

Product Information CANoe.FlexRay

Table of Contents

1	Introduction CANoe.FlexRay	3
1.1	Highlights	3
1.2	Application Areas	3
1.3	Database Support	4
2	Analysis	4
3	Stimulation/Simulation	4
4	Testing	4
5	Diagnostics	4
6	Further Programs	5
6.1	FIBEX Explorer	5
6.2	AUTOSAR System Description Network Explorer	5
7	CAPL Interface	6
8	Hardware Interfaces	6
9	Stress Module for FlexRay	6

Documentation Note

Valid for CANoe.FlexRay 8.0

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

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

1 Introduction CANoe.FlexRay

FlexRay is a scalable, flexible high-speed communication system that fulfills growing technical requirements in the automotive field. High-performance analysis tools are needed in this area of safety-critical applications with FlexRay. The tool CANoe.FlexRay from Vector provides a universal tool for developing distributed real-time systems.

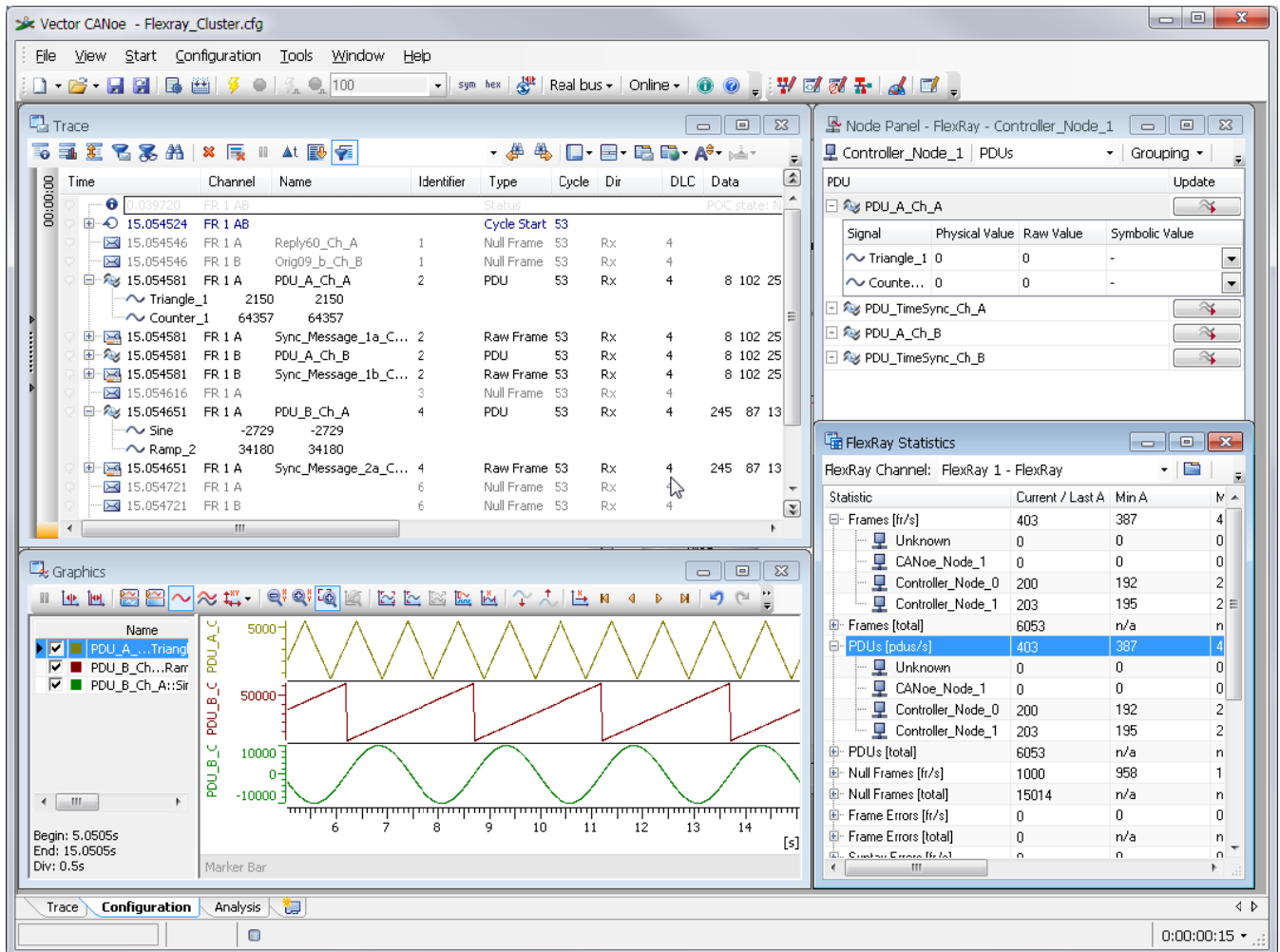


Figure 1: CANoe.FlexRay configuration for analyzing a FlexRay system with Trace window and Statistics window

1.1 Highlights

- Full AUTOSAR PDU support
- Ready for use with all official FIBEX versions
- Easy node simulations based on the database description
- Simulation and testing of FlexRay diagnostics

1.2 Application Areas

CANoe.FlexRay covers all applications from network analysis, complex simulations to comprehensive test scenarios. The multibus approach enables simultaneous operation of the CAN, LIN, MOST, Ethernet and FlexRay bus systems.

1.3 Database Support

CANoe.FlexRay supports system descriptions in FIBEX and AUTOSAR format. It assigns the databases directly to a network in the Simulation Setup, and it gives you flexible access to frame and signal information and for the automatic configuration of the hardware interfaces.

2 Analysis

CANoe.FlexRay offers you all of the analysis functions that are available in CANalyzer.FlexRay (see separate product information):

- Listing the bus data traffic (tracing)
- Graphic and text displays of signal values
- Interactive sending of PDUs and frames
- Statistics on nodes and messages with the Statistics window and Cluster Monitor
- Logging PDUs and frames for later replay or offline evaluation
- Well-organized display of cycle multiplexing, in-cycle repetition and PDUs in the analysis windows

3 Stimulation/Simulation

CANoe.FlexRay provides you with an extensive set of functions for simulating a network or individual nodes:

- Automatically configure (fully or partially) the sending behavior of individual ECUs
- Execute protocols (TP, NM, IL)
- Run Matlab models and user-specific modules
- Use FlexRay panels to conveniently send FlexRay frames and PDUs for stimulating the network
- The CANoe RT platform lets you perform extensive simulations with very short latency times

Signal	Physical Value	Raw Value
GearLock	5	2
Diagnostics	5	5
AccelerationForce	6	6
CarSpeed	4	8

Signal	Physical Value	Raw Value
EngForce	8	8
EngPower	0.04	4
PetrolLevel	3	3
IdleRunning	3	3
EngSpeed	555	555
EngTemp	26	38

Figure 2: Node Panel

4 Testing

The Test Feature Set (TFS) for FlexRay offers the tools you need to conveniently implement, execute and evaluate test sequences. It simplifies the execution of functional and integration tests for ECUs and networks by:

- XML checks for implementing typical application tests (e.g. monitoring transmission cycles, PDU and frame-oriented checks and pattern)
- The CAPL script language offers the greatest possible freedom in creating complex test sequences
- Implementation of disturbance scenarios on the bus level by integration of FRstress (see separate datasheet and chapter 9.0)

5 Diagnostics

With the Diagnostic Feature Set, CANoe.FlexRay offers an easy and convenient way to test the diagnostic functionality in the ECU directly over the FlexRay bus:

- Supported transport protocols: AUTOSAR, ISO 10681-2, OEM-specific
- Use of diagnostic parameters from the CANdela database and ODX/MDX files

- Direct FlexRay support of the Diagnostic Feature Set including Fault Memory window and Diagnostic Console
- Support of test modules with diagnostics on the FlexRay bus
- Visualization of diagnostic requests in the Trace window via an integrated observer

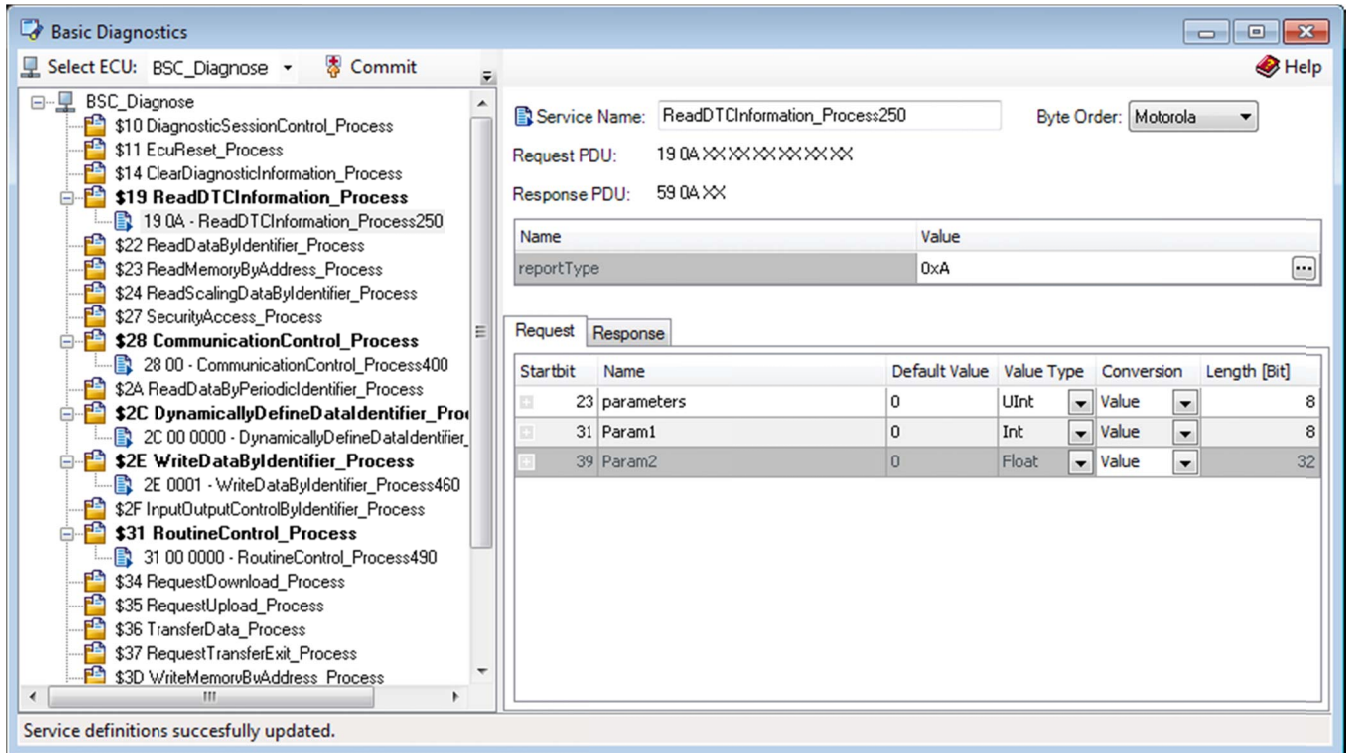


Figure 3: Basic Diagnostic Editor

6 Further Programs

6.1 FIBEX Explorer

Convenient viewing, editing and extension of the FIBEX data in the supplied FIBEX Explorer tool give FlexRay developers a quick and detailed understanding of the data and its interrelationships.

All relevant variants of the FIBEX specification are supported:

- 1.2.0a
- 2.0.1
- 3.x

The FIBEX Explorer is supplied in two variants. The View variant allows the user to display data, while the Pro variant, in addition to View variant features, also supports editing:

Programs	CANoe		
	pex	run	full
FIBEX Explorer Pro	no	yes	yes
FIBEX Explorer View	yes	no	no

6.2 AUTOSAR System Description Network Explorer

The AUTOSAR Explorer lets you display system descriptions and ECU extracts in an easy to comprehend way. This tool gives users a quick overview of their systems.

The AUTOSAR Explorer currently supports the following AUTOSAR versions:

- 3.0.2 (only view)
- 3.1.4 (view and edit)
- 3.2 (view and edit)

The AUTOSAR Explorer is supplied in two variants. The View variant allows the user to display data, while the Pro variant, in addition to View variant features, also supports editing:

Programs	CANoe		
	pex	run	full
AUTOSAR Explorer Pro	no	yes	yes
AUTOSAR Explorer View	yes	no	no

7 CAPL Interface

The CAPL script language is used in all areas of CANoe usage, from analysis to simulation and testing. CAPL offers you functions tailored to the FlexRay protocol:

- Event Handler for bus events and controller states (e.g. error)
- CAPL objects for frames, PDUs, signals to be sent and for the network configuration
- Specific functions for such tasks as sending and receiving the wake-up pattern and configuring the communication controller

8 Hardware Interfaces

CANoe.FlexRay supports Vector's VN interface product line and the FlexCard. These high-performance and flexible PC interfaces for FlexRay give you optimal interfaces for your application. For detailed information please refer to the "Hardware Interfaces for FlexRay and CAN" data sheet.

9 Stress Module for FlexRay

FRstress is a special tool for error simulation and manipulation of FlexRay frames on the protocol and bit levels. Besides disturbing the bus physics, it is also possible to manipulate, delay or delete specific data.

For more information please refer to the FRstress data sheet.

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