

Product Information CANoe.LIN

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Documentation Note

Valid for CANoe.LIN 8.0

This document presents the **CANoe.LIN** application areas of analysis, stimulation/simulation and testing and enumerates their individual functions. The document also contains a brief overview of supplemental programs and hardware interfaces.

Product information and **technical data** on CANoe and the MOST and FlexRay options are available in separate documents.

1 Introduction CANoe.LIN

LIN (Local Interconnect Network) is a cost-effective and deterministic communication system for connecting ECUs with smart sensors, actuators and controls. Vector's software tool CANoe.LIN provides you with unrivaled features for developing, analyzing and testing LIN networks according to the specifications **LIN1.x**, **LIN2.x**, **SAE-J2602** (US-LIN) and **Cooling-Bus**.

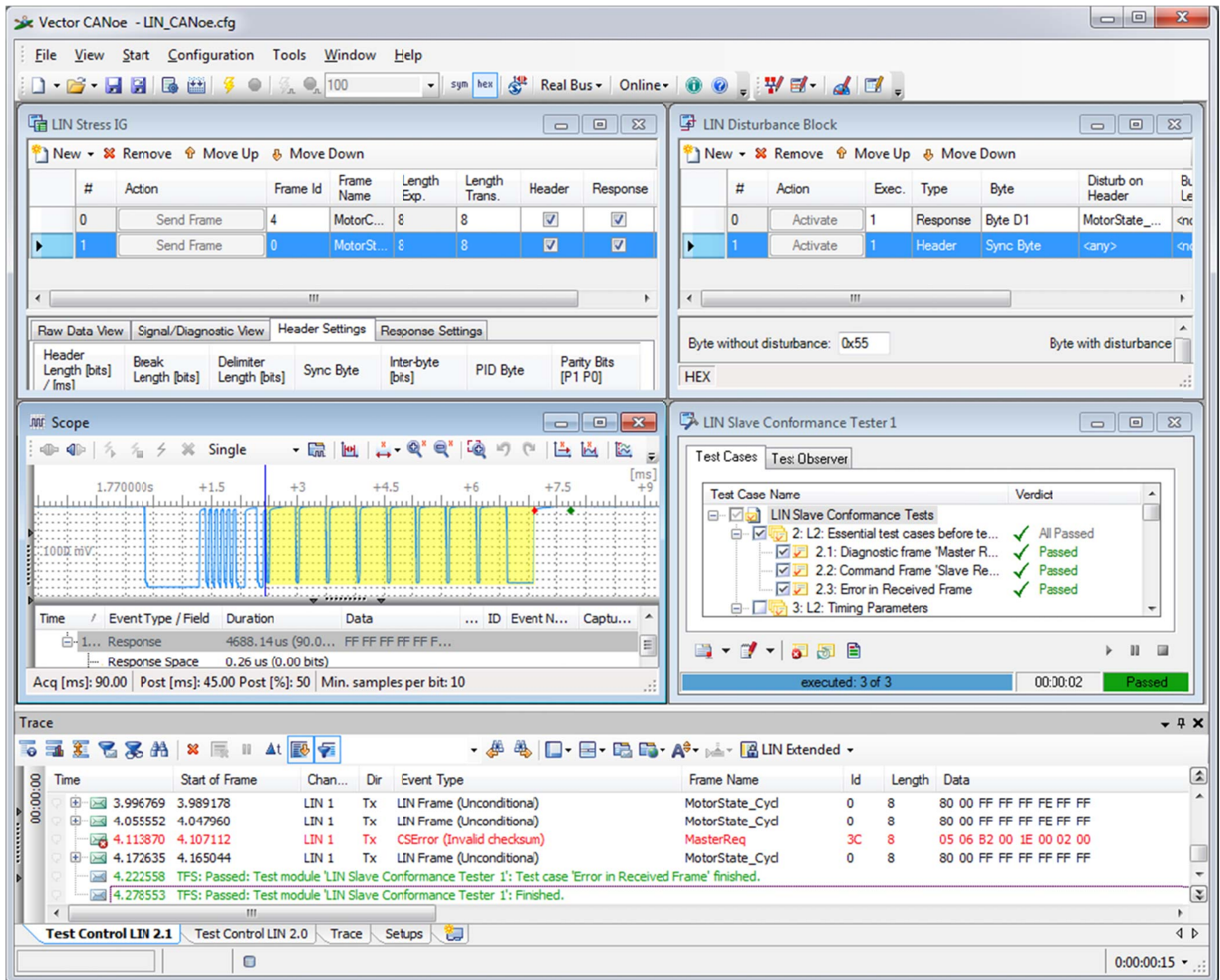


Figure 1: CANoe.LIN user interface

1.1 Highlights

- LIN support of CANoe Option SCOPE
- Interactive stress and disturbance features for LIN
- Slave conformance tests for LIN2.x and J2602

1.2 Application Areas

CANoe.LIN is capable of fully simulating up to 32 LIN networks and any number of nodes. Together with its integrated CAN features, this is the ideal tool for developing and testing LIN nodes (Master and Slave), CAN-LIN gateways and CAN-LIN diagnostics.

1.3 Development Features

CANoe.LIN offers you sophisticated LIN development features:

- Easy simulation of LIN nodes/networks according to LDF (including multi-channel LIN Masters and gateways)
- Full support of LIN2.x Slave reconfiguration
- Network management for LIN2.x and J2602
- Script functions for modeling LIN nodes (including diagnostics)
- User-configurable and integrated panels for interactively manipulating signals, frames and scheduling

2 Analysis

CANoe.LIN provides you with the professional analysis features of CANalyzer.LIN (see separate product information):

- Network analysis according to LDF
- Interpretation of LIN2.x configuration commands
- Interpretation of diagnostics according to ODX/MDX/CANdela files
- Detailed error and event detection
- Numerical and graphical visualization of signals
- Network Management window
- Network and node statistics with LIN Statistics window
- Logging, Replay, Filter and Trigger blocks

2.1 Timing Analysis

The LIN Analysis Feature Set gives you easy access to LIN timing information either via trace columns or script functions, e.g.:

- Header, response and total frame transmission time
- Schedule slot delay time, interframe space and bus idle time
- Sync break, sync delimiter and inter-byte space
- Header and response tolerance
- Wake-up signal length
- Baud rate of header and response

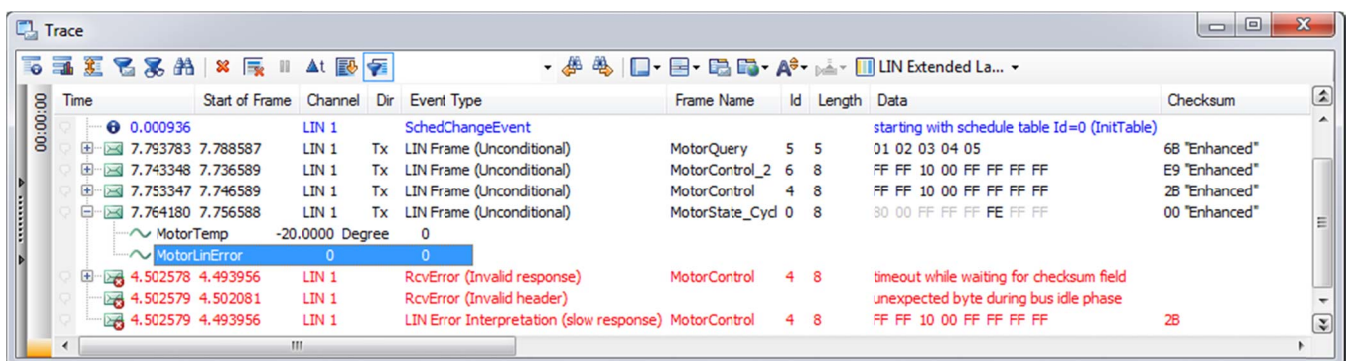


Figure 2: Trace window with enhanced interpretation of LIN protocol errors

2.2 Support of Option SCOPE

Option SCOPE is an integrated oscilloscope solution for CANoe based on oscilloscope hardware with a USB power supply. This new CANoe option appears in the program as a further analysis window with views for configuration, bus level and protocol decoding. The supported hardware PicoScope 4227 has 2 input channels for 1 CAN channel or 2 LIN channels and is triggered using the Sync line of Vector's interface hardware. Up to 4 USB scopes can be used in parallel. Option SCOPE is available for all CANoe variants except CANoe pex and can be used offline without an option license, e.g. to view measurements from colleagues.

This very powerful combination of USB scope and CAN/LIN tool offers many new possibilities for the analysis of protocol errors. A representation of the physical layer is particularly during the execution of conformity tests, often indispensable. With bus-specific trigger conditions and CANoe time synchronization, you can find the causes of protocol errors much quicker than with a traditional oscilloscope. Multi-hardware support lets you monitor up to 4 CAN or 8 LIN networks in parallel for errors.

For more details please see separate product information for CANoe.

3 Stress and Test

3.1 Stress Features

With Vector's next generation interface hardware for LIN (e.g. VN1630, CANcardXL_e), CANoe.LIN can stress your LIN network. Using the LIN Stress Interactive Generator (LIN Stress IG) or script functions you can create almost every type of LIN error, e.g.:

- Invalid parity ID/sync byte/checksum
- Invalid sync break/delimiter
- Short message error/no response/collision
- Transmission of arbitrary bit streams (also as a response)

Using the LIN Disturbance block, you can interactively configure and execute recessive and dominant disturbances, e.g.:

- Bit disturbance(s) in any header or response byte
- Bus disturbance of a configurable length

With the LINcabs/piggies 7269 mag, we also support high speed LIN transmission (max. 330 kbit/s), e.g. for flashing LIN Slaves.

3.2 Test Features

Using the Test Feature Set (TFS) for LIN, you can define, control and report your own LIN tests. With the Slave Conformance Test Module you can directly integrate conformance tests into your own test configurations. This special test module supports the official Slave conformance tests (OSI-layers 2 and 3) for **LIN1.3**, **LIN2.0**, **LIN2.1** and **J2602**. You can easily automate the test execution (e.g. for hardware reset and sleep mode detection) using Vector's test hardware VH1100.

You can also test Master nodes or complete LIN networks without stimulation using LIN checks of the Test Service Library, e.g.:

- Schedule table transmission according to LDF
- Diagnostic delay times according to LDF
- Header and response tolerance
- Sync break and delimiter times
- Baud rate accuracy of Master node
- Format of reconfiguration commands
- Master initialization time
- Wake-up signal and wake-up sequences

- Event-triggered frame

4 Further Programs

- The **LDF Explorer** is a GUI-based utility for easy viewing, editing and creation of LIN Description Files (LDFs).
- The **LIN File Editor** is a text-based editor for LDFs/NCFs with an integrated consistency checker.

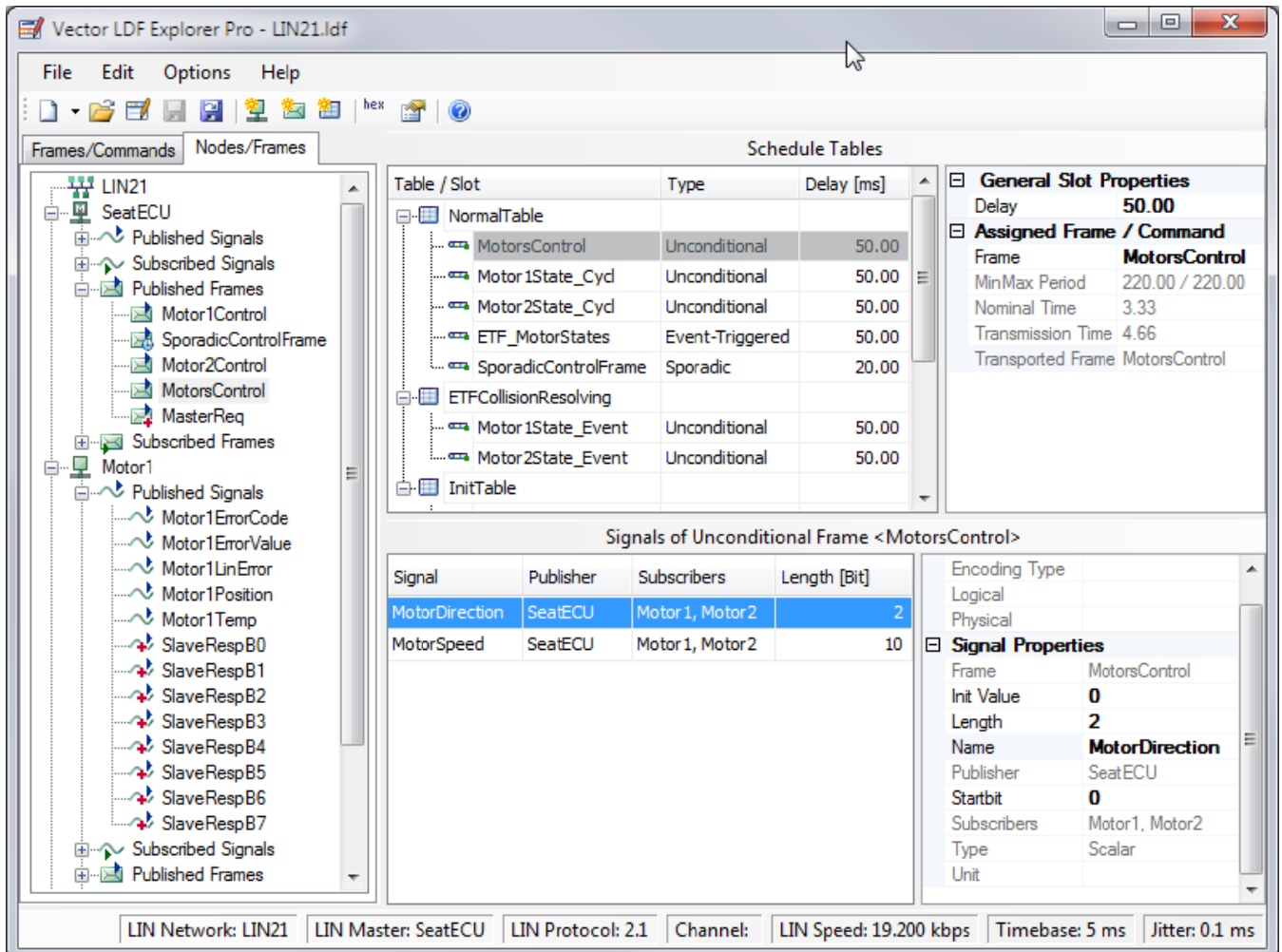


Figure 3: LDF Explorer for viewing and editing LIN Description Files

Network Designer LIN is a dedicated tool for the design of LIN1.x, LIN2.x and J2602 networks. Together with the Network Designer CAN and FlexRay, you can also define gateways. For detailed information please see this product's data sheet.

5 Hardware Interfaces

CANoe.LIN supports Vector's XL and VN interface families of high performance and flexible PC interfaces for CAN and LIN. With Vector's next generation hardware (e.g. VN 1630, CANcardXL), you have full access to all of CANoe.LIN's stress features and full support of the LIN2.1 conformance tests (OSI-layers 2 and 3). For detailed information, please see the data sheet "Hardware Interfaces for CAN, LIN and J1708".

For more information about Vector's LIN solutions please visit: www.lin-solutions.com

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