

EtherCAT[®] Master Stack

IXXAT offers in cooperation with acontis technologies an EtherCAT Master stack to fast and easily implement EtherCAT based controllers.

The EtherCAT Master stack is designed and specifically optimized to run on various embedded (real time) operating systems.

Implementations are already available for [Microsoft Windows CE](#), [Wind River VxWorks](#), [On Time RTOS-32](#), [QNX Neutrino RTOS](#), [IntervalZero RTX](#), [TenAsys INtime for Windows](#) and [Linux with RT Preempt Patch \(Kernel V2.6.24 and higher\)](#). For Microsoft Windows XP and Windows 7 a non-real-time capable version is also available.

Advantages of using the EtherCAT Master stack

- Compliant to the EtherCAT Master Class Directive according to ETG.1500
- Two product editions available: Class A (Full Featured) and Class B (Basic Features)
- Reliable, field-tested and robust implementation for various CPU architectures like x86, ARM, PowerPC and others; well proven in more than 40 customer applications worldwide
- Operating system and compiler independent, optimized for SMP multi-core operation (symetric multi-processing)
- High performance with low CPU load and small memory footprint, no file system required

Modular Architecture

The EtherCAT Master stack consists of:

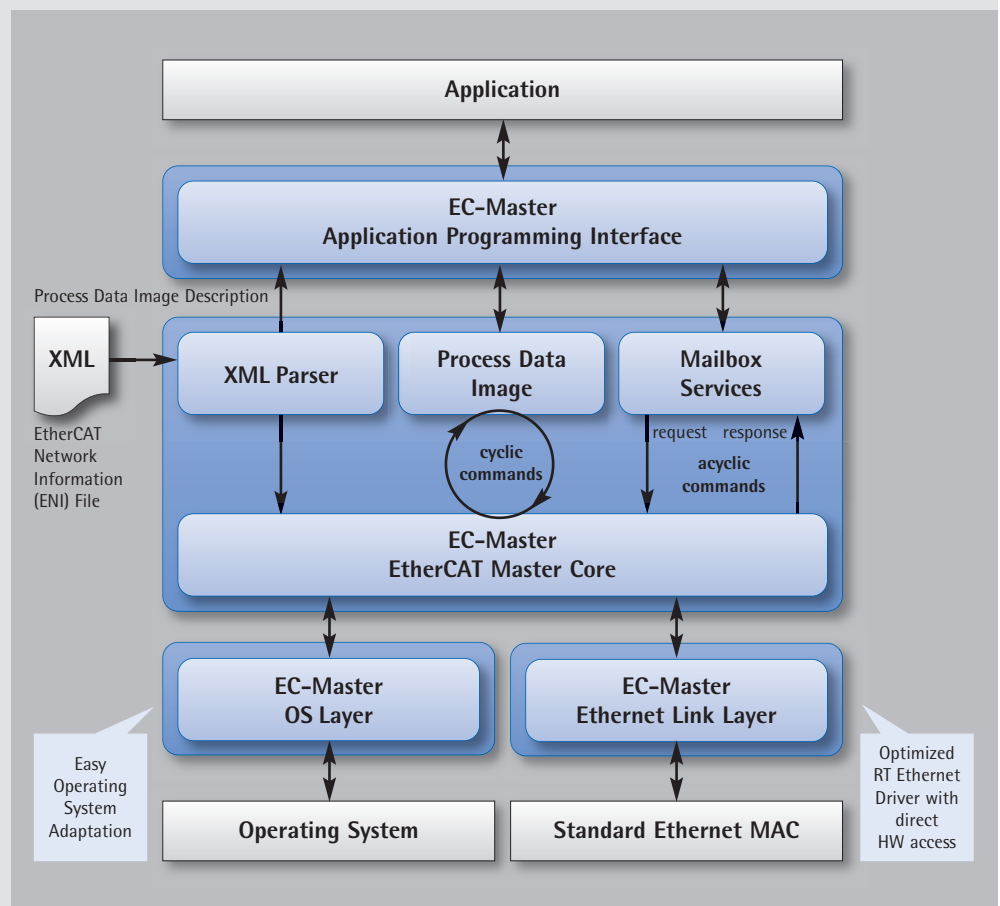
- Application Programming Interface: API for the EtherCAT master.
- EtherCAT Master Core: The main EtherCAT master functionality is implemented in the core layer.

All protocol handling, e.g. process data transfer and mailbox protocols (CoE, EoE, FoE, SoE, AoE) are executed here.

- Ethernet Link Layer: Handles the data exchange between master and slaves. Zero-copy and/or polling techniques together with the core layer are supported to achieve best real time performance and minimize CPU load.
- OS Layer: The only operating system specific module. All operating system calls are handled here. To achieve the best performance the most functions are implemented using simple "C"-language macros.

Supported EtherCAT Features – Class B Edition

- Support of EtherCAT Network Information (ENI) configuration file
- Compare configured and existing network configuration during boot-up
- Cyclic process data exchange (I/O data)



- CANopen over EtherCAT (CoE) protocol
 - SDO Upload and Download
 - SDO Information Services to access CANopen Object Dictionary
 - Emergency Request
- Ethernet over EtherCAT (EoE) protocol (virtual switch)
- Servo Profile over EtherCAT (SoE) protocol
- Slave to Slave Communication
- Support of Safety over EtherCAT (FSoE) slaves
- Error detection and diagnosis
 - Bus scan with bus topology and configuration validation of the slaves (slave detection without existing bus configuration, EEPROM information service, EtherCAT Slave Information (ESI) format)
 - Cable break detection
 - Wrong or missing slave response
 - Supervising slave states and monitoring of slave operation
 - Support of Ethernet link layer debug messages for run-time error diagnostics
- Optional usage of the alias addressing

Supported EtherCAT Features – Class A Edition

- All Class B features
- Synchronization with Distributed Clocks (DC) including Master Synchronization (DCM)
- File Transfer over EtherCAT (FoE) mailbox protocol
- ADS over EtherCAT (AoE) mailbox protocol
- Vendor over EtherCAT (VoE) mailbox protocol

Optional functions (Feature Packs)

- Hot Connect (HC) support to dynamically connect and disconnect slaves while others are in full operation
- Redundancy support (ring topology), can be combined with Hot Connect Feature Pack
- Control of multiple, independent EtherCAT networks by one master
- Master Object Dictionary with objects for master state, slave state, error history and bus-scan result. Access via SDO services.
- TCP/IP remote interface with identical API for remote and local operation. Useful feature for diagnostic and configuration tools.

EtherCAT Out-of-the-box

Microsoft Windows CE

The EtherCAT Master stack is available for:

- Windows CE 5.0, 6.0 and 7.0 on platforms x86, XScale and ARM
- Optimized link layer for Intel PRO/100, Intel PRO/1000, Realtek 8139 and Realtek 8111/8168/8169

Wind River VxWorks

The EtherCAT Master stack for VxWorks is delivered in source code and will be adapted to customers environment (VxWorks version and processor architecture) during system integration. The EtherCAT Master stack is available for:

- All VxWorks Versions from 5.4 up to 6.9 (SMP) on platforms x86, ARM, PowerPC and others
- Optimized link layer for Intel PRO/100, Intel PRO/1000, Realtek 8139 and Realtek 8111/8168/8169

On Time RTOS-32

The EtherCAT Master stack is available for:

- Version 5.x
- Optimized link layer for Intel PRO/100, Intel PRO/1000, Realtek 8139 and Realtek 8111/8168/8169

QNX Neutrino RTOS

The EtherCAT Master stack is available for:

- Version 6.x on x86 platforms
- Optimized link layer for Intel PRO/100, Intel PRO/1000, Realtek 8139 and Realtek 8111/8168/8169

IntervalZero RTX

The EtherCAT Master stack is available for:

- RTX 8.1, RTX 2009 and RTX 2011
- Optimized link layer for Intel PRO/100, Intel PRO/1000, Realtek 8139 and Realtek 8111/8168/8169

TenAsys INtime for Windows

The EtherCAT Master stack is available for:

- Version 3.x and 4.x
- Optimized link layer for Intel PRO/100, Intel PRO/1000, Realtek 8139 and Realtek 8111/8168/8169

Linux with RT Preempt Patch (Kernel V2.6.24 & higher)

- Optimized link layer for Intel PRO/100, Intel PRO/1000, Realtek 8139 and Realtek 8111/8168/8169

Linux without Real Time requirements

- All Linux network drivers are supported using the Raw Socket link layer implementation

Microsoft Windows XP and Windows 7 without Real Time requirements

- All Windows network drivers are supported using the WinPcap link layer implementation