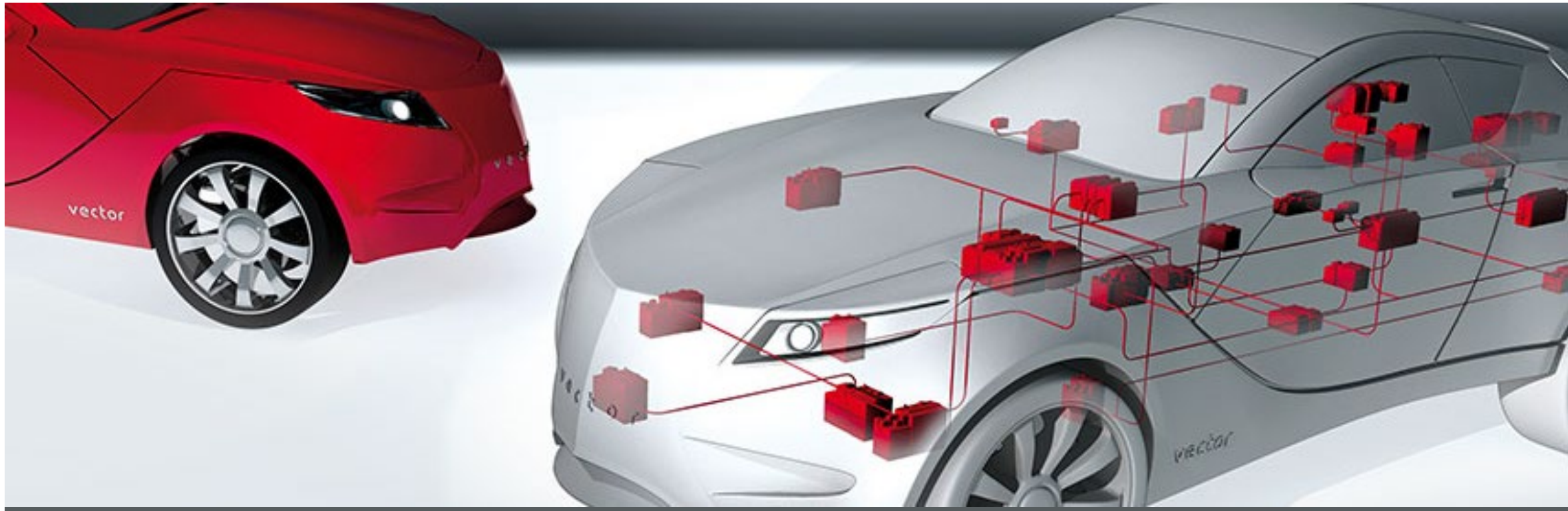
VECTOR




# CANoe/CANalyzer 12.0 - New Features

Webinar 2019-06-03

# Agenda

- **Release Information**
  - General
  - Automotive Options
  - Testing (CANoe)
  - VT System (CANoe)
  - Additional Options
  - Smart Charging (CANoe)
  - Ethernet
  - Car2x
  - Additional Protocols
  - Summary

Skip topic

# Overview

- Release date 12.0
  - May 2019
- Supported network technologies
  - CAN & CAN FD, LIN, FlexRay, MOST, J1708, Ethernet, WLAN

- Options
  - Smart Charging - CANoe **New**
  - AMD/XCP – CANoe
  - Car2x
  - Scope for CAN & CAN FD, LIN, FlexRay
  - J1939, CANopen, J1587
  - ISO11783 – CANoe
  - Aerospace options: AFDX®, A429, CANaero (now part of standard option .CAN)
  - Sensor (PSI5, SENT, SPI) - CANoe

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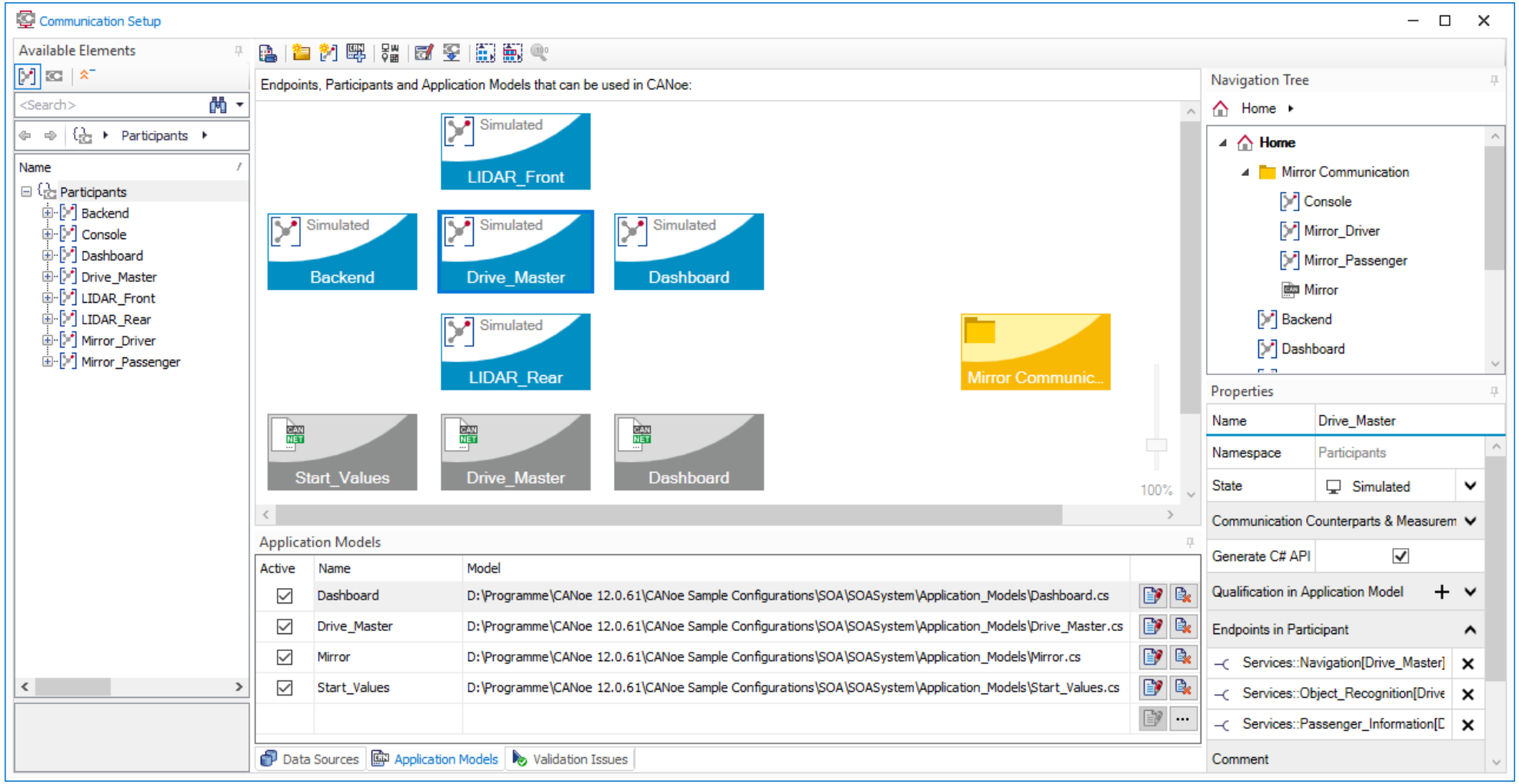
# Main Benefits

- New Communication Concept:
  - New graphical configuration
  - Switching of endpoints (simulated, remote, measured)
- Ethernet
  - TC8 Support
  - TLS Support
  - New hardware
- Testing
  - CANoe comes with viewer version of vTESTstudio
  - Export test reports to PDF
  - VT System: New Switch Matrix Module
- New Option .Smart Charging – Standards:
  - GB/T 27930 (China)
  - DIN 70121/ISO 15118 (Europe, USA)
- Option .Sensor: SENT Piggy for VN1640A/VN1530
  - No VT necessary for smaller projects
- Option .CANopen: New and completely reworked configuration
- Option .Car2x: New map window

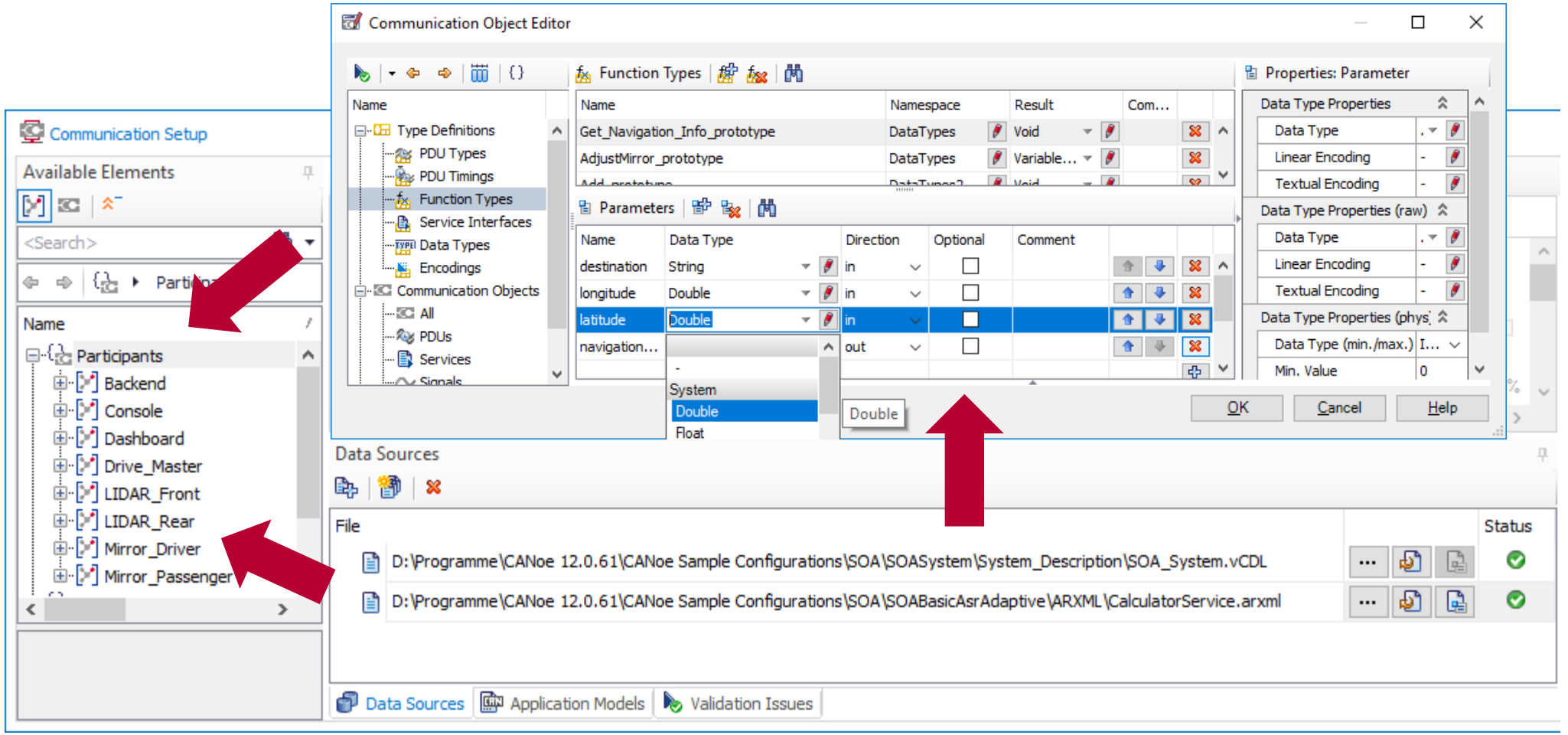
# Communication Concept (CANoe)

- New graphical Communication Setup window as central place to configure the Communication Model



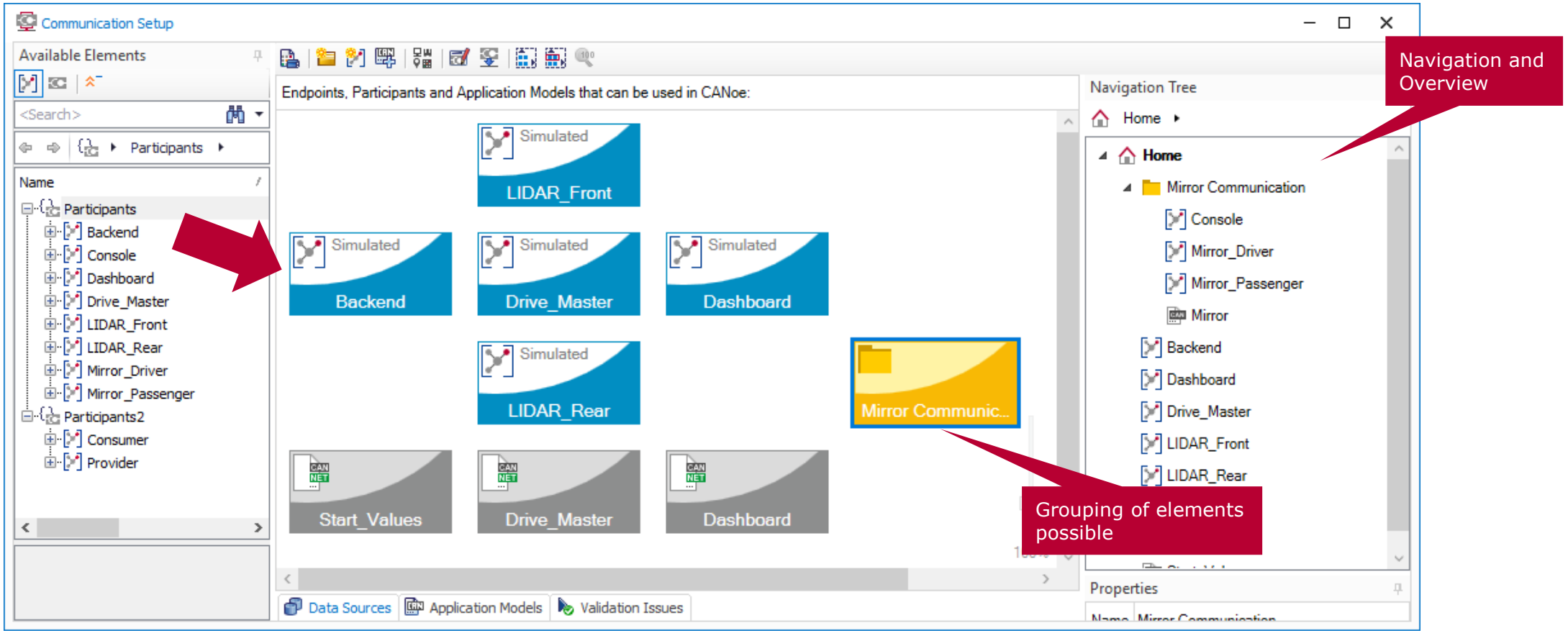
# Communication Setup Window – Data Model

- Import of ARXML and vCDL (Vector Communication Description Language) files into the Data Model
- Edit the Data Model and create elements from scratch



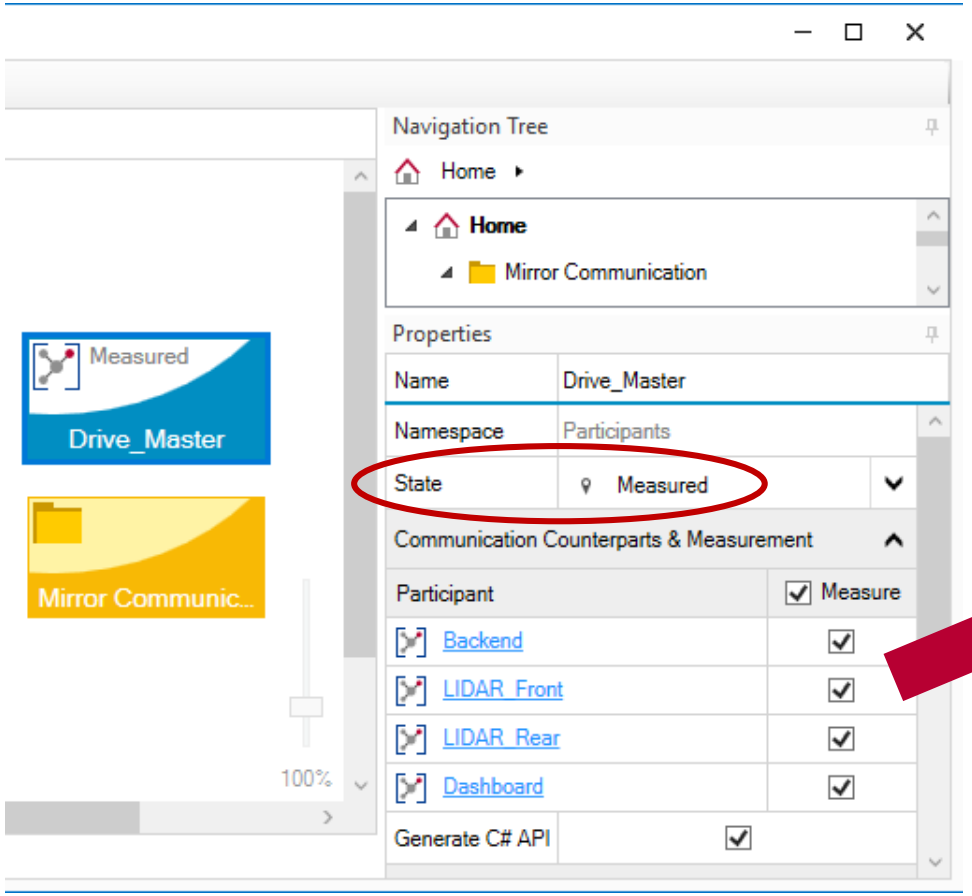
# Communication Setup Window – Communication Model

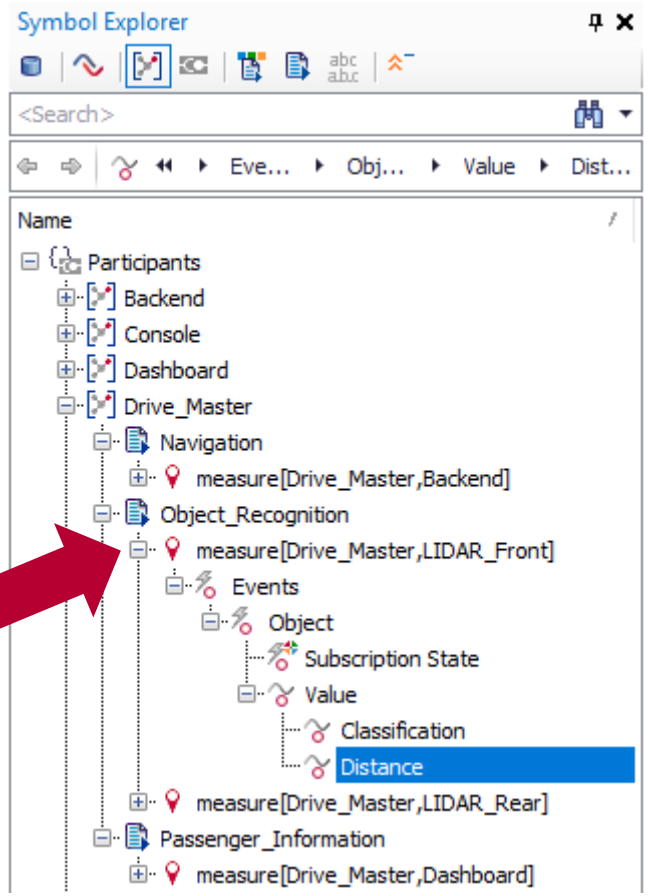
- Select elements from the Data Model that can be used in CANoe –> Communication Model
- The Communication Model is represented by the blocks in the middle
- Application Models are represented as well and can be grouped with other elements



# Communication Setup Window – Switching of States and Measurement

- State of Participants and Endpoints can be switched between Off, Simulation, Remote, and Measured
- Measurement Points allow measuring of point-to-point connections



# vCDL – Support of SOME/IP Binding Configuration

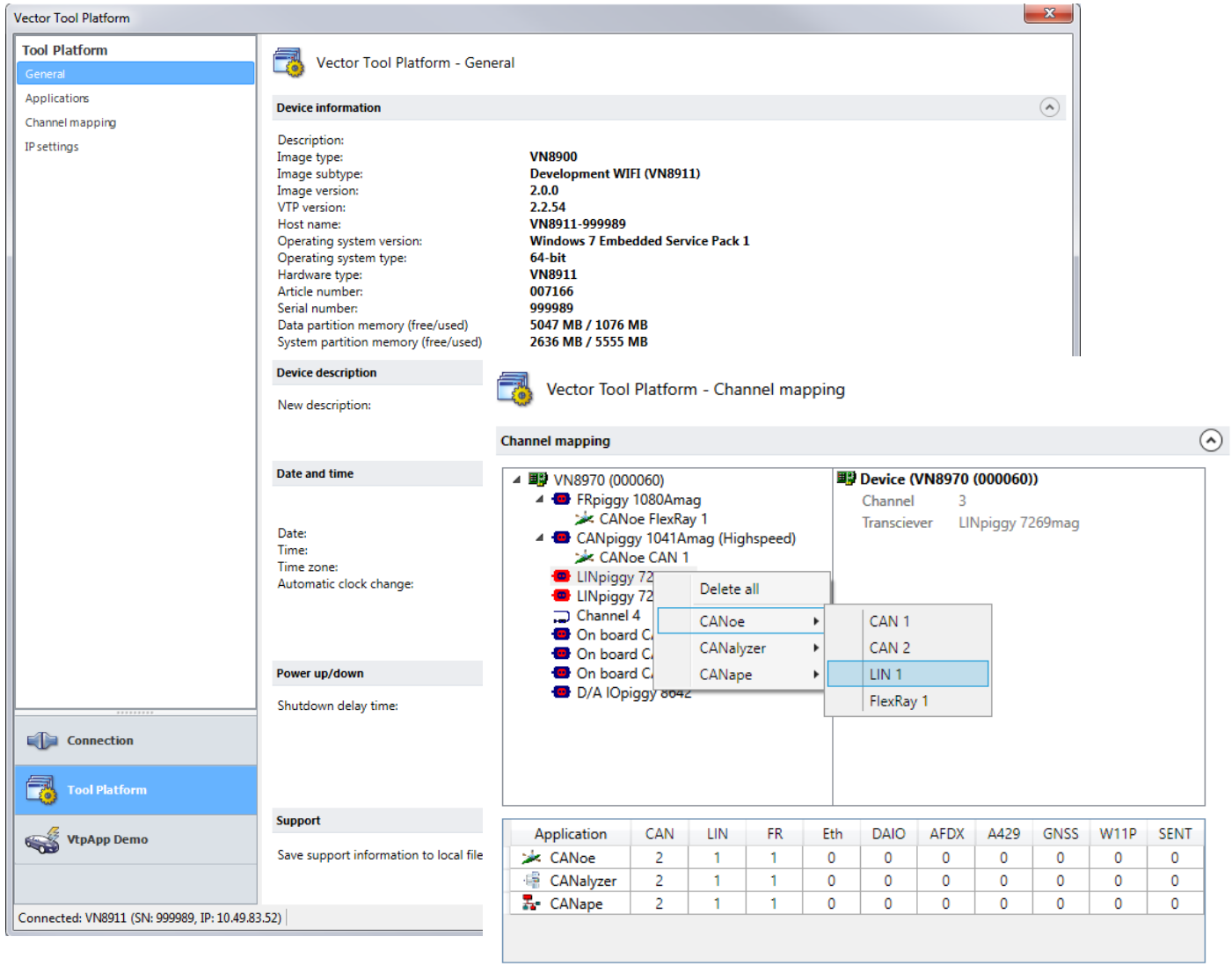
```
[version=1.0, serviceId=11]
service Calculator
{
    void Add(int32 operand1, int32 operand2, out float result)       [methodId=31];
    void Substract(int32 operand1, int32 operand2, out float result) [methodId=32];
    void Multiply(int32 operand1, int32 operand2, out float result)  [methodId=33];
    void Divide(int32 operand1, int32 operand2, out float result)    [methodId=34];

    [udpEndpoint="192.168.1.10:40000", sdMulticastEndpoint="239.0.0.1:30490"]
    consumer Terminal;

    [simulated = false, instanceId = 1];
    provider VC121;
}
```

Binding configuration can also be separated from interface definition

(e.g. multiple files)

# Distributed Mode

- Unified configuration for all VTP devices
  - All VTP devices can now be configured independently of the connection type (USB or Ethernet)
  - The connection in distributed mode must now be explicitly defined
  - There is a new button in CANoe Ribbon for this purpose
- Channel Mapping
  - For all VTP devices the channel mapping can now be done via the Platform Manager
  - This works via USB (as before) as well as via Ethernet connection



# Distributed Mode – Affected RT setups

VN89xx: Network interface and simulation platform

USB or Ethernet

VN89xx

VT60xx: VT board as simulation platform

Ethernet

VT System

CANoe RT Rack: IPC as simulation platform

Ethernet

CANoe RT Rack

VTP dialog also replaces the standalone manager

VN8900 standalone

VT System standalone

VT System

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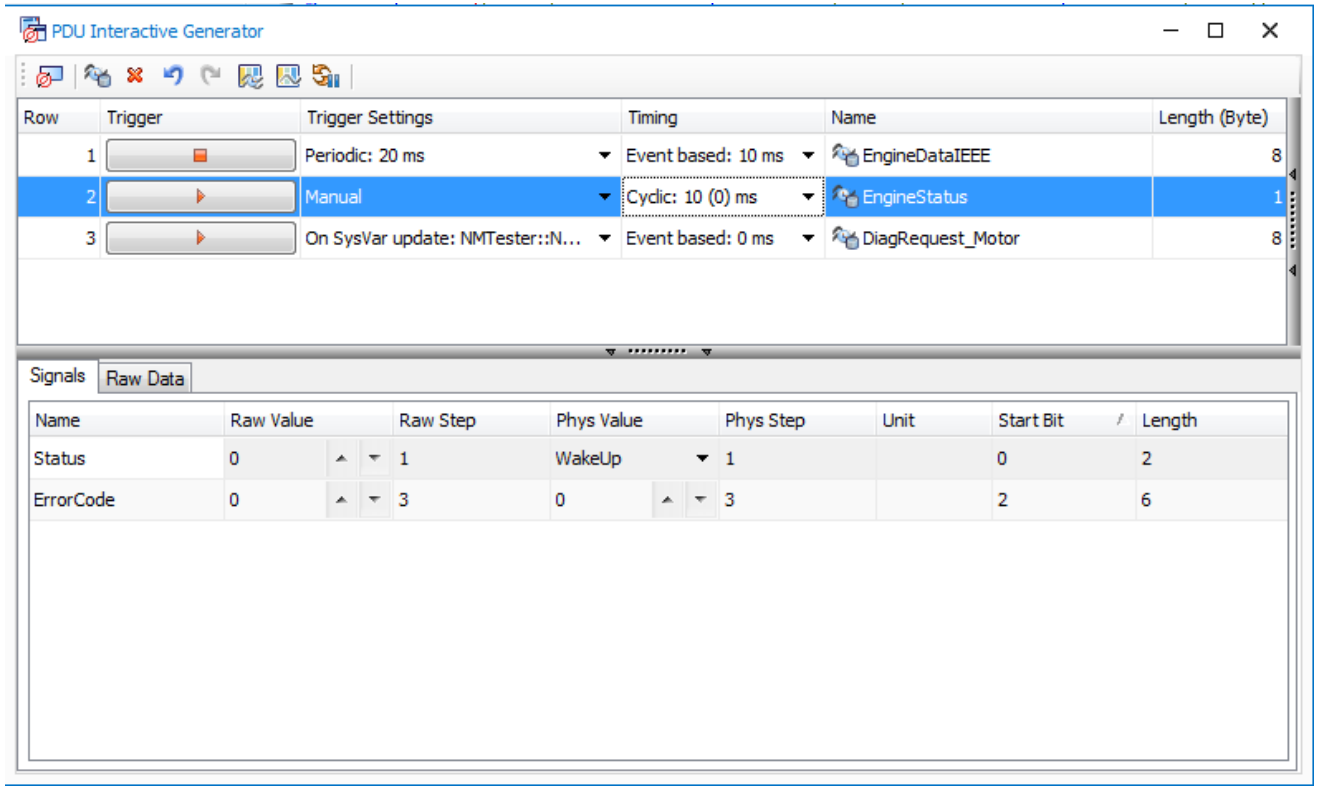
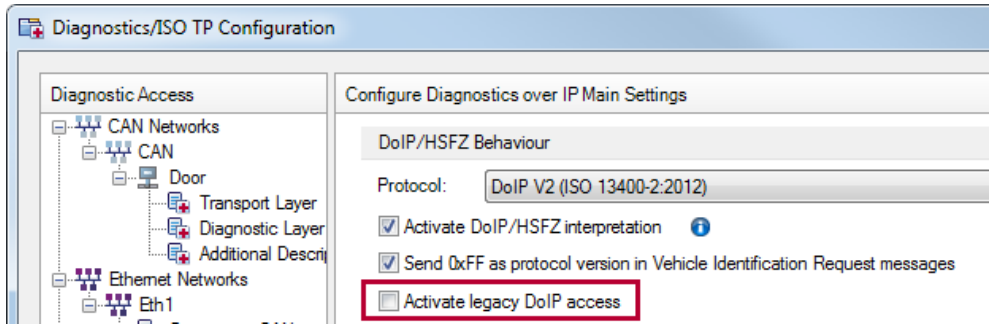
# AUTOSAR PDU IG for CAN, Ethernet & FlexRay

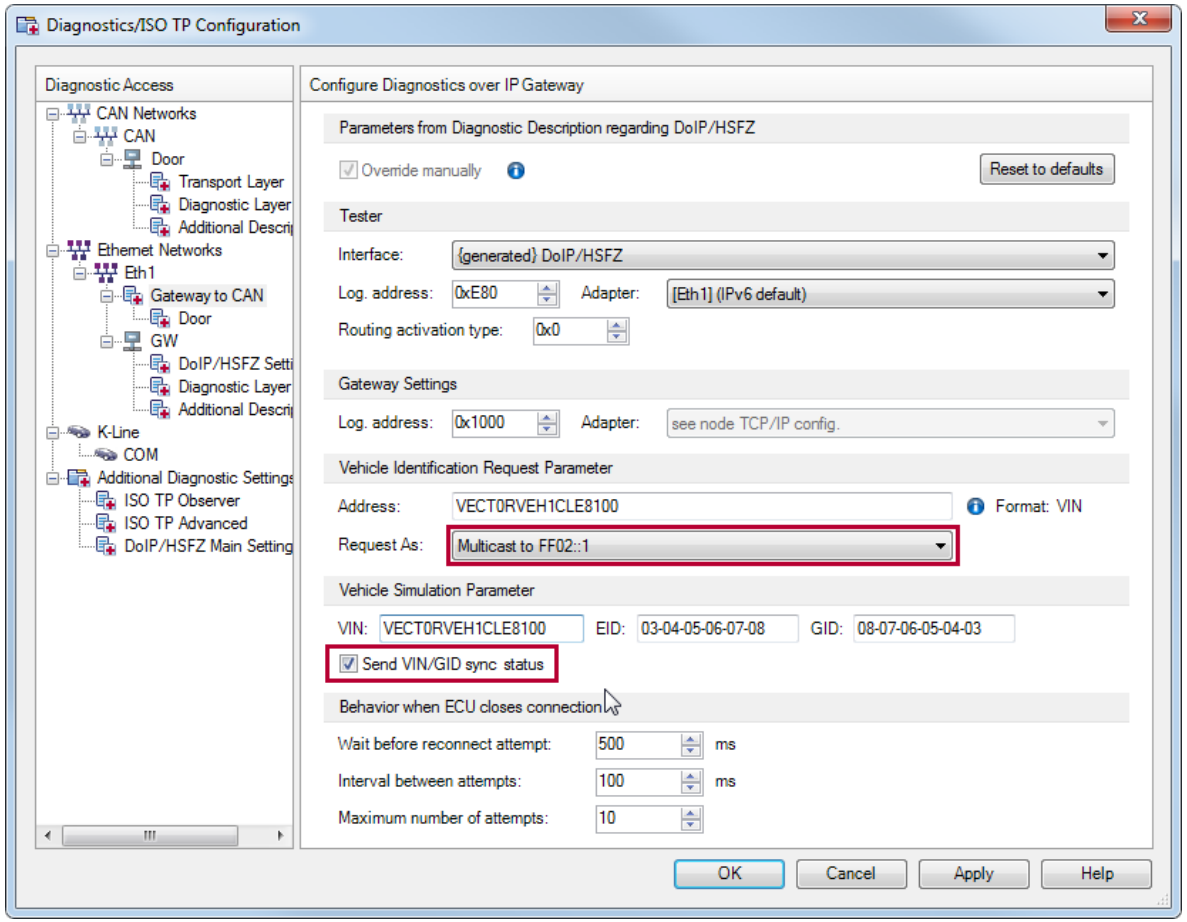
- New IG for AUTOSAR PDUs
  - Interactive, intuitive stimulation tool for AUTOSAR PDU based networks
  - Available in CANoe and CANalyzer
  - Manipulates PDU timings, triggers PDUs, changes PDU payload
  - Full support of security & safety PDU features in CANoe (Secured PDUs, SQC, Update Bit)
  - Familiar workflow for CAN IG users



# Diagnostics: Features and Improvements

- DoIP:
  - Transmit “Vehicle Identification Request” as IPv6 multicast and as unicast to a dedicated address
  - Choose whether the optional "VIN/GID sync status" should be sent by a simulation node
  - "Legacy DoIP access" can be deactivated (deactivated by default in new configurations to avoid confusion when using VN56xx HW interfaces)

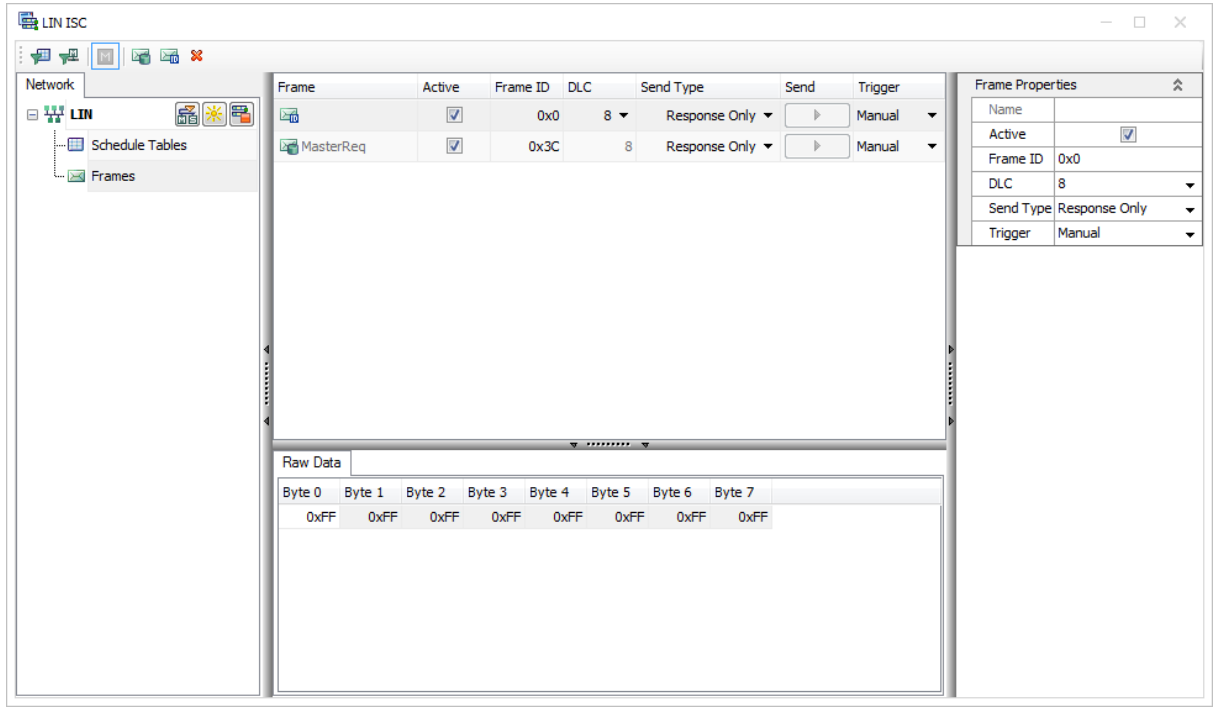



- Improved data interpretation for OBD-II
- Support service 0x38 "Request File Transfer" in the standard diagnostic description (GenericUDS.cdd)

# LIN: Improvements

- The **Interactive Scheduler** now allows you to configure and send individual frames:
  - Raw frames
  - Frames from the LDF description
- The checksum model of the LIN-Reserved-Frames (ID 0x3e/f) can now be configured:
  - Use function **linSetChecksumModel**



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# Features and Improvements (1)

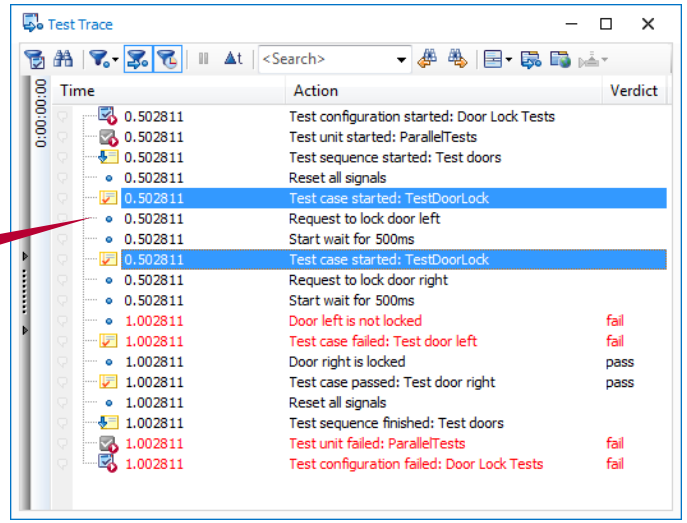
- CAPL now supports **parallel execution** of multiple threads within one test case or parallel execution of multiple test cases within one test sequence

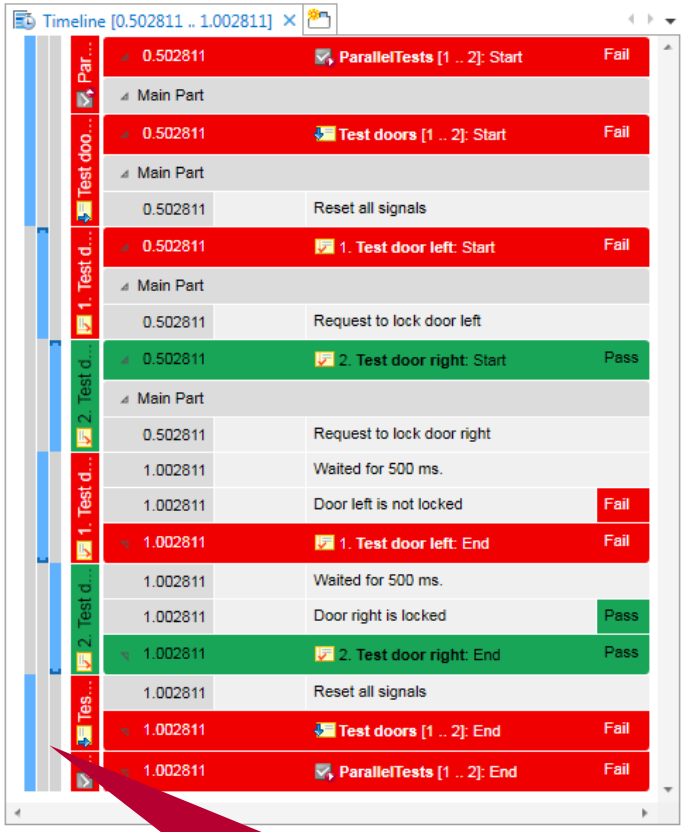
```
export testsequence TestDoorLeftRight()
{
  dword tcDoorLeft, tcDoorRight;

  ResetSignals();

  tcDoorLeft = testStartParallel(TestDoorLock, "left", LockRequestLeft, LockStateLeft);
  tcDoorRight = testStartParallel(TestDoorLock, "right", LockRequestRight, LockStateRight);

  testWaitForAllParallel(1000);

  ResetSignals();
}

testcase TestDoorLock(char side[], signal* sigLockRequest, signal* sigLockState)
{
  // ...
}
```

API to start parallel execution in/of test cases

API to wait for one, multiple or all threads to return

Visualization of parallel threads in the Test Trace Window

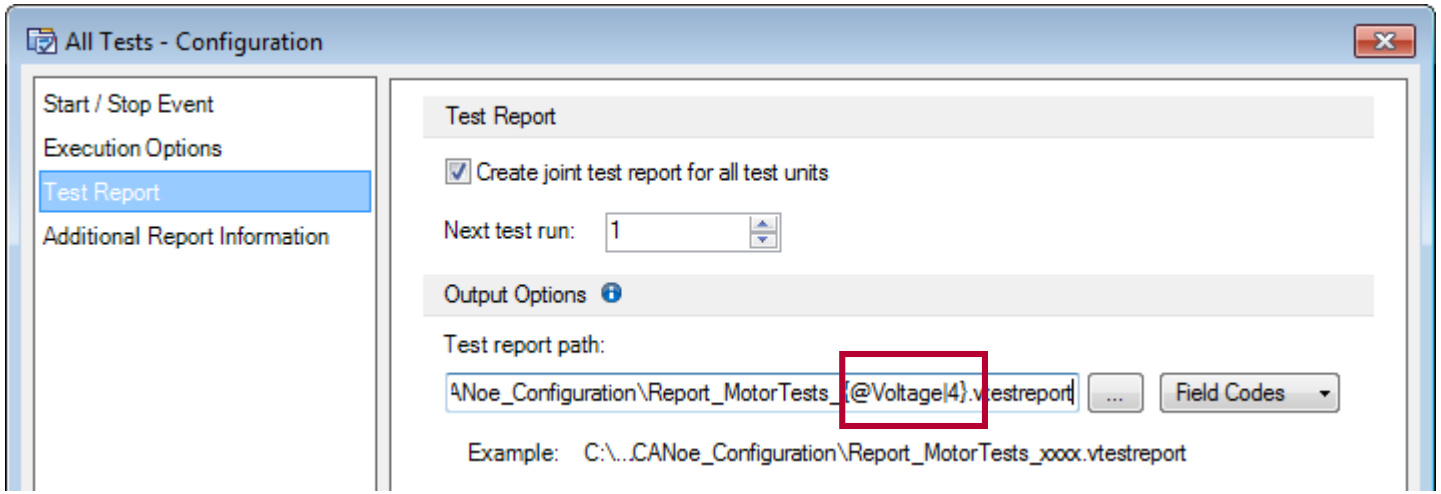



Visualization of parallel threads in the Timeline of the Test Report Viewer

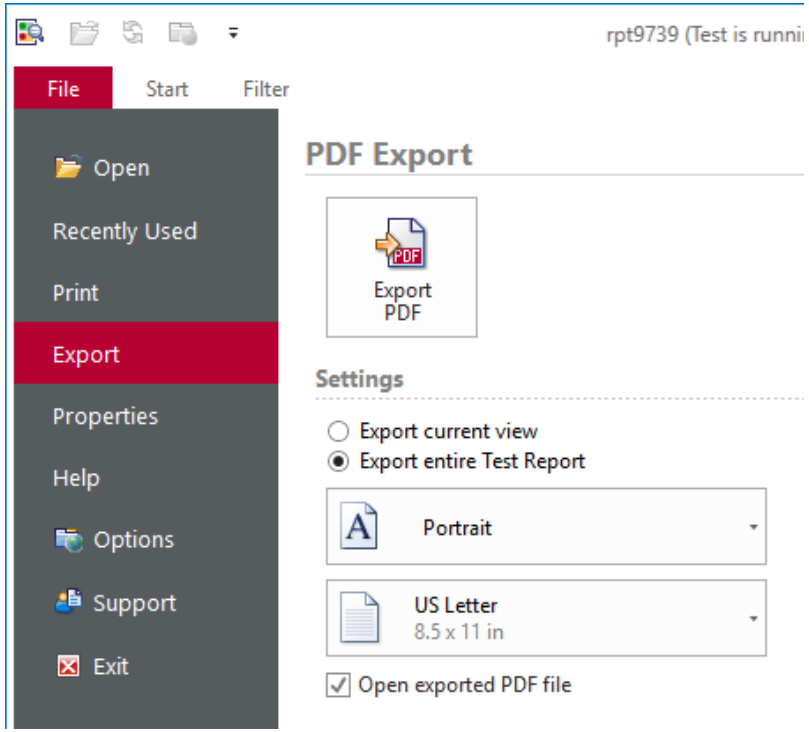
# Features and Improvements (2)

- A **viewer version of vTESTstudio** is now part of the CANoe installation and available as free download as well; thus, no vTESTstudio license is needed anymore to open and view vTESTstudio test designs
- When using numeric system variable as **field codes** for the test report name the **precision** of the value can be specified now; the precision specifies the number of string characters or the number of decimal places



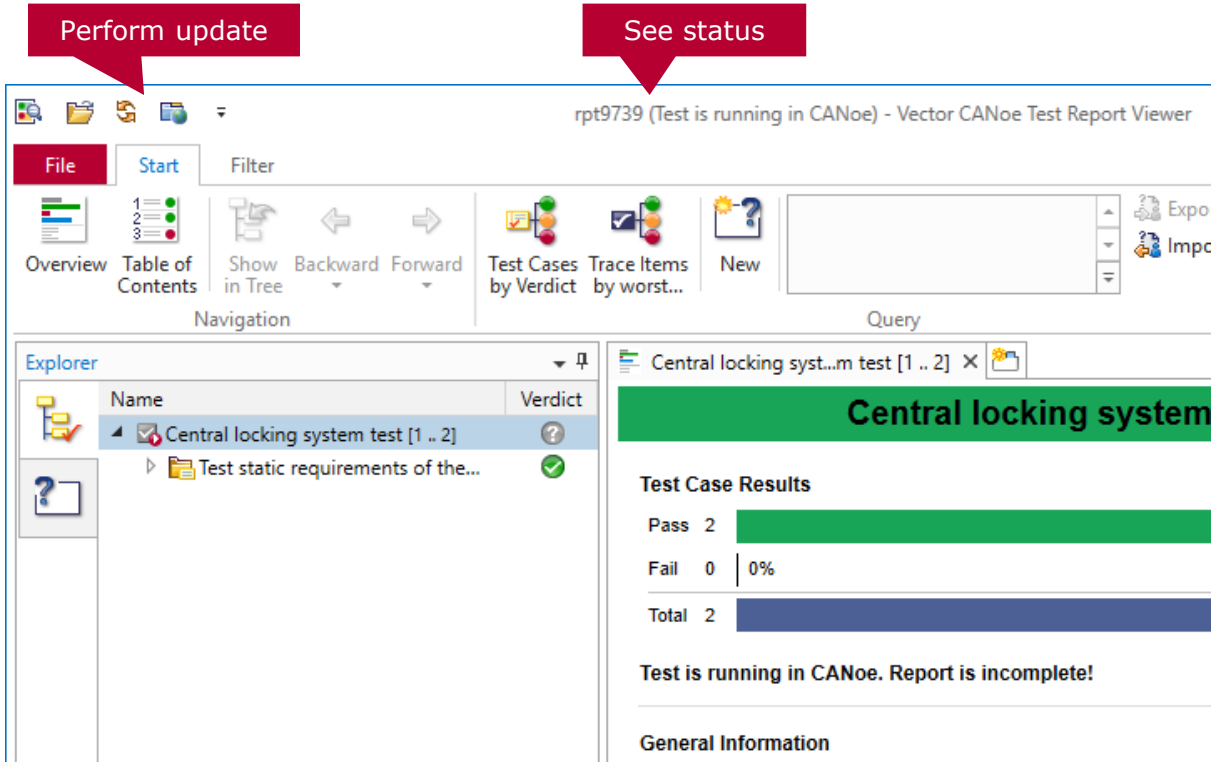

- A **command line interface for the Connection Utilities** allows continuous integration with Jenkins; a Connection Utility is available for free for IBM DOORS NG/RQM, Siemens Polarion ALM and PTC Integrity

# Features and Improvements (Report Viewer)




- **Export to PDF**
  - Create navigable and searchable PDF file (since 11.0 SP3)
  - Structural elements can be navigated
  - Many referenced elements can be used for navigation as well

- **Run & analyze test in parallel**
  - Reports in the Report Viewer format can now be opened, viewed and analyzed even during test run
  - Update of current report is done by dedicated user action



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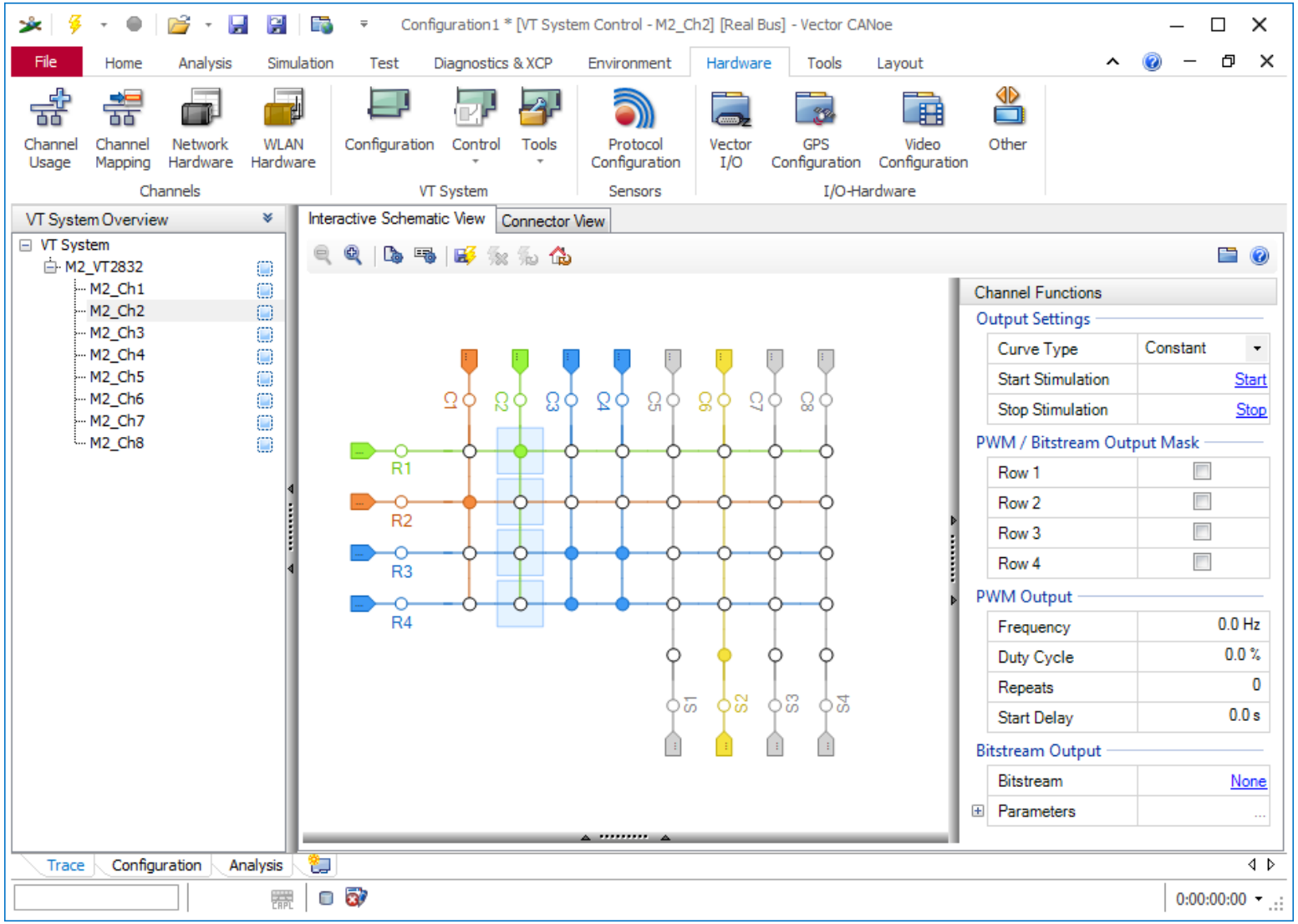
# VT2832 - Switch Matrix Module

## Use Cases

- Current switching & measurement
- PWM switching / bouncing contact simulation
- Endurance Tests

## Configuration

- Each switched path is given a unique colour
- Connected paths are given the same color
- Each column can be switched independently with PWM or bitstream
- PWM and bitstream configuration is identical to other VT System modules



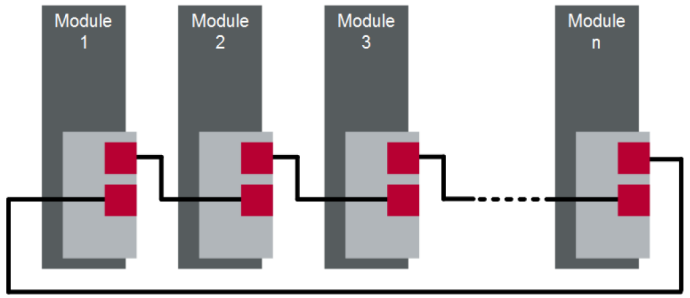
# Inter Board Communication (IBC) between User FPGA Modules

## Use Cases

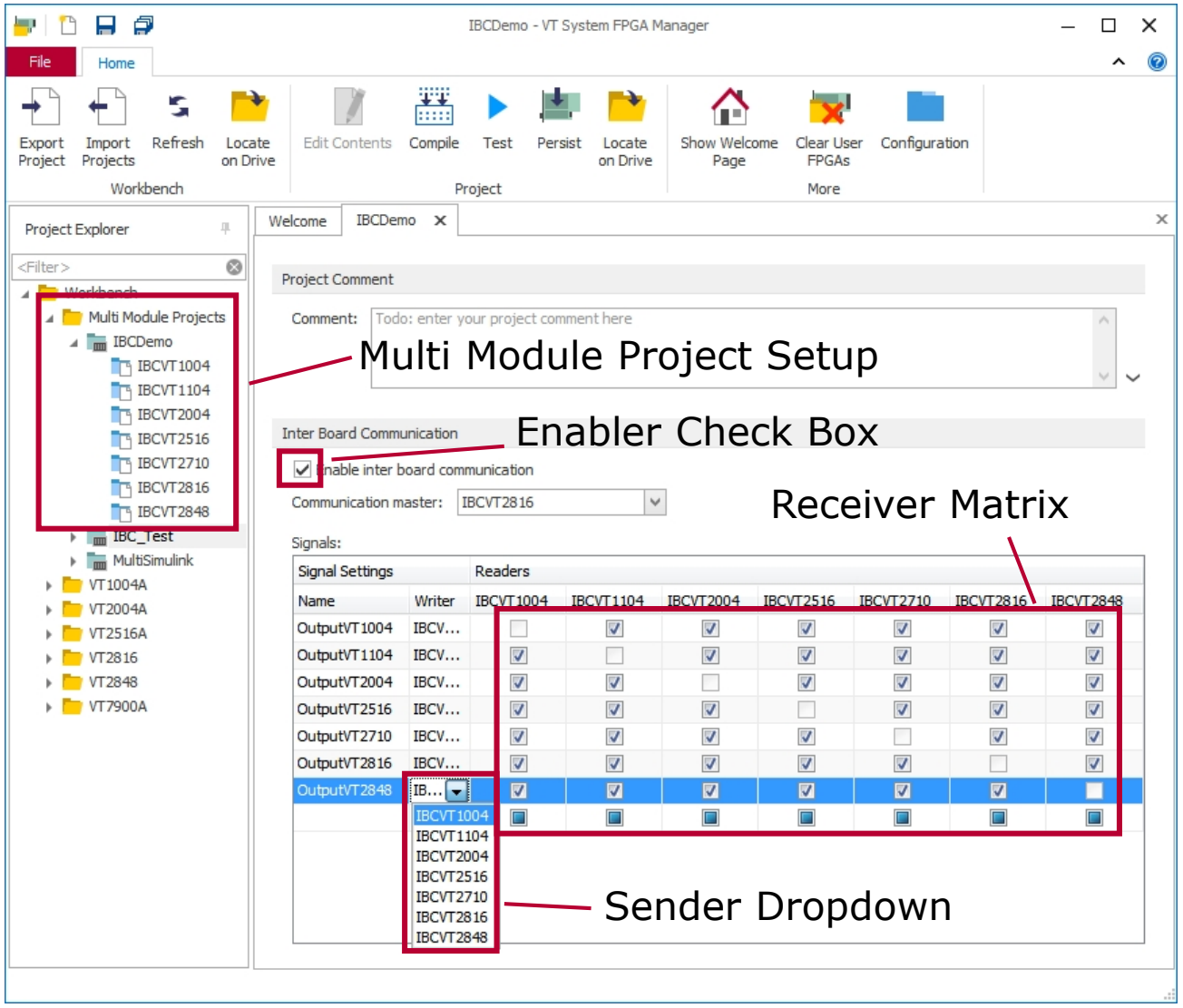
- Highly synchronized output of analog and/or digital signals
- Fast data exchange between User FPGA modules

## Realization

- Ring architecture between User FPGA processor boards



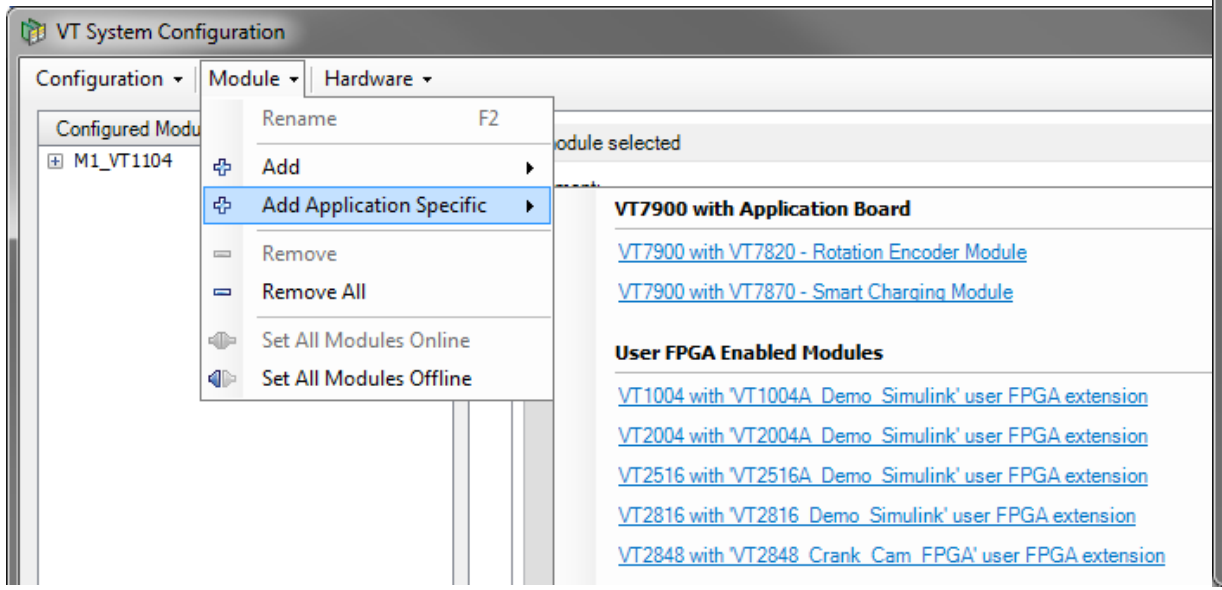

- Simultaneous flashing of multiple VT System User FPGA module is now possible in VT System FPGA Manager

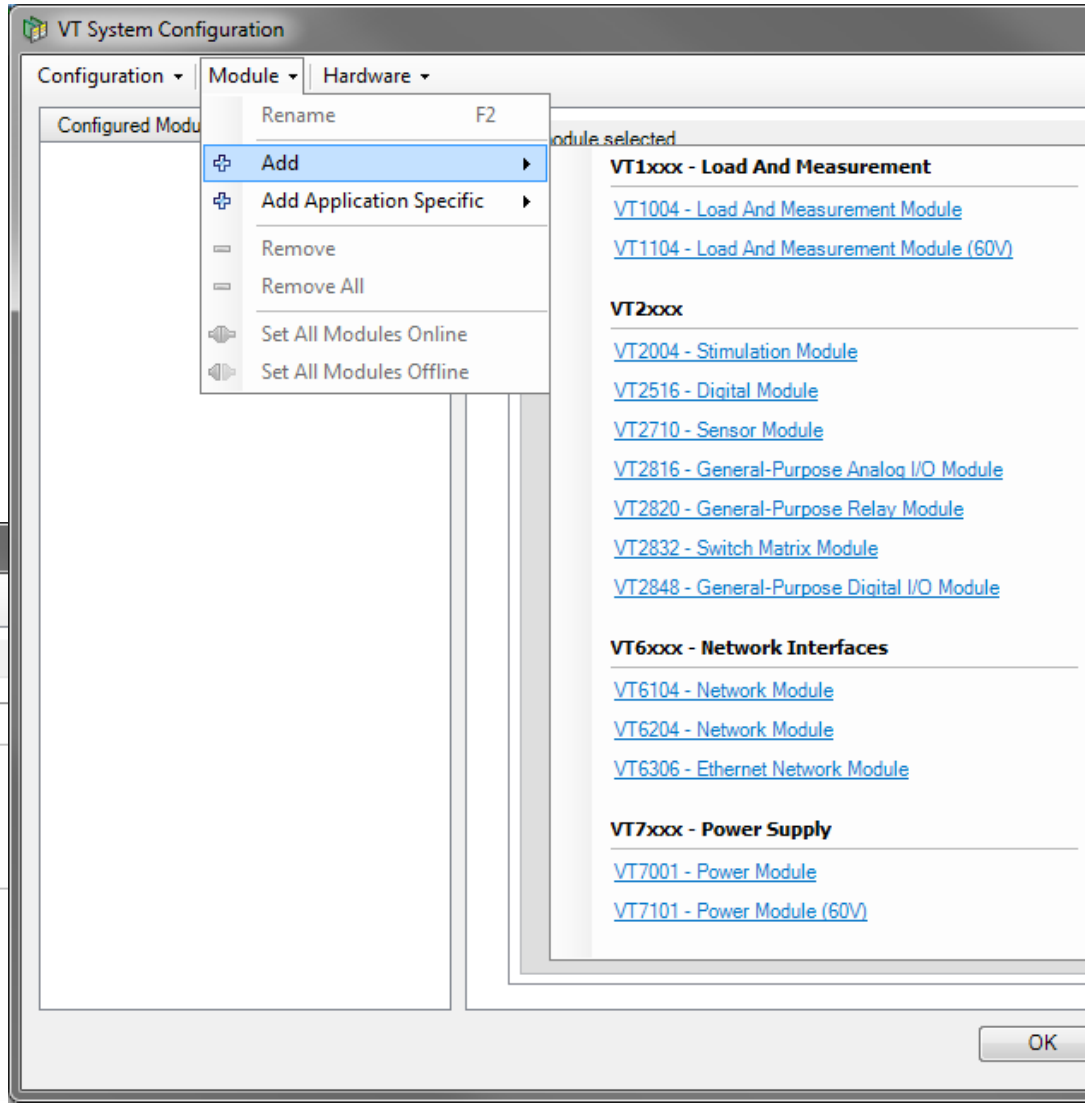


# Improved VT System Configuration Dialog

- All regular and application specific VT System modules are now grouped in a clear way in the VT System Configuration dialog

- Support for new 60V variants already included
  - VT1104 Load and Measurement Module (60V)
  - VT7101 Power Module (60V)



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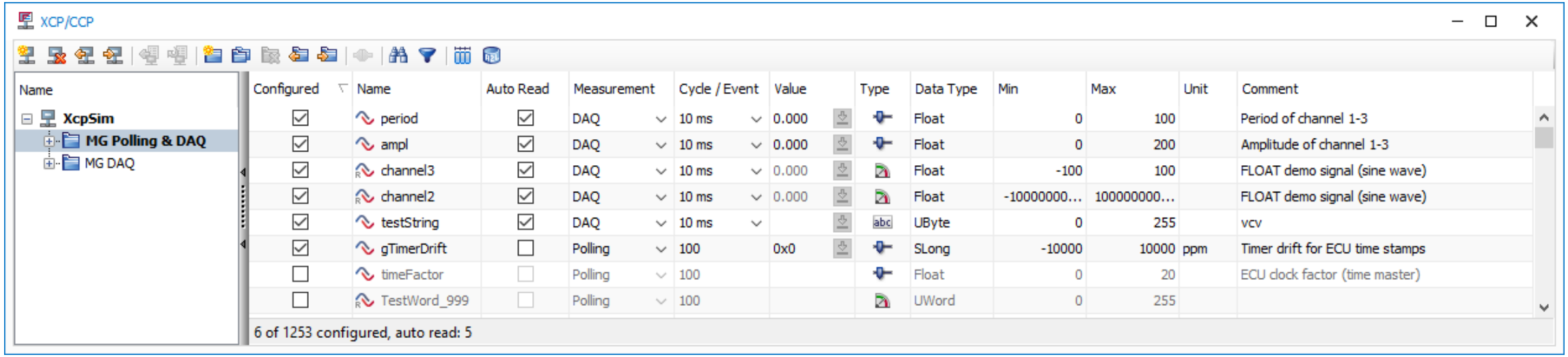
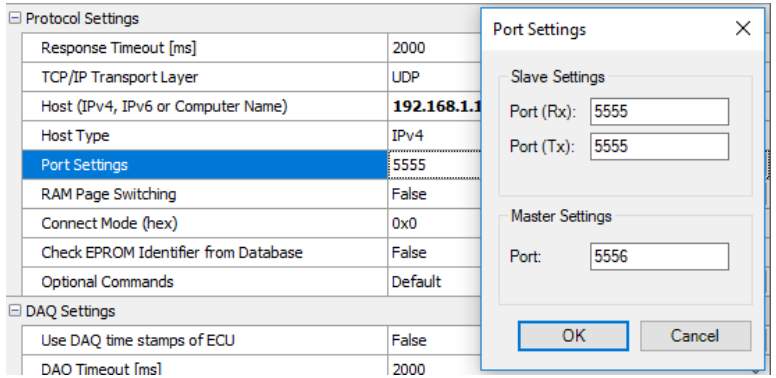
# AMD/XCP: Feature Improvements

- New columns for parameter type, min, max and unit (CANoe 11.0 SP3)

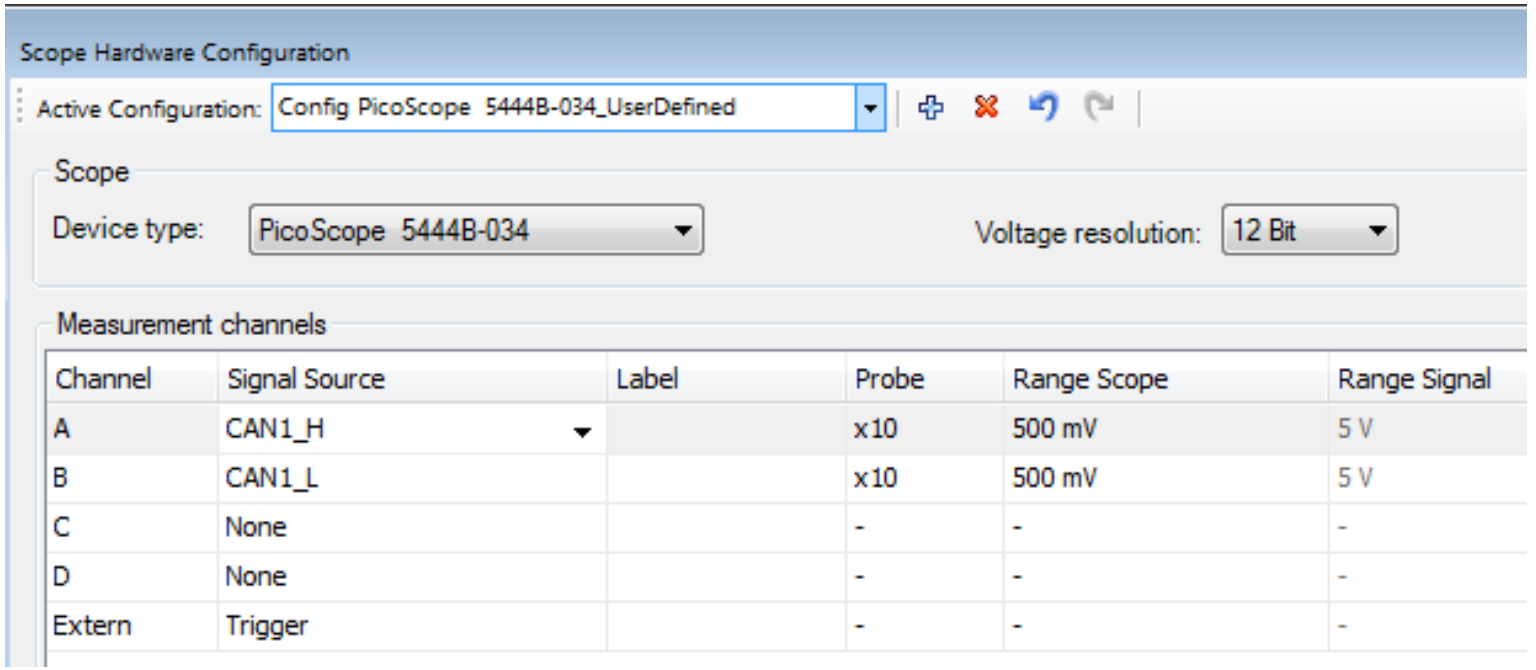



- The XCP Master Port can now be configured for XCP on Ethernet connections



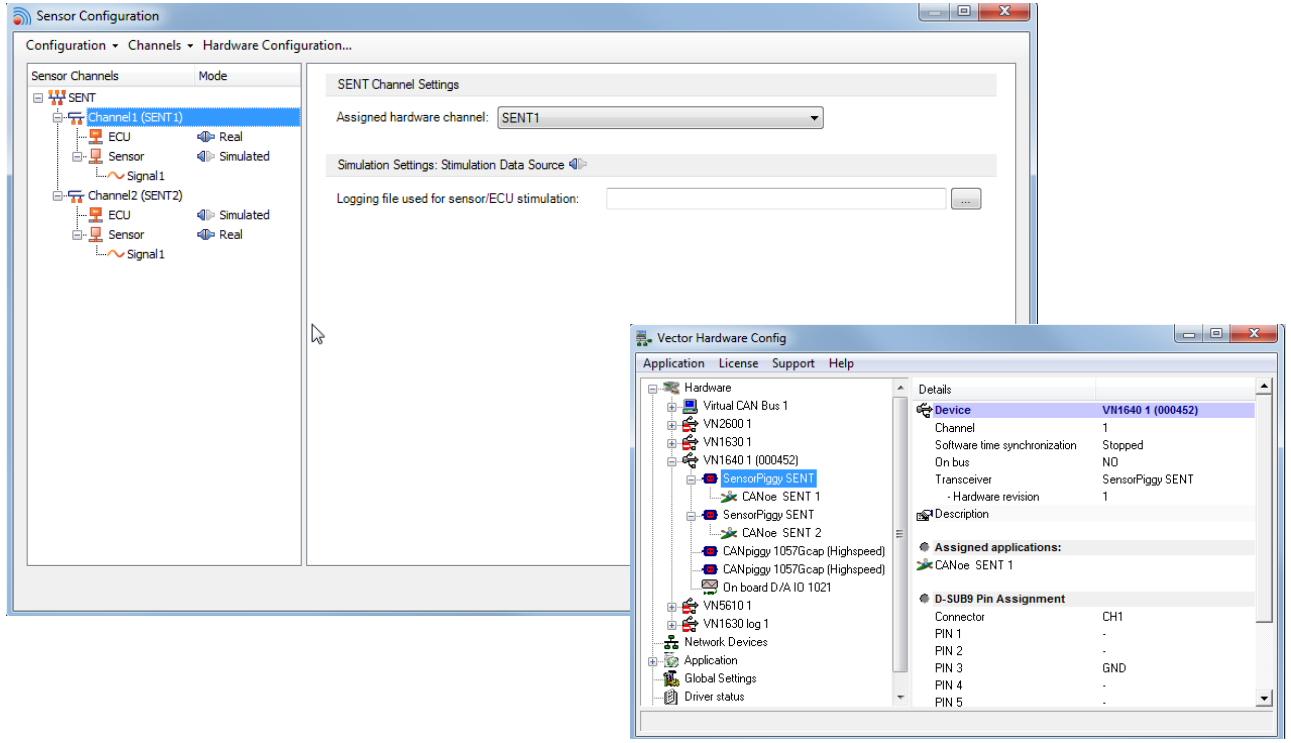
# Scope: New Features

- With CANoe/CANalyzer 12.0 it is possible to switch between
  - Several scope hardware configurations - means users can predefine several hardware settings which can be activated for each measurement
- Hardware configuration capabilities are available in GUI and CAPL



# Sensor: SENT Piggyback

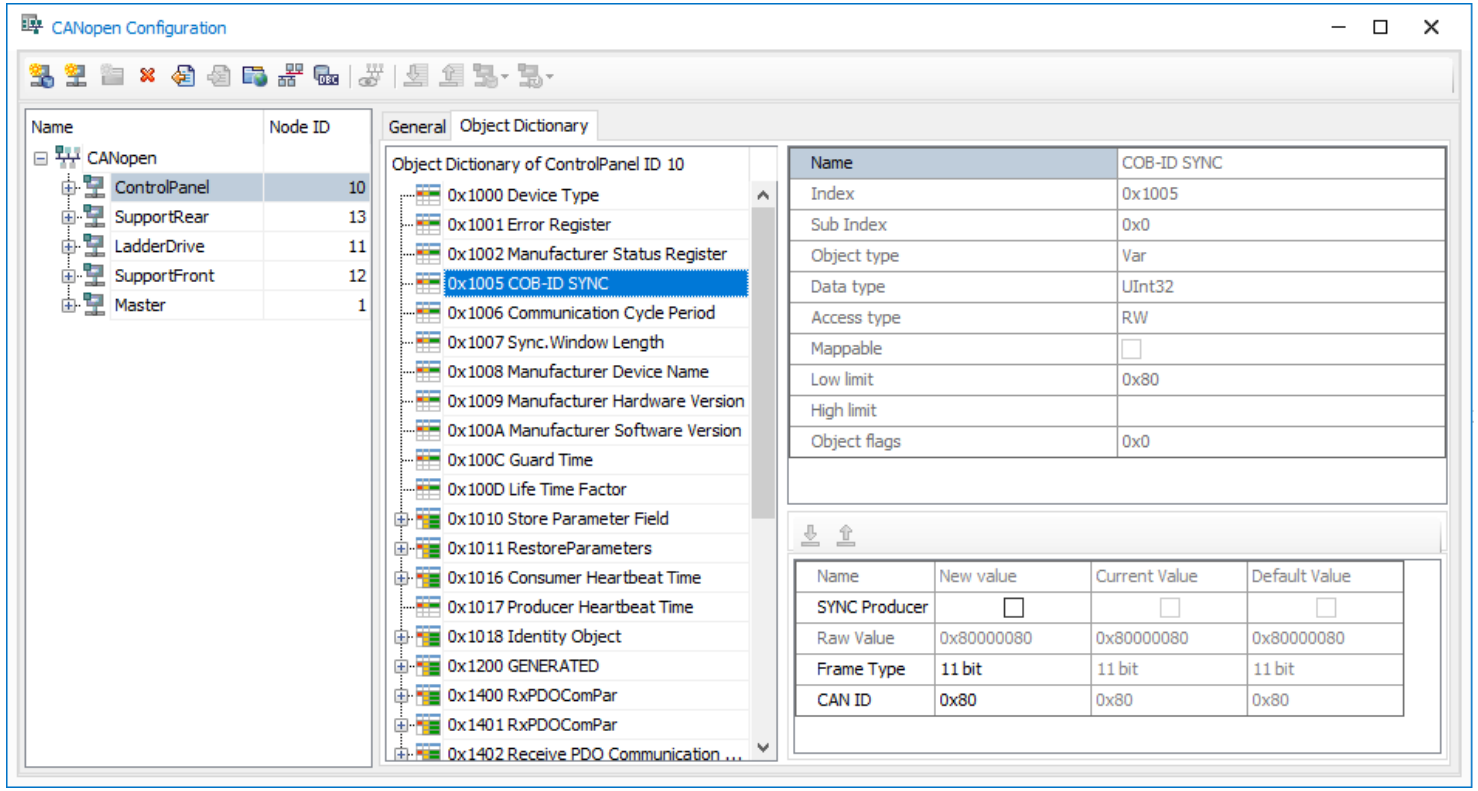
- New SENT Piggyback
- Supported Network Interfaces:
  - VN1640A and VN1530 (PCIe Interface)
  - Drivers already released




# CANopen: Configuration Window

New CANopen Configuration window replaces ProCANopen and allows analysis, configuration and simulation of CANopen networks

- Scanning of CANopen networks
- Access of the entire object dictionary of real and simulated (CANoe) nodes
- Setup of PDO and SRDO communication
- Configuration of Heartbeat monitoring
- Read and write the entire network configuration
- Generation of CAN database
- Creation of simulation nodes for a network simulation (CANoe)



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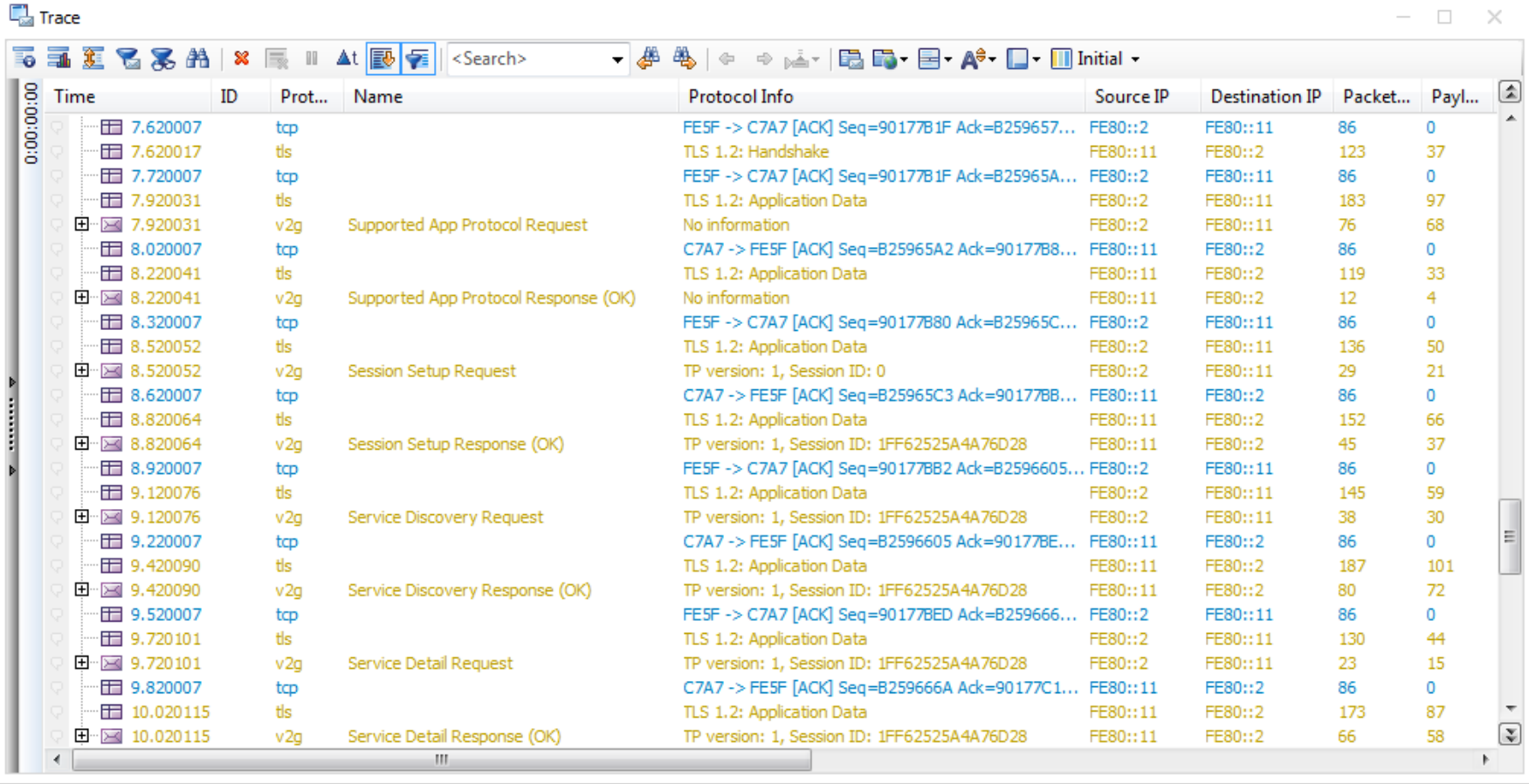
# TLS Support for ISO15118

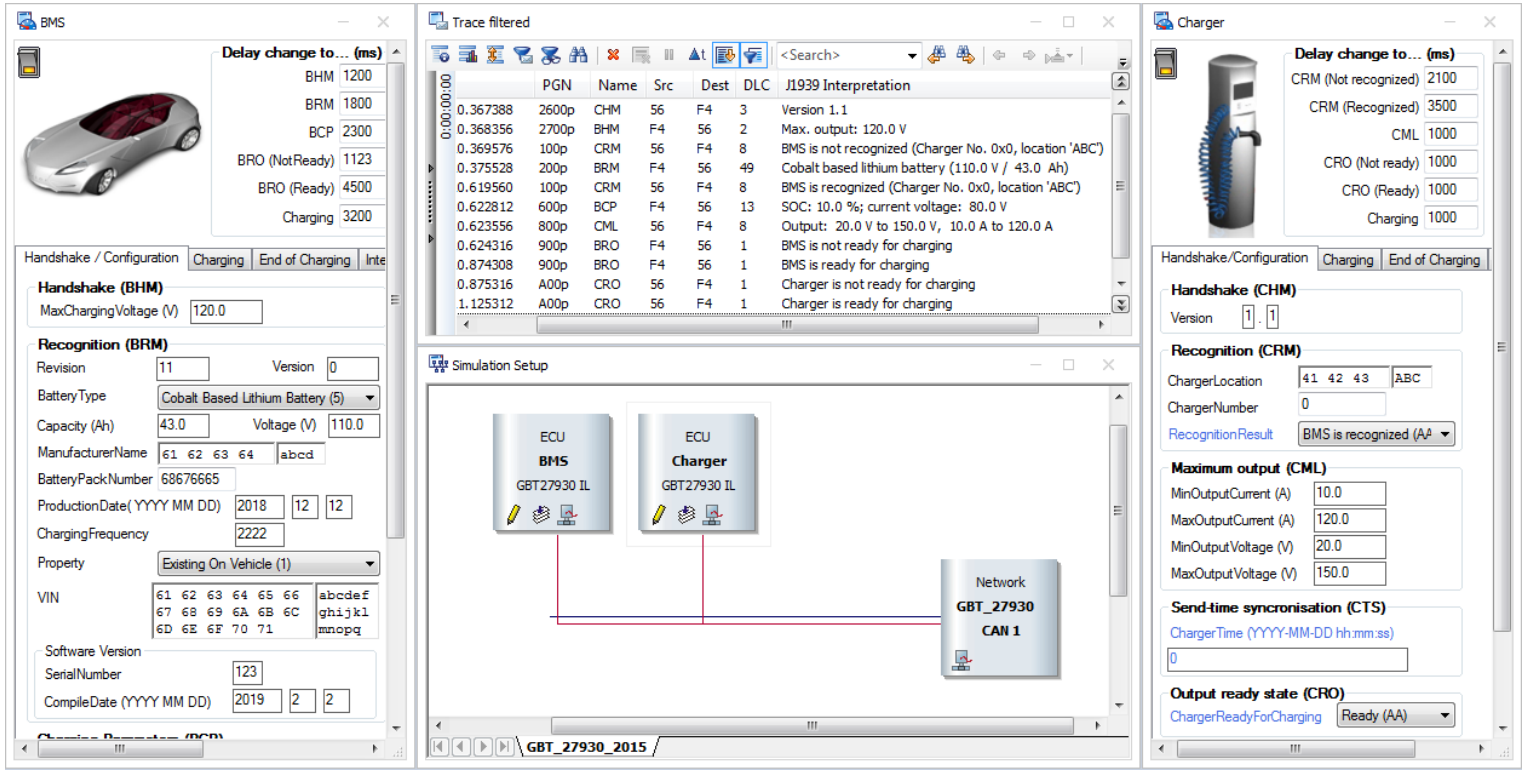
- Analysis of Transport Layer Security (TLS) communication in Trace Window
  - When either charging station or vehicle is simulated




| Time | ID | Prot... | Name | Protocol Info | Source IP | Destination IP | Packet... | Payl... |
|---|---|---|---|---|---|---|---|---|
| 7.620007 | | tcp | | FE5F -> C7A7 [ACK] Seq=90177B1F Ack=B259657... | FE80::2 | FE80::11 | 86 | 0 |
| 7.620017 | | tls | | TLS 1.2: Handshake | FE80::11 | FE80::2 | 123 | 37 |
| 7.720007 | | tcp | | FE5F -> C7A7 [ACK] Seq=90177B1F Ack=B25965A... | FE80::2 | FE80::11 | 86 | 0 |
| 7.920031 | | tls | | TLS 1.2: Application Data | FE80::2 | FE80::11 | 183 | 97 |
| 7.920031 | | v2g | Supported App Protocol Request | No information | FE80::2 | FE80::11 | 76 | 68 |
| 8.020007 | | tcp | | C7A7 -> FE5F [ACK] Seq=B25965A2 Ack=90177B8... | FE80::11 | FE80::2 | 86 | 0 |
| 8.220041 | | tls | | TLS 1.2: Application Data | FE80::11 | FE80::2 | 119 | 33 |
| 8.220041 | | v2g | Supported App Protocol Response (OK) | No information | FE80::11 | FE80::2 | 12 | 4 |
| 8.320007 | | tcp | | FE5F -> C7A7 [ACK] Seq=90177B80 Ack=B25965C... | FE80::2 | FE80::11 | 86 | 0 |
| 8.520052 | | tls | | TLS 1.2: Application Data | FE80::2 | FE80::11 | 136 | 50 |
| 8.520052 | | v2g | Session Setup Request | TP version: 1, Session ID: 0 | FE80::2 | FE80::11 | 29 | 21 |
| 8.620007 | | tcp | | C7A7 -> FE5F [ACK] Seq=B25965C3 Ack=90177BB... | FE80::11 | FE80::2 | 86 | 0 |
| 8.820064 | | tls | | TLS 1.2: Application Data | FE80::11 | FE80::2 | 152 | 66 |
| 8.820064 | | v2g | Session Setup Response (OK) | TP version: 1, Session ID: 1FF62525A4A76D28 | FE80::11 | FE80::2 | 45 | 37 |
| 8.920007 | | tcp | | FE5F -> C7A7 [ACK] Seq=90177BB2 Ack=B2596605... | FE80::2 | FE80::11 | 86 | 0 |
| 9.120076 | | tls | | TLS 1.2: Application Data | FE80::2 | FE80::11 | 145 | 59 |
| 9.120076 | | v2g | Service Discovery Request | TP version: 1, Session ID: 1FF62525A4A76D28 | FE80::2 | FE80::11 | 38 | 30 |
| 9.220007 | | tcp | | C7A7 -> FE5F [ACK] Seq=B2596605 Ack=90177BE... | FE80::11 | FE80::2 | 86 | 0 |
| 9.420090 | | tls | | TLS 1.2: Application Data | FE80::11 | FE80::2 | 187 | 101 |
| 9.420090 | | v2g | Service Discovery Response (OK) | TP version: 1, Session ID: 1FF62525A4A76D28 | FE80::11 | FE80::2 | 80 | 72 |
| 9.520007 | | tcp | | FE5F -> C7A7 [ACK] Seq=90177BED Ack=B259666... | FE80::2 | FE80::11 | 86 | 0 |
| 9.720101 | | tls | | TLS 1.2: Application Data | FE80::2 | FE80::11 | 130 | 44 |
| 9.720101 | | v2g | Service Detail Request | TP version: 1, Session ID: 1FF62525A4A76D28 | FE80::2 | FE80::11 | 23 | 15 |
| 9.820007 | | tcp | | C7A7 -> FE5F [ACK] Seq=B259666A Ack=90177C1... | FE80::11 | FE80::2 | 86 | 0 |
| 10.020115 | | tls | | TLS 1.2: Application Data | FE80::11 | FE80::2 | 173 | 87 |
| 10.020115 | | v2g | Service Detail Response (OK) | TP version: 1, Session ID: 1FF62525A4A76D28 | FE80::11 | FE80::2 | 66 | 58 |

# Simulation and Test of GB/T 27930

- New GB/T 27930 Interaction Layer (GBT27930_IL.dll)
  - Easy to use, minimal configuration effort
  - Simple control during measurement via CAPL
  - Various options for fault injection
  - Direct access to the simulated node from a test unit
  - Requires Option .J1939



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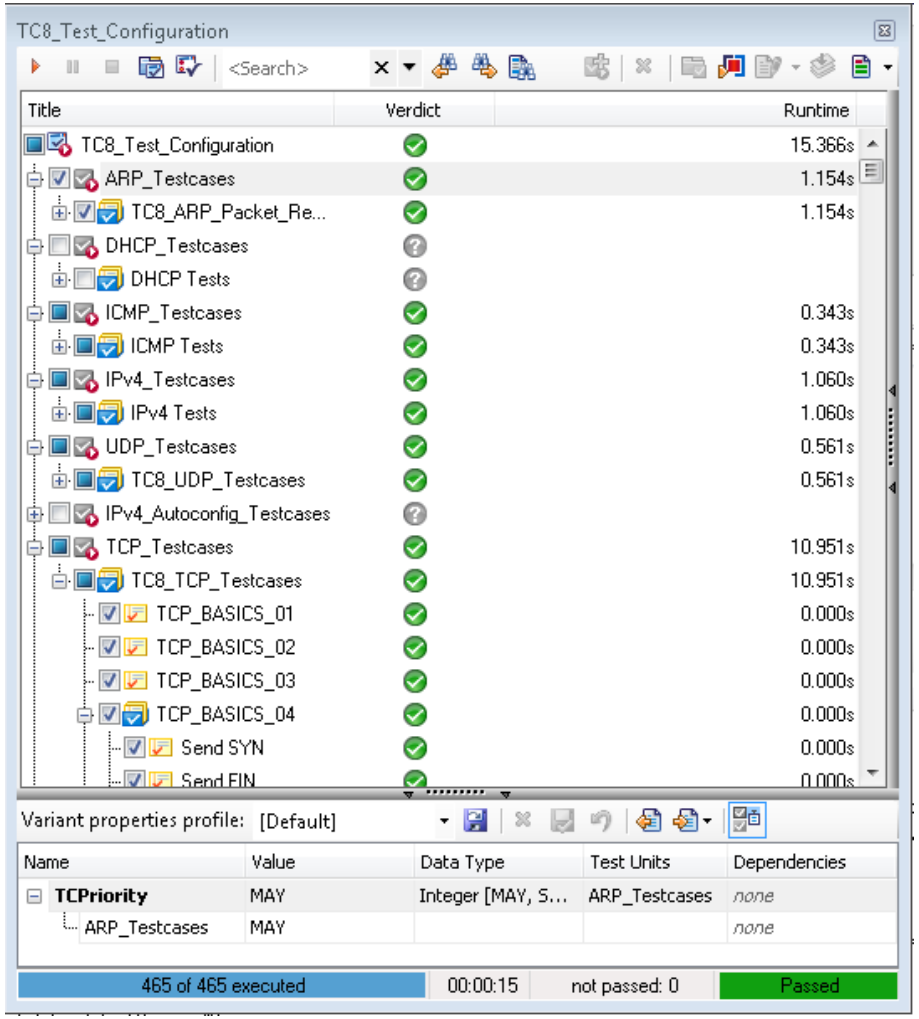
# OPEN Alliance ECU Test Specification (TC8)

- As of version 12, CANoe .Ethernet includes a configuration for running the OPEN Alliance test specification for Ethernet controllers
- The tests covers mostly OSI/ISO layer 2 to 7
- The test procedure and the test definition are completely disclosed and can be adjusted with the help of vTESTstudio
- The configuration does not require extra licensing
- A simulation of the DUT (Golden Device) is included, too

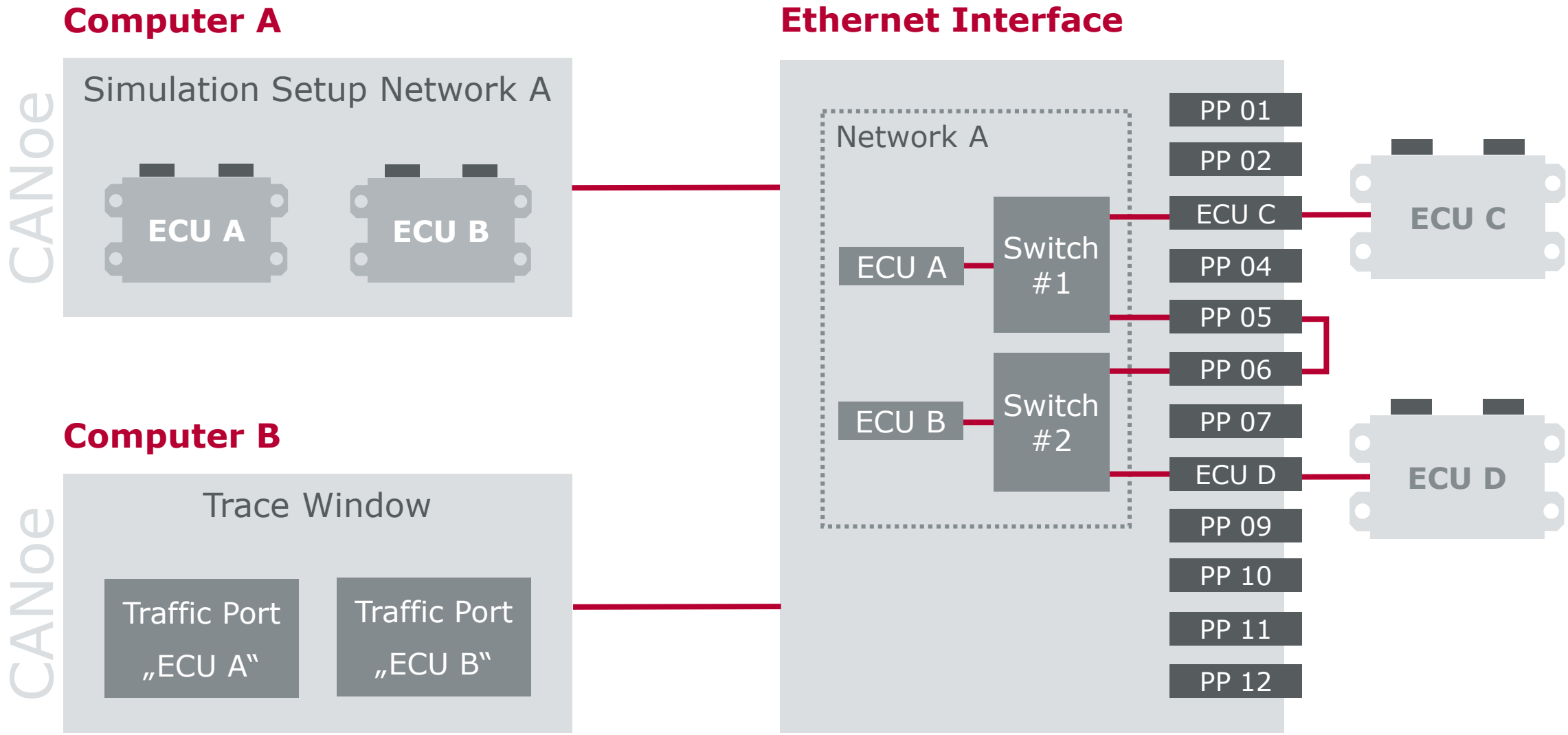
| | Test Group | CANoe 12.0 | CANoe 12.0 SP2 |
|---|---|---|---|
| Layer 1 | Physical Layer | partially | partially |
| Layer 2 | TC8 Switch Tests | ✓ | ✓ |
| | ARP | ✓ | ✓ |
| Layer 3 | ICMPv4 | ✓ | ✓ |
| | IPv4 | ✓ | ✓ |
| | Dynamic IPv4 Link Local Address | ✓ | ✓ |
| Layer 4 | UDP | ✓ | ✓ |
| | TCP | ✓ | ✓ |
| Layer 7 | DHCPv4 | ✓ | ✓ |
| | SOME/IP Server | ✓ | ✓ |
| | SOME/IP ETS | | ✓ |



# New Features of Ethernet Interfaces

- CANoe .Ethernet is prepared to support the upcoming features coming with the release of the new Ethernet interface firmware
  - All new Ethernet interface configuration procedure
    - External configuration, interface configuration is not necessarily part of CANoe configuration
    - and configuration of the hardware is independent of the tool and can be used across-the-board
  - Direct link between the each simulated node and interface hardware
    - Improved topology related stimulation without topology dependency in CANoe
  - Improved network representation/handling in CANoe compared to former application channel representation of the network
    - Support of multiple “paths” to one network
  - Changed measurement concept from “view all” to “view only what is of interest” to leverage computing resources

# New Features of Ethernet Interfaces (cont.)



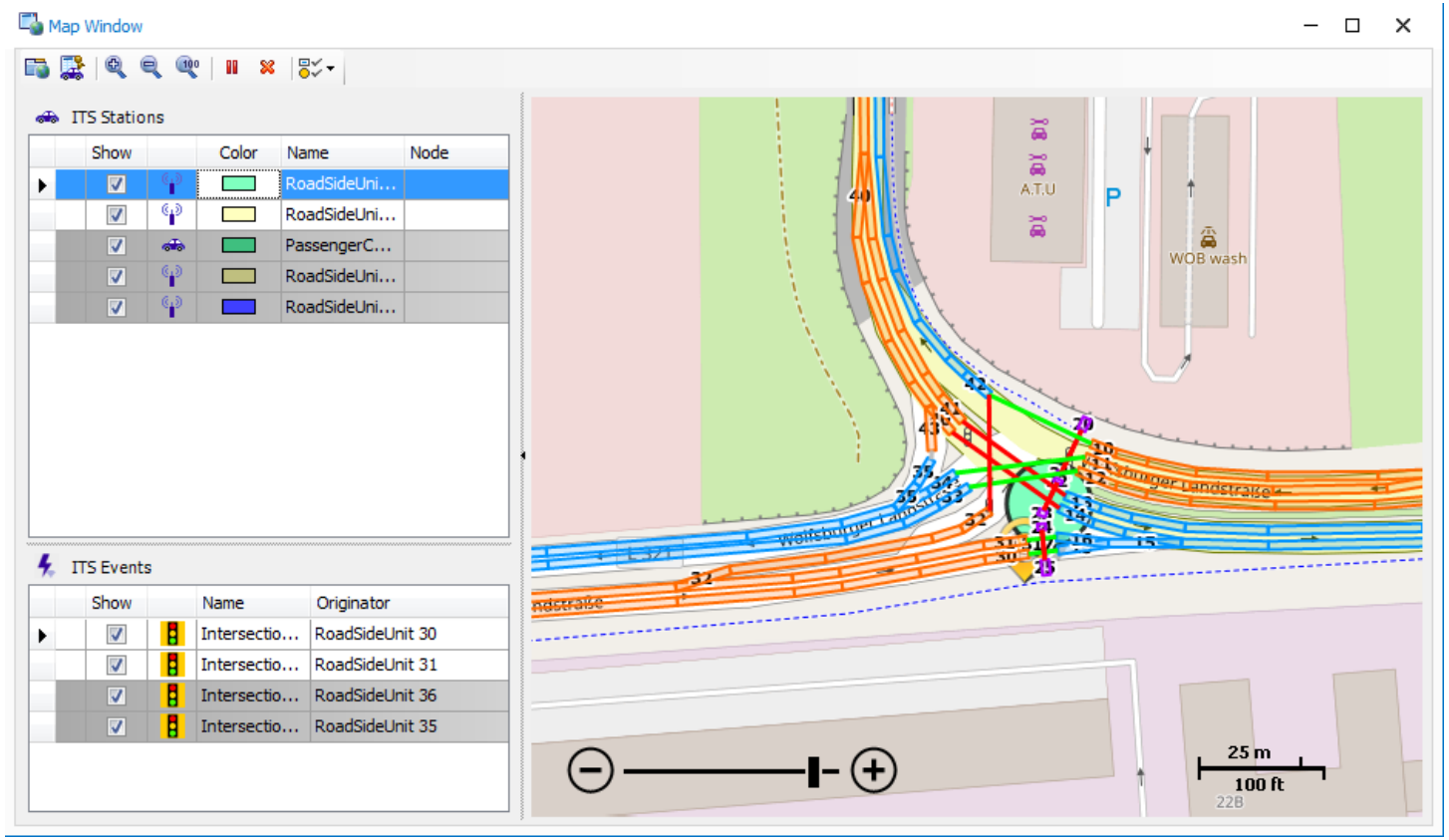
# Agenda

- Release Information
- General
- Automotive Options
- Testing (CANoe)
- VT System (CANoe)
- Additional Options
- Smart Charging (CANoe)
- Ethernet
- **Car2x**
- Additional Protocols
- Summary

Skip topic

# New Features and Improvements

- Map Window
  - New control, more modern look and feel
  - Intersection visualization based on SPaT and MAP message
  - Support of fragmented MAP messages
  - Visualization of Waypoints
  - Improved filtering mechanisms
  - Caching of map tiles
  - “Zoom to fit” button



# New Features and Improvements

- Application Messages
  - Car2xSystem Demo supports the latest CAM/DENM/CDD version (due to EU delegated act)
  - System Demo contains intersections with SPaT/MAP messages
- VN4610
  - Supports DCC (Decentralized Congestion Control) in order to send messages prioritized
  - High precision timestamps are now supported
- Car2x Network Explorer
  - Shows the value table of the data elements of application messages
  - Improved CAPL code generation for the data elements with copy-paste operation
- Scenario Editor
  - Nodes and attributes in timeline can be expanded/collapsed
  - Child attributes are supported now
- Security
  - Supports Request / Response mechanism for ETSI EN 103097 version 1.3.1

# Agenda

- Release Information
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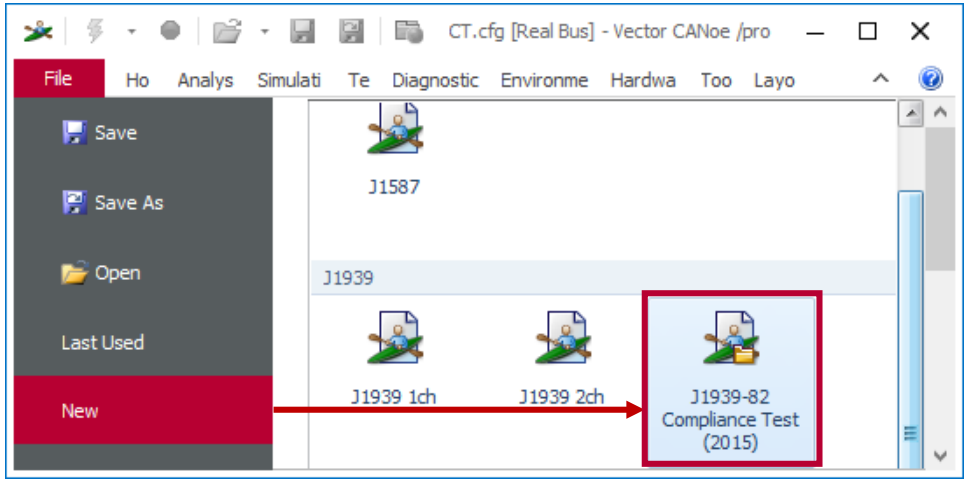
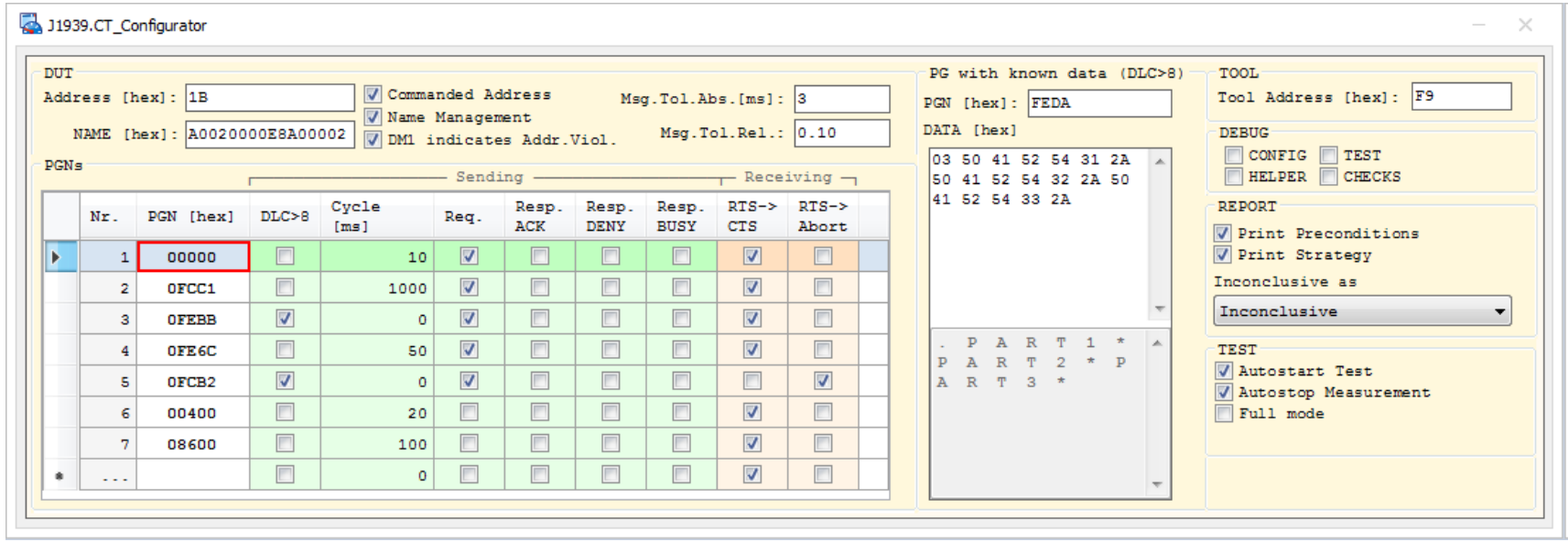
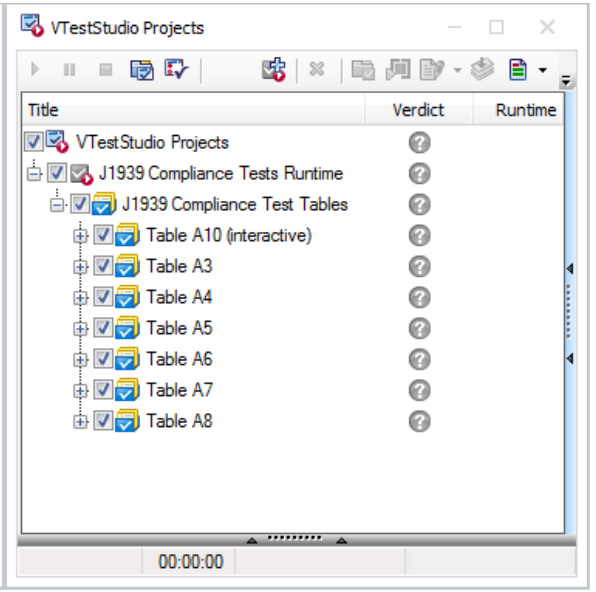
# J1939-82 Compliance Test (Revision 2015, CANoe)

- Tables A3 - A8 and A10 are fully implemented
- Simple configuration, detailed and easy to understand interpretation;
- Individual protocol blocks can be tested, e.g.:
  - Address Claiming / Commanded Address
  - Name Management
  - Transport Protocol
  - Request / Response

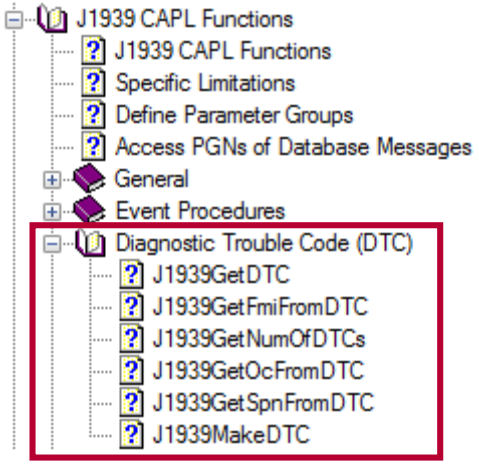


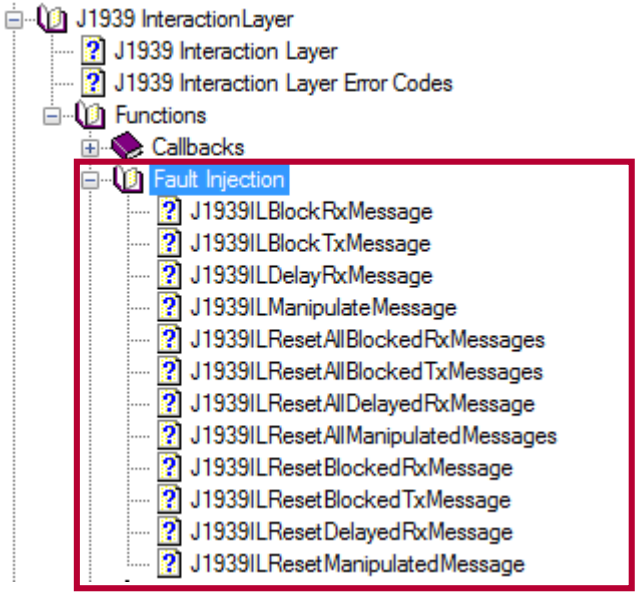



# J1939

- Convenient CAPL functions to support J1939 Diagnostic Messages
  - Assembling DTCs from their parts (SPN / FMI / OC)
  - Splitting of DTCs into their components (SPN / FMI / OC)
  - Filling diagnostic messages with DTCs
  - Extraction of DTCs from diagnostic messages
  - Test Feature Set (CANoe): waiting for diagnostic messages with any combination of SPN / FMI / OC




- New CAPL functions for fault injection (CANoe)
  - Delayed reaction to received messages
  - Manipulation of any received or sent messages
  - Direct access to the simulated node from a test unit
  - All J1939 / ISO11783 Interaction Layers supported
    - J1939
    - ISO11783
    - Virtual Terminal
    - Task Controller
    - File Server



# ISO11783 (CANoe)

- New File Server Interaction Layer (ISO11783_FS_IL.dll):
  - Easy to use, minimal configuration effort
  - Simple control during measurement via CAPL
  - Various options for fault injection
  - Direct access to the simulated node from a test unit

- Tractor Implement Management (TIM):
  - Implementation of the latest specification (FDIG 1.01)
  - TIM Simulator: all specified functions and facilities can be controlled and monitored via dedicated panels
    - 32 Aux Valves
    - Rear and Front PTOs
    - Rear and Front Hitches
    - Vehicle Speed
    - External Guidance

- Improvement of Task Controller Interaction Layer (ISO11783_TC_IL.dll)
  - additional CAPL functions to verify the structure of a device description

# Main Benefits

- New Communication Concept:
  - New graphical configuration
  - Switching of endpoints (simulated, remote, measured)
- Ethernet
  - TC8 support
  - TLS support
  - New hardware
- Testing
  - CANoe comes with viewer version of vTESTstudio
  - Export test reports to PDF
  - VT System: New Switch Matrix Module
- New Option .Smart Charging – Standards:
  - GB/T 27930 (China)
  - DIN 70121/ISO 15118 (Europe, USA)
- Option .Sensor: SENT Piggy for VN1640A/VN1530
  - No VT necessary for smaller projects
- Option .CANopen: New and completely reworked configuration
- Option .Car2x: New map window

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