

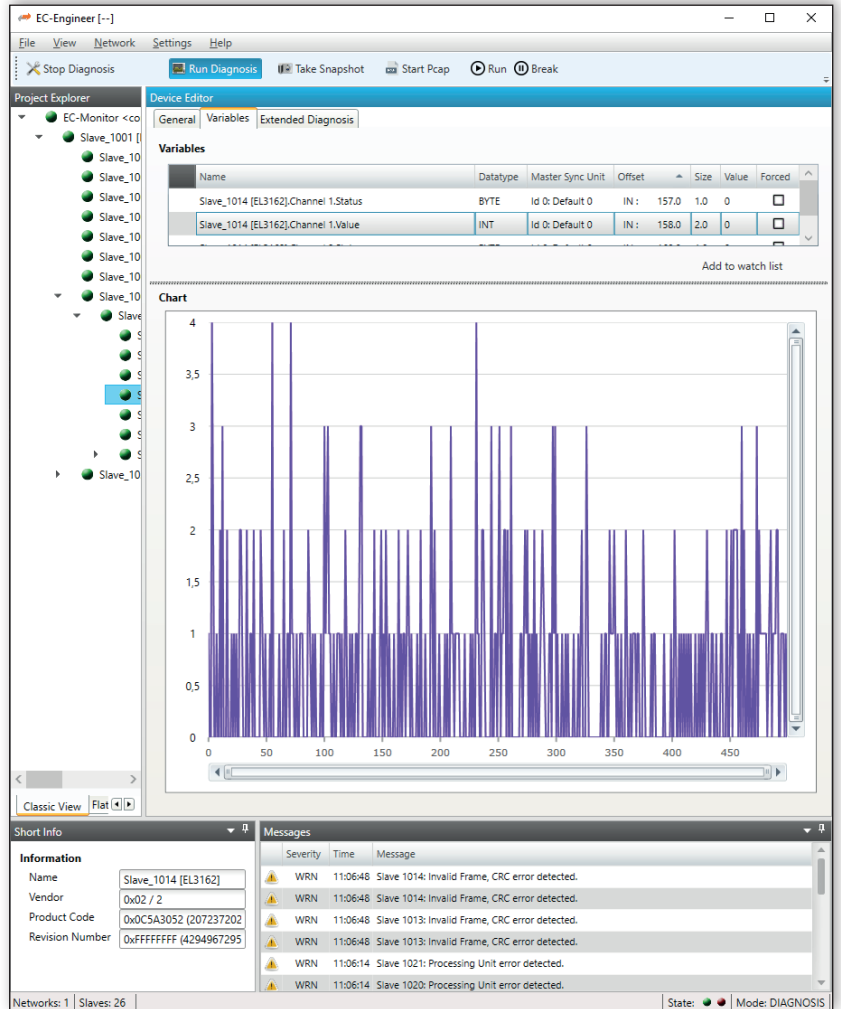
Troubleshooting and Monitoring Tool for EtherCAT® Networks

EtherCAT® Analysis without any Impact on the Network

EC-Inspector is an easy-to-use Windows® application for analyzing and monitoring EtherCAT® networks. The program can be used independently from the master controller and works with EtherCAT® masters of many manufacturers. EC-Inspector analyzes the complete data traffic between the master and the EtherCAT® slaves via a TAP (Test Access Point) device inserted after the master. The TAP device enables both the outgoing frames (Master → Slaves) and the incoming frames (Master ← Slaves) to be recorded and evaluated.

With EC-Inspector, there is no need to intervene in the network, the controller, the EtherCAT® master software, or the configuration. Thus, EC-Inspector is suitable for new installations (greenfield) as well as for existing systems and machines (brownfield). The raw data is decoded and associated with the corresponding symbolic variables (inputs and outputs) based on the descriptions from the EtherCAT® Network Information file.

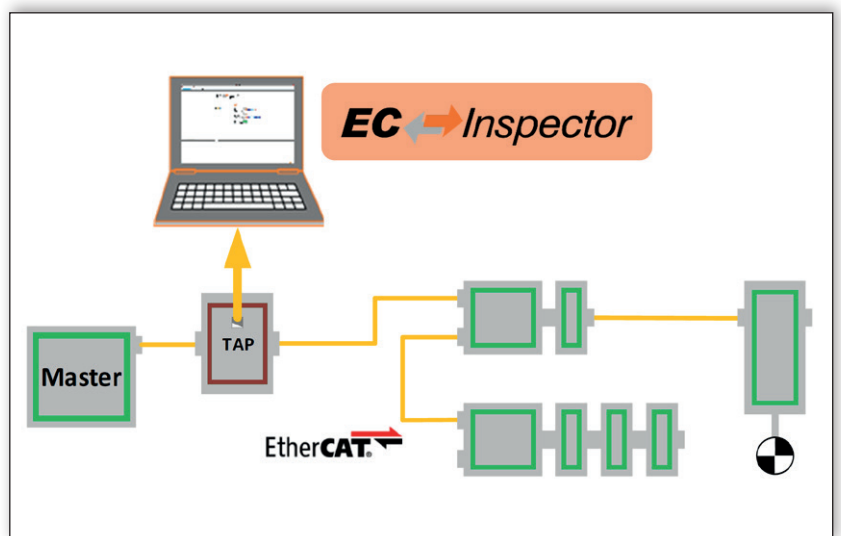
In addition to monitor process data, EC-Inspector can also be used to analyze communication faults on the EtherCAT® network.



System Architecture

A Test Access Point (TAP) must be inserted into the existing EtherCAT® network to capture the EtherCAT® frames. The TAP is recommended to be placed between the master and the first slave, but it can also be installed between any two slave devices. However, it is only possible to completely analyze all input and output data when the TAP is installed immediately after the master, because some data (LRW commands) are overwritten by the downstream slave's subsequent input data. The selected TAP device, e. g. Dualcomm ETAP-1000, should have a small propagation delay to minimize its impact on the overall network timing.

The "monitor" port of the TAP is connected to the computer running EC-Inspector via a standard Ethernet cable.



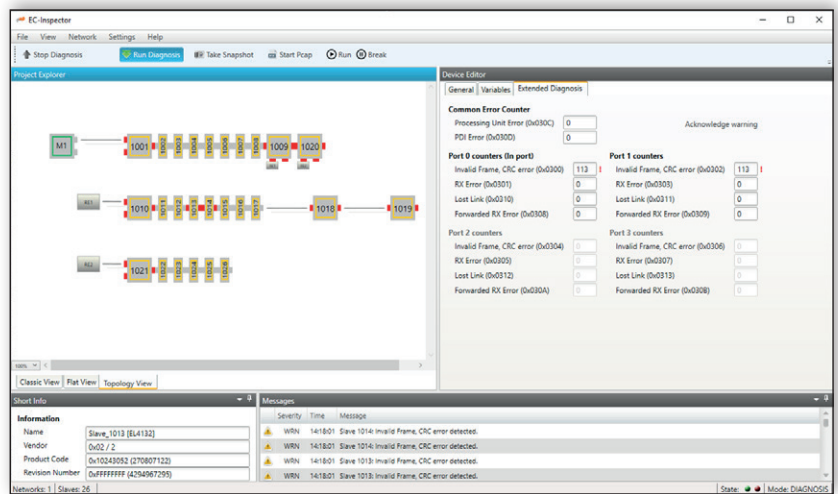
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Analysis of Communication Problems, Frame Errors, Link Loss

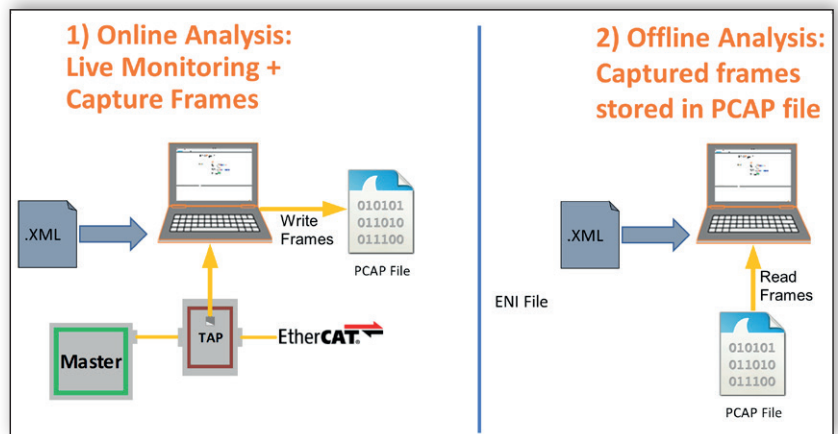
Part of the data communication recorded by the EC-Inspector contains information that informs about the transmission quality of the network. EC-Inspector processes this information accordingly and displays the results graphically.

For example, the location and cause of possible errors can be determined by the slave and port-specific error counters (bad cables or faulty plug connections). In the topology view, this is indicated by respective symbols. In addition, every new error that occurs is also reported and logged.



Capturing and Processing of Network Traffic (Wireshark File)

EC-Inspector makes it possible to monitor live data and save the complete traffic to a PCAP file (in parallel). This file can also be loaded and evaluated with EC-Inspector to analyze process data and errors cycle by cycle. This feature provides a simple and fast detection of communication faults, as well as a symbolic association of all input and output data. The investigation of PCAP files recorded by Wireshark is also possible.



Features

- Analyzing and Decoding the EtherCAT® Protocol
- Utilizes the EtherCAT® Network Information (ENI) file
- Monitoring of Process Data Variables including Trigger Conditions
- Monitoring of Slave States
- Monitoring of Slave Error Counters (ESC registers 0x300 to 0x313)
- Graphical View of Network Topology
- Processing of Previously Captured and Saved Raw Network Traffic (Wireshark files)
- Take Snapshots to Save to Files

Advantages and Benefits

- No integration with the existing master controller required
- No specific TAP device required, even a regular switch device may be used
- No impact (e.g. timing, load) on the existing network and application
- No changes to existing software required
- Very small engineering effort: simply use the existing ENI file
- Use the same tool to analyze machines operated by controllers from different manufacturers (Beckhoff, Bosch-Rexroth, Omron, Yaskawa, etc.)
- No installation of Windows® Packet Capture Library & Driver (WinPcap / Npcap) required



EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

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