



# CANoe .ISO11783

Product Information

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This document presents the application and functions of the Option .ISO11783 for CANoe. CANoe.ISO11783 extends the standard functionality of CANoe.

**Product information** and **technical data** for the basic functions of CANoe can be found in separate documents.

## 1 Introduction

ISO 11783 (or ISOBUS) is a J1939-based CAN protocol for communication in the agriculture industry. ISOBUS is a CAN-based multimaster network whose protocol has been harmonized with J1939. This means that both systems may be used in parallel in the same network or segment.

### 1.1 Application Areas

CANoe.ISO11783 is suitable for the design, diagnostics, and testing of ISO11783-based networks and components. CANoe.ISO11783 gives the user an optimal tool that can be used from development to end-of-line testing.

### 1.2 Features and Advantages

ISO 11783 standard allows the user to analyze and simulate complex communication structures easily and efficiently. By provision of examples such as Virtual Terminal (VT), Task Controller(TC), Auxiliary Inputs, Tractor ECU, File Server, TIM Server and TIM Client the main components of an ISO 11783 network are delivered.

CANoe.ISO11783 Virtual Terminal Version 2 through 5 and Task Controller Version 1 to 4. The same communication analysis characteristics apply as described in CANoe.J1939. In addition, the examples can be adapted easily to particular circumstances. Quick access to CANoe.ISO11783 is thus guaranteed.

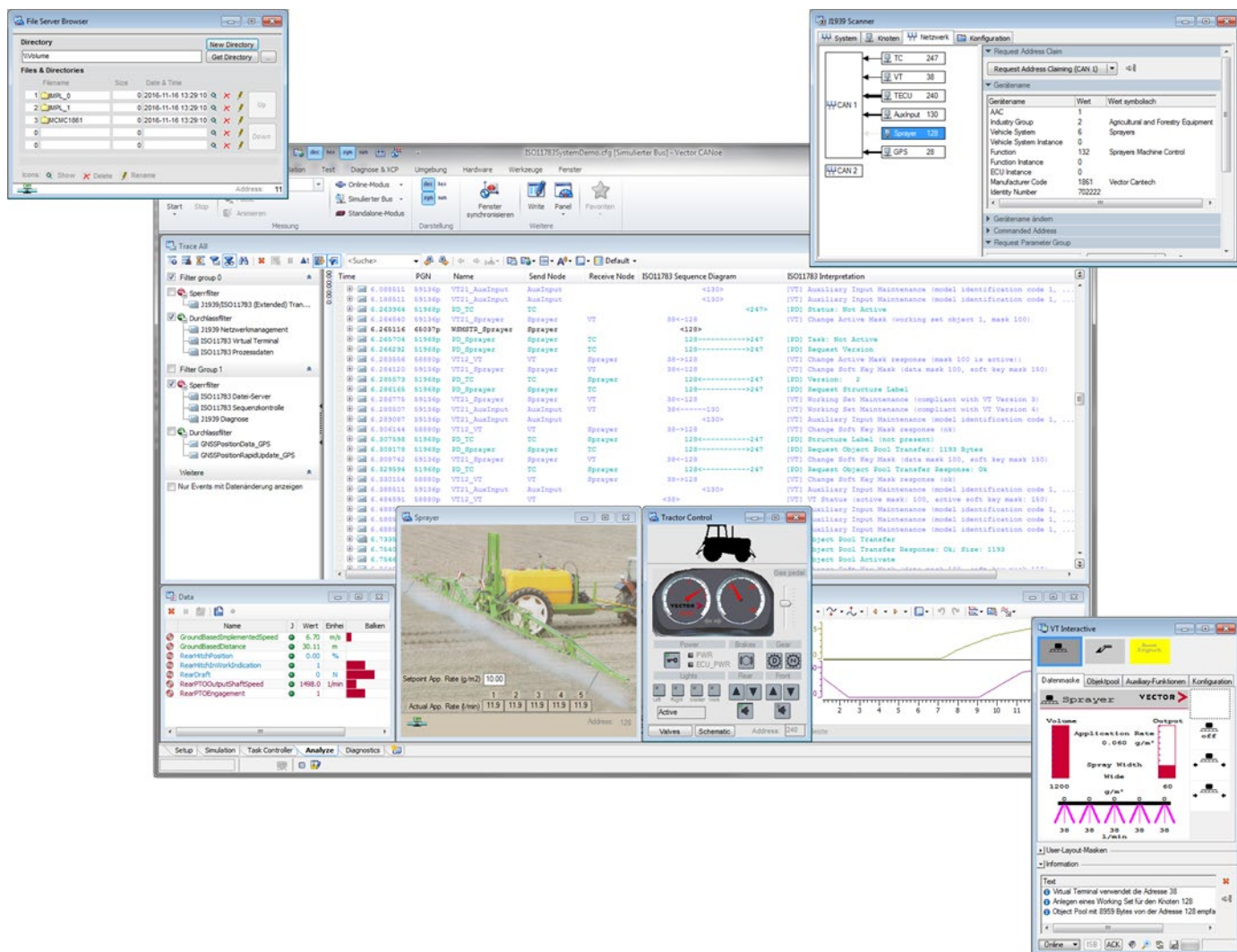


Figure 1: Figure 1: Sample configuration of CANoe.ISO11783 with simulation of attachment unit, Virtual Terminal, Task Controller and File Server.

### 1.3 Hardware Interfaces

All hardware interfaces supported by CANoe and the Vector Test System (VT System) can be used. For compatibility reasons, we recommend that you use ISO 11783 (ISO Highspeed) compatible bus drivers (e.g. CANcab 251opto).



## 1.4 Further Information

### > [Vector Download-Center](#)

Various documents related to CANoe are available on the Internet. In the Demo version, for example, you get sample configurations for the various use areas and detailed online Help texts, in which all CANoe functions are described. In addition, you benefit from our valuable know-how in the form of technical articles and application notes.

### > [CANoe Feature Matrix](#)

More information on variants, channels and bus system support is presented in the feature matrix.

## 2 Functions

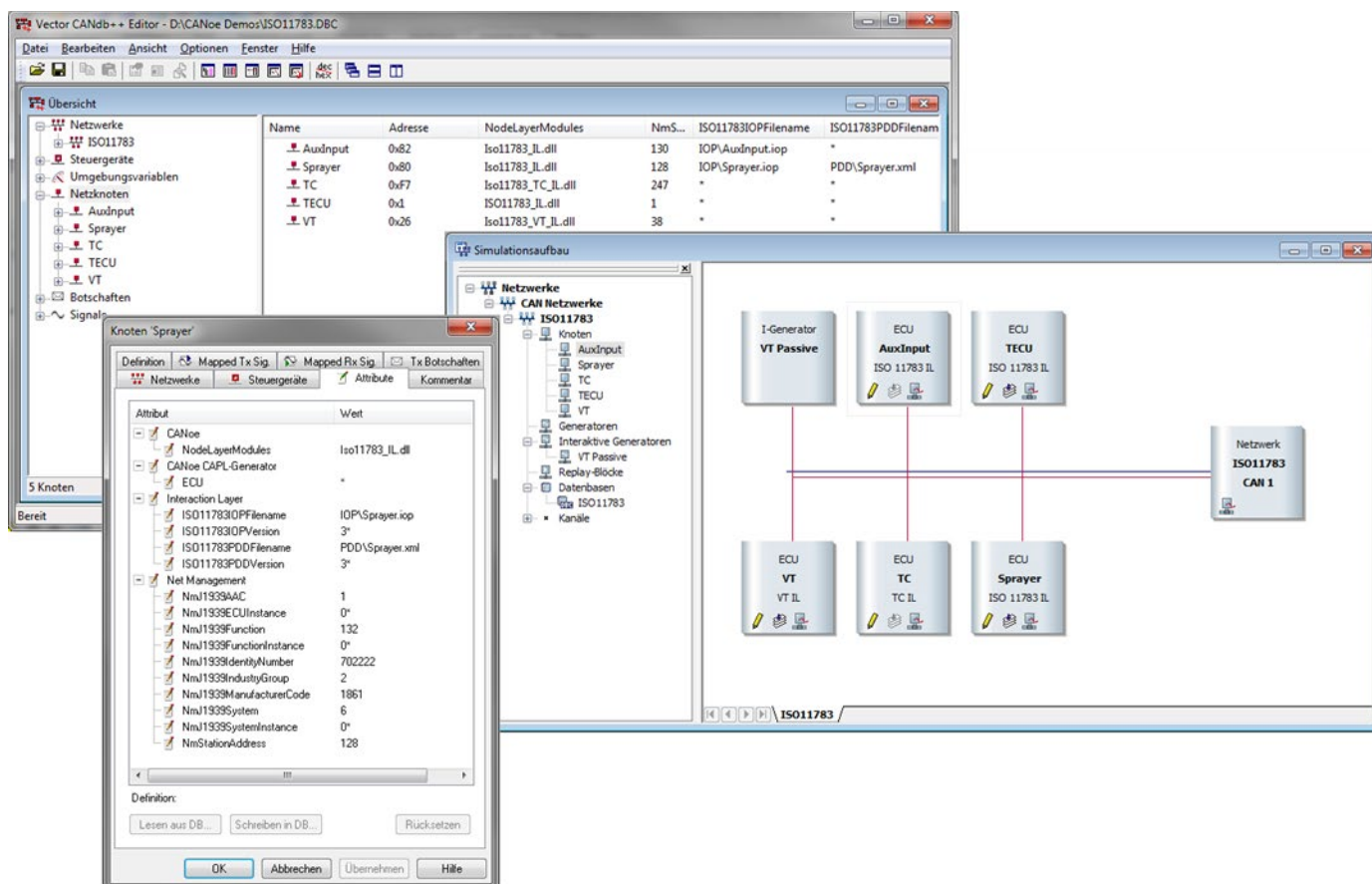
CANoe.ISO11783 contains CANoe.J1939 functionality and expands upon it. Here is a brief overview of key functions:

- > Simulation of several device types:
  - > Implement
  - > Virtual Terminal
  - > Task Controller
  - > TIM Server and TIM Client
  - > File Server
  - > Auxiliary Input
  - > Tractor ECU
- > Easy creation and automated execution of complex tests
- > GNSS support (simulation/display/logging)
- > Protocol-specific display, checks, interpretation, filters and search functions in the Trace-, Data- and Graphics window
- > Support of all relevant transport protocols such as BAM, CMTD, Fast Packet and ETP
- > Extended DBC database with ISO11783-specific PGs such as VT12 / VT21, PD, TIM12 / TIM21, AUTH12/AUTH21, FSC / CFS etc.
- > Support of ISO 11783 diagnostics

These functions will be described in detail below.

## 3 Simulation of Attachments

The simulation of individual attachments is simplified greatly through specific functionality. The different network nodes are simulated by the ISO11783 interaction layer based on the communication relationships in the database. This means that the network management, the transfer of the object pool to the VT and the transfer of the device description to the task controller are already taken care of – without a single line of code. Measurement data requested by the task controller is also provided automatically by the interaction layer. For further functions, such as application-specific processing of user input via the VT, there is a ISO11783 library for the CAPL programming language available.



**Figure 2:** With the aid of the ISO 11783 interaction layer, a rapid realization of ISO 11783 models is possible based on the communication relationships in the database.

## 4 Simulation of Virtual Terminal

CANoe.ISO11783 offers all functions for simulating a virtual terminal (VT). The user can choose between two variants:

- > a Virtual Terminal Interaction Layer (VT\_IL) implemented as a software library or
- > an easy-to-use Virtual Terminal Window (VT Window).

The VT\_IL variant lets the user adapt the simulation to specific requirements through the comfortable API. The VT Window variant lets you simulate a VT without prior programming knowledge, and offers the possibility to visually control the data masks as well as the contents of object pools. Both variants support the ISOBUS Shortcut Button (ISB) functionality.

Great importance was placed on the flexible description of the terminal properties. For example, the user can configure the simulated terminal so that it supports a color or black and white display. The number of "Soft Keys" and the screen resolution are also freely configurable. User-defined "user layout" masks can be displayed simultaneously, as can the masks of the different working sets. With this tool, the user can test all terminal variants and operating concepts in practical situations.

Besides its use for pure simulation, the VT Window or rather VT\_IL can also be run passively in the network as a reference. In this case, the CANoe Virtual Terminal does not actively participate in CAN communication, rather it listens to the communication between an implement device and the real terminal. This makes it easy to reveal compatibility problems of the real VT quickly. In addition, the passive VT operating mode is well-suited to the analysis of previously recorded bus traffic. Problems in communication can be visualized immediately using the CANoe VT, simply by playing back a log file. This simplifies the time-consuming analysis of the CAN data traffic and its potential effects on the application level.

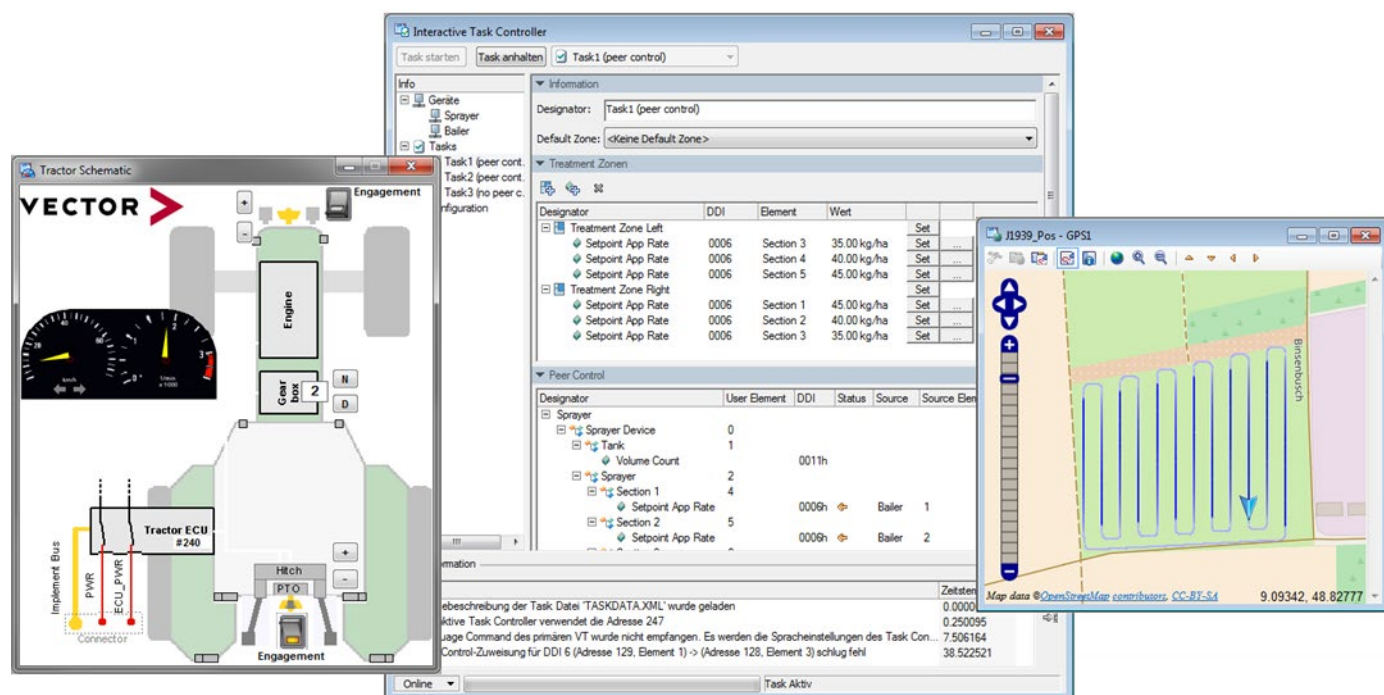
## 5 Simulation of Task Controller

As in the case of the Virtual Terminal, the user can choose between two variants:

- > a Task Controller Interaction Layer (TC\_IL) that was implemented as a software library or
- > an easy-to-use Interactive Task Controller (ITC).

Thanks to the comfortable API, the TC\_IL variant allows an individual adaptation of the simulation to the respective requirements and a simple integration into an automated test environment. The ITC variant has a graphical user interface and allows the simulation of a Task Controller without any programming skills. Both variants (TC\_IL and ITC) provide easy access to the individual process data of any implement. The process variables are displayed as physical values. Beyond that for implement control various tasks can be defined which can be activated as needed. You can also set up the peer control assignments. If available CANoe can import standardized device description files based on XML to query implement information or receive it directly from the implement via CAN.

Like VT\_IL and VT Window, ITC and TC\_IL can also run passively on the network. This has the same benefits, such as the detection of compatibility issues in an active network or during logging file replay.



**Figure 3:** Figure 2: CANoe.ISO11783 with GNSS Monitor and schematic representation of a tractor. The Interactive Task Controller enables an easy and quick access to the process data of an implement.

## 6 Simulation of File Servers

CANoe .ISO11783 provides a File Server Interaction Layer (FS IL) with which you can expand a simulation node of an ISOBUS network into a file server. As all other ISO11783xxx ILs, the FS IL variant has a comfortable API, which enables an individual adaptation of the simulation to the respective requirements and a simple integration into an automated test environment. The following functions are available:

- > Configuration of the root directory and other file server properties
- > Communication with multiple file server clients
- > Error injection

## 7 Simulation of TIM Server and TIM Client

With the CANoe.ISO11783 you can simulate both the TIM Server and the TIM Client. The ISO11783 Interaction Layer provides a comprehensive set of CAPL functions for this purpose, which make it possible to configure a TIM simulation as required. Among other things, the following is possible:

- > Configuring AEF certificates, CRL and keys
- > Simulation of user input
- > Control of TIM functions
- > Error injection

Specialized filters and intelligent interpretation in the trace window enable a clear and informative presentation of the message flow.

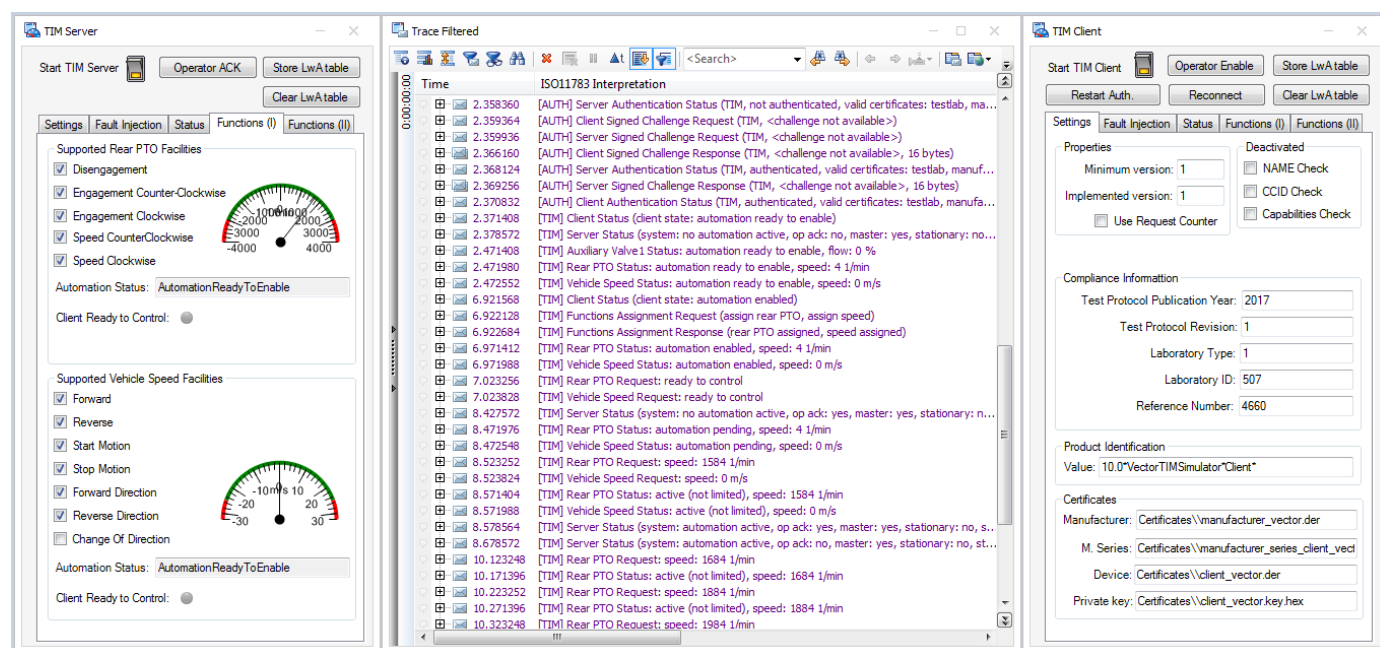
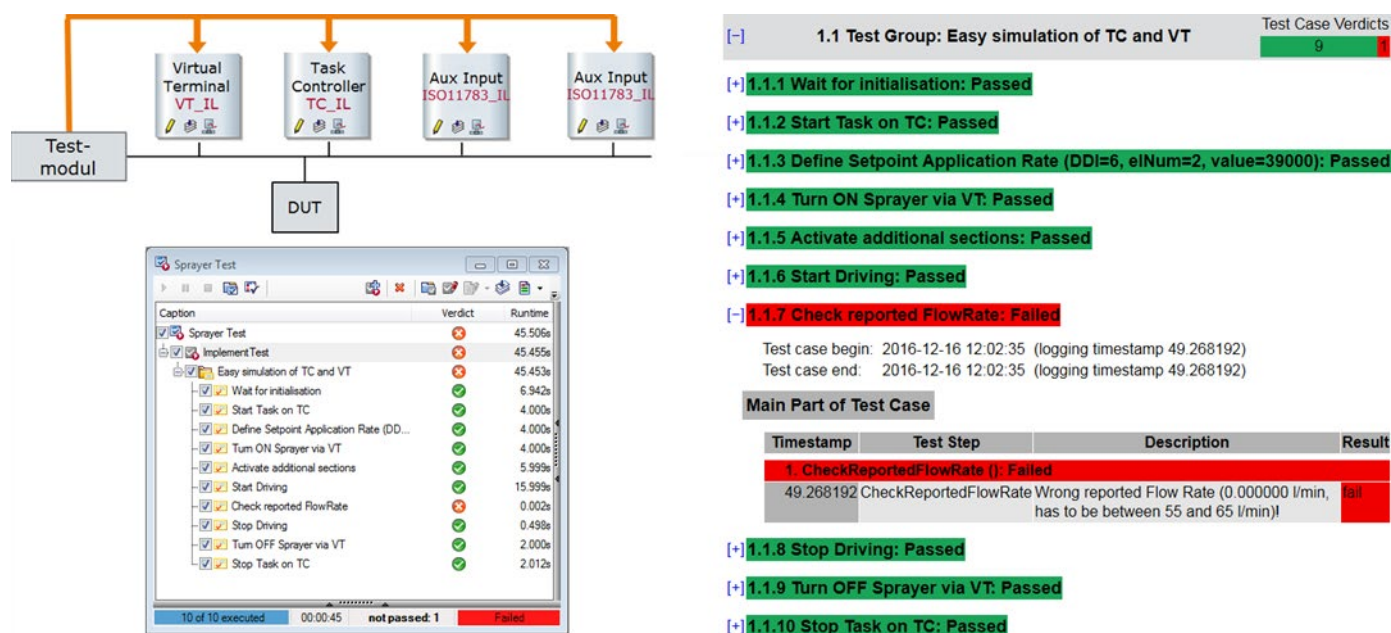


Figure 4: Panels for controlling the TIM server and TIM client and trace window with the corresponding bus communication

## 8 Automated Testing

As already mentioned, CANoe.ISO11783 provides several libraries with which each ISOBUS- relevant component can be simulated. All these libraries can be easily integrated into a test environment (such as vTESTstudio). Thanks to a comfortable programming interface, no detailed knowledge of the ISO11783 specification is necessary for the test development.

From the individual test cases, any complex tests can be compiled. Test results are presented in a clear way, causes of the failure are explained in detail.



**Figure 5:** Schematic representation of a CANoe.ISO11783 configuration for testing a sprayer, a test unit controlling the test procedure, and presentation of the test results in the test report.

## 9 GNSS

In addition to the functions of CANoe.ISO11783, the user has access to a GNSS Monitor (GPS) and a GPS window. This allows the recording and representation of saved paths. In parallel, line color can be used to display the output of a third variable at any time, such as vehicle speed or a process data variable. The Fast Packet Transport Protocol, which is used for the transmission of GNSS (GPS) data, is also supported. If only certain position data is to be evaluated, there is a special filter available that can filter for specific parameter groups and, optionally, for a specific source.

With the GNSS node layer DLL or an optional dialog, the user can define paths that will then be taken by the GNSS Simulator. This makes it easy to simulate tractor movement. The realization with the aid of the GNSS Nodelayer DLL also allows complex simulations that consider feedback from the system, e.g. changes in speed or direction of movement.

After stop of measurement, the GNSS Monitor, Graphic window and Trace window can be synchronized for the subsequent analysis. Starting from location information in the GNSS Monitor the user is lead to the respective parameter group in the Trace window or gets a measuring point in the Graphic window at the corresponding point in time or vice versa.

## 10 J1939 Filter

The J1939 Filter in the Measurement Setup supports networks with changing ECU addresses. The filter is configured using the J1939 device name, so you can create CANoe configurations that are largely independent of the real addresses used. Columns can be configured to better match the structure of the application. Additional protocol-specific filter conditions are also possible.

## 11 Network management

The J1939 Scanner monitors the communication and provides a clear display of all network nodes. Especially changes in a dynamic network can be easily traced and analyzed. Address changes are briefly highlighted. Time stamps for the first appearance and the last address change of a node are also available as are warnings regarding occurrence of protocol violations and notes about unusual occurrences in communication. Synchronization of information with the Trace and Graphic window is possible. If necessary, a central and clearly structured reconfiguration of the node addresses or J1939 device names may be executed. In addition, information about function, manufacturer, and affiliation to a Working Set are output.

For nodes that are unknown in the database, a meaningful node name is derived from the J1939 device name and is used in the display, e.g. in the Trace window.



## 12 Transport Protocols

Option .ISO11783 supports the transport protocols BAM, CMTD, Fast Packet and ETP. With the use of this protocols CANoe.ISO11783 can reassemble the individual fragments. Communication is monitored for errors during measurement and, if necessary, warnings are output.

Protocol interpretation is limited to the channel the user configured as ISO 11783. Gateway solutions with various protocols can thus be monitored easily. Display of 29 and 11 bit CAN identifiers is supported at the same time.

## 13 Database

ISO 11783 parameter groups and signals are described in a database, which already contains predefined standard objects that serve as examples. This database is already filled with all standard objects. The user can expand the database using the editor (included with delivery). This makes it possible to define application-specific parameter groups, for example. Parameter groups and signals thus defined can be selected symbolically in the entire program.

## 14 Diagnostics

The DTC Monitor and Diagnostic Memory window components make it easy to work with the diagnostic protocol defined in ISO 11783-12. For OEM-specific diagnostic protocols, the Diagnostic Feature Set (KWP2000 and UDS) is available. This enables support of networks with dynamic ECU addresses as well.

## 15 Comparison Options .ISO11783 and .J1939 for CANalyzer and CANoe

	CANalyzer .J1939	CANoe .J1939	CANoe .ISO11783	
Trace Window: J1939 specific columns	■	■	■	Presentation of PGN, SA, DA, Prio, DP, PGN name, node name, protocol interpretation and protocol violations with corresponding column filters, presentation of networks as a kind of sequence diagram
Trace Window: ISO11783	—	—	■	Interpretation e.g. for Virtual Terminal / Process Data / File Server / Peer Control / TIM
Trace Window: Context search	■	■	■	Previous/next PG from same SA / request-response / transport protocol
Trace Window: Analysis filter extensions	■	■	■	J1939-specific extensions for PGN, SA, DA and Prio; dynamic SA/DA filter based on J1939 Network Management
Trace Window: Analysis filter for J1939 subject areas	■	■	■	Network Management / Diagnostics / Proprietary PGs
Trace Window: Analysis filter for ISO11783 subject areas	—	—	■	Virtual Terminal / Process Data / File Server / Sequence Control / TIM
J1939 Filter in Measurement setup	■	■	■	Filter related to PG – dependent or independent from SA, DA and Prio;
Interactive Generator: J1939 specific parameters	■	■	■	Comfortable configuration of PGN, SA, DA, Prio, etc.; support of transport protocols
CAPL: Extensions for PGs	■	■	■	Language extensions for processing of parameter groups
J1939 Scanner	■	■	■	Monitors and displays communication aspects of Controller Applications; provides functions for reconfiguration of addresses and J1939 device names
DTC Monitor	■	■	■	GUI to the J1939 diagnostic protocol
OBD I/M Monitor	■	■	■	On Board Diagnostic Inspection and Maintenance Monitor
Diagnostic Memory Access	■	■	■	Read and write SPNs and memory areas
GNSS Monitor / GPS Window	■	■	■	Recording of position data and graphical display of covered path
GNSS Simulator	■	■	■	Simulation of position data (GNSS/GPS)
Virtual Terminal	—	—	■	Enables tests with different types of Virtual Terminals (resolution, monochrome, color)
Interactive Task Controller Window	—	—	■	Process data dialog allows to access individual data of any implement
Transport Protocol: BAM	■	■	■	Broadcast Announce Message
Transport Protocol: CMTD	■	■	■	Connection Mode Data Transfer (unicast)
Transport Protocol: Fast Packet	■	■	■	Fast transport protocol (e.g. for transfer of position data)

	CANalyzer .J1939	CANoe .J1939	CANoe .ISO11783	
Transport Protocol: ETP	–	–	■	Extended Transport Protocol (for transfer of large amount of data)
Example Database: J1939	■	■	■	Database preconfigured with standardized J1939 PGNs
Example Database: ISO11783	–	–	■	Database preconfigured with standardized ISO 11783 PGNs
Database: J1939 Communication Matrix	■	■	■	Visualization and easy configuration of interrelationships between signals, PGNs and CAs
Database: J1939 ARXML (AUTOSAR 4.2.2)	■	■	■	System Description according to the AUTOSAR 4.2.2 standard version
Demos: J1939	■	■	■	Examples for diagnostics, exhaust sys., tire pressure monitoring sys., etc.
Demos: ISO11783	–	–	■	Examples with Virtual Terminal, Interactive Task Controller, Address Claiming, etc.
Simulation	–	■	■	Simulation of independent nodes for test; simulation of remaining bus
J1939 Interaction Layer	–	■	■	Model-based signal-oriented simulation with minimal or no programming
CAPL: J1939 Nodelayer DLL	–	■	■	J1939 specific function library for processing of network management, PGs and transport protocols
CAPL: GNSS Nodelayer DLL	–	■	■	Library with specific functions for complex simulations of a GNSS receiver
ISO11783 Interaction Layer	–	–	■	Easy simulation of implements or Auxiliary Inputs including communication with Virtual Terminal, Task Controller, TIM Server and TIM Client. Comprehensive and comfortable CAPL interface. Seamless integration in a test environment.
ISO11783 Virtual Terminal Interaction Layer	–	–	■	Easy simulation of a Virtual Terminal. Comprehensive and comfortable CAPL interface. Seamless integration in a test environment.
ISO11783 Task Controller Interaction Layer	–	–	■	Easy simulation of a Task Controller. Comprehensive and comfortable CAPL interface. Seamless integration in a test environment.
ISO11783 File Server Interaction Layer	–	–	■	Easy simulation of a File Server. Comprehensive and comfortable CAPL interface. Seamless integration in a test environment.
Test Feature Set	–	■	■	Automation and documentation of test procedures
J1939 XML Test Module Manager	–	■	■	Supports the creation of tests based on the Test Feature Set; automatic generation of a compliance tests defined in J1939-82 (2008)
J1939-82 Compliance Test Unit	–	■	■	Automatically performs compliance tests defined in J1939-82 (2015)

## 16 Training

As part of our training program, we offer a range of classes and workshops on CANoe.ISO11783 in our classrooms and on-site at our customers.

You will find more information on individual training courses and a schedule online at: [www.vector-academy.com](http://www.vector-academy.com)



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