EC Simulator

EtherCAT® Network Simulation

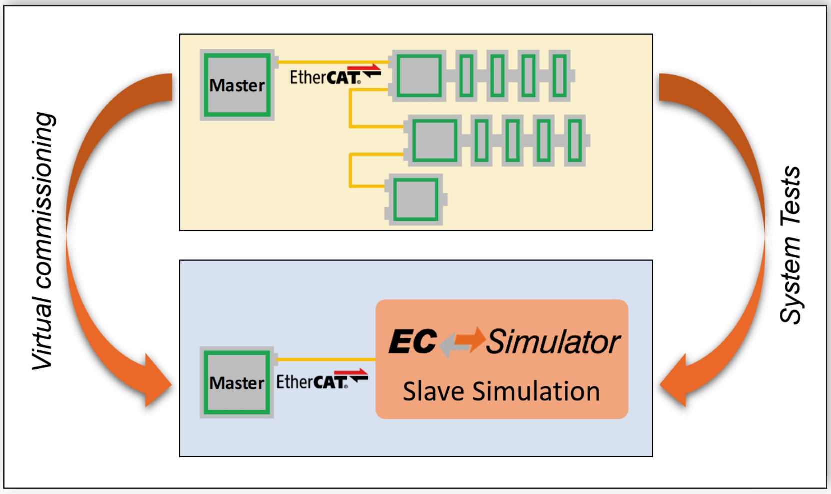
Run an EtherCAT® Controller with a Simulated Network

Overview

EC-Simulator virtualizes EtherCAT® networks to run EtherCAT® Master systems without real EtherCAT® slaves. Configuration of the simulated network is seamless using the ENI file of the real network.

The Software Development Kit allows programmatic changes to Process Data, SDOs and EtherCAT® Slave Stack interaction. Various other engineering, testing or virtualization tools like ISG Virtuos® can be connected.

Optionally, the simulator can be fully integrated into an EC-Master based application without the need to connect with an external simulator hardware via a dedicated physical network adapter (SiL).



Virtual commissioning

System Tests

Master

EtherCAT

Master

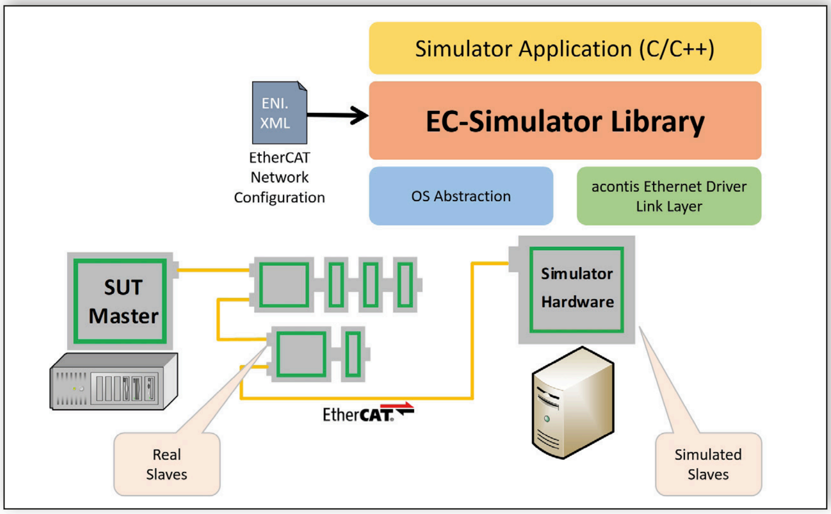
EtherCAT

EC Simulator

Slave Simulation

Hardware-in-Loop (HiL) Simulation

- The System-Under-Test (SUT) is communicating via an EtherCAT® cable with the EC-Simulator software running on an external hardware, the HiL System
- Existing EtherCAT® master systems can be connected without the need to modify them using the standard, physical network interface
- Combine real slaves and simulated slaves to create a Digital Twin step-by-step



Simulator Application (C/C++)

ENI. XML

EtherCAT Network Configuration

EC-Simulator Library

OS Abstraction

acontis Ethernet Driver Link Layer

SUT Master

Simulator Hardware

EtherCAT

Real Slaves

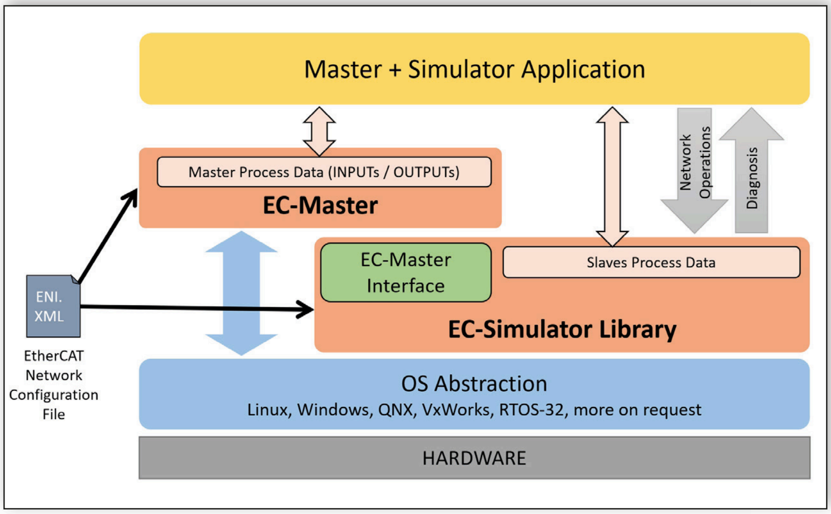
Simulated Slaves

Software-in-Loop (SiL) Simulation

- Run acontis EC-Master applications where the Simulator is fully embedded and without the need for a dedicated physical network adapter and external hardware
- Integrate testing algorithms directly into the System Under Test's application

Software Development Kit

- The EC-Simulator SDK supports writing custom applications in C/C++ and optionally in Python or .NET.
- The network configuration file (ENI) allows the system implementation in a declarative way. The configuration file may also contain extended simulator settings. Furthermore, the application can programmatically define the system's behavior using various APIs and register callbacks.
- The SDK's OS abstraction layer allows writing portable application code for a wide range of operating systems.



Master + Simulator Application

Master Process Data (INPUTs / OUTPUTs)

EC-Master

Network Operations

Diagnosis

ENI. XML

EtherCAT Network Configuration File

EC-Master Interface

Slaves Process Data

EC-Simulator Library

OS Abstraction

Linux, Windows, QNX, VxWorks, RTOS-32, more on request

HARDWARE

acontis technologies

acontis technologies

www.acontis.com
sales@acontis.com

GERMANY – Headquarters
acontis technologies GmbH
Franz-Beer-Straße 98, 88250 Weingarten
Tel. +49 (0) 751 - 560 30 30

USA
acontis technologies Incorporated
945 Concord St., Framingham, MA 01701
Ph. +1-508-809-7200

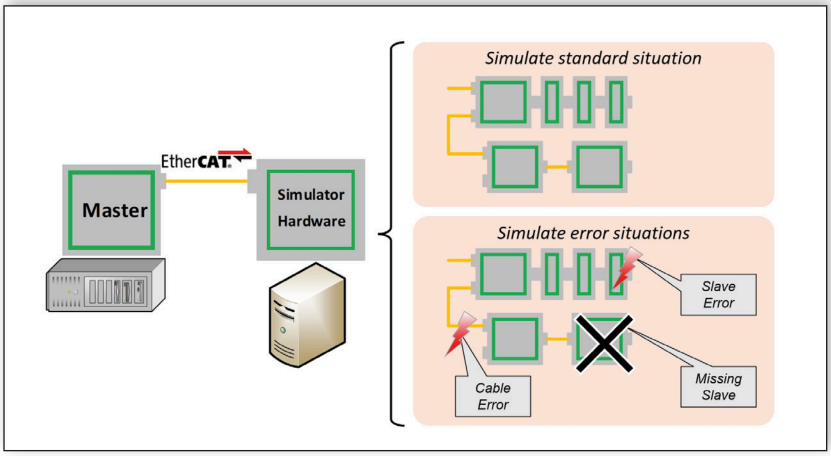
JAPAN
acontis technologies Japan
〒226-0027
神奈川県横浜市緑区長津田1-22-10-42
電話 +81-(0)80-3097-4111

EtherCAT® Network Simulation

EC-Simulator

Use Cases

- Virtual commissioning / Digital Twin:
  Test and optimize the application at an early stage of the engineering, even without any real existing target hardware. Test error scenarios which are dangerous and/or lead to damages
- EtherCAT® simulation mode for customer application
- EtherCAT® control system release tests:
- Test extended scenarios, e.g., simulate topology changes. Simulate slave errors, huge networks, mismatching topologies, etc.
- Software development and education

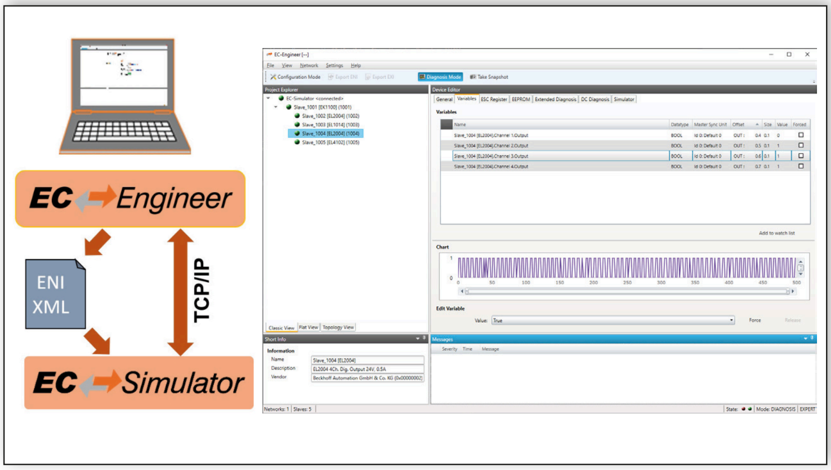


Configuration with EC-Engineer

- Define simulated network topology
- Modify CoE Objects contents
- Set simulated slave application type

Diagnosis with EC-Engineer

- Check EtherCAT® state
- Monitor OUTPUTs received from Master
- Set INPUTs at Simulator sent to Master
- Inspect CoE objects
- Set link loss simulation, incl. CRC errors
- Analyze error counters
- Power slaves off or on
- Change cabling (slave connections)



Advantages and Benefits

- Ready-to-run on various operating systems
- Run tests in purely virtualized environments
- Reproducibility of test results
- Cost-effective
- Time-saving
- Decoupled SW and HW development
- Easily increase test coverage including regression testing
- Scale-up testing environments without changing hardware
- Test custom slave firmware code versions without flashing
- Analyze Master application behavior for slaves not physically available
- Mock exceptional slave behavior

Features

- Standard EtherCAT® Network Information (ENI) file is used to configure the EC-Simulator software
- Support for EtherCAT® masters from many manufacturers
- Full simulation of slave firmware and EtherCAT® Slave Controller (ESC)
- Comprehensive diagnosis with EC-Engineer
- Mailbox protocols CoE (SDO and PDO, Object Dictionary), EoE, FoE
- Support for all mailbox initialization commands
- Support for distributed clocks
- Mixed Mode support including real slaves in simulated networks
- Network error simulation for link loss or CRC errors
- Network operations to programmatically change topology
- DS402 (CiA402) motion profile support

acontis technologies
www.acontis.com
sales@acontis.com

GERMANY – Headquarters
acontis technologies GmbH
Franz-Beer-Straße 98, 88250 Weingarten
Tel. +49 (0) 751 - 560 30 30

USA
acontis technologies Incorporated
945 Concord St., Framingham, MA 01701
Ph. +1-508-809-7200

JAPAN
acontis technologies Japan
〒226-0027
神奈川県横浜市緑区長津田1-22-10-42
電話 +81-(0)80-3097-4111