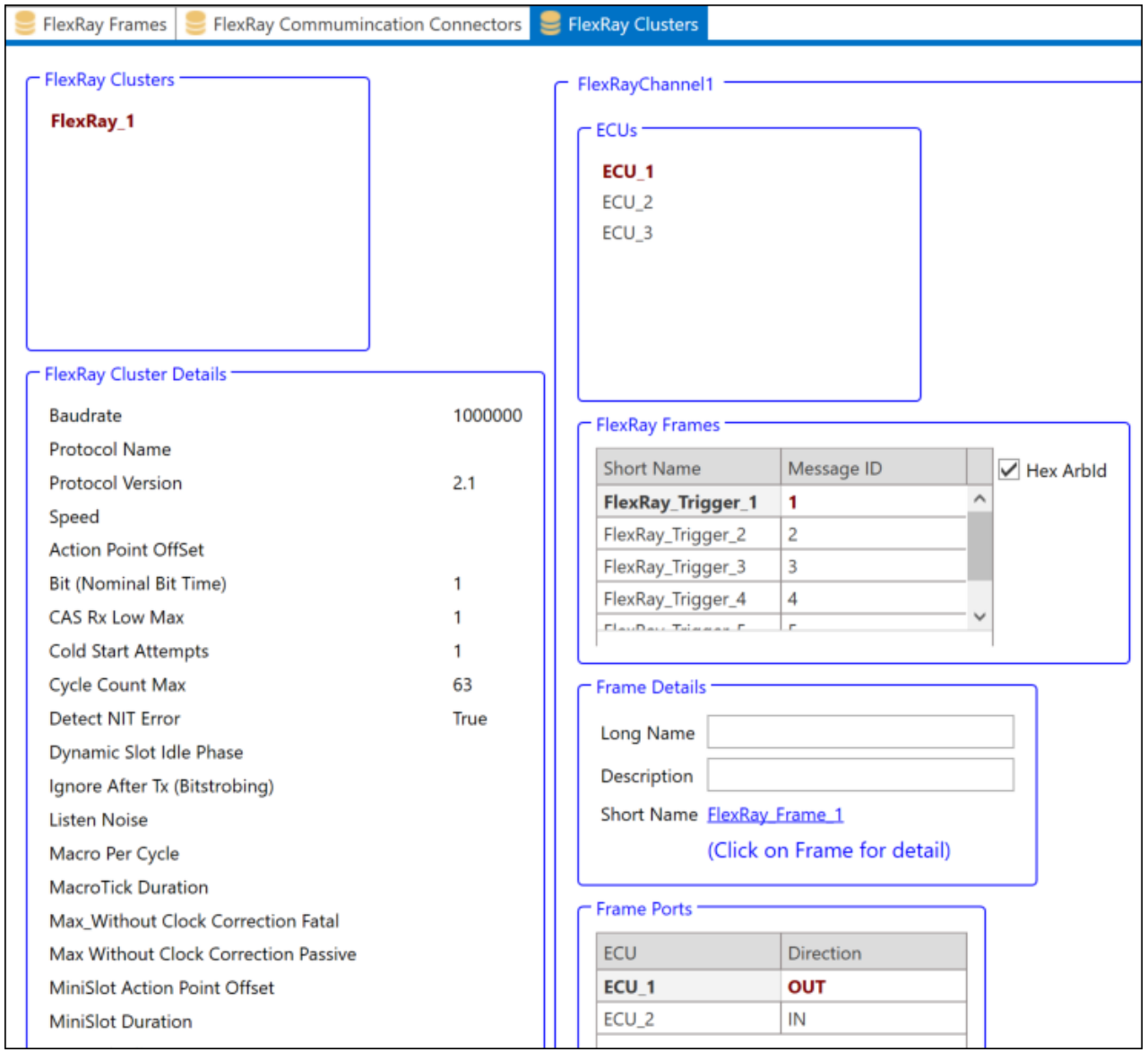
ARXML COM – Ethernet Network Endpoint, Application Endpoint



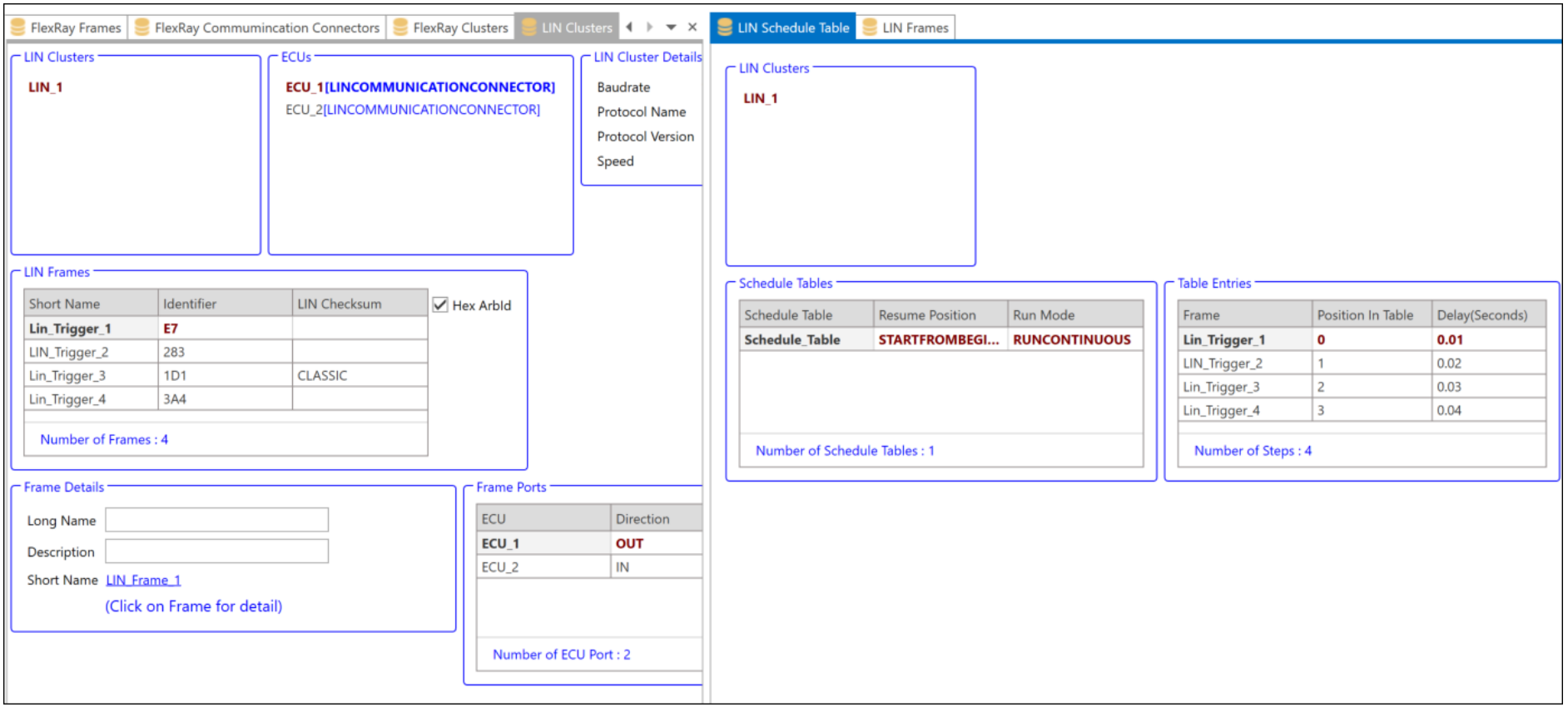
ARXML COM – Describes Socket Connections



ARXML COM FlexRay Cluster



ARXML COM – LIN Clusters, LIN Schedule Table, LIN Frames



ARXML is the future

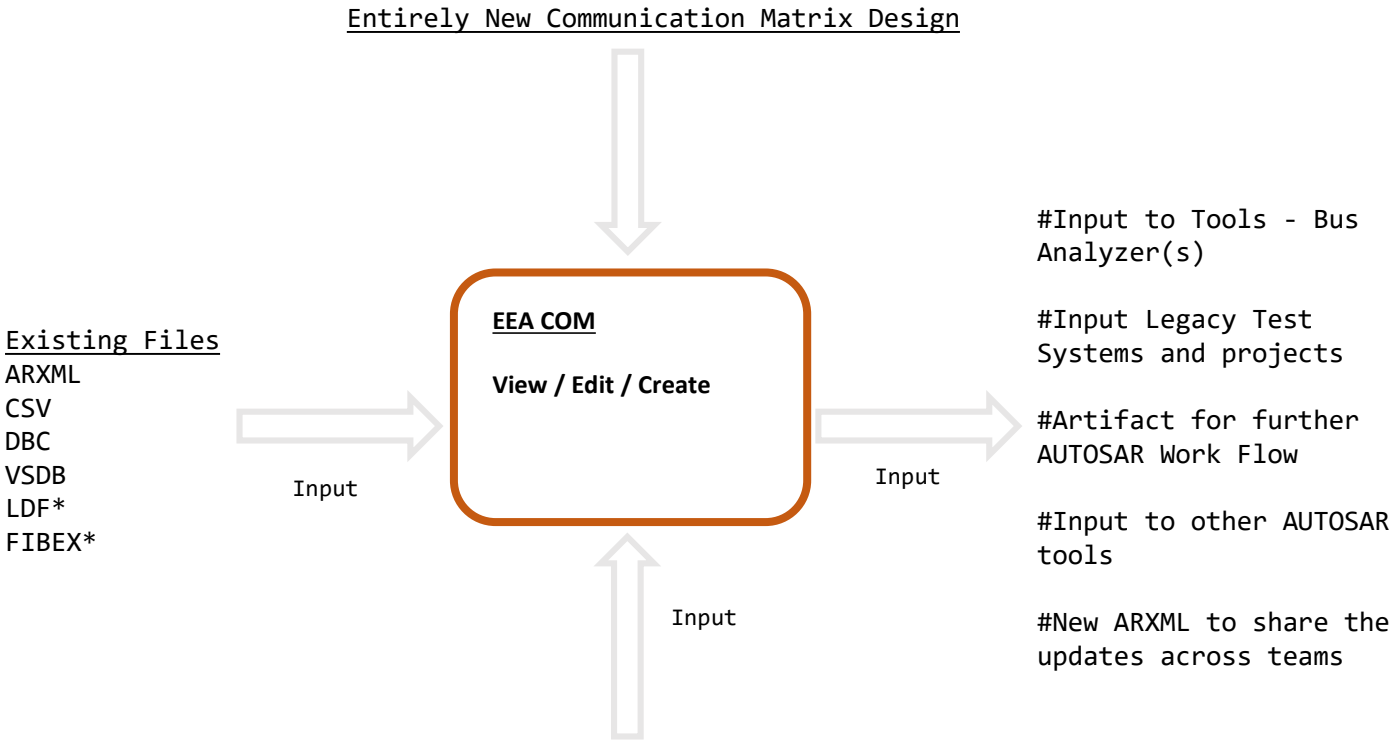
Intrepid EEA COM tool is an easy way to get on board for Autosar ARXML

EEA COM - An Autosar compliant new Vehicle Network Communication Databases tool

VehicleSpy supports ARXML files with all the features available as of DBC/LDF etc

In general if you are using DBC, LDF or FIBEX and ODX/PDX file's then there is a high probability that you will be working on ARXML files

ARXML is the future – EEA COM tool can help



Thank you for your time.

Hope you enjoyed learning about AUTOSAR ARXML files.