

Software Library for Monitoring EtherCAT® Networks

Overview

With the EC-Monitor software library it is possible to analyze and evaluate the data traffic of an EtherCAT® network. The library records the EtherCAT® frames and provides the decoded data to a customer application. In addition to the process data (inputs and outputs), the slave states, the slave error counters and other data are also extracted from the EtherCAT® frames.

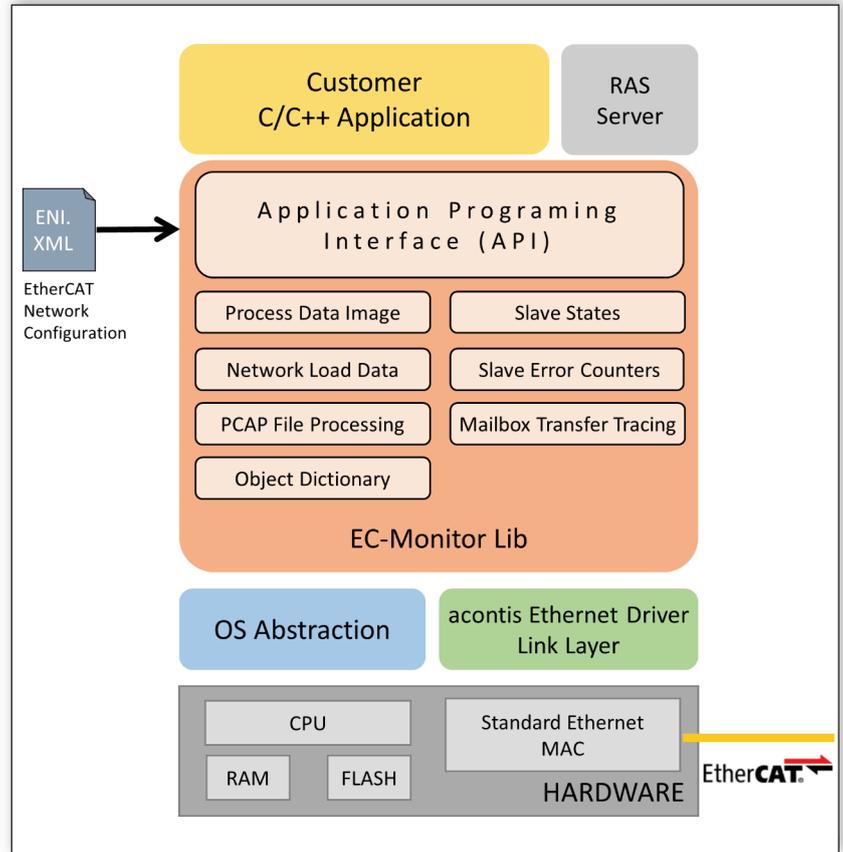
Software Architecture

The EC-Monitor library can be used on numerous operating systems like Windows®, Linux, QNX, and more without any modifications. The network controller is connected via a special driver from acontis known as the link layer.

EC-Monitor processes the ENI file and uses it to determine a variety of aspects of the system like the number of slaves, the structure of the process image, the variable names, and the variable offset in the process data image.

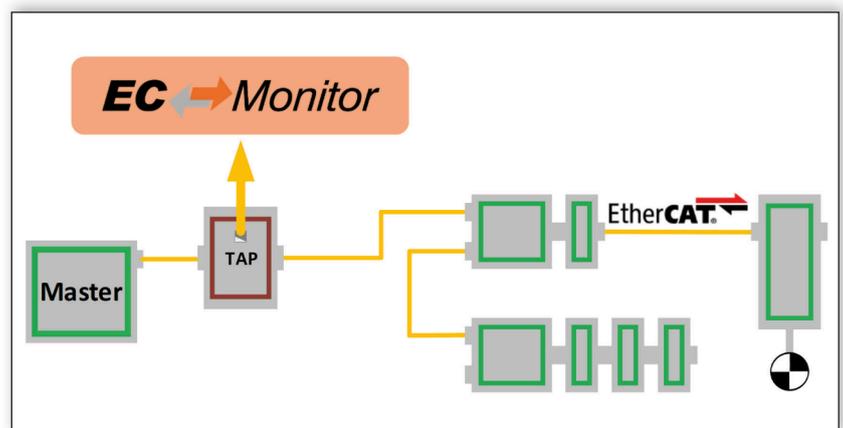
The API provides functions to access the process data memory, the slave registers and the object dictionary and much more.

The Remote Access (RAS) server enables online diagnosis services for the EC-Engineer tool, or for remote control by customer applications.



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 TAP device selected, e. g. Dualcomm ETAP-1000, should have a small propagation delay to minimize its impact on the overall network timing.

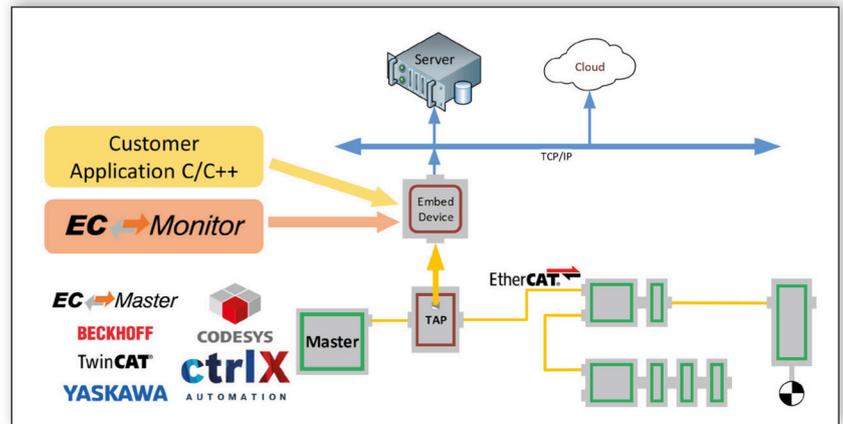


Software Library for Monitoring EtherCAT® Networks

Use Case:

IIoT Gateway, Edge Device

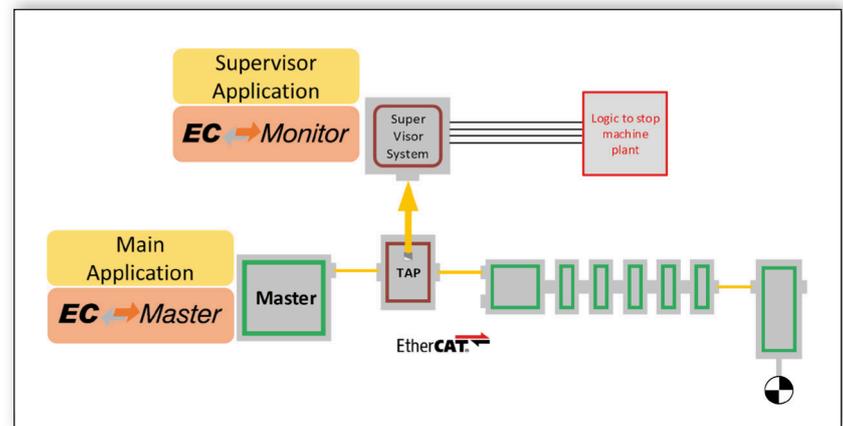
An important feature of the EC-Monitor library is the lossless recording of all process data. This is a prerequisite for implementing applications for quality assurance (condition monitoring) or for predictive maintenance. The recorded data can then be analyzed and processed with appropriate algorithms, e.g., on a PC or in an embedded device. The information collected may afterwards be forwarded to a central server or into the cloud.



Use Case:

Observation of Critical Applications with a “Supervisor” System

The EC-Monitor library allows the complete investigation of the entire process data of an EtherCAT® network in Real-time. For safety-critical applications, this data can be validated by an application on another system. This monitoring system thus controls the main application and can take appropriate measures to shut down the main controller in the event of a fault.



Features

- Analyzing and Decoding the EtherCAT® Protocol
- Utilizes the EtherCAT® Network Information (ENI) file
- Monitoring of Process Data Variables
- Monitoring of Slave States
- Monitoring of Slave Error Counters (ESC registers 0x300 to 0x313)
- Monitoring of CoE mailbox protocol
- Processing of previously captured raw network traffic (Wireshark files)
- Save raw network traffic in a PCAP (Wireshark) file
- RAS-Server for EC-Engineer support

Advantages and Benefits

- No integration with an existing master controller required
- Suitable for new (greenfield) and existing (brownfield) installations
- No specific TAP required, even a regular switch device may be used
- No impact (e.g. timing, load) on the existing application
- No changes to existing software required
- Very small engineering effort: simply use the existing ENI file
- Use the same software to analyze machines operated by controllers from different manufacturers (Beckhoff, Bosch-Rexroth, Omron, Yaskawa, etc.)