



VN2640 MOST Interface Manual

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Imprint

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1 Introduction

In this chapter you find the following information:








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1.1 About this User Manual

Conventions

In the two following charts you will find the conventions used in the user manual regarding utilized spellings and symbols.

| Style | Utilization |
|-------------|---|
| bold | Blocks, surface elements, window- and dialog names of the software. Accentuation of warnings and advices. [OK] Push buttons in brackets File Save Notation for menus and menu entries |
| Source Code | File name and source code. |
| Hyperlink | Hyperlinks and references. |
| <CTRL>+<S> | Notation for shortcuts. |

| Symbol | Utilization |
|---|---|
|  | This symbol calls your attention to warnings. |
|  | Here you can obtain supplemental information. |
|  | Here you can find additional information. |
|  | Here is an example that has been prepared for you. |
|  | Step-by-step instructions provide assistance at these points. |
|  | Instructions on editing files are found at these points. |
|  | This symbol warns you not to edit the specified file. |

1.1.1 Warranty

Restriction of warranty

We reserve the right to change the contents of the documentation and the software without notice. Vector Informatik GmbH assumes no liability for correct contents or damages which are resulted from the usage of the documentation. We are grateful for references to mistakes or for suggestions for improvement to be able to offer you even more efficient products in the future.

1.1.2 Registered Trademarks

Registered trademarks

All trademarks mentioned in this documentation and if necessary third party registered are absolutely subject to the conditions of each valid label right and the rights of particular registered proprietor. All trademarks, trade names or company names are or can be trademarks or registered trademarks of their particular proprietors. All rights which are not expressly allowed are reserved. If an explicit label of trademarks, which are used in this documentation, fails, should not mean that a name is free of third party rights.

- ▶ Windows, Windows 7, Windows 8.1, Windows 10 are trademarks of the Microsoft Corporation.

1.2 Important Notes

1.2.1 Safety Instructions and Hazard Warnings

**Caution!**

In order to avoid personal injuries and damage to property, you have to read and understand the following safety instructions and hazard warnings prior to installation and use of this interface. Keep this documentation (manual) always near the interface.

1.2.1.1 Proper Use and Intended Purpose

**Caution!**

The interface is designed for analyzing, controlling and otherwise influencing control systems and electronic control units. This includes, inter alia, bus systems like CAN, LIN, K-Line, MOST, FlexRay, Ethernet, BroadR-Reach and/or ARINC 429.

The interface may only be operated in a closed state. In particular, printed circuits must not be visible. The interface may only be operated (i) according to the instructions and descriptions of this manual; (ii) with the electric power supply designed for the interface, e.g. USB-powered power supply; and (iii) with accessories manufactured or approved by Vector.

The interface is exclusively designed for use by skilled personnel as its operation may result in serious personal injuries and damage to property. Therefore, only those persons may operate the interface who (i) have understood the possible effects of the actions which may be caused by the interface; (ii) are specifically trained in the handling with the interface, bus systems and the system intended to be influenced; and (iii) have sufficient experience in using the interface safely.

The knowledge necessary for the operation of the interface can be acquired in work-shops and internal or external seminars offered by Vector. Additional and interface specific information, such as „Known Issues“, are available in the „Vector KnowledgeBase“ on Vector’s website at www.vector.com. Please consult the „Vector KnowledgeBase“ for updated information prior to the operation of the interface.

1.2.1.2 Hazards

**Caution!**

The interface may control and/or otherwise influence the behavior of control systems and electronic control units. Serious hazards for life, body and property may arise, in particular, without limitation, by interventions in safety relevant systems (e.g. by deactivating or otherwise manipulating the engine management, steering, airbag and/or braking system) and/or if the interface is operated in public areas (e.g. public traffic, airspace). Therefore, you must always ensure that the interface is used in a safe manner. This includes, inter alia, the ability to put the system in which the interface is used into a safe state at any time (e.g. by „emergency shutdown“), in particular, without limitation, in the event of errors or hazards.

Comply with all safety standards and public regulations which are relevant for the operation of the system. Before you operate the system in public areas, it should be tested on a site which is not accessible to the public and specifically prepared for performing test drives in order to reduce hazards.

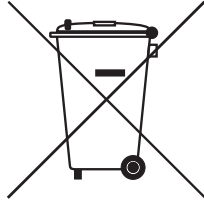
1.2.2 Disclaimer

**Caution!**

Claims based on defects and liability claims against Vector are excluded to the extent damages or errors are caused by improper use of the interface or use not according to its intended purpose. The same applies to damages or errors arising from insufficient training or lack of experience of personnel using the interface.

1.2.3 Disposal of Vector Hardware

Please handle old devices responsibly and observe the environmental laws applicable in your country. Please dispose of the Vector hardware only at the designated places and not with the household waste.



Within the European Community, the Directive on Waste Electrical and Electronic Equipment (WEEE Directive) and the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS Directive) apply.

For Germany and other EU countries, we offer free take-back of old Vector hardware.

Please carefully check the Vector hardware to be disposed of before shipping. Please remove all items that are not part of the original scope of delivery, e.g. storage media. The Vector hardware must also be free of licenses and must no longer contain any personal data. Vector does not perform any checks in this regard. Once the hardware has been shipped, it cannot be returned to you. By shipping the hardware to us, you have relinquished your rights to the hardware.

Before shipping, please register your old device via:

<https://www.vector.com/int/en/support-downloads/return-registration-for-the-disposal-of-vector-hardware/>

2 Device Description

In this chapter you find the following information:

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2.1 Scope of Delivery

Contents

The delivery includes:

- ▶ 1x VN2640 MOST Interface
- ▶ 1x Power supply 100...240 V AC, 12 V DC, 1.25 A
- ▶ 1x MOST fiber optic cable (1x MOST 2+0 connector and 2x HFBR 4531)
- ▶ 2x Fiber optic coupler for HFBR connectors
- ▶ 1x Power supply cable, 1.5 m with open end
- ▶ 1x Toslink-S/PDIF fiber optic cable, 5 m, 2.2 mm POF
- ▶ 1x ECL cable, 1.5 m with stripped wires,
see accessories manual for further information

2.2 Introduction

About the VN2640

The VN2640 is a high-performance hardware interfaces for the analysis, simulation, and testing of MOST networks. Even at large quantities of data, several devices can be used simultaneously with short reaction times, which is especially advantageous for the analysis of ring position-dependent procedures and high-load tests.

Features

The main features of the VN2640 MOST Interface are:

- ▶ MOST150 interface
- ▶ Vector Spy150-IP-core in the FPGA
- ▶ ECL for exchanging wake up and diagnostic information
- ▶ Sending up to 800 control messages per second
(depending on the driver version)
- ▶ Receiving up to 800 control messages per second
(depending on the driver version)

Power up

After supplying the power, the VN2640 switches immediately into **bypass mode**. The power of the optical transmitter building block (FOT) is set to 100% (0 dB). This state is maintained until the application sets another configuration. The status LEDs always display the current state of the device and of the ring network (lock/unlock).

The VN2640 will support the configuration of the power up mode with a future driver release. With this feature, the VN2640 can start either in **(static-)master, slave** or **bypass mode** to prevent later unlocks when the ring has to be accessed. This is useful when the VN2640 has to be connected to a PC when a ring failed and unlocking would reset the problem.

To set the INIC power up reference frequency to either 44.1 kHz or 48 kHz a switch inside the VN2640 can be used (factory setting 48 kHz). To change the setting, the device must be opened. This setting can be overridden by the application.

Switch for reference frequency

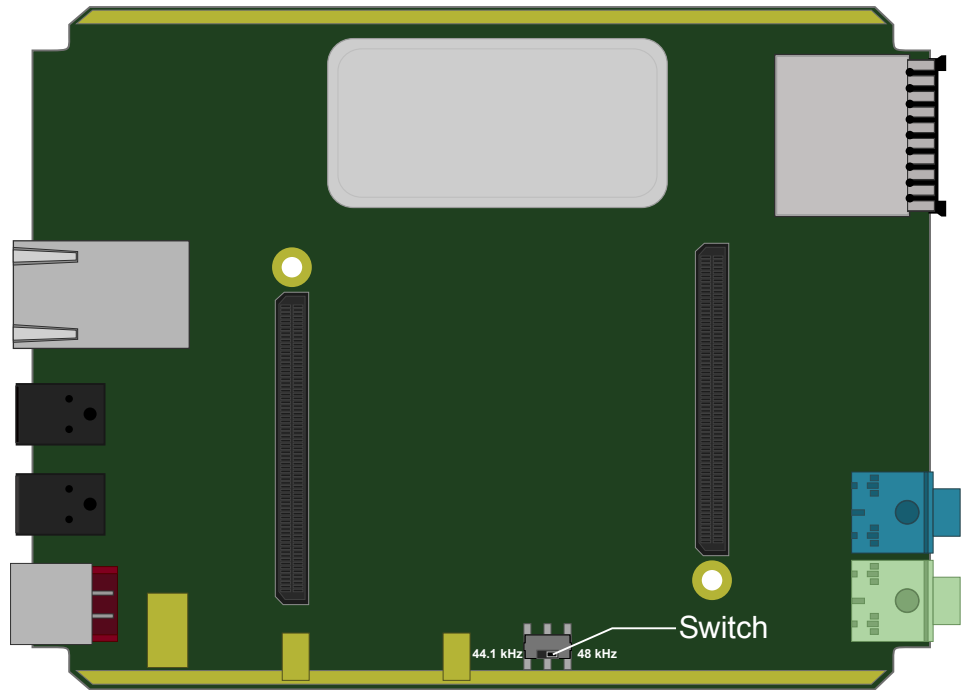


Figure 1: Switching the reference frequency

Node and spy position

The VN2640 supports the simultaneous operation of the **node mode** (**static-master** or **slave**) and the **spy mode** for all messages and packets transmitted on the MOST bus. The spy follows the transmitting node of the VN2640.

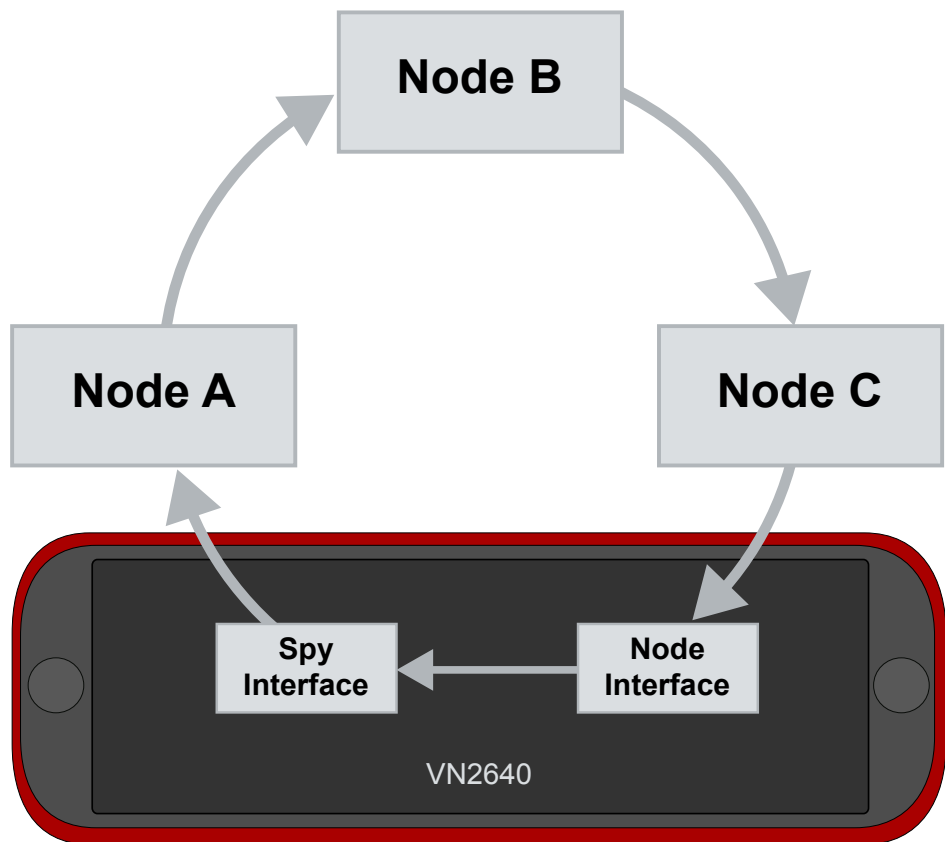


Figure 2: Example for spy/node application

| | |
|----------------------------|---|
| OS81110 | The used MOST network controller is an OS81110 INIC, which guarantees full compatibility to existing MOST150 systems. The OS81110 is connected to a low power FPGA via a Vector proprietary MediaLB+® IP-core with the maximum possible bandwidth of 400 Mbps (8192 Fs). The firmware of the OS81110 INIC is automatically updated by the driver. |
| Spy | The Vector proprietary Spy150-IP-core in the FPGA decodes and extracts all bits and bytes as well as ring states and statistics for ring analyses. This information is forwarded with low latency and high bandwidth to the PC. |
| Unlock | An FPGA internal unlock generator accurately destroys two of three preambles in order to cause unlocks in following devices without that their PLLs drift apart. In this way precise unlock times can be generated. |
| Galvanic isolation | USB/analog audio, power, sync, Ethernet, and ECL are all individually and galvanically isolated from each other to prevent high current ground loops especially in cars. Such ground loops can destroy the VN2640, the notebook and the ECUs if the VN2640 and the notebook are supplied at different positions in the car for example. The housing of the VN2640 is connected to the USB/analog audio potential. |
| Modes and functions | The device can be used as a timing master , timing slave , as a static master or in bypass operation . Parallel to each of these modes, all control messages, asynchronous data and Ethernet packets can be recorded online via a suitable application (e. g. CANoe) without influencing the MOST bus using the spy function . In (static-)master mode , a frame frequency of 44.1 kHz or 48 kHz can be set. |
| Amount of control messages | When the device is a visible node in (static-)master or slave mode in the MOST network, up to 800 control messages per second can be received and transmitted (depending on the driver version). The bandwidth is limited by the OS81110 INIC. |
| Packet length | Asynchronous data and Ethernet packets can only be transmitted in (static-)master and slave mode . Receiving is also possible in bypass mode which always provides all packets to the application that are transmitted on the ring. Transmission and reception are supported with packet lengths up to 1524 bytes payload for MOST Data Packets (MDP) and up to 1506 bytes payload for MOST Ethernet Packets (MEP) at a maximum bandwidth limited by USB/INIC. |

2.3 Accessories



Reference

Information on available accessories can be found in the separate accessories manual on our website.

2.4 Connectors USB Side

Back side

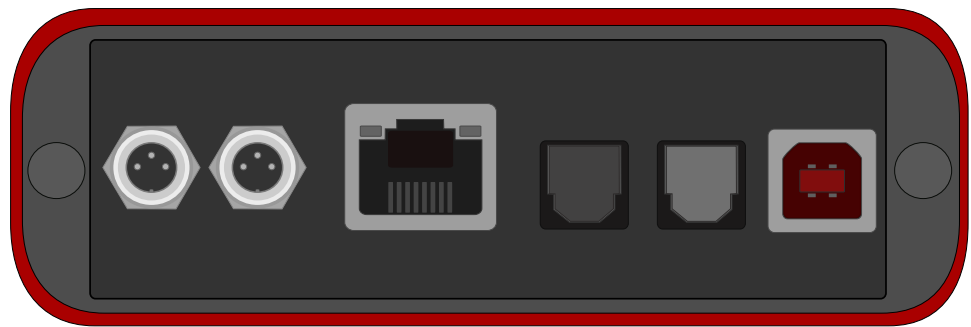


Figure 3: Connectors on the USB side

Device connectors

▶ **2x Power/Sync (Binder connector)**

The VN2640 has two power/sync connectors (Binder type 711) which can be used for time synchronization of different Vector devices (see section [Time Synchronization](#) on page 34) or for power. It does not matter which connector is used to supply the device. For proper operation of the VN2640, an external power supply is required. It is not possible to chain the power supply through the VN2640 (e. g. to operate several VN2640 interfaces on one power supply) due to internal diodes.

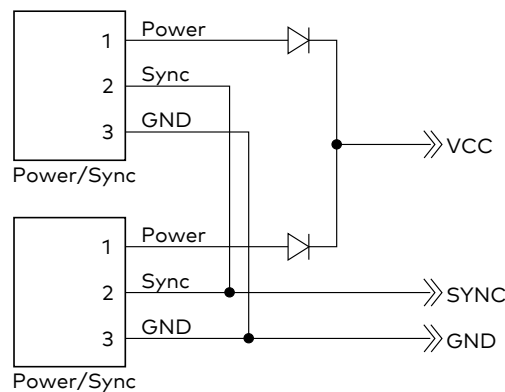


Figure 4: Internal wiring of the power/sync connector

| Pin | Assignment |
|-----|--|
| 1 | Power supply |
| 2 | Synchronization line (5 V compatible) |
| 3 | GND, ground of the power supply and of the sync line |



▶ **Ethernet (RJ45)**

This connector is reserved for future use.

▶ **Audio (S/PDIF)**

The VN2640 has additional S/PDIF connectors (Toslink) for digital audio input to the MOST bus and digital audio output from the MOST bus. One stereo channel can be provided per connector through the optical S/PDIF connectors. This means that only the MSB and CSB for the left and right channel of the S/PDIF data stream can be routed to/from MOST via connection labels. The LSB and CUV bytes are omitted or transmitted as zeros.

Both sampling frequencies of MOST and S/PDIF can be optionally equalized by two sample rate converters (SRC) to avoid clicks.

The following operation modes are available:

- MOST Timing Slave, S/PDIF Master (SRC off)
- MOST Timing Slave, S/PDIF Slave (SRC on)
- MOST Timing Master, S/PDIF Master (SRC off)
MOST clock by quartz with 44.1 kHz or 48 kHz
- MOST Timing Master, S/PDIF Slave (SRC on)
MOST clock by quartz with 44.1 kHz or 48 kHz

It is possible to synchronize the S/PDIF output to the S/PDIF input to avoid synchronization errors in special cases. Synchronization errors occur when neither the S/PDIF source nor the S/PDIF drain or both at the same time synchronize to their inputs.

For the following standard cases the synchronization is automatically set. In other cases the activation and deactivation of synchronization respectively is done by the user in the application.

- Left: audio analysis as MOST slave
- Right: the audio stimulation as MOST slave with notsynchronized source

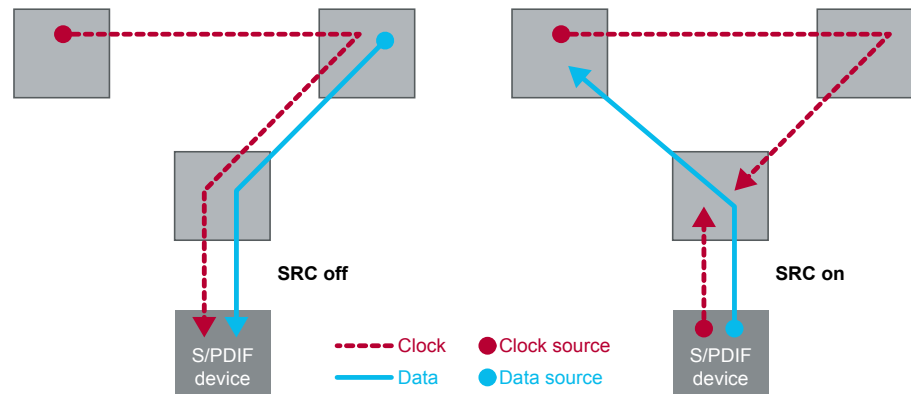


Figure 5: Audio analysis and audio stimulation as MOST slave

- Left: audio analysis as MOST master (44.1 kHz/48 kHz)
- Right: audio stimulation as MOST master with fixed frame rate (44.1 kHz/48 kHz) and not synchronized source

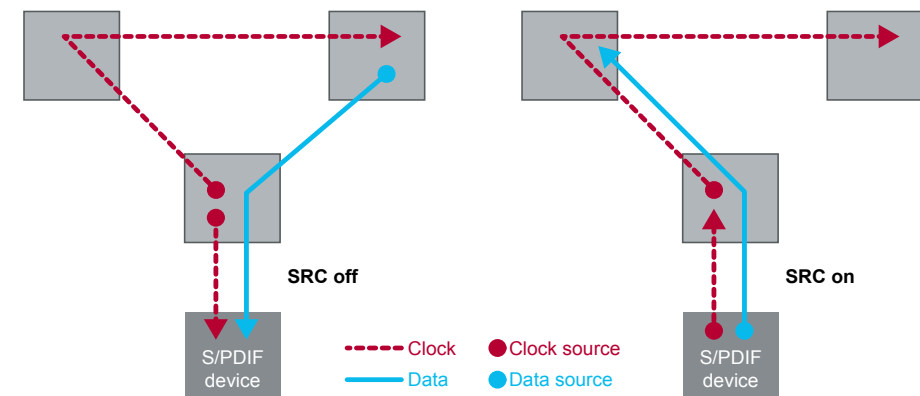


Figure 6: Audio analysis and audio stimulation as MOST master

▶ **USB**

Connect your PC and the VN2640 via USB to install and to use the device with measurement applications (e. g. CANoe, CANalyzer). The PC's USB port must be USB2.0 Highspeed compliant to make us of the MOST bandwidth. The VN2640 can be operated at a USB3.0 Superspeed connector, but the bandwidth is limited to USB3.0 Highspeed. USB1.1 is not supported by the VN2640 MOST Interface. Due to the high data rate of MOST a USB1.1 connection is not sufficient.

2.5 Connectors MOST Side

Front side

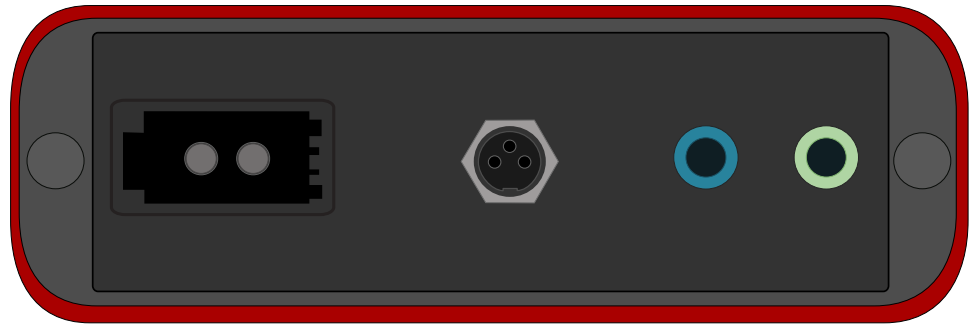


Figure 7: Connectors on the MOST side

Device connectors

► **MOST (fiber optic)**

In order to incorporate the VN2640 into an existing MOST network, the fiber optic cable of the MOST ring must be cut through between two nodes and the HFBR connectors attached (not included in the scope of delivery). Then, the Vector MOST fiber optic cable has to be connected with the VN2640 using the included coupling pieces (see accessories manual) and the fiber optic cable of the MOST network.

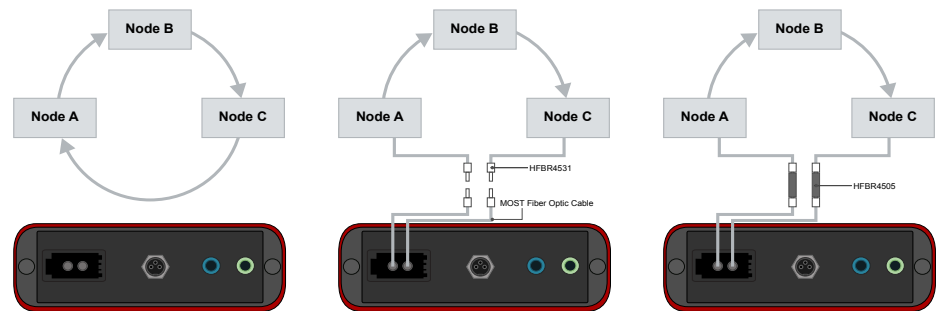


Figure 8: Connection example

The signal direction and the correct connection of light output and light input respectively must be heeded here. The fibers of the MOST fiber optic cable are marked for easier identification (see accessories manual). Alternatively, the MOST 2+0 connector can be connected with a custom fiber optic cable.

The power of the optical transmitter can be lowered according to the MOST specification from 100% to 50% (-3 dB).



Note

For the function test (loop test) described in the installation instructions, the Rx and Tx fibers of the MOST fiber optic cable must be connected to each other using a coupler.

► **Electrical Control Line (Binder connector)**

The VN2640 has an Electrical Control Line (ECL) port (Binder connector type 09 0078 00 03) according to the MOST specification which is used for exchanging wake up and diagnostic information along the MOST ring.

Use the included ECL cable with stripped wires to connect to this port. For further information please refer to the accessories manual. The Vbat voltage has to be externally applied to pin 1 and supplies the ECL pull-ups and the transceiver. This allows testing the ECL in variable voltage scenarios such as engine starts. The voltage of Vbat can be in the range of 0 V ... 30 V, but for a proper function it has to be in the range of 5.5 V ... 30 V. Vbat is also protected against inverse polarity.

Pin 2 (ECL) is an open collector bus. The internal output driver can drive the bus only to GND. To avoid high currents under faulty conditions it has an internal current limitation to 40 mA. High levels are generated with the internal or additional external pull-up resistors. Inside the VN2640 there are two pull-up resistors between Vbat and ECL. The first resistor with 60 kOhm is permanently connected. The second pull-up with 1.1k Ohm in parallel to the first resistor can be switched on by software. The ECL line is protected against inverse polarity and electromagnetic discharges of 4 kV.

The used transceiver (ATA6664) uses Vbat as reference voltage for its receiver. A save low level is detected if the ECL line is below 40 % of Vbat. A save high level is detected if the ECL line is above 60 % of Vbat. The detected logic state is undefined between 40 % and 60 % of Vbat.

Pin 3 (GND) of the ECL connector is the reference ground for Vbat and ECL.

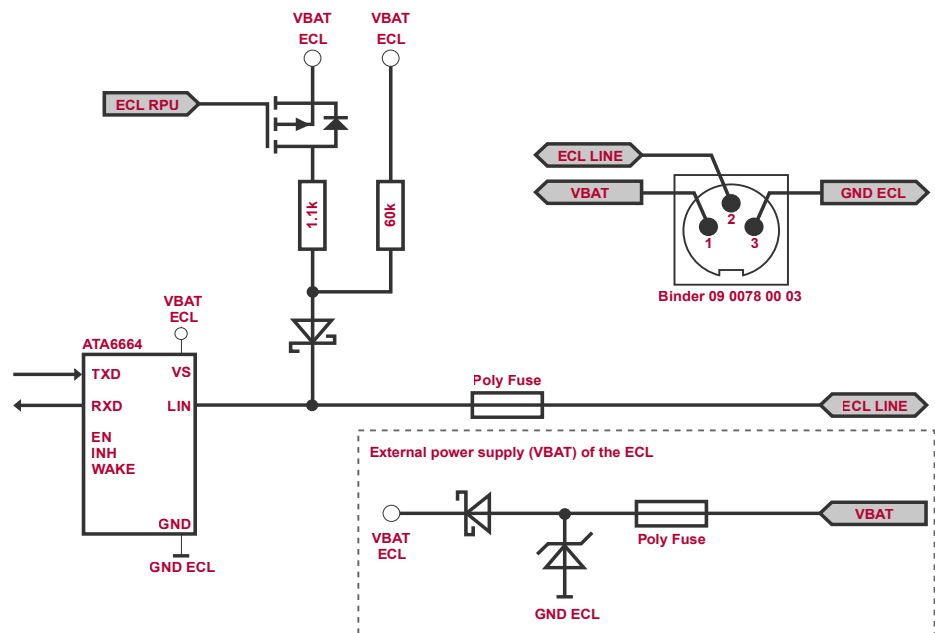


Figure 9: Scheme of the ECL port

► **Audio (3.5 mm stereo jacks)**

The VN2640 offers a line in and line out/headphone connector for input and output of analog audio signals. The signal assignment is as follows:

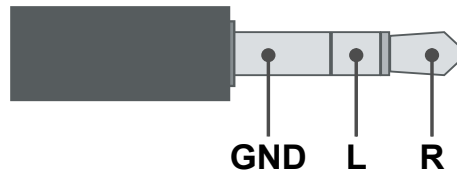


Figure 10: Signal assignment on the stereo jack

Analog signals fed through the line in are first digitalized and can be routed via connection labels of the OS81110 INIC to the MOST ring. Digital audio signals from MOST can also be converted into analog audio signals with adjustable volume, provided on the line out connector. With the built-in amplifier it is also possible to operate headphones (16 Ω, 150 mW) on the line out. Digital line in and line out signals have a 2 x 16 bit resolution.

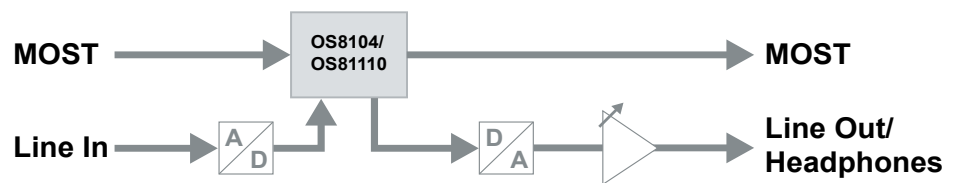


Figure 11: Scheme of line in and line out

2.6 LEDs

▶ Lock

LED indicating the lock state.

| Color | Description |
|-------|---|
| Green | Device is synchronized to the master's clock . |
| Off | Device is not synchronized to the master's clock . |

▶ Master

LED indicating the master state.

| Color | Description |
|--------|---|
| Yellow | Device is configured as master . |
| Off | Device is either slave or bypass . In bypass mode, neither the master nor the slave LED illuminates. |

▶ Slave

LED indicating the slave state.

| Color | Description |
|--------|--|
| Yellow | Device is configured as slave . |
| Off | Device is either master or bypass . In bypass mode, neither the master nor the slave LED illuminates. |

▶ Rx/Tx

Multicolored LED indicating the bus activity for MOST.

| Color | Description |
|--------|---|
| Green | Flashing: Packet or message transmitted (Tx). |
| Orange | Flashing: Packet or message received and transmitted. |
| Red | Flashing: Packet or message received (Rx). |
| Off | No packets or messages transmitted. |

▶ Power

LED indicating the power status.

| Color | Description |
|-------|---|
| Green | On: Device is ready for operation. Flashing: Device is initializing. |
| Off | Device is not ready for operation. |

2.7 Technical Data

| | |
|--|---|
| MOST network controller | OS81110 INIC150 |
| Number of MOST channels | 1 |
| Operating modes | Master, static master, slave, spy, bypass |
| Spy for Control- and asynchronous channel | Can also be activated separately parallel to other modes at any time |
| Control messages (master / slave) | Up to 800/s; limited by INIC (depending on the driver version) |
| Control messages (spy) | Full bandwidth receivable |
| Asynchronous data and Ethernet packets (master / slave) | Packet length up to 1524 /1506 payload bytes. Up to 24000 packets/s ; limited by INIC (Tx and/or Rx); (depending on the driver version) |
| Asynchronous data and Ethernet packets (spy) | Full bandwidth receivable; limited by USB |
| Synchronous channels | 1x Line In 1x Line Out/Headphone 1x S/PDIF optical IN 1x S/PDIF optical OUT 2x sample rate converter for S/PDIF |
| Line in connector | 3.5 mm stereo jack |
| Line out/headphone connector | 3.5 mm stereo jack |
| S/PDIF In Connector | Toslink, optical, 16 bit, stereo |
| MOST connector | Standard MOST 2+0, Full Physical Compliant AFBR-1150L / AFBR-2150L Infineon |
| Master frame rates | Fs, 44.1 and 48 kHz |
| PC interface | USB2.0 Highspeed USB1.1 not supported Ethernet (currently not supported) |
| Port isolation | USB/analog audio connected to housing. Power, sync, Ethernet and ECL are on separately isolated isles. |
| Time stamp accuracy | 1 μ s with hardware synchronization |
| Line in impedance | 11.2 k Ω |
| Line in voltage | Max. 1000 mVp |
| Line out voltage | Max. 447 mVpp |
| Line out power | 6 W @ 16 Ohm |
| Ethernet* | 10/100 Base-TX with Auto-MDIX (crossing det.) support; no device control possible |
| ECL connector | |
| Vbat (pin 1) | 0 V ... 30 V to GND |
| Voltage protection | ESD 4 kV |
| Current limiting | 40 mA (polyfuse) |
| ECL signal (pin 2) | |
| Transceiver | ATA6664 |
| Pull up resistor | 60 kOhm permanent; optional 1.1 kOhm in parallel to Vbat |
| Voltage protection | ESD 4 kV |
| Current limiting | 40 mA (polyfuse) |
| High level | 0.6 * Vbat ... 30 V (ATA6664) |

| | |
|--|---|
| Low level | 0 V ... 0.4 * Vbat (ATA6664) |
| GND (pin 3) | Reference to Vbat and ECL signal |
| Power supply | Externally (not by USB) Startup: 7 V...50 V, approx. 7 W Operation: 5 V...50 V, approx. 7 W |
| Temperature range (ambient temp. of the device) | Operation: -40 °C ... +60 °C Storage: -40 °C ... +85 °C |
| Relative humidity of ambient air | 15 %...90 %, non-condensing |
| Weight | 0.36 kg |
| Dimensions (LxWxH) | Approx. 140 mm x 105 mm x 32 mm |
| Operating system requirements | Windows 10 (64 bit) |

3 Getting Started

In this chapter you find the following information:

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3.1 Driver Installation

General information

The **Vector Driver Setup** allows the installation or the removal of Vector devices.



Note

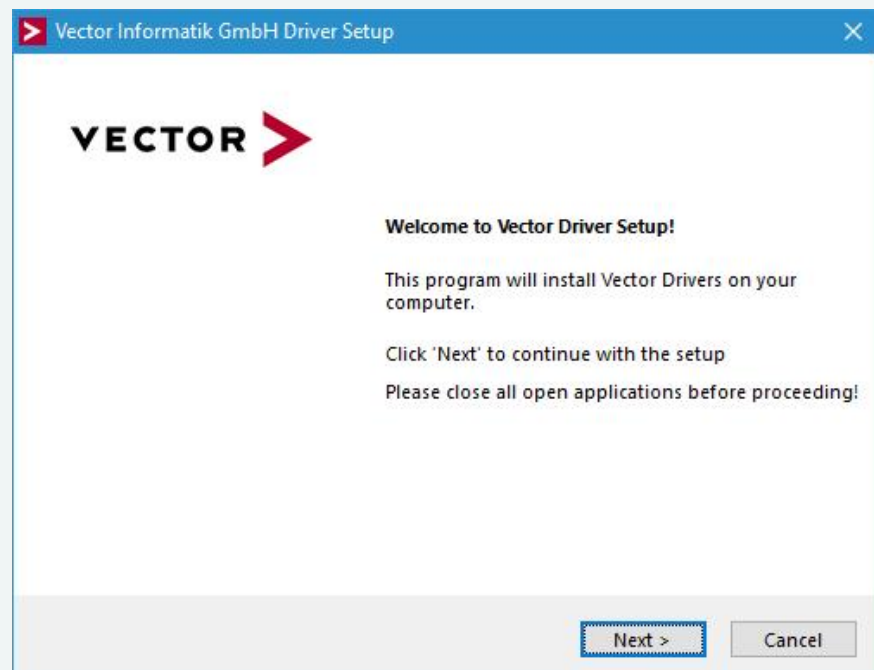
Please note that you will need **Administrator Rights** for the following steps.



Step by Step Procedure

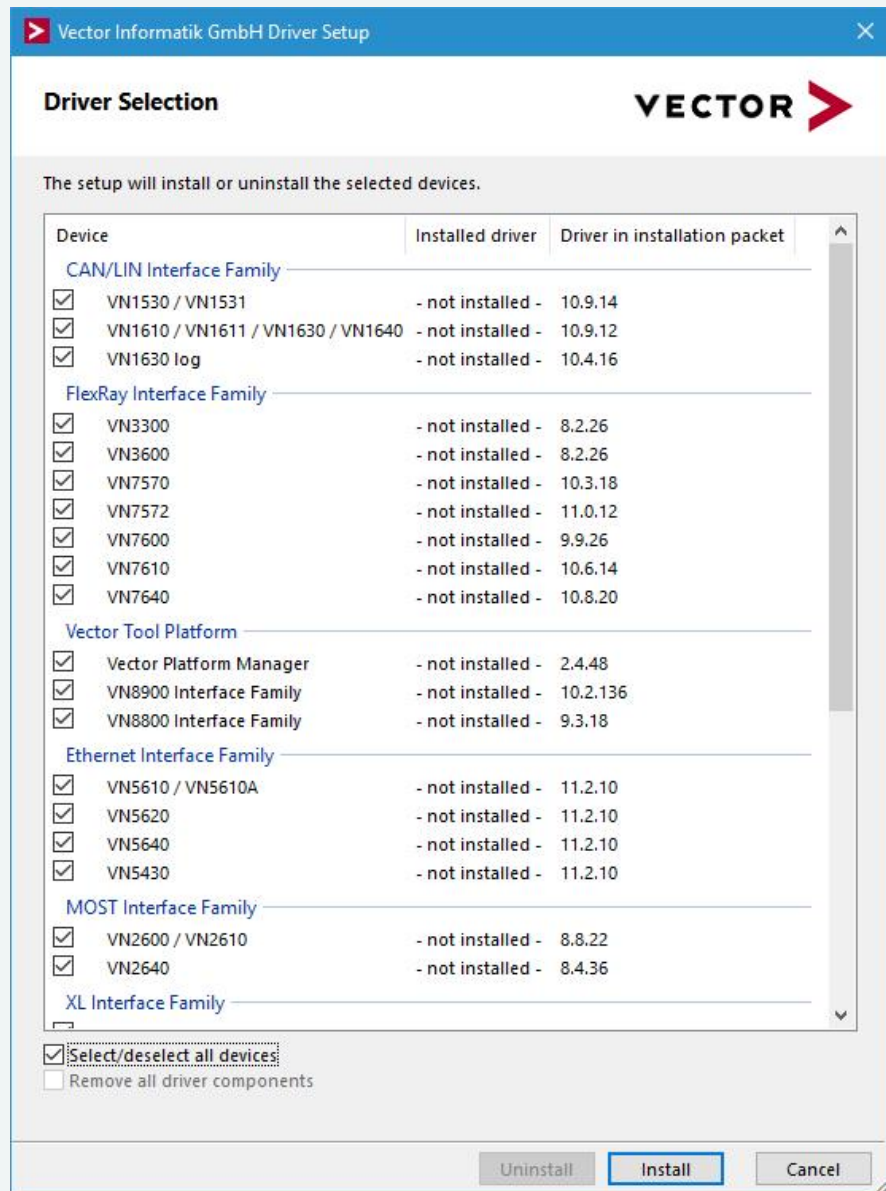
1. Execute the driver setup `\Drivers\Setup.exe` before the device is connected to the PC with the included USB cable.

If you have already connected the device to the PC, the **Windows found new Hardware** wizard appears. Close this wizard and then execute the driver setup.



2. Click **[Next]** in the driver setup dialog. The initialization process starts.

- In the driver selection dialog, select your devices to be installed (or to be uninstalled).



- Click **[Install]** to execute the driver installation, or **[Uninstall]** to remove existing drivers.
- A confirmation dialog appears. Click **[Close]** to exit. After successful installation, the device is ready for operation and can be connected to the PC with the included USB cable and powered by supplying external voltage (e. g. with an appropriate cable offered by Vector).

3.2 Device Configuration

Configuration

Before the installed device can be used in an application, it must be properly configured for the needed use case. This configuration is done with the **Vector Hardware Config** tool which comes with the driver installation. The tool can be found in **Windows | Start | Settings | Control Panel | Vector Hardware** and manages all installed Vector devices.



Reference

Further details on **Vector Hardware Config** can be found in the installation instructions (see section [Vector Hardware Configuration](#) on page 28).

3.3 Loop Tests

Operation test

The test described here can be performed to check the functional integrity of the driver and the device. This test is identical for **Windows 7 / Windows 8.1 / Windows 10** and independent of the used application.

3.3.1 MOST

MLoop.exe

This functional test requires a MOST fiber optic cable and a fiber coupler for HFBR connectors.



Step by Step Procedure

1. Start `\Drivers\Common\M150Loop.exe` from the **Vector Driver Setup**.
2. Select the VN2640 to be tested from the list of detected devices.
3. Click **[Twinkle]** and check if the power LED of the VN2640 is blinking at least for one second.
4. Connect the MOST fiber optic cable with the VN2640 device, select **Master** mode and check if the program displays the status **Unlock**. Check if red light comes out of the TX fiber of the MOST fiber optic cable.
5. Connect both ends of the fiber with one fiber coupler to a ring and check if the program displays the status **Lock**.
6. Close MLoop.exe with **[Exit]**.

4 Vector Hardware Configuration

In this chapter you find the following information:

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| 4.2.1 Introduction | 30 |
| 4.2.2 Tree View | 31 |

4.1 General Information

Executing Vector Hardware Config

After the successful driver installation, you will find the configuration application **Vector Hardware** in the Control Panel (see below). The tool gives you information about the connected and installed Vector devices. There are also several settings that can be changed.



Figure 12: Icon in Control Panel

Control Panel Windows 7

- ▶ Category view
Windows Start | Control Panel | Hardware and Sound,
click **Vector Hardware** in the list.
- ▶ Symbols view
Windows Start | Control Panel,
click **Vector Hardware** in the list.

Control Panel Windows 8.1

- ▶ Category view
<Windows key>+<X> | Control Panel | Hardware and Sound,
click **Vector Hardware** in the list.
- ▶ Symbols view
<Windows key>+<X> | Control Panel,
click **Vector Hardware** in the list.

Control Panel Windows 10

- ▶ Category view
<Windows key>+<X> | Control Panel | Hardware and Sound,
click **Vector Hardware** in the list.
- ▶ Symbols view
<Windows key>+<X> | Control Panel,
click **Vector Hardware** in the list.

4.2 Tool Description

4.2.1 Introduction

Vector
Hardware Config

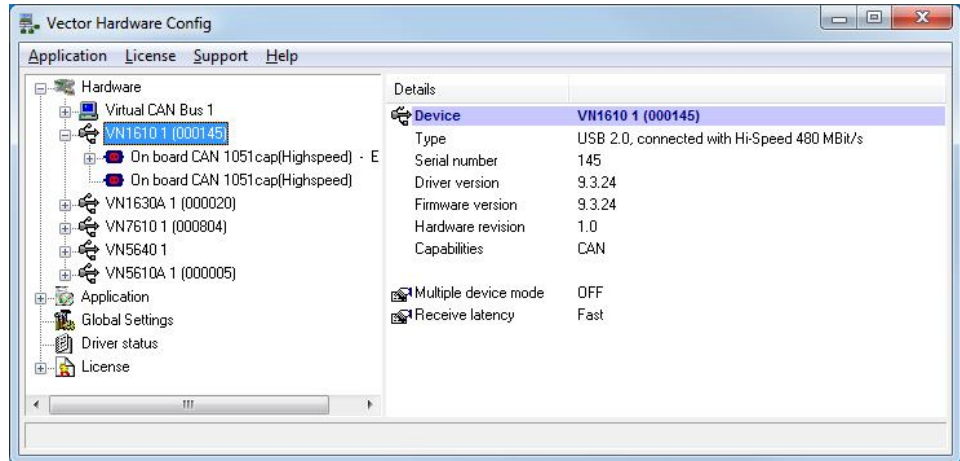


Figure 13: General view of Vector Hardware Config

Logical and physical
channels

Vector Hardware Config enables the channel configuration between installed Vector devices and applications. Applications use so-called logical channels which are hardware independent and have to be assigned to real hardware channels.

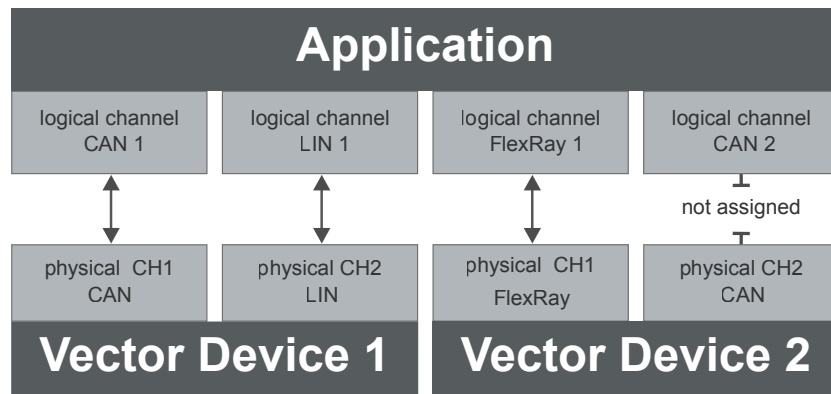


Figure 14: Concept of channel assignments

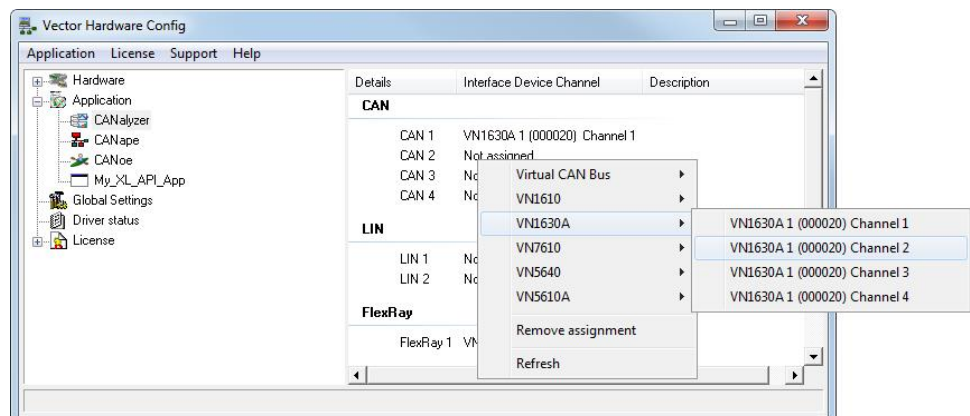


Figure 15: Channel assignment in Vector Hardware Config

4.2.2 Tree View

Accessing Vector devices

The tool is split into two windows. The left window has a tree view and lets you access the installed Vector devices, the right window displays the details of the selection. The following nodes are available in the tree view:

Hardware

The **Hardware** section lists the installed Vector devices. Each device item has physical channels which can be assigned to any number of logical channels (e. g. CANalyzer CAN 1). A logical channel can be assigned to only one physical channel.

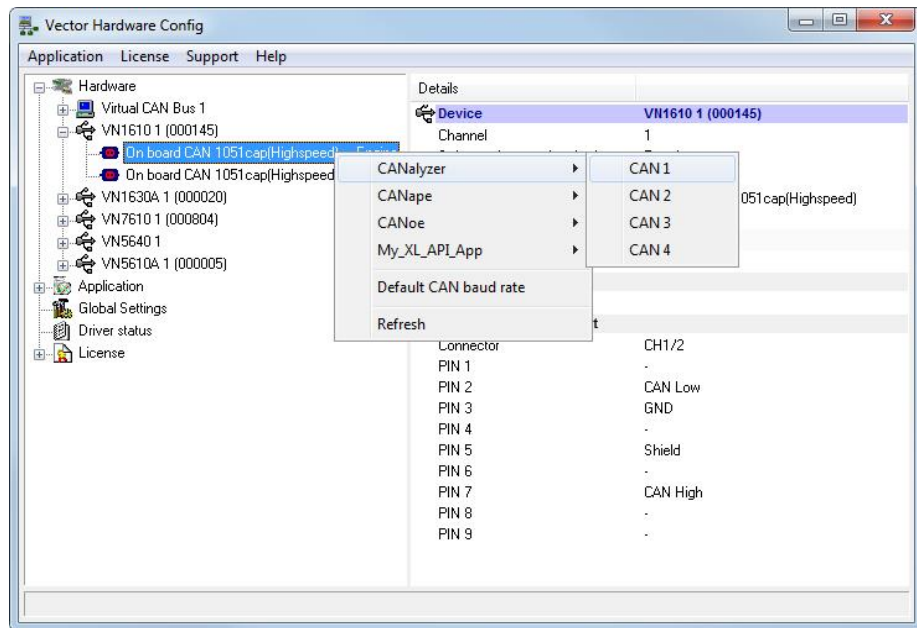


Figure 16: Hardware

Application

In **Application**, all available applications are displayed in a tree view. According to each application, the assignments of logical and physical channels are displayed in the right part of the window. If no assignment exists, the information **Not assigned** appears. The assignment can be edited via a right-click.

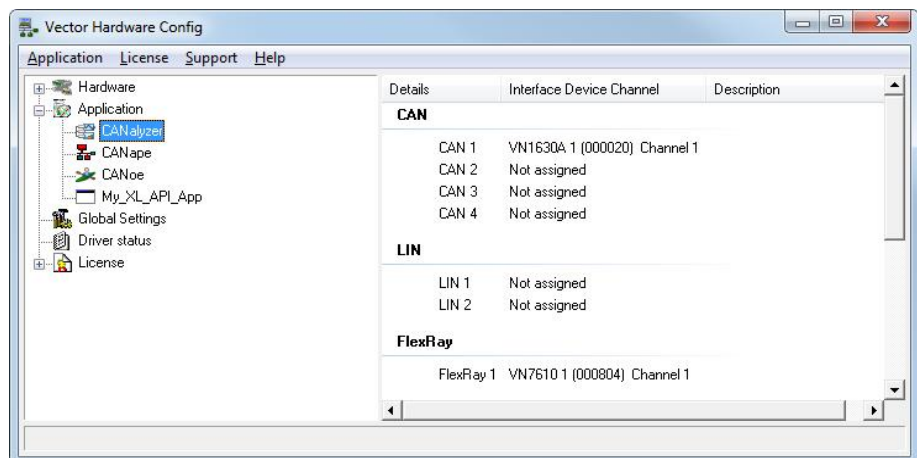


Figure 17: Application

Global settings

Global settings contains global device configuration possibilities, e. g. software time synchronization, GNSS time synchronization, transmit queue size, configuration flags or the number of virtual CAN devices.

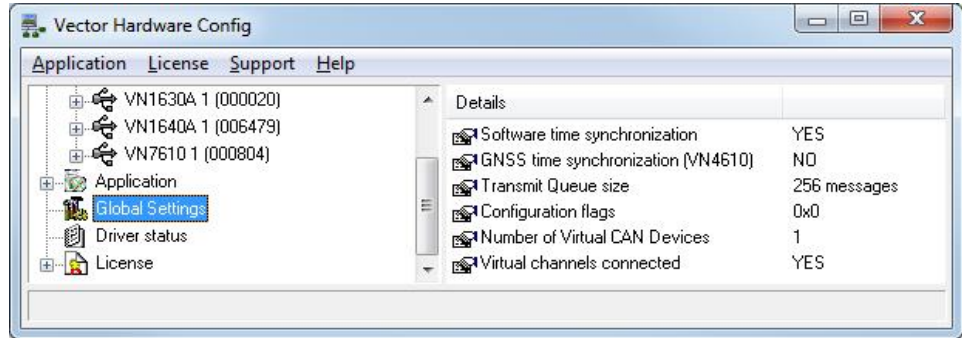


Figure 18: Global settings

Driver status

Driver status offers an overall status information of devices and applications currently in use. You can see whether the channels are connected to the bus (online/off-line) and whether the time synchronization is activated or not (Time-Sync-On/Time-Sync-Off).

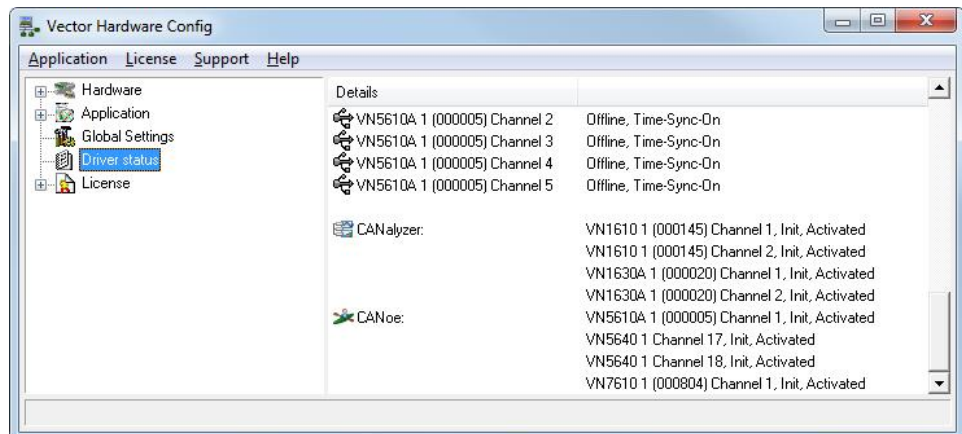


Figure 19: Driver status

License

The **License** section contains information on all current available licenses (Vector bus devices, Vector License USB dongle devices).

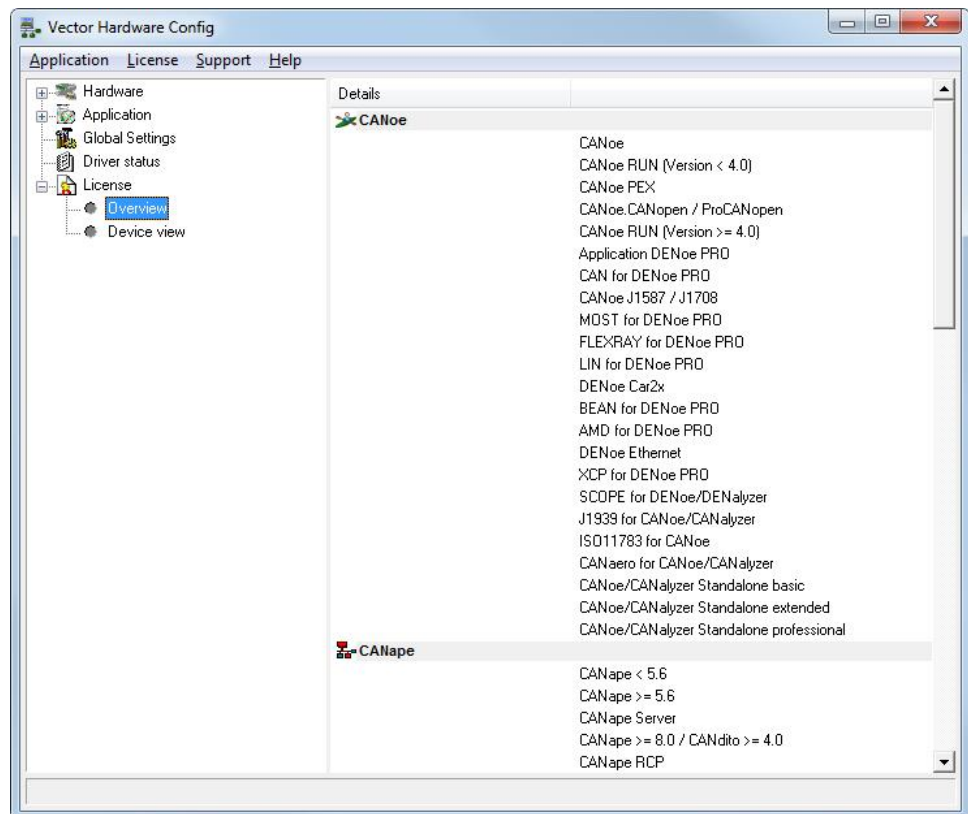


Figure 20: License



Reference

You will find a detailed description of **Vector Hardware Config** in the online help (**Help | Contents**).

5 Time Synchronization

In this chapter you find the following information:

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| 5.1 General Information | 35 |
| 5.2 Software Sync | 37 |
| 5.3 Hardware Sync | 38 |

5.1 General Information

Time stamps and events

Time stamps are useful when analyzing incoming or outgoing data or event sequences on a specific bus.

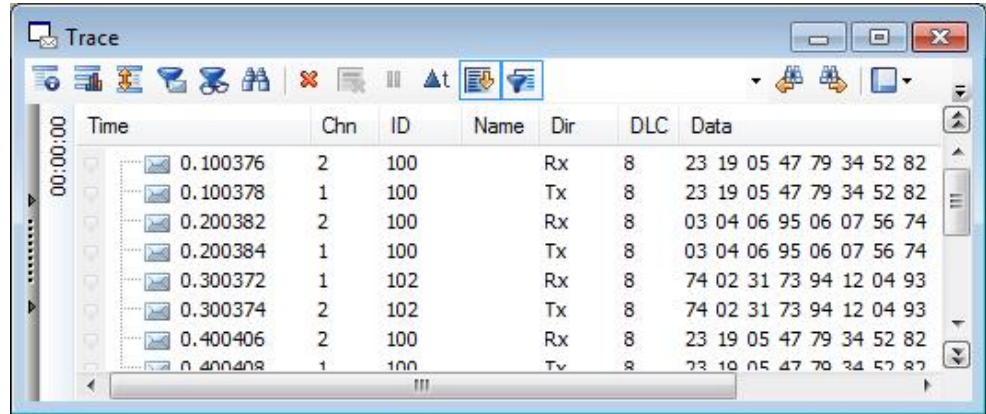


Figure 21: Time stamps of two CAN channels in CANalyzer

Generating time stamps

Each event which is sent or received by a Vector network interface has an accurate time stamp. Time stamps are generated for each channel in the Vector network interface. The base for these time stamps is a common hardware clock in the device.

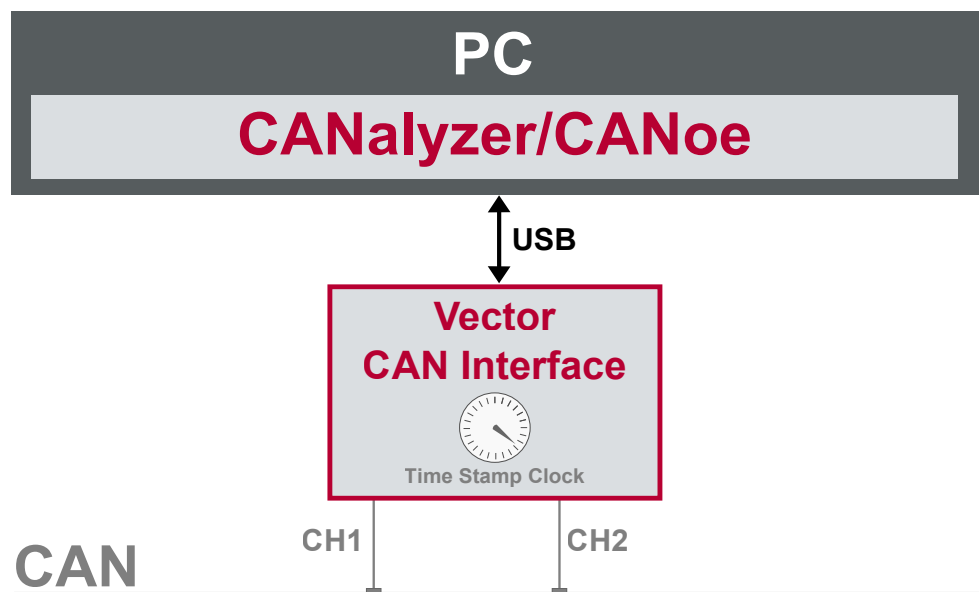


Figure 22: Common time stamp clock for each channel

If the measurement setup requires more than one Vector network interface, a synchronization of all connected interfaces and their hardware clocks is needed.

Due to manufacturing and temperature tolerances, the hardware clocks may vary in speed, so time stamps of various Vector devices drift over time.

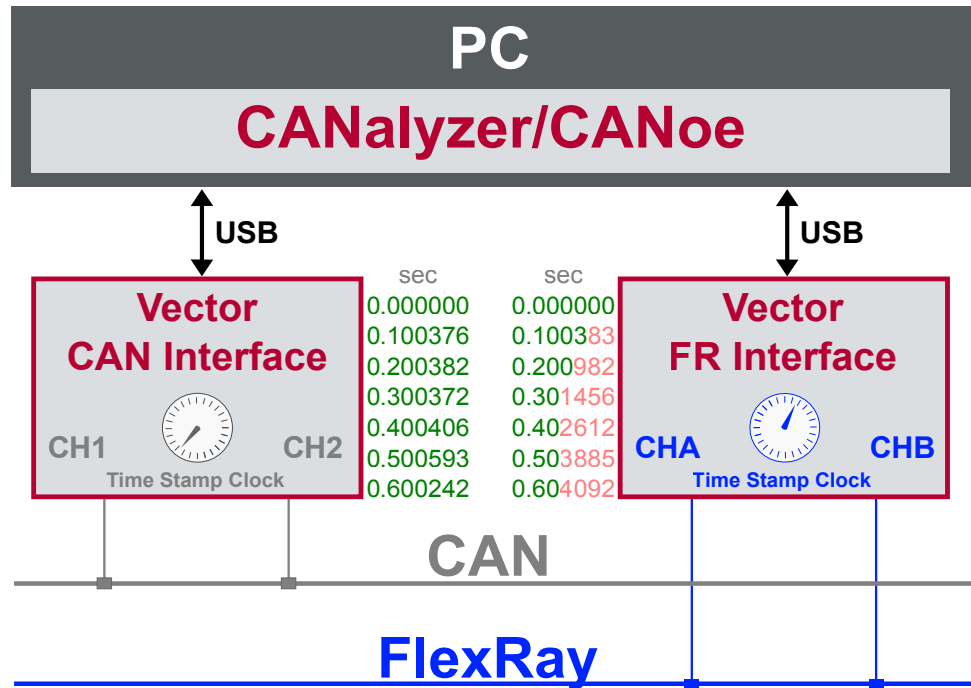


Figure 23: Example of unsynchronized network interfaces. Independent time stamps drift apart

To compensate for these time stamp deviations between the Vector network interfaces, the time stamps can be either synchronized by software or by hardware (see next section).



Note

The accuracy of the software and hardware sync depends on the interface. Further information on specific values can be found in the technical data of the respective devices.

5.2 Software Sync

Synchronization by software

The software time synchronization is driver-based and available for all applications without any restrictions. The time stamp deviations from different Vector network interfaces are calculated and synchronized to the common PC clock. For this purpose no further hardware setup is required.

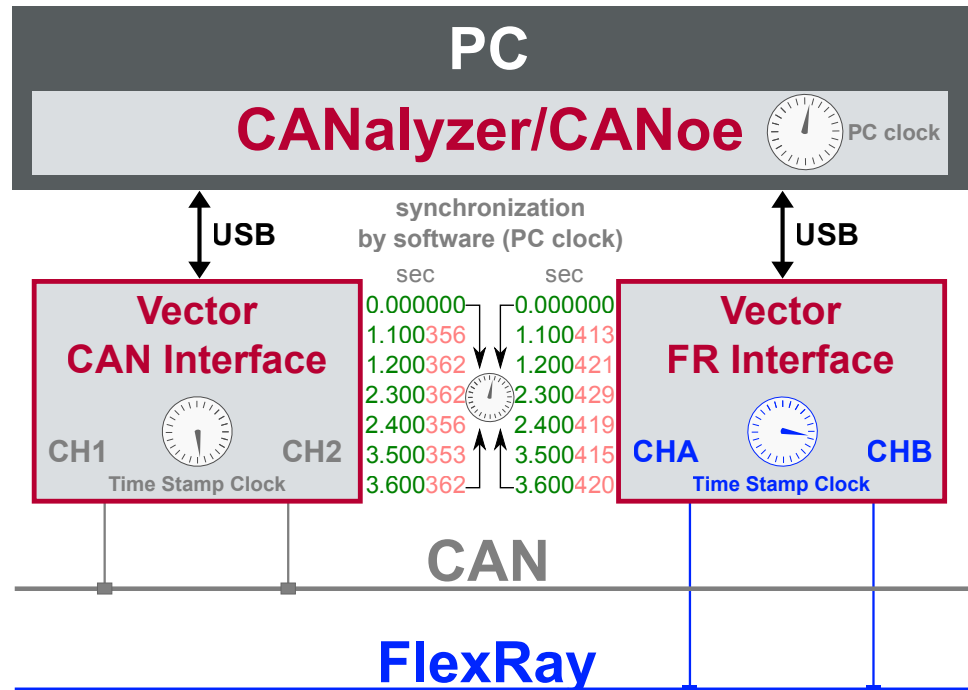


Figure 24: Time stamps of devices are synchronized to the PC clock

The setting of the software time synchronization can be changed in the **Vector Hardware Config** tool in **General information | Settings | Software time synchronization**.

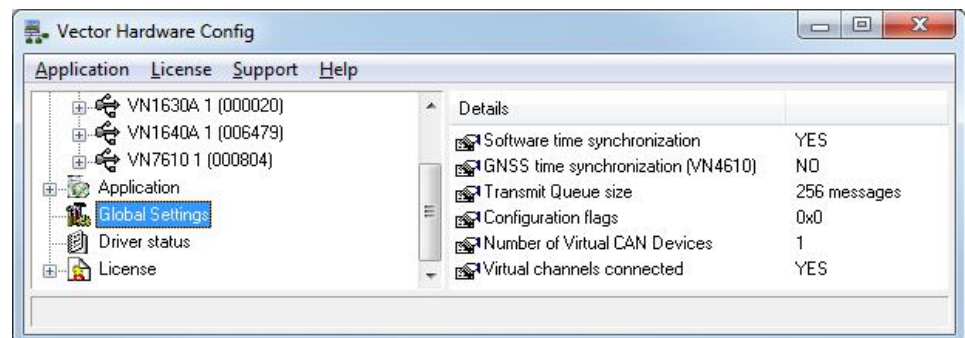


Figure 25: Switching on the software synchronization

- ▶ **YES**
The software time synchronization is active.
- ▶ **NO**
The software time synchronization is not active. Use this setting only if the Vector network interfaces are being synchronized over the sync line or if only a single device is used.

5.3 Hardware Sync

Synchronization by hardware

A more accurate time synchronization of multiple devices is provided by the hardware synchronization which has to be supported by the application (e. g. CANalyzer, CANoe). Two Vector network interfaces can therefore be connected with the SYNCcableXL (see accessories manual, part number 05018).

In order to synchronize up to five devices at the same time, a distribution box is available (see accessories manual, part number 05085).

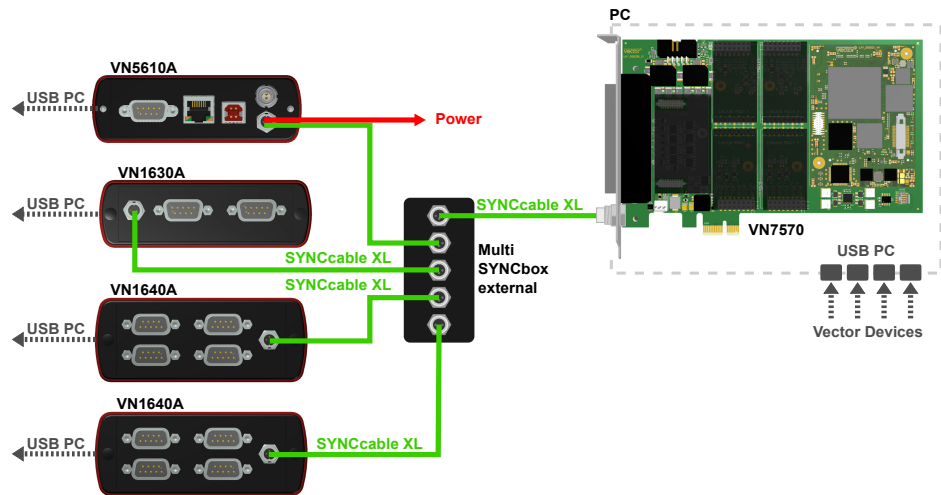


Figure 26: Example of a time synchronization with multiple devices

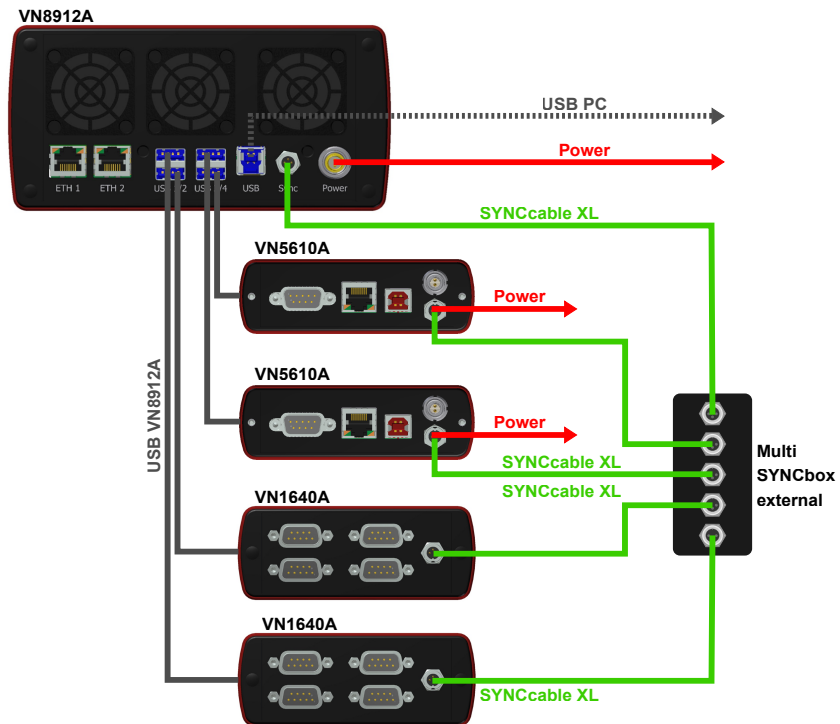


Figure 27: Example of a time synchronization with VN8912A and additional devices

At each falling edge on the sync line which is initiated by the application, the Vector network interface generates a time stamp that is provided to the application. This allows the application to calculate the deviations between the network interfaces

and to synchronize the time stamps to a common time base (master clock) which is defined by the application.

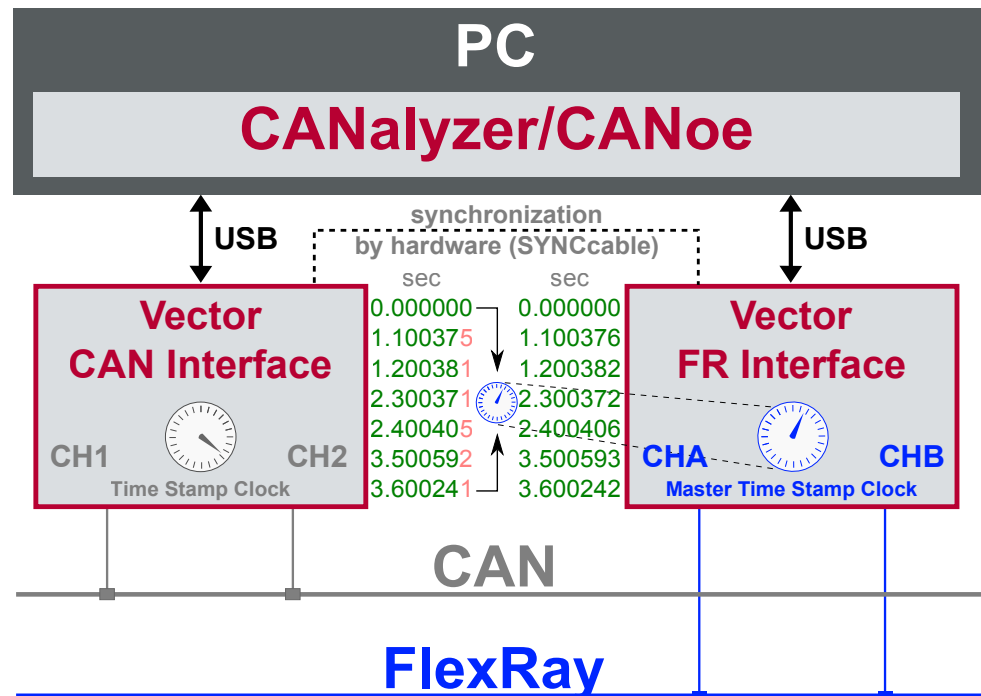


Figure 28: Time stamps are synchronized to the master clock



Note

The hardware synchronization must be supported by the application. For further information please refer to the relevant application manual. Please note that the software synchronization must be disabled (see **Vector Hardware Config | General information | Settings | Software time synchronization**) if the hardware synchronization is used.



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