
Documentation EtherCAT Sniffer Library for LabVIEW 1.0

This document describes the usage and installation of the “EtherCAT Sniffer Library for LabVIEW“ version 1.0.

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1 General Information

The “EtherCAT Sniffer Library for LabVIEW” is a LabVIEW library, that acquires EtherCAT process data parallel to an EtherCAT master. The process data is read by "sniffing" the Ethernet cable in the EtherCAT system. The EtherCAT data stream is accessed via a network TAP which copies the Rx data line of the EtherCAT bus to a separate network adapter. The EtherCAT Sniffer Library captures the data and parses the process data from the EtherCAT datagrams to build the process data image. The information about the EtherCAT system and process data setup is taken from an EtherCAT ENI file.

The library can be used to log, process and visualize process data from a control system like TwinCAT without changing anything in the control system.

Use cases can be:

- Data logging
- Maintenance monitoring
- Error analysis

2 System Requirements

2.1 Operating System

The library can be used on Windows XP, Vista and 7 with 32 and 64 bit with LabVIEW 32 bit.

2.2 LabVIEW

The library can be used with LabVIEW 2009 and higher in LabVIEW 32 bit.

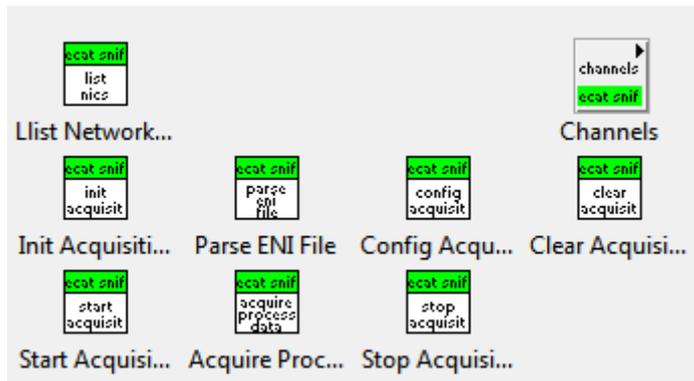
3 Installation

3.1 LabVIEW Library

The installer installs files directly to the LabVIEW directory (..\program files\National Instruments\LabVIEW xx\..)

The library is installed into the intr.lib folder in the subfolder "_Ackermann Automation\EtherCAT Sniffer Library".

The functions palette is installed under Instrument Drivers.



A shortcut to examples and documents is installed in the Start Menu in Programs -> Ackermann Automation -> EtherCAT Sniffer LabVIEW

3.2 LabVIEW Examples

The examples are installed in the LabVIEW examples folder
“..\Program Files\National Instruments\LabVIEW xx\examples\Ackermann Automation\EtherCAT Sniffer Library“.

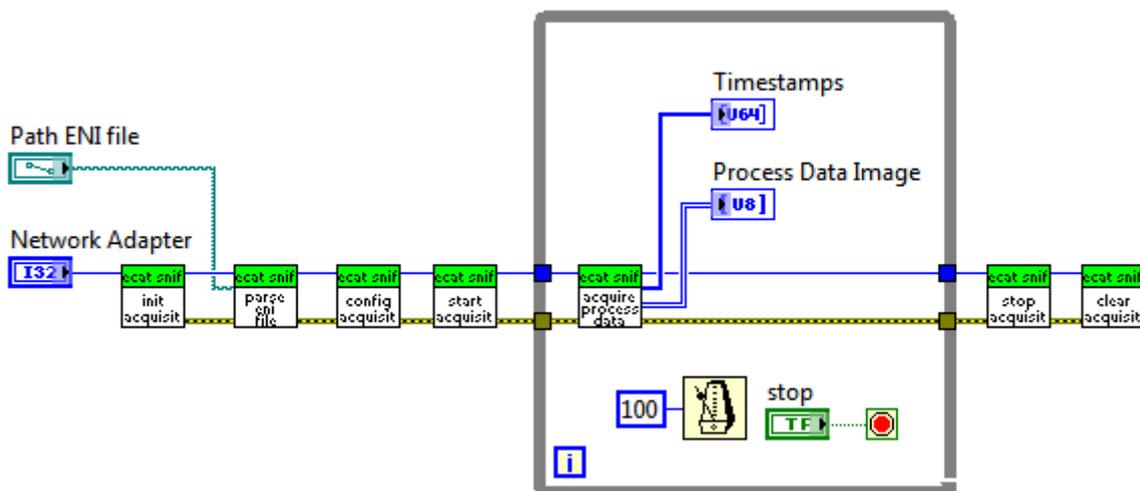
4 Programming

This chapter describes the principals of programming with the library. The detailed VI information can be found in the help file.

4.1 Acquiring Process Data

The basic chain of function calls to acquire the process data is as follows:

1. Initializing the acquisition by setting the network adapter
2. parsing the EtherCAT system ENI file
3. Calling configure acquisition
4. Calling start acquisition
5. Acquiring process data in a loop
6. Calling stop acquisition
7. Calling clear acquisition



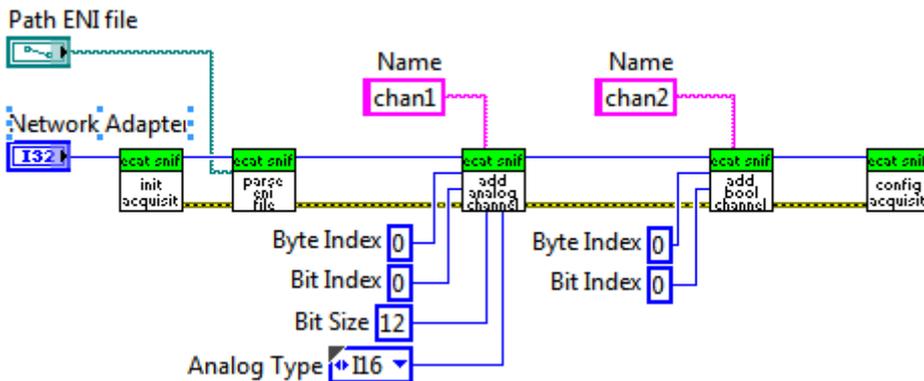
The network adapter is set by index. A list of available network adapters can be called using the list network adapters function.



4.2 Channel Configuration

The library supports data scaling and extraction to channels. The scaling and extraction is done in a c dll, which in general has a better performance than processing the data in LabVIEW.

The channels have to be configured before the function configure acquisition is called. Each channel is assigned a name, by which it can be referenced for reading.



There are 2 different channel types:

Analog

A data value is processed with 2 stages of gain and offset calculation. 2 stages are used for easier configuration. One set of gain and offset for calculation of ADC value to electrical value and one set of gain and offset for electrical value to physical unit.

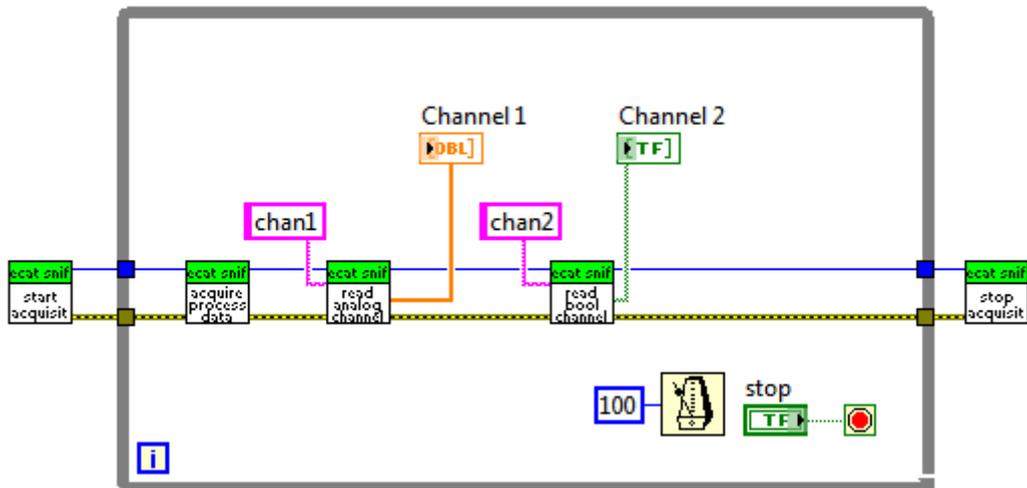
Bool

A single bit is extracted from a byte and bit offset.

4.3 Reading Channels

After the start of acquisition, the function acquire process data has to be called before reading any channel. This executes the data processing and makes the channel data available.

The channel data can then be read using the read channel functions. These use the channel name or channel indices to read the data.

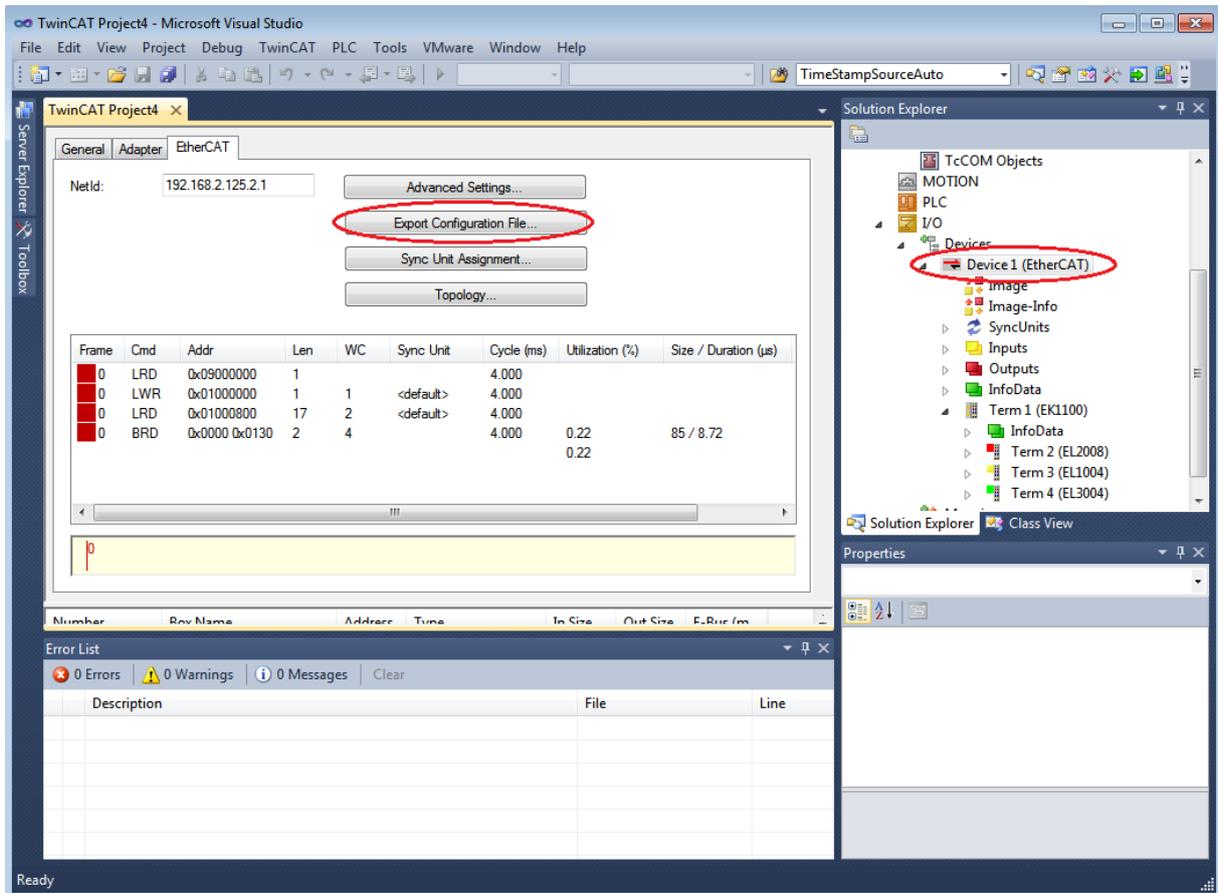


5 ENI File

The EtherCAT Sniffer Library uses an ENI file (EtherCAT Network Information) for the process data conversion. The ENI file holds all information about the bus topology and the process data setup of all slaves.

5.1.1 Export from TwinCAT

ENI files can be exported in the TwinCAT System Manager. The export function is located in the "EtherCAT Device" View.



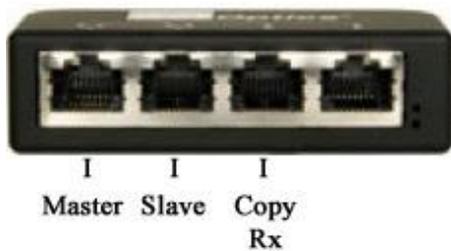
6 Hardware Connection

This chapter gives information about the hardware options to acquire the EtherCAT data stream. This is done by placing a network TAP (Test Access Point) into the EtherCAT topology.

6.1 Active Network TAP

An active network TAP copies the data stream to a monitor port, while the data passes through the device. For a realtime Ethernet it is important to use a zero delay device to not disturb the master cycle.

The EtherCAT Data Sniffer only reads the Rx line, so it is required that the network TAP does not merge Rx and Tx lines on the monitor port.



6.2 Access Location

The data exchange with the slave devices is done on the Tx line. The EtherCAT Data Sniffer only reads the Rx line with the returning packets. So the network TAP can be placed anywhere in the topology.

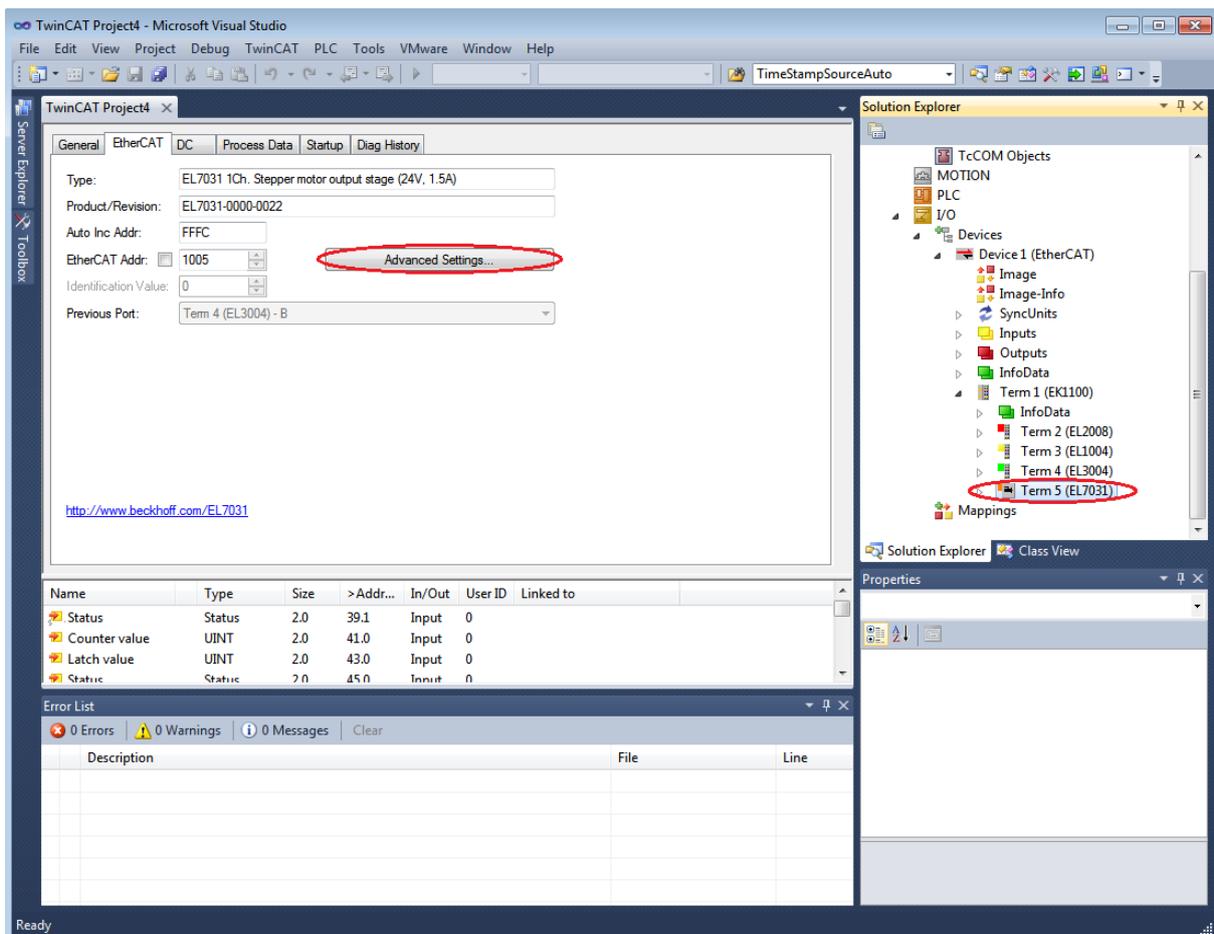
7 EtherCAT Configuration

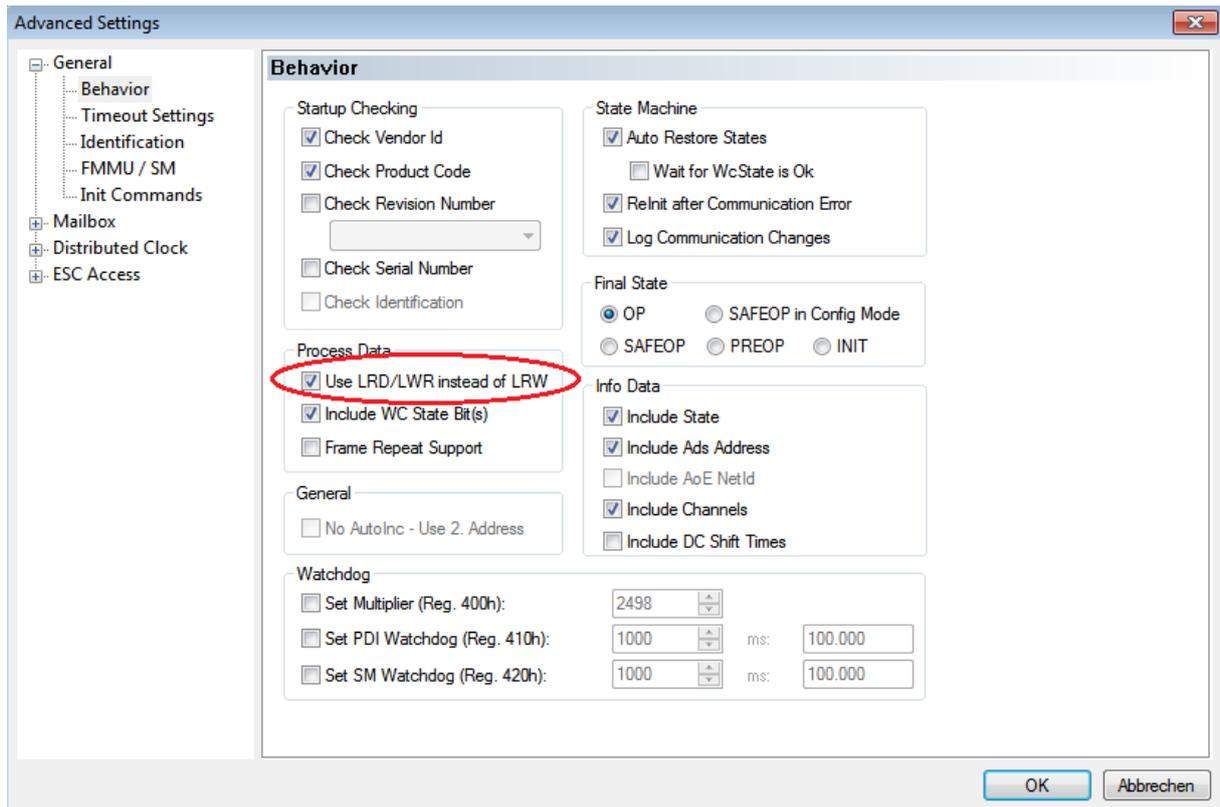
7.1 Cyclic Frame Configuration

The cyclic frames handle the process data of the slaves in an EtherCAT topology. A frame is sent on the Tx line from the master and passes all slaves. Input and output data is exchanged with the slaves while the frame passes the slaves.

For better performance on the bus "LRW" Datagrams can be used. These datagrams basically hold input and output information in one address space. The slave output data is taken from that address space and the slave input data is written to that address space. This results in the problem, that output data, which shares address space with input data, is not available on the Rx line. It can therefore not be read by the EtherCAT Process Data Sniffer software.

The use of LRW datagrams can be configured in TwinCAT per slave. So if it is necessary to read inputs and outputs, the configuration of that slave has to be changed to not use LRW datagrams.





8 Licensing

The licensing is done by USB dongle.

If no USB dongle is found, the library is in demo mode for 10 minutes.

9 Support

For support contact:

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