



acontis technologies GmbH

SOFTWARE

EC-Engineer Web

User Manual

Version 2.2

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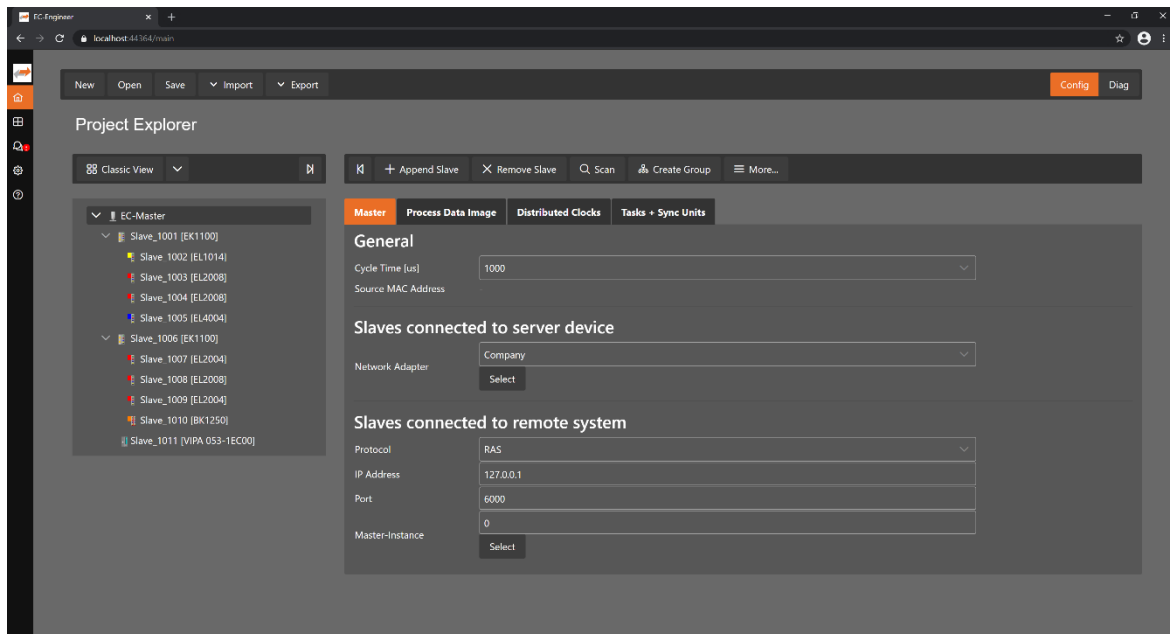
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1 Introduction

1.1 Overview

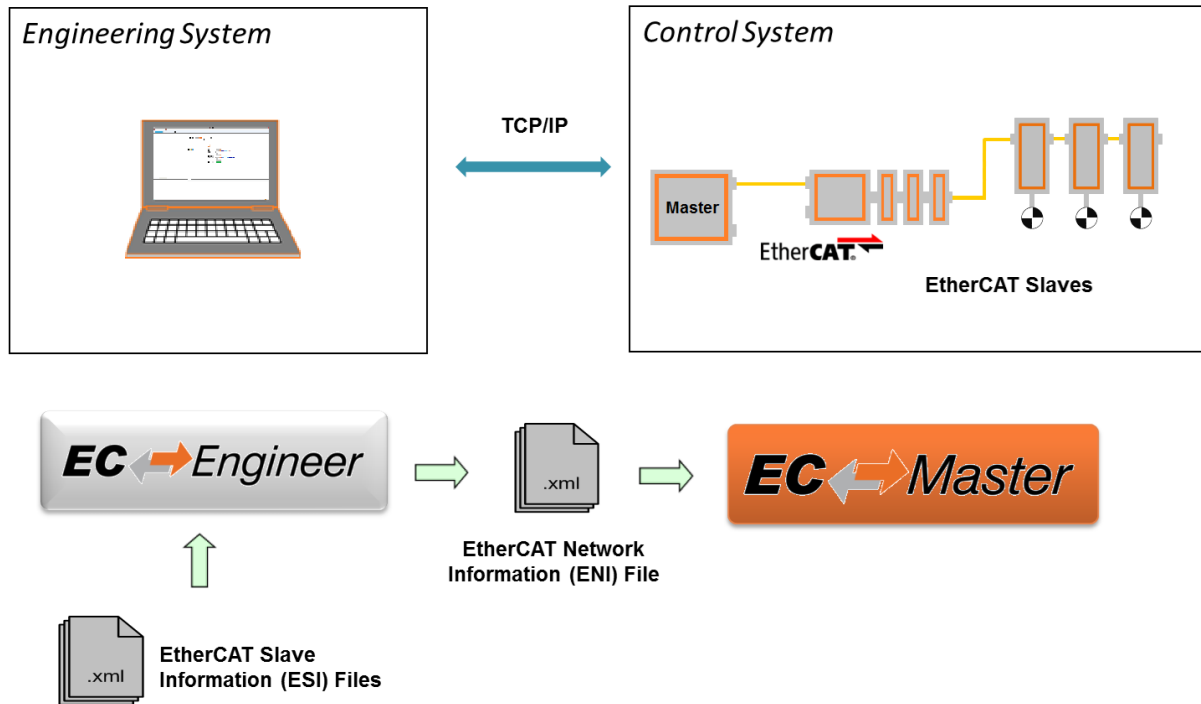
EC-EngineerWeb is a configuration and diagnosis tool for EtherCAT networks that are controlled by the EC-Master.

The following screenshot shows the EC-EngineerWeb in configuration mode:



It runs on the Engineering System where the engineer can configure the EtherCAT network. All slaves default to settings that match the Slave's typical use case. Complex networks or installations with special requirements need adjustments to the default settings. Using the Configuration Mode, the user can configure his EtherCAT network according to the project's needs.

As the result of his work the user can export the EtherCAT Network Information (ENI) file, which is necessary to run the EC-Master on the Control System:



1.2 Requirements

Client

Screen resolution at least 1024x768 pixel

Supported browsers

- Chrome
- Firefox
- Opera
- Edge
- Safari

Server

Memory as recommended for operating system

Disk space approximately 80 MB (depend on number of ESI files)

Windows (x86/x64)

Microsoft Windows 10 and above

Linux (x64/ARM)

Ubuntu 16.04 x64 and above

MacOS (x64)

MacOS High Sierra 10.13 and above

1.3 EtherCAT Slave descriptions (ESI files)

The EC-EngineerWeb needs information about each Slave Type to correctly initialize it, give reasonable default settings and present the configurable properties to the user. The knowledge about the different Slave types is gathered from ESI files. The ESI files can be managed by the *ESI-Manager*.

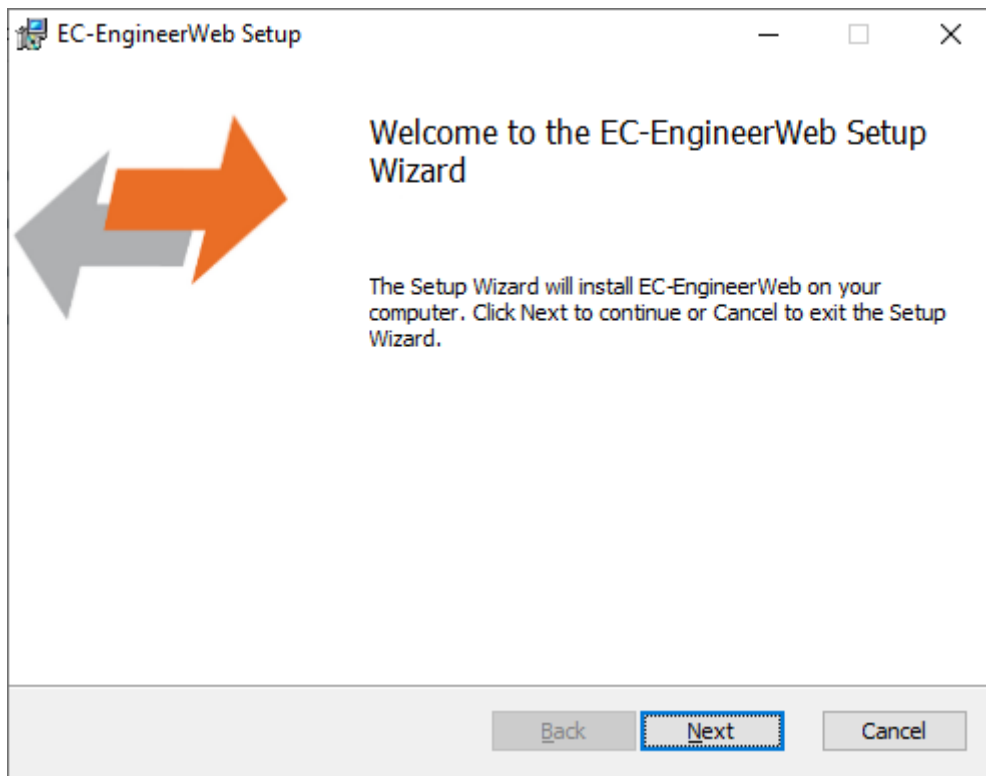
2 Installation

2.1 Windows

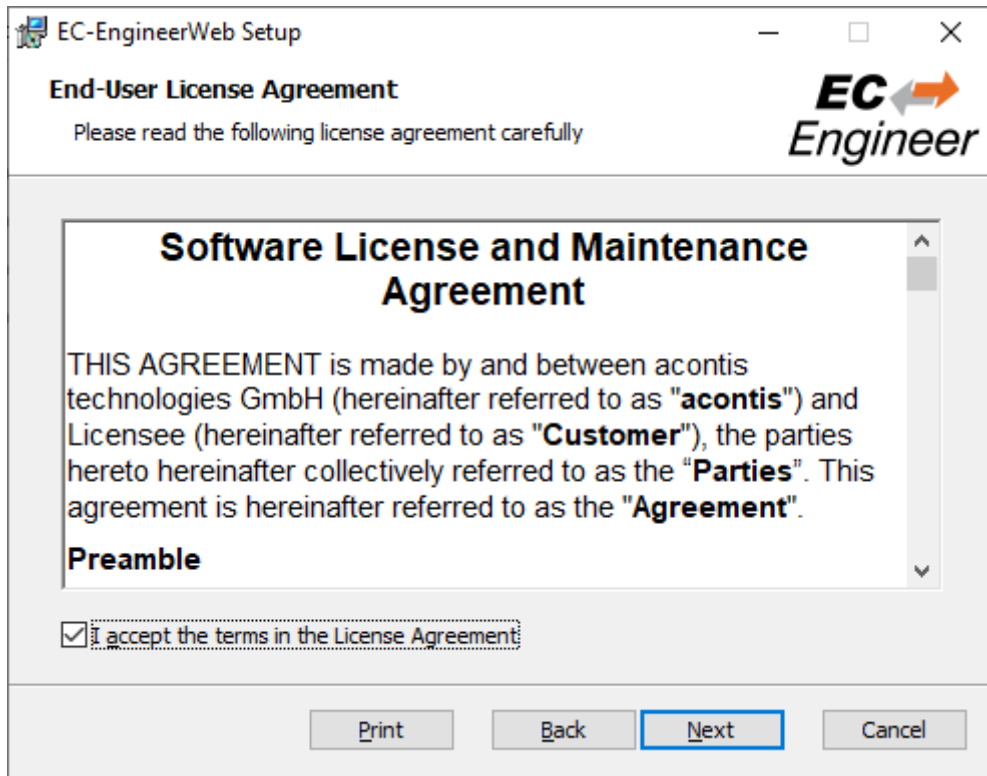
2.1.1 Setup Process

The product can be installed by executing the `setup.exe` (requires administrator privileges) and follow the screen instructions:

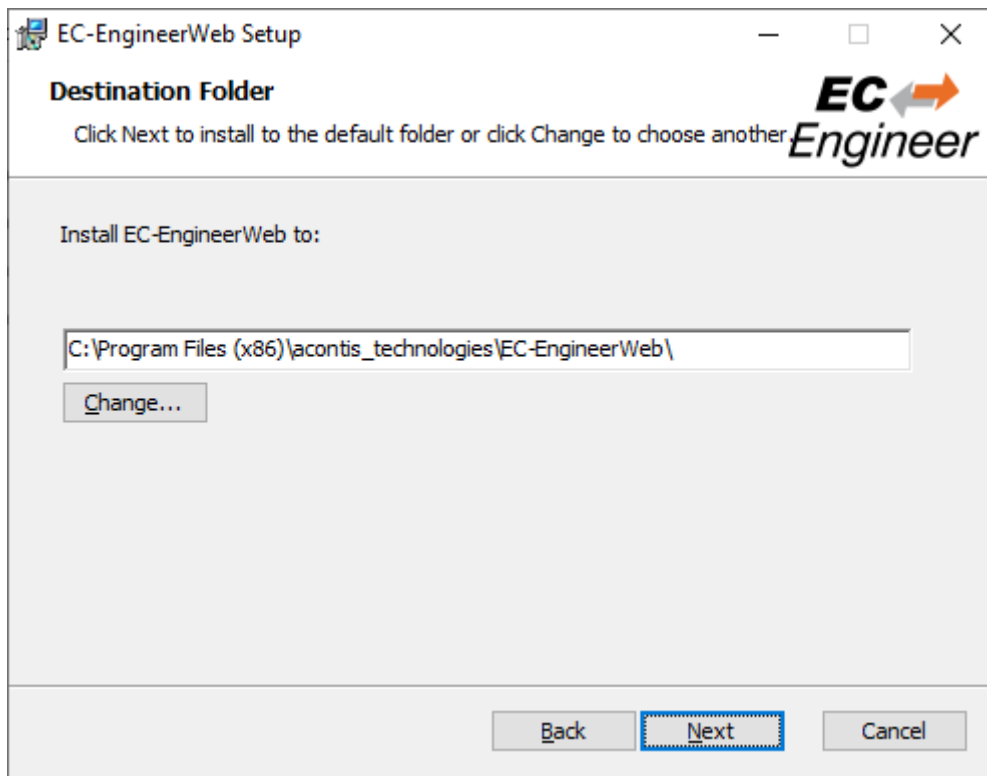
Welcome page:



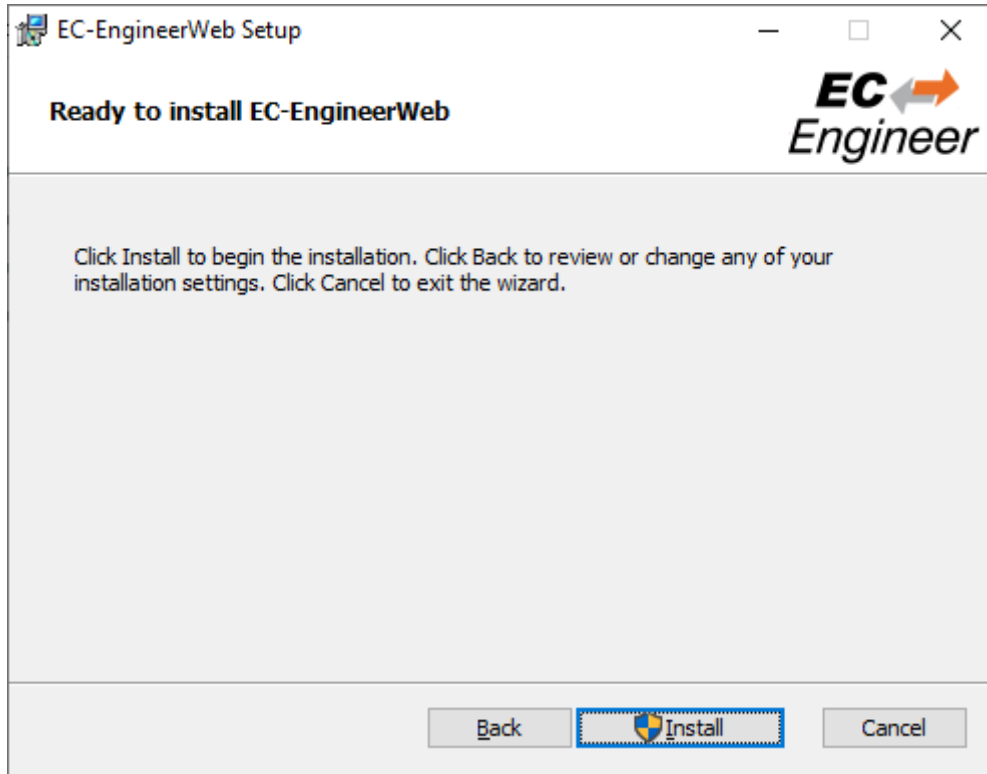
License Agreement:



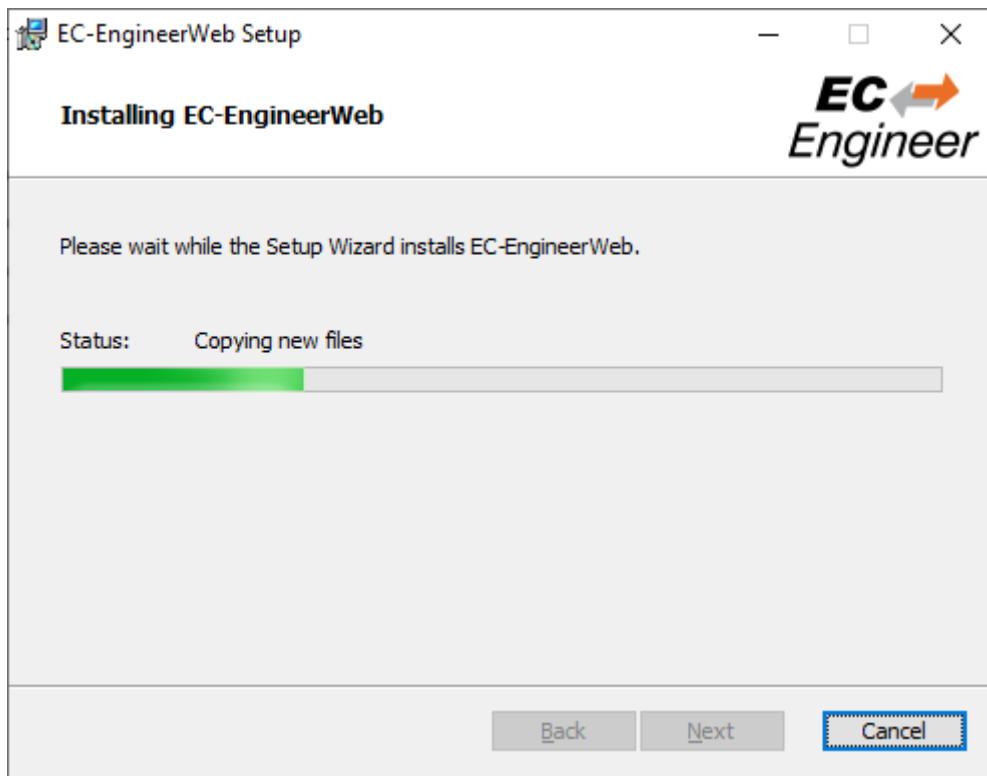
Select Installation Folder:



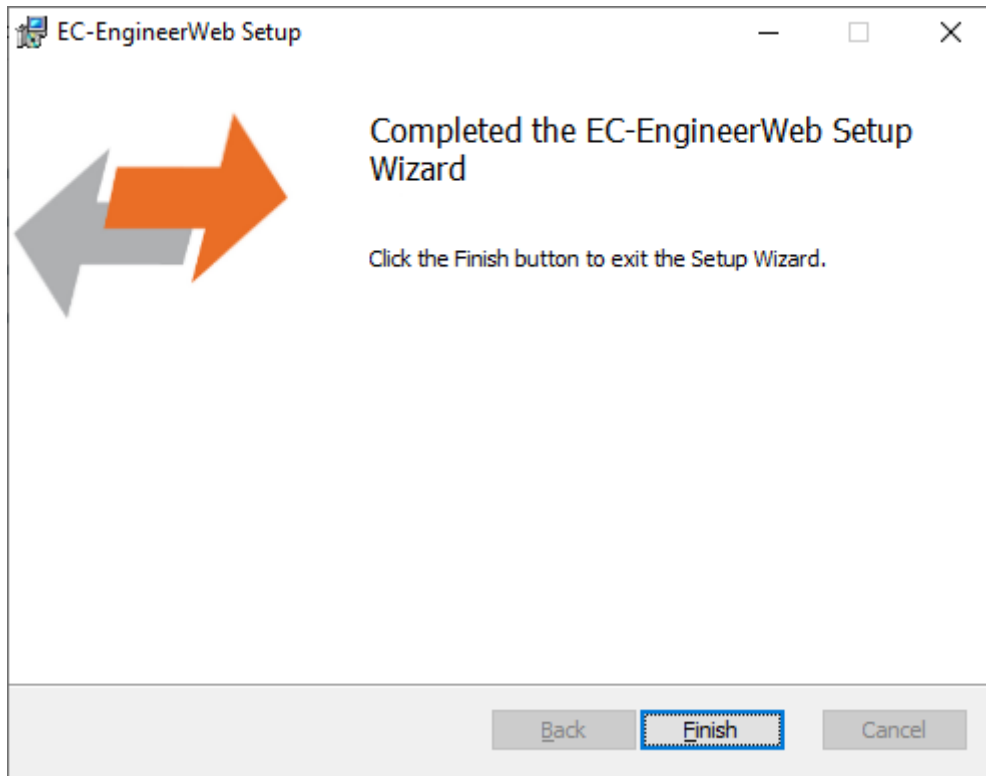
Confirm Installation:



Installing EC-EngineerWeb:



Installation Complete:



2.1.2 Silent Installation (optional)

The product can be also installed in silent mode by using the command line parameters of `msiexec`.

Sample 1: Installs EC-EngineerWeb into default installation folder

```
$ msiexec /i c:/temp/EcEngineerWebSetup.msi /quiet /qn /norestart /log  
↪ c:/temp/install.log
```

Sample 2: Installs EC-EngineerWeb into C:/EC-EngineerWeb

```
$ msiexec /i c:/temp/EcEngineerWebSetup.msi /quiet /qn /norestart /log  
↪ c:/temp/install.log INSTALLLOCATION="C:/EC-EngineerWeb"
```

For more information please refer command line parameters of `msiexec`.

Note: The system requirements *EtherCAT Slave descriptions (ESI files)* will be not checked!

2.1.3 File and Folder Structure

The setup process will copy all necessary files into the following folder:

Installation directory: (Default: %ProgramFiles%/acontis_technologies/EC-EngineerWeb)

- **/Doc**
Release notes and the user manual
- EcEngineerWeb.exe
- EcMaster.dll
- ...

All users directory: (%ALLUSERSPROFILE%/EC-EngineerWeb, like
C:/ProgramData/EC-EngineerWeb)

/CAPTURE

Capture files which can be analysed in offline diagnosis mode (see *Capture File*)

/EtherCAT

EtherCAT Slave Information ESI Files (can be modified via *ESI-Manager*)

/EMI

EtherCAT Master Information files (see User Manual *EC-Engineer* , Chapter EMI Manager)

ESICache.xml

ESI-File-Cache for faster access of ESI files

EC-EngineerWeb.log

Log file

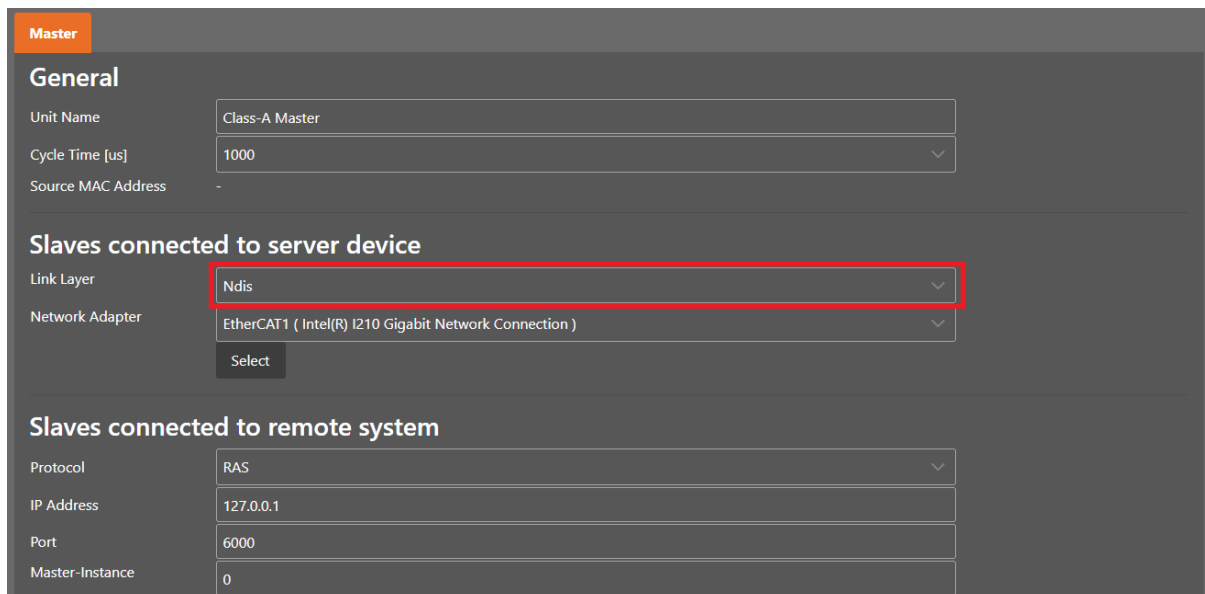
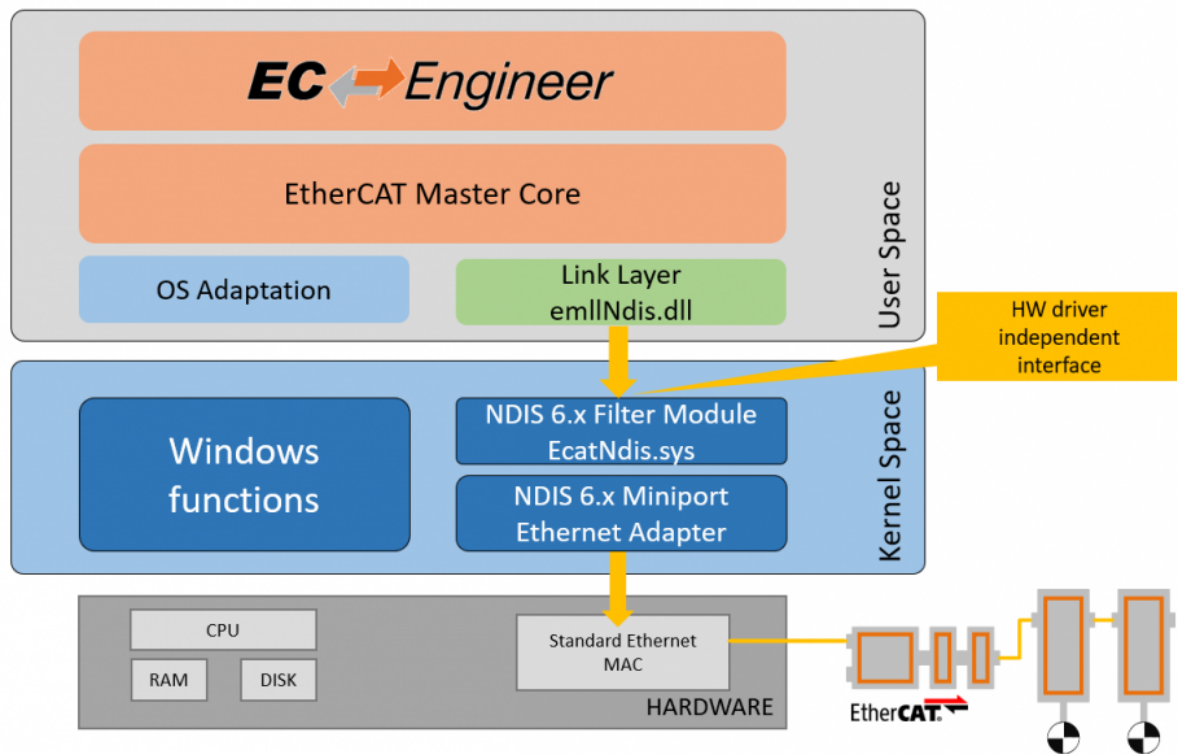
User.myusername.xml

User specific settings

2.1.4 NDIS Driver

The Network Driver Interface Specification (NDIS) is the specification for a network driver architecture that allows transport protocols like TCP/IP to communicate with an underlying physical network adapter. For sending and receiving EtherCAT frames in Windows, EC-EngineerWeb makes use of the well-known Windows packet capture library, WinPcap. However, WinPcap was based on the NDIS 5.x driver model, and development has ceased. The latest versions of Windows 10 do not support this old NDIS 5.x version anymore, so now EC-EngineerWeb (V3.2 and higher) includes an installation package in the install directory of EC-EngineerWeb to install the acontis NDIS 6.x Filter Module `EcatNdis.sys`. With this new Filter Module and the new NDIS Link Layer `emllNdis.dll`, it is now possible for EC-EngineerWeb to work without WinPcap on all Windows 10 versions.

Note: Please restart EC-EngineerWeb after the NDIS installation.



2.2 Linux

2.2.1 Setup Process Linux

The product can be installed by following the following step:

Extract it e.g. into /opt/EC-EngineerWeb_Linux-x64/ (sudo is required)

Optional

Images are missing you may need to install those libraries:

- lib64-dev
- libgdipplus

Dongle version

Install “CodeMeter User Runtime for Linux”: <https://www.wibu.com/support/user/downloads-user-software.html>

E.g. Ubuntu-x64

- download the package “Linux 64-bit DEB Package”
- open context menu and select *Open with Ubuntu Software Center* and install the package

Run `/opt/EC-EngineerWeb_Linux-x64/bin/EcEngineerWeb` (sudo is required)

Open default browser and enter <http://127.0.0.1:5000>

2.2.2 File and Folder Structure Linux

The setup process describes how to install all files into the following folder:

Installation directory: (Default: /opt/EC-EngineerWeb_Linux-x64/)

/bin

- EcEngineerWeb
- EcMaster.dll
- ...

/doc

Release notes and the user manual

/etc

Linux specific

/EMI

- EtherCAT Master Information files (see User Manual *EC-Engineer* , Chapter EMI Manager)
- EcEngineerWeb.xml
- User specific settings

/var

Linux specific

/cache

ESICache.xml

ESI-File-Cache for faster access of ESI files

/lib

Linux specific

/EtherCAT

EtherCAT Slave Information ESI Files (can be modified via *ESI-Manager*)

/log

EcEngineerWeb.log
Log file

2.3 MacOS

2.3.1 Setup Process MacOS

The product can be installed by following the following step:

Extract it e.g. into `/Users/username/Desktop/EC-EngineerWeb_MacOS-x64/`

Optional

Images are missing you may need to install those libraries:

libgdiplus

Dongle version

Install “CodeMeter User Runtime for mac OS”: <https://www.wibu.com/support/user/downloads-user-software.html>

Run `/Users/username/Desktop/EC-EngineerWeb_MacOS-x64/EcEngineerWeb`

Open default browser and enter `http://127.0.0.1:5000`

2.3.2 File and Folder Structure MacOS

The setup process describes how to install all files into the following folder:

Installation directory: (Default: `/Users/username/Desktop/EC-EngineerWeb_MacOS-x64/`)

/Doc

Release notes and the user manual

/EMI

EtherCAT Master Information files (see User Manual [EC-Engineer](#), Chapter EMI Manager)

/EtherCAT

EtherCAT Slave Information ESI Files (can be modified via [ESI-Manager](#))

EcEngineerWeb.xml

User specific settings

EcEngineerWeb

EC-EngineerWeb

ESICache.xml

ESI-File-Cache for faster access of ESI files







EcEngineerWeb.log

Log file

3 Getting Started

For a better usability, the product comes up with a start page, where the user can choose what he wants to do:

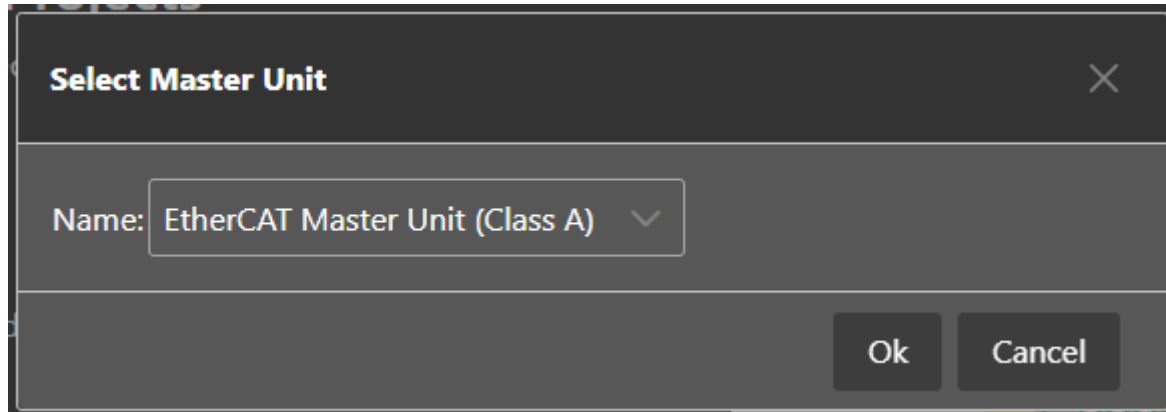
Getting Started

	<p>Offline Configuration In the office</p>
	<p>Online Configuration Slaves connected to engineering system</p>
	<p>Remote Configuration Slaves connected to target system</p>
	<p>Remote Diagnosis Slaves connected to target system</p>
	<p>Offline Configuration and Simulation Slaves simulated (SiL)</p>
	<p>Offline Diagnosis Slaves captured</p>

3.1 Offline Configuration

This mode is for configuring the EtherCAT network in the office by manually adding slaves to the network.

If the user clicks on this link he will see first the *Select Master Unit Dialog* for choosing the desired master unit (at the moment he can choose between Class A and Class B master):



Afterwards he will see the *Slave Select Dialog*, where he can configure his EtherCAT network:

Append Slave
✕

Filter

Search

Vendors

Show Hidden Slaves

Connection

Connect at

Slaves

Select a specific slave from the list.

Group	Name	Description	RevisionNo
Drives	AX2000-B110	AX2000-B110 EtherCAT Drive (CoE) (obsolete product)	0x00001B82 (7042)
Terminal Couplers (BK1xxx, ILxxxx-B110)	BK1120	BK1120 EtherCAT Fieldbus coupler	0x00150000 (1376256)
Terminal Couplers (BK1xxx, ILxxxx-B110)	BK1150	BK1150 EtherCAT Fieldbus coupler	0x00130000 (1245184)
Panel Couplers	CPXXXX-BK1150	CPXXXX-BK1150 EtherCAT Control Panel	0x001004C3 (1049795)
EtherCAT Infrastructure components	CU1123	CU1123 EtherCAT junction (3-ports)	0x00100000 (1048576)
EtherCAT Infrastructure components	CU1124	CU1124 EtherCAT junction (4-ports)	0x00100000 (1048576)
EtherCAT Infrastructure	CU1128	CU1128 6x EtherCAT	0x00020000 (131072)

Number of slaves:

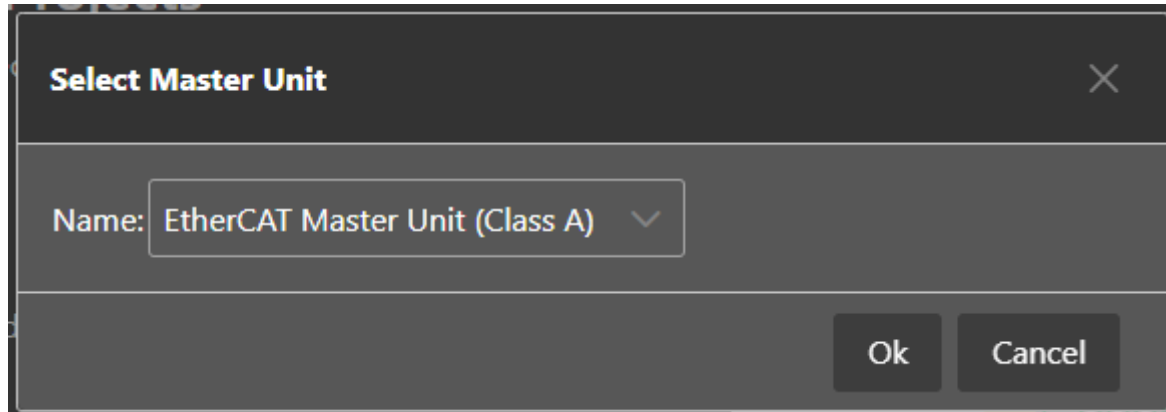
Append

If you can not find your slave or if you want to use your own ESI file, you can edit this list by using the *ESI-Manager*. After configuring the network you can select the *network* node and use the *Export ENI* button for generating an ENI file.

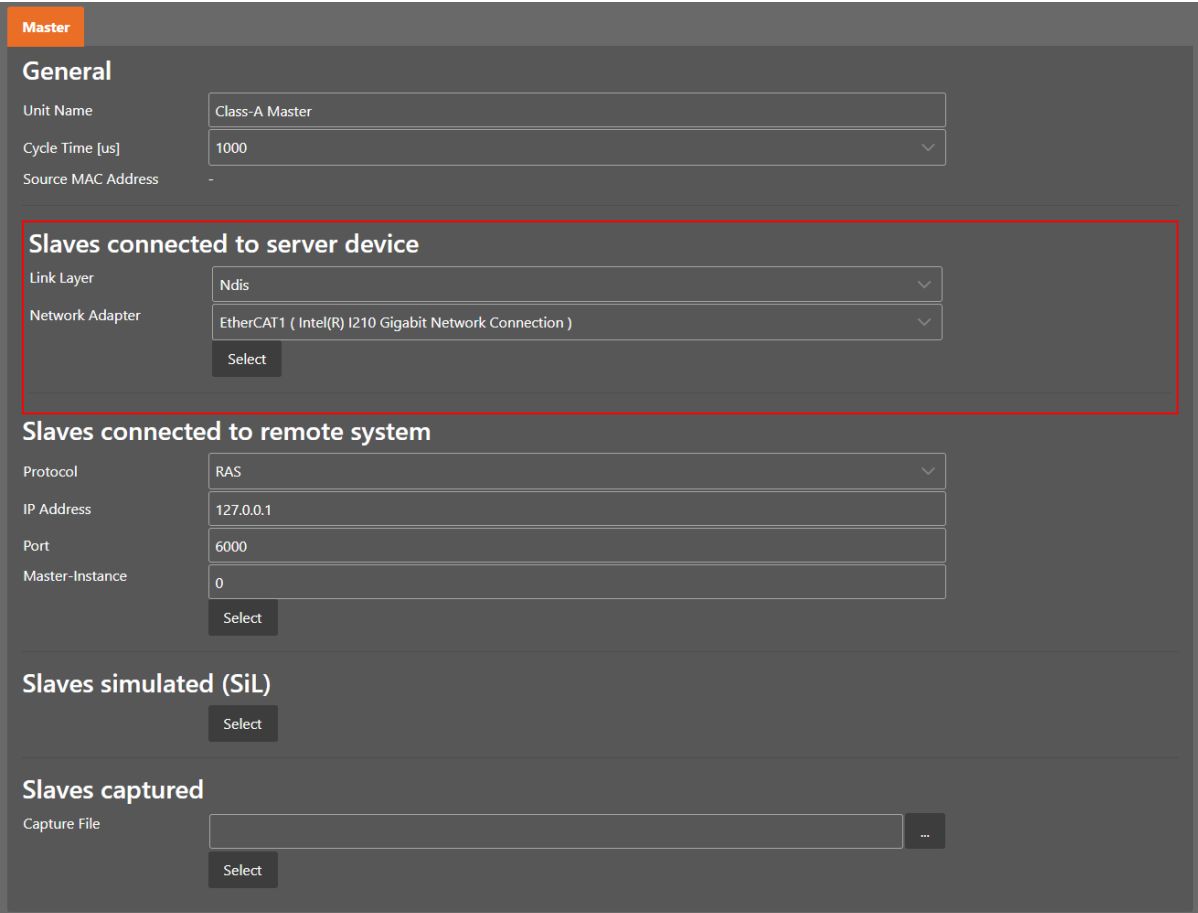
3.2 Online Configuration

This mode can be used if slaves are connected to the Engineering System by scanning the EtherCAT network configuration.

If user clicks on this link he will see first the *Select Master Unit Dialog* for choosing the desired master unit (at the moment he can choose between Class A and Class B master):



Afterwards he will see the *Master-Tab*, where he can choose the network adapter which is connected to the control system:



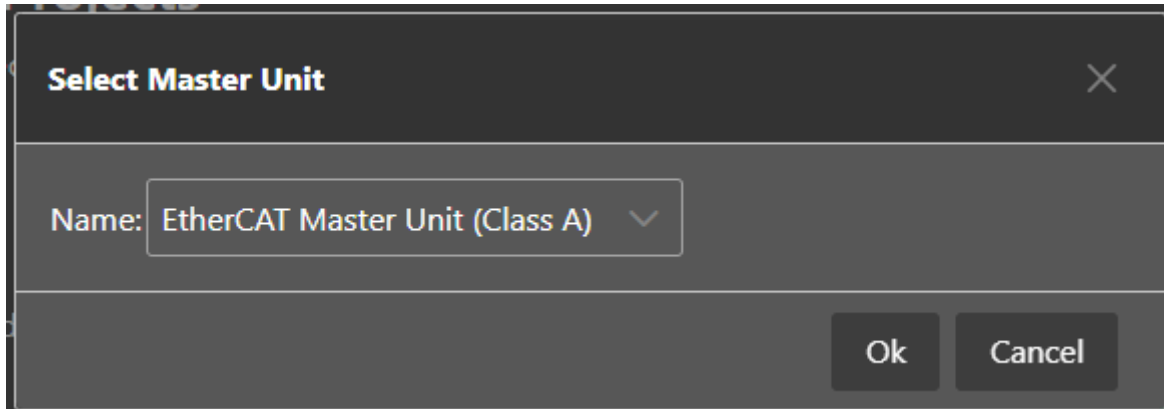
After selecting the network adapter, the EC-EngineerWeb scans the control system and adds the network configuration to the project explorer. Here the user can adjust the configuration or use the *Export ENI* button for generating directly an ENI file.

Note: Please make sure that the selected network adapter is connected to the EtherCAT slaves.

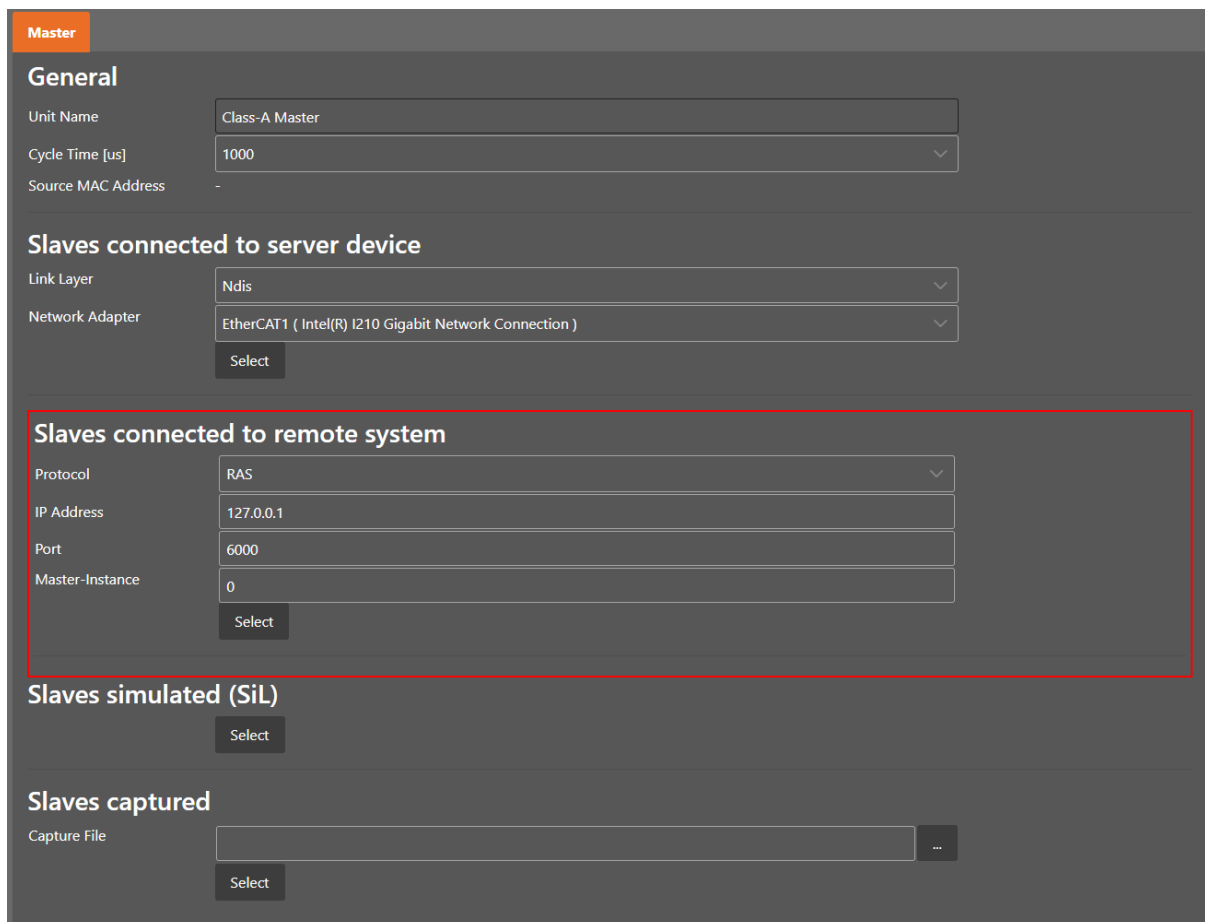
3.3 Remote Configuration

This mode can be used if slaves are connected to the control system. Means user can connect via TCP/IP to the control system if EC-Master RAS (remote access service) server is running and scan the EtherCAT network configuration.

If user clicks on this link he will see first the *Select Master Unit Dialog* for choosing the desired master unit (at the moment he can choose between Class A and Class B master):



Afterwards he will see the *Master-Tab*, where he can enter the IP address of the remote system (and if necessary change the port and the master-instance, but normally this should not be necessary):



Master

General

Unit Name: Class-A Master

Cycle Time [us]: 1000

Source MAC Address: -

Slaves connected to server device

Link Layer: Ndis

Network Adapter: EtherCAT1 (Intel(R) I210 Gigabit Network Connection)

Select

Slaves connected to remote system

Protocol: RAS

IP Address: 127.0.0.1

Port: 6000

Master-Instance: 0

Select

Slaves simulated (SiL)

Select

Slaves captured

Capture File: [] ...

Select

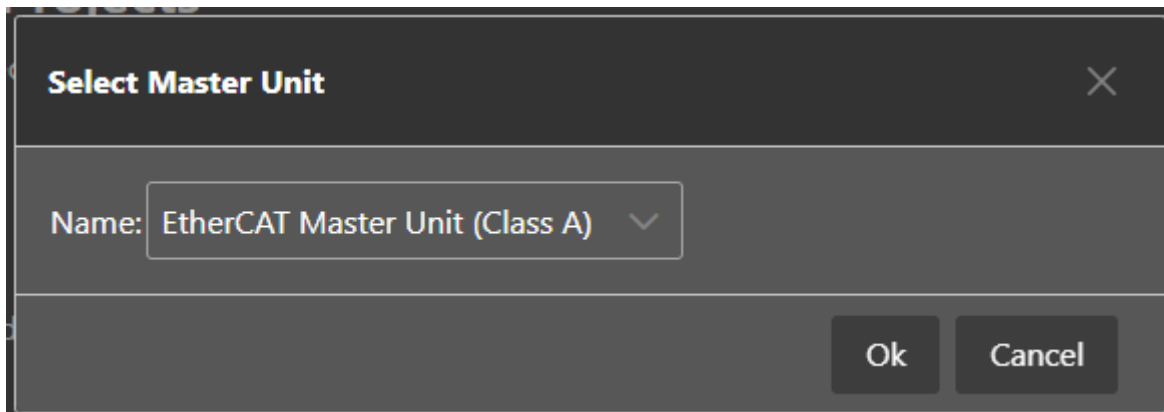
After entering the IP address, a click to *Select* tells the EC-EngineerWeb to connect to and scan the remote system.

The EC-EngineerWeb adds all Slaves of the network configuration to the project explorer. Here the user can adjust the configuration or use the *Export ENI* button for generating directly an ENI file.

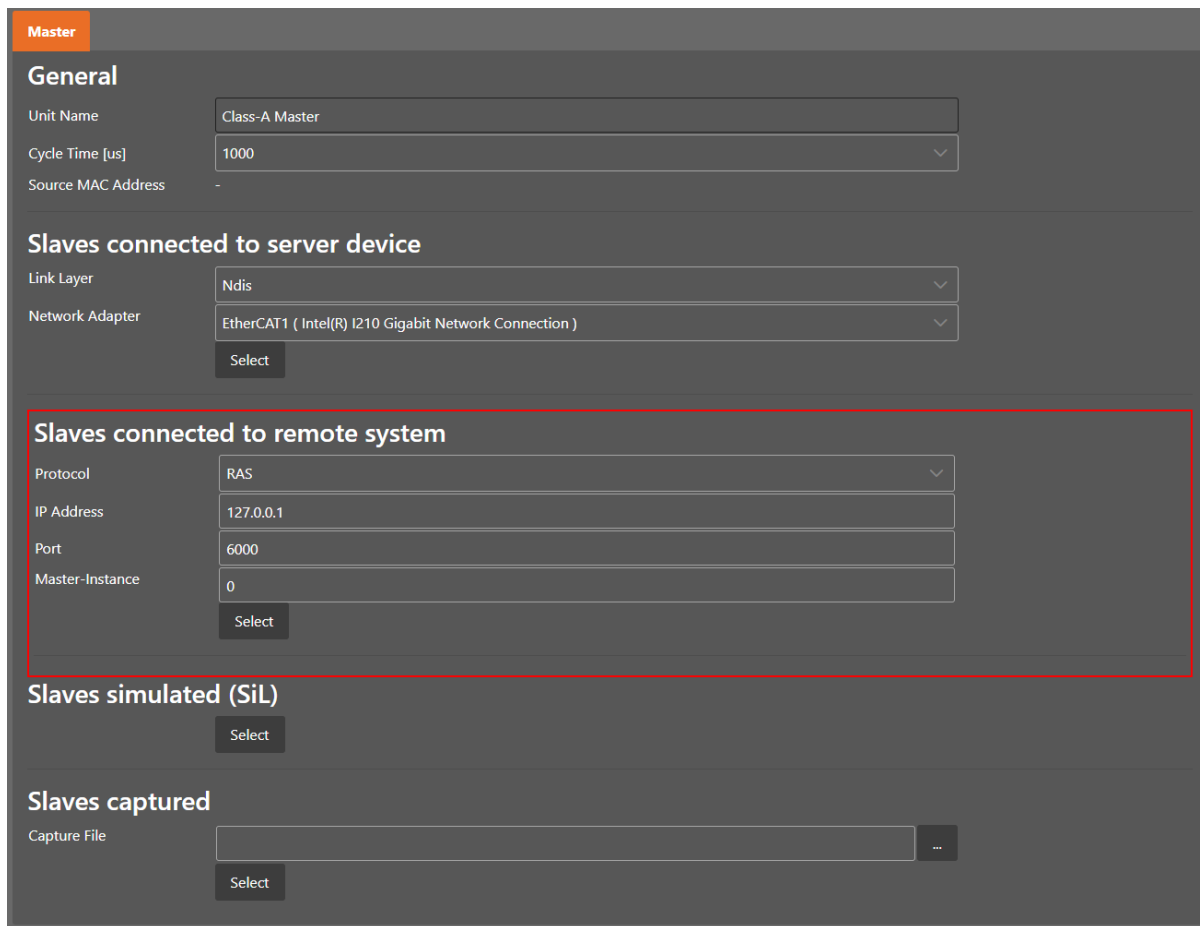
3.4 Remote Diagnosis

This mode should be used if the EC-Master is already running on the control system and the user wants to take a look into the “health” of the EtherCAT system.

If user clicks on this link he will see first the *Select Master Unit Dialog* for choosing the desired master unit (at the moment he can choose between Class A and Class B master):



Afterwards he will see the *Master-Tab*, where he can enter the IP address of the remote system (and if necessary change the port and the master-instance, but normally this should not be necessary):

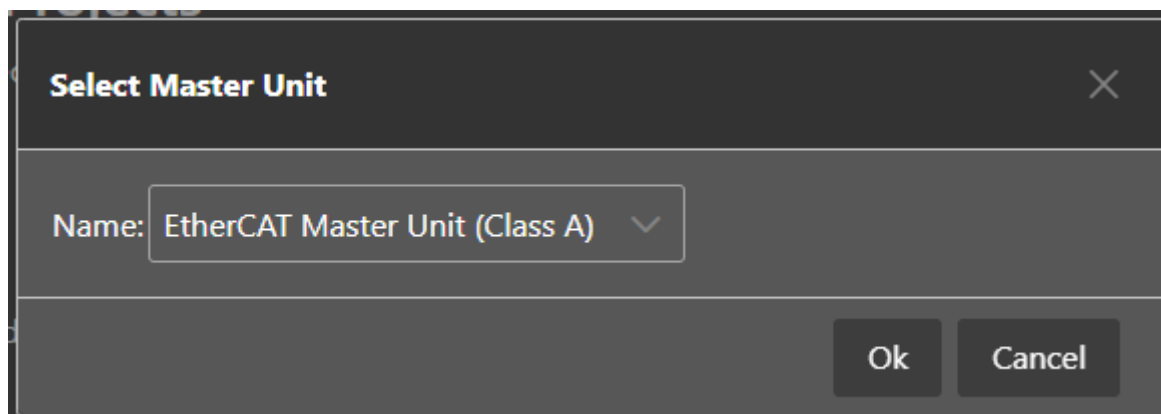


After entering the IP address, a click to *Select* switches the EC-EngineerWeb into Diagnosis Mode. There the user sees the “health” of his EtherCAT system.

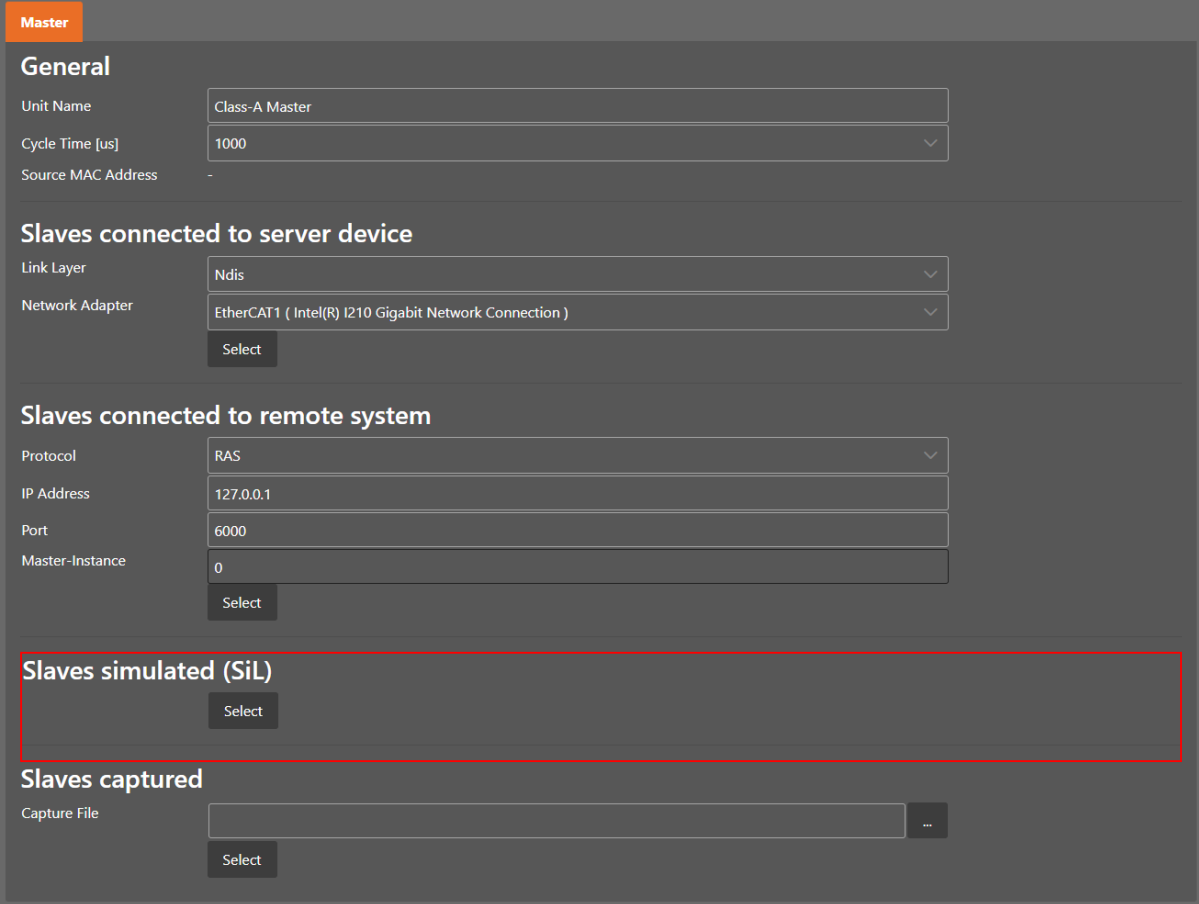
3.5 Offline Configuration and Simulation

This mode is for configuring the EtherCAT network in the office by manually adding slaves to the network.

If the user clicks on this link he will see first the *Select Master Unit Dialog* for choosing the desired master unit (at the moment he can choose between Class A and Class B master):



Then the user have to select the simulator:



The screenshot shows a web-based configuration interface for a 'Master' device. The interface is dark-themed and contains several sections for configuration:

- Master** (tab)
- General**
 - Unit Name: Class-A Master
 - Cycle Time [us]: 1000
 - Source MAC Address: -
- Slaves connected to server device**
 - Link Layer: Ndis
 - Network Adapter: EtherCAT1 (Intel(R) I210 Gigabit Network Connection)
 - Select button
- Slaves connected to remote system**
 - Protocol: RAS
 - IP Address: 127.0.0.1
 - Port: 6000
 - Master-Instance: 0
 - Select button
- Slaves simulated (SiL)**
 - Select button
- Slaves captured**
 - Capture File: [empty field] ...
 - Select button

Afterwards he will see the *Slave Select Dialog*, where he can configure his EtherCAT network:

Append Slave
✕

Filter

Search

Vendors Beckhoff Automation GmbH & Co. KG ▾

Show Hidden Slaves

Connection

Connect at Port B, MII ▾

Slaves

Select a specific slave from the list.

Group	Name	Description	RevisionNo
Drives	AX2000-B110	AX2000-B110 EtherCAT Drive (CoE) (obsolete product)	0x00001B82 (7042)
Terminal Couplers (BK1xxx, ILxxxx-B110)	BK1120	BK1120 EtherCAT Fieldbus coupler	0x00150000 (1376256)
Terminal Couplers (BK1xxx, ILxxxx-B110)	BK1150	BK1150 EtherCAT Fieldbus coupler	0x00130000 (1245184)
Panel Couplers	CPXXXX-BK1150	CPXXXX-BK1150 EtherCAT Control Panel	0x001004C3 (1049795)
EtherCAT Infrastructure components	CU1123	CU1123 EtherCAT junction (3-ports)	0x00100000 (1048576)
EtherCAT Infrastructure components	CU1124	CU1124 EtherCAT junction (4-ports)	0x00100000 (1048576)
EtherCAT Infrastructure	CU1128	CU1128 6x EtherCAT	0x00020000 (131072)

Number of slaves:

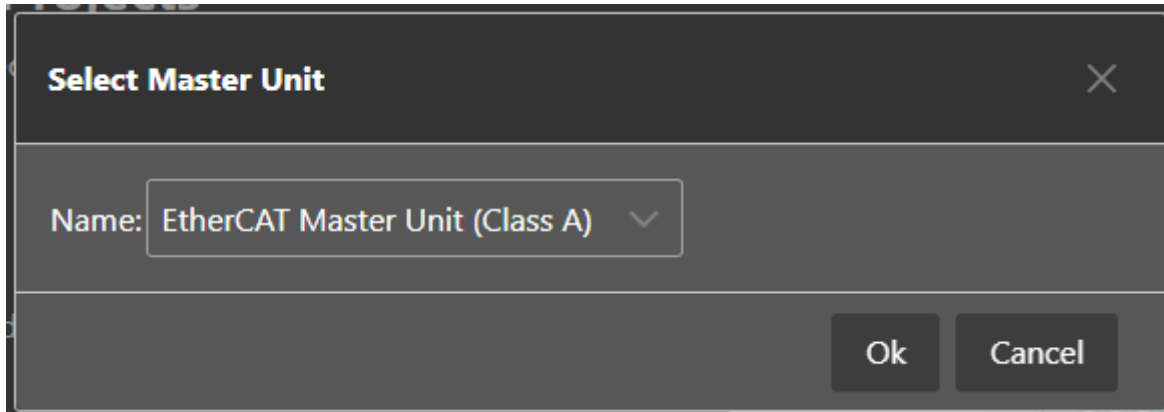
Append

If you can not find your slave or if you want to use your own *ESI* file, you can edit this list by using the *ESI-Manager*. After configuring the network you can select the *network* node and use the *Export ENI* button for generating an ENI file or switch to diagnosis mode and simulate the network.

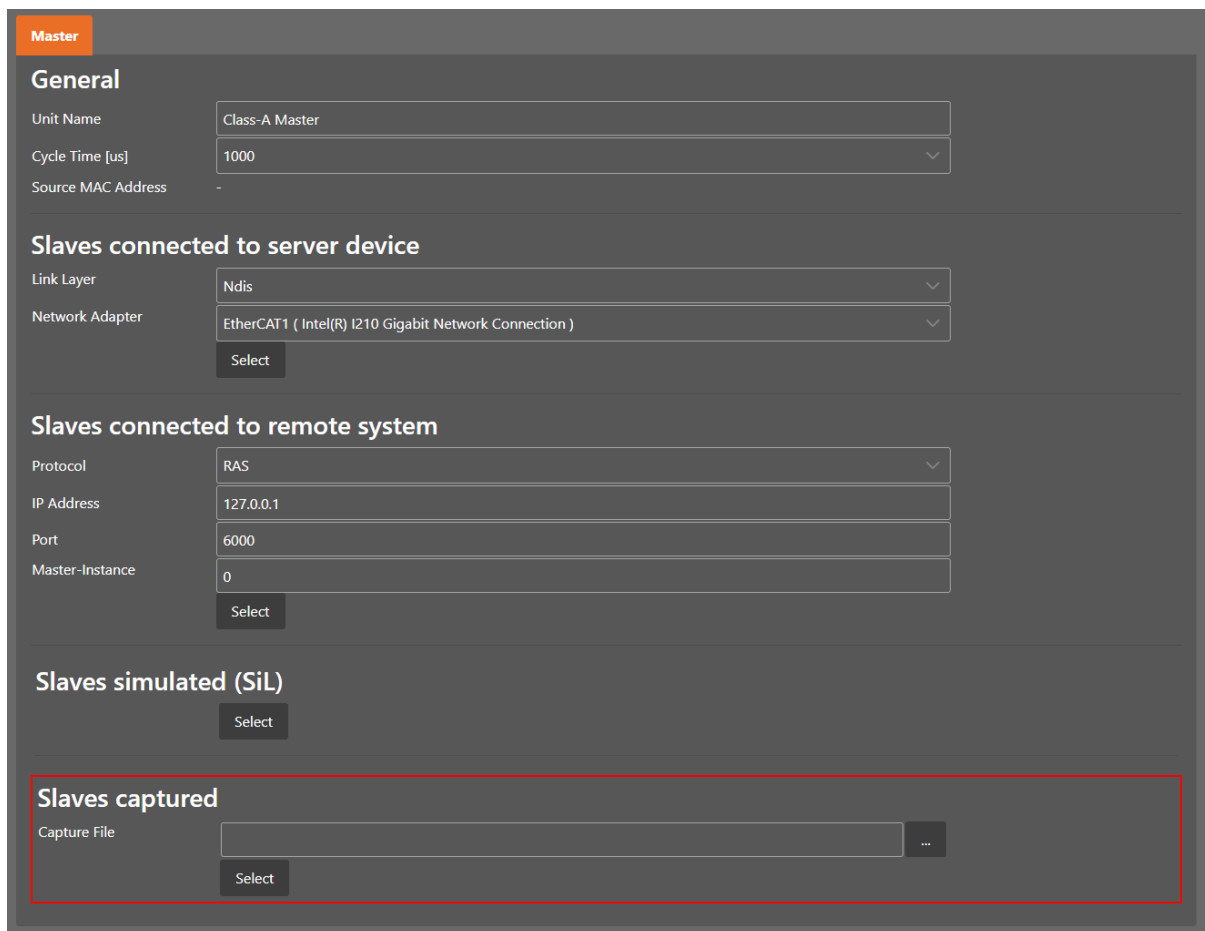
3.6 Offline Diagnosis

This mode should be used if the user wants to analyse a previously created capture file. This can be done offline, which means that the “real system” no not necessary.

If user clicks on this link he will see first the *Select Master Unit Dialog* for choosing the desired master unit (at the moment he can choose between Class A and Class B master):



Afterwards he will see the *Master-Tab*, where he can enter the path to the capture, which contains one or more previously taken snapshots:

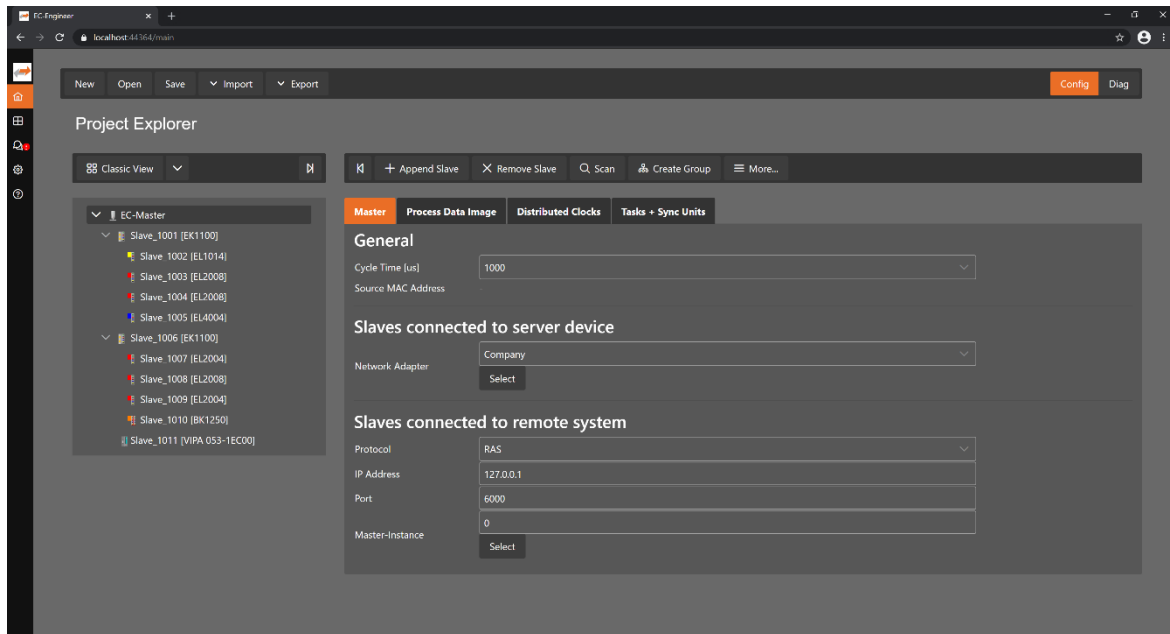


After choosing the path to the capture file, a click to *Select* switches the EC-EngineerWeb into Diagnosis Mode. Now, the user can analyse the previously taken snapshots of a EtherCAT system.

4 Graphical user interface

4.1 Overview

This section gives an overview about the graphical user interface:



The graphical user interface:

Server IP

To open the GUI of the Client in a Browser. To connect with you server, just enter the IP address

Main Toolbar

Similar to a file menu. Is different for every view.

Project Toolbar

Important functions like append or remove slaves.

Slave Tree

You can see your bus configuration here. Can also be switched to a topology view.

Side Bar / Main Menu

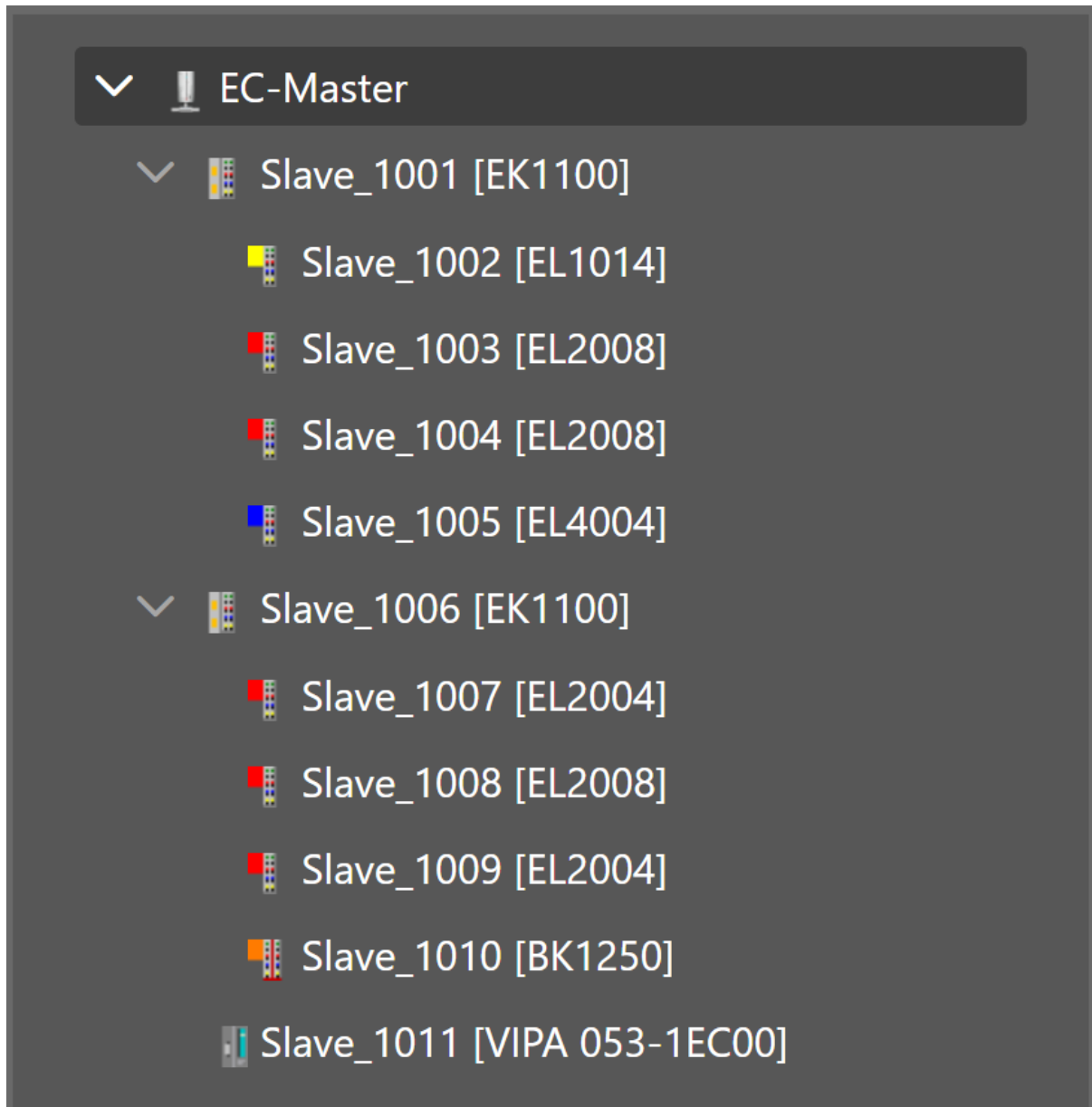
You can switch between the views there. For example open the *ESI-Manager* or the Log file.

4.2 Project Explorer

4.2.1 Configuration Mode

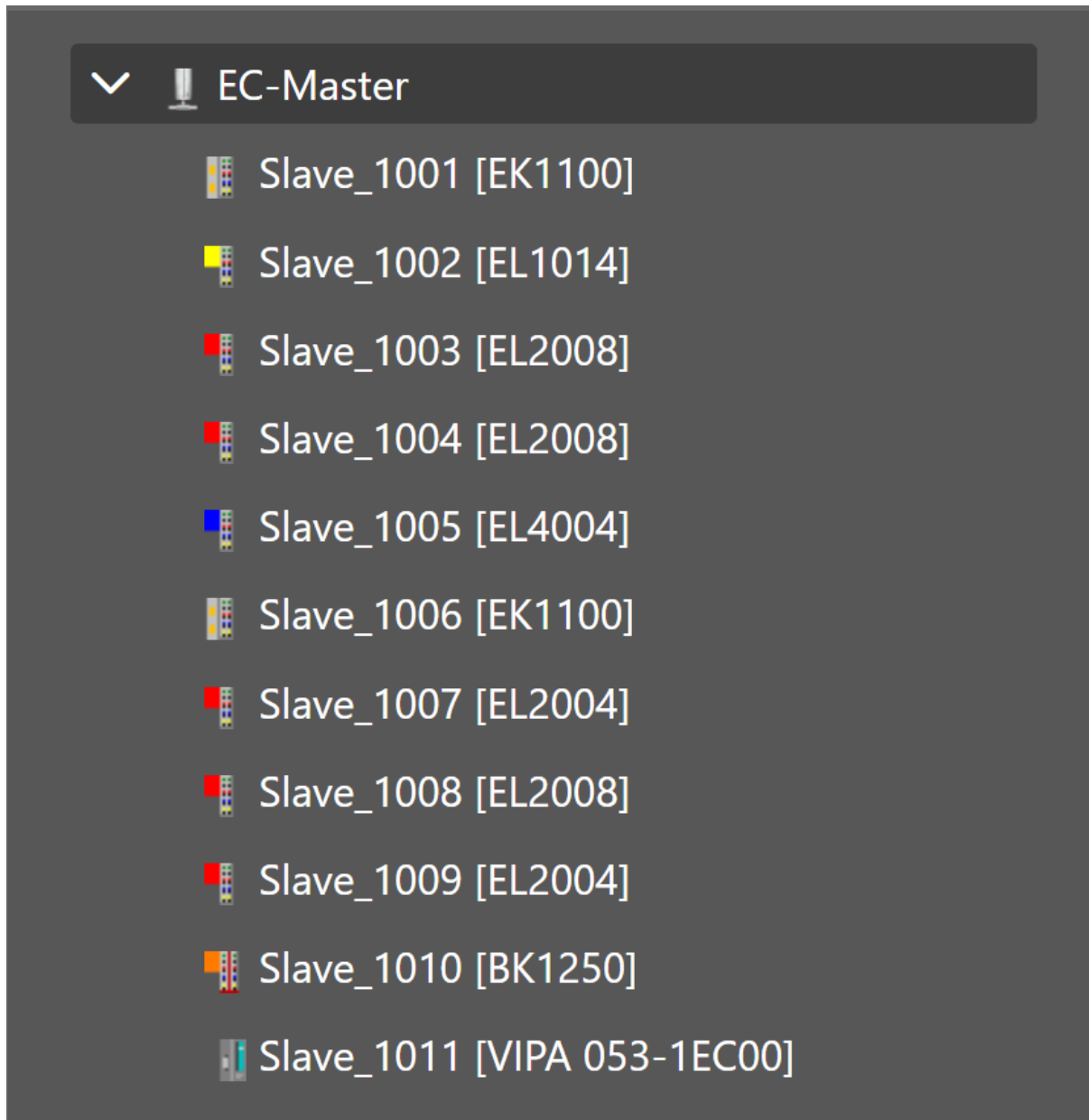
There are three topology visualisation views:

Classic View



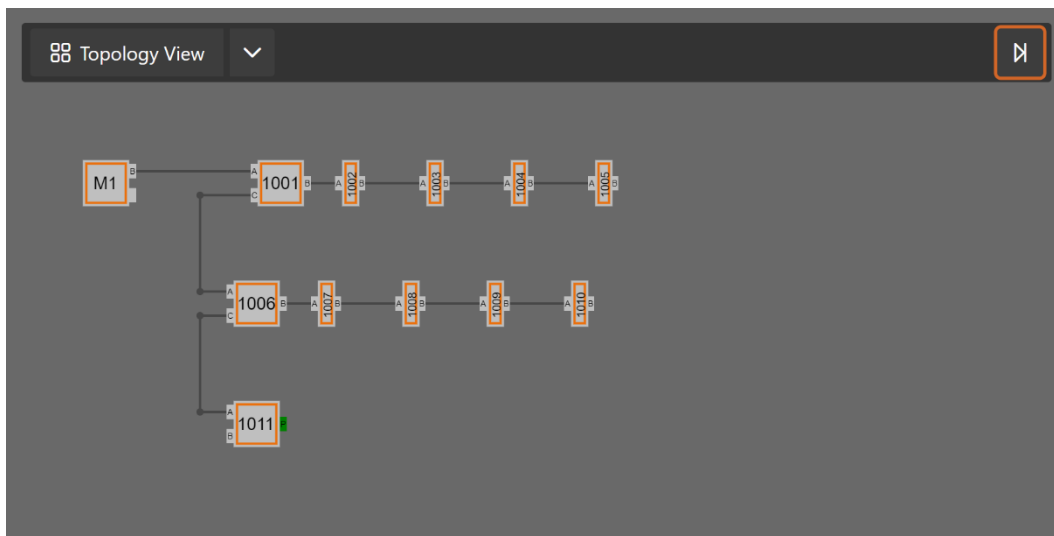
This is a tree view which has two levels. In the first level you can find coupler slaves and in the second level you will see the connected slaves.

Flat View



This view shows all slaves in a flat list, as they are connected in the EtherCAT network.

Topology View

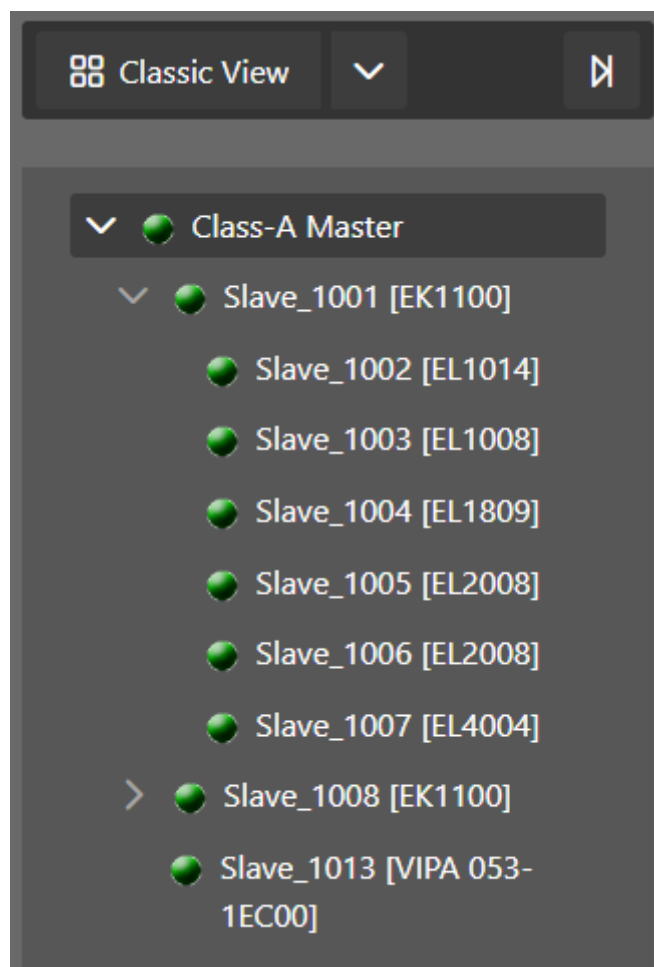


This view shows a graphical tree of all slaves, as they are connected in the EtherCAT network.

4.2.2 Diagnosis Mode

There are three topology visualisation views:

Classic View



This is a tree view which has two levels. In the first level you can find coupler slaves and in the second level you will see the connected slaves.

Possible device states:



-  Init Bootstrap
-  Pre-Op
-  Safe-Op
-  Op


Flat View



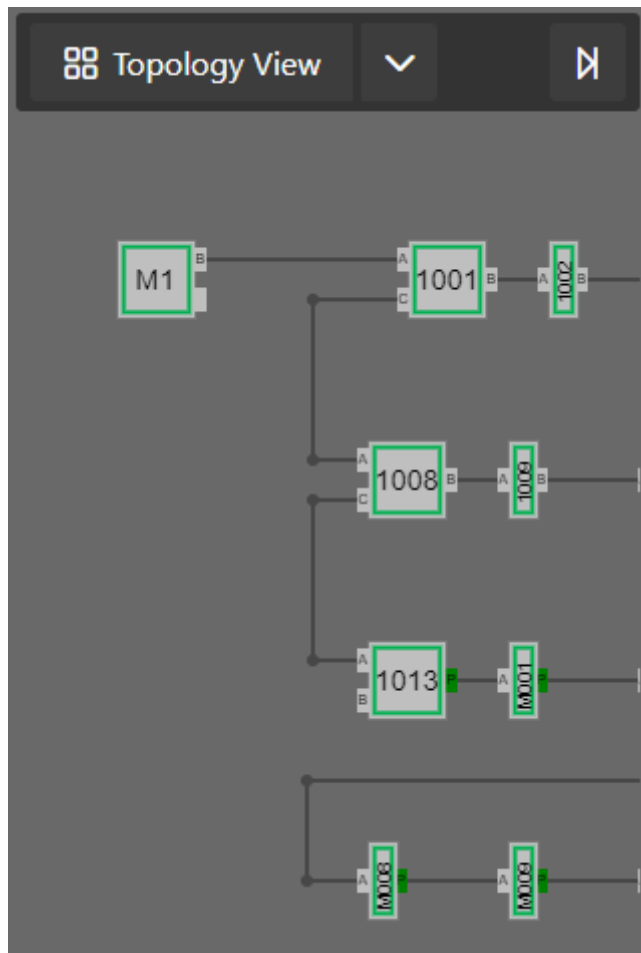
This view shows all slaves in a flat list, as they are connected in the EtherCAT network.

Possible device states:

-  Init Bootstrap
-  Pre-Op

-  Safe-Op
-  Op

Topology View






This view shows a graphical tree of all slaves, as they are connected in the EtherCAT network.

Possible device states:

-  Init Bootstrap
-  Pre-Op
-  Safe-Op
-  Op


Possible port states:

-  Bad Cable Quality
-  Constricted Cable Quality
-  Good Cable Quality

If cable quality is constricted or bad, please check the error counters of the slave (for more information about the extended diagnosis, see [Extended Diagnosis](#)).

4.3 Device Editor

This Editor gives the user the possibility to read and write information of the selected master or slave:

General	PDO Mapping	Variables	Advanced Options	Distributed Clock	Init Commands	CoE Object-Dictionary	Sync Units	Simulator
Address								
Station Address <input type="text" value="1001"/> 								
Information								
Name <input type="text" value="Slave_1001 [SGDV-E1 CoE Drive]"/>								
Description SGDV-E1 EtherCAT(CoE) SERVOPACK Rev3								
Vendor Yaskawa Electric Corporation (0x00000539)								
Product Code 0x02200001 (35651585)								
Revision Number 0x00030005 (196613)								
ESI File Yaskawa SGDVE1_CoE rev3.05.xml								
Identification Value Not Used								
Ports								
A EC-Master								
D Not Available								
B Not Connected								
C Not Available								

5 Configuration Mode

5.1 Overview

The EC-Master needs the EtherCAT-Network-Information (ENI) file to initialize and control the EtherCAT network. In most cases the automatically generated Slave settings can be used to run the EtherCAT network. In this chapter you can read how EC-EngineerWeb helps you to view or adjust those settings.

It consists of three sections:

- Add Master Unit: List of available master units
- Recent Projects: List of the last five opened projects
- Getting Started: List of available run modes

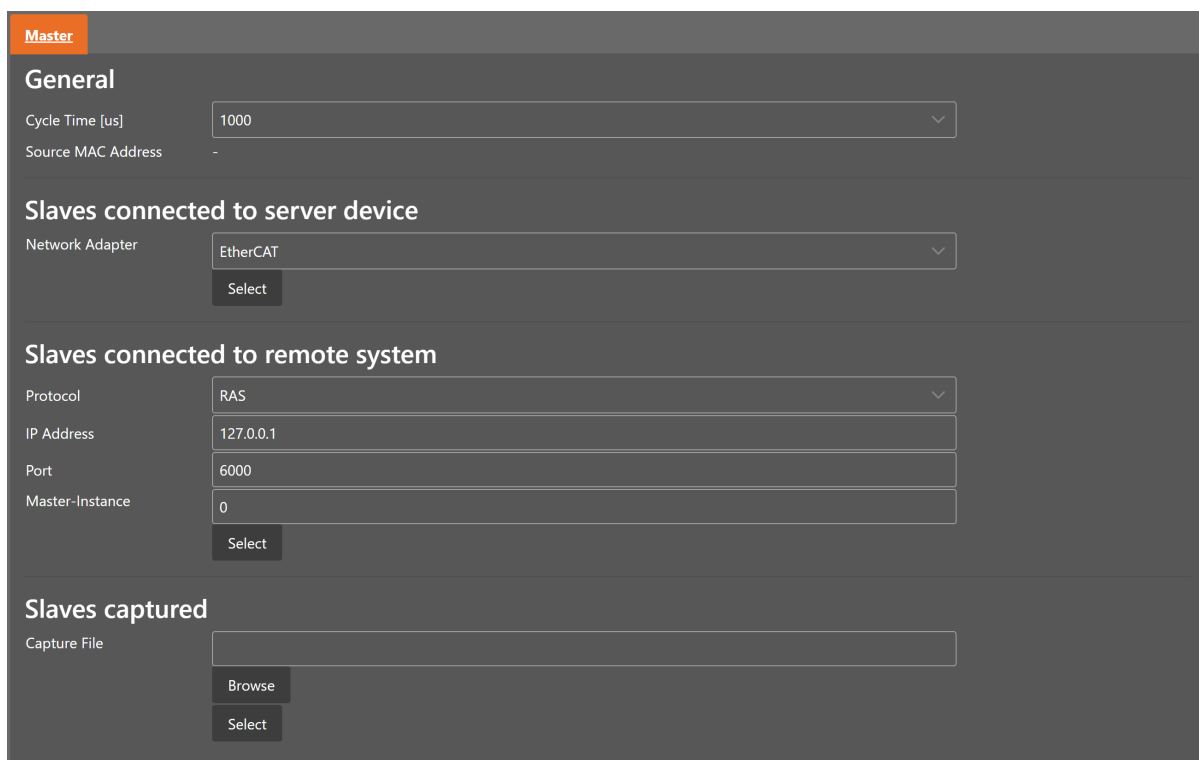
If the user clicks on one of the links, it runs a new master unit, opens an already existing project or switches in the “Getting Started” mode.

5.2 Master Settings

This section includes network related or master related settings. Some of those settings will also affect the “Master” section of the ENI.

5.2.1 Master

In this tab, the user can configure the name of the master and the cycle time. If he wants to connect to a control system, this can be also configured:



The screenshot shows the 'Master' configuration tab in EC-EngineerWeb. It is divided into four main sections:

- General:** Contains 'Cycle Time [us]' set to 1000 and 'Source MAC Address' set to '-'.
- Slaves connected to server device:** Contains 'Network Adapter' set to 'EtherCAT' with a 'Select' button below it.
- Slaves connected to remote system:** Contains 'Protocol' set to 'RAS', 'IP Address' set to '127.0.0.1', 'Port' set to '6000', and 'Master-Instance' set to '0' with a 'Select' button below it.
- Slaves captured:** Contains 'Capture File' with a text input field, a 'Browse' button, and a 'Select' button below it.

General

Unit Name:

Name of the master device

Cycle Time:

Interval in microseconds in which all EtherCAT commands will be sent from the master. The user can choose between the following values: 50, 100, 125, 250, 500, 1000, 2000, 4000, 8000, 10000 and 16000.

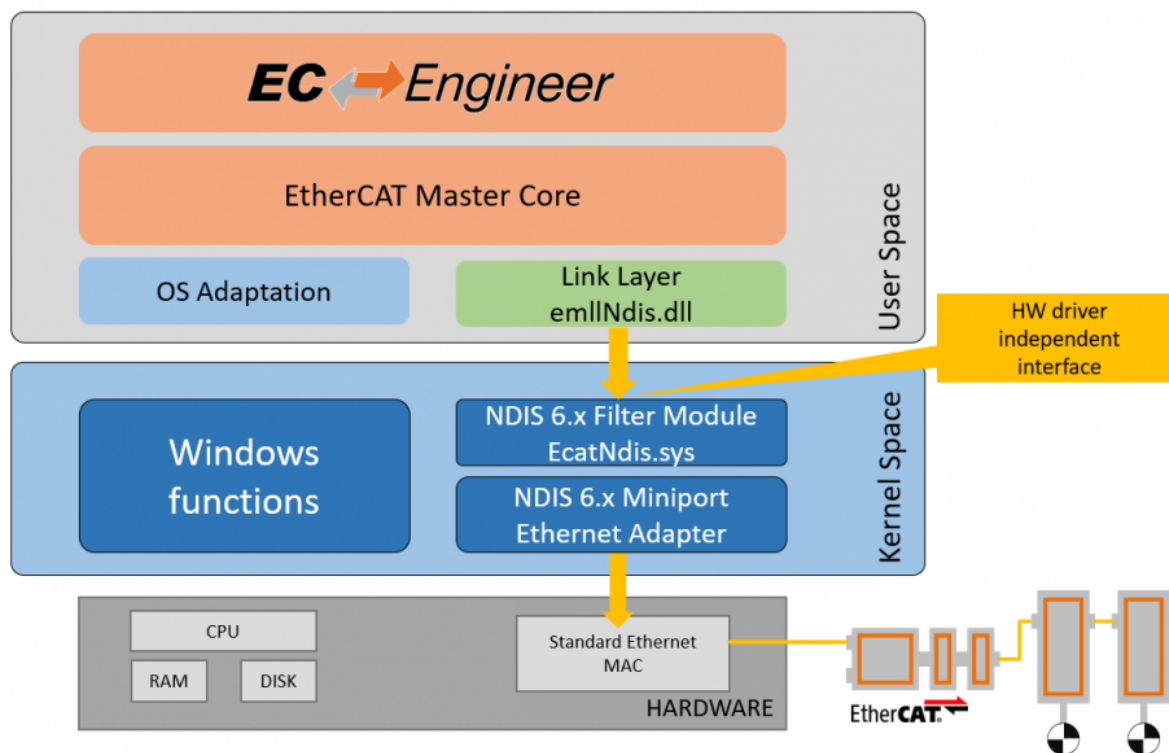
Source MAC address:

MAC address of the connected system (will be filled during bus scan)

Slaves connected to local system

Network Adapter:

Network adapter which is connected to the control system. In newer versions it is also a possibility to select the Link-Layer.



Slaves connected to remote system

Protocol:

Protocol of the remote system

- RAS (Default port is 6000)
- **Mailbox Gateway (Default port is 34980)**
 - EC-Master V3.0.1.22 and above
 - TwinCAT 3.1.4024 or TwinCAT 3.1.4022.30 and above

IP Address:

IP address of the remote system, which is connected to the control system

Port:

Port of the remote system, which is connected to the control system

Master-Instance:

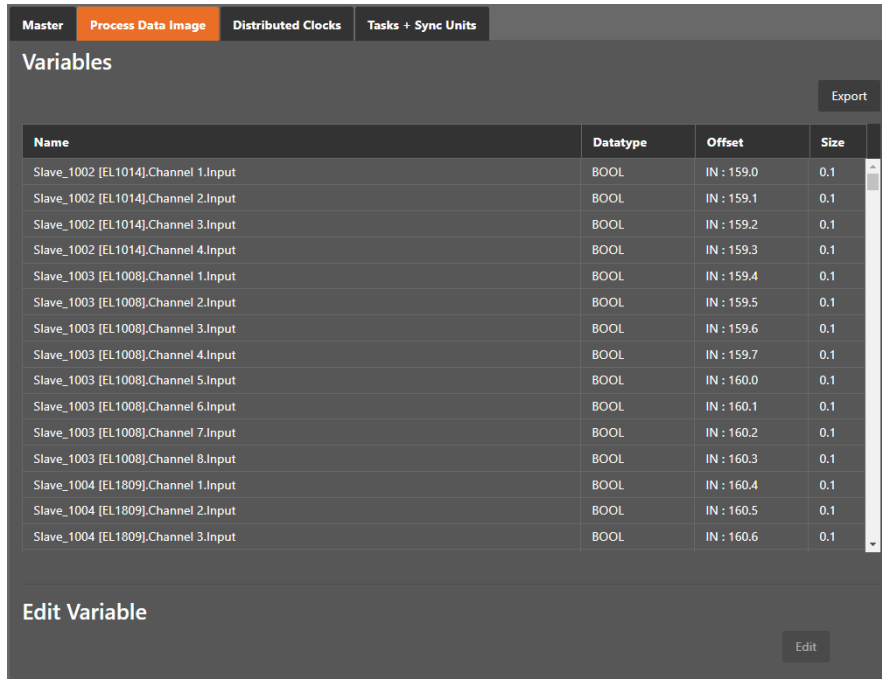
Used to determine which master instance should be used in the remote system (Master supports up to 10 instances).

Data to load from capture file**Capture File:**

Path to the capture file, which contains one ore more snapshots

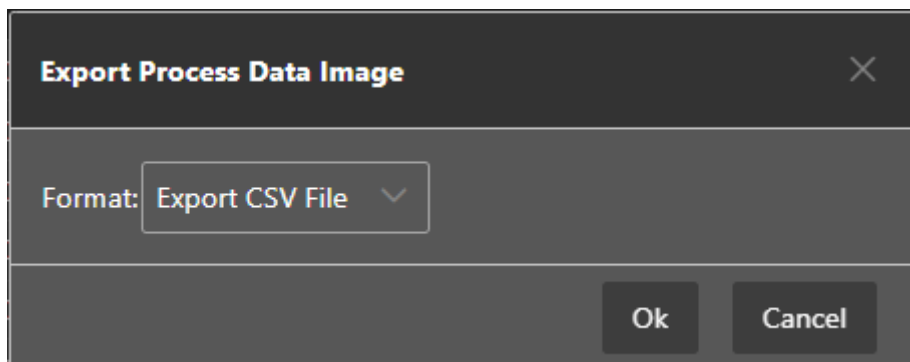
5.2.2 Process Data Image

In this tab, the user can see all variables of the process data image. If he wants, he can also export the list:



Name	Datatype	Offset	Size
Slave_1002 [EL1014].Channel 1.Input	BOOL	IN : 159.0	0.1
Slave_1002 [EL1014].Channel 2.Input	BOOL	IN : 159.1	0.1
Slave_1002 [EL1014].Channel 3.Input	BOOL	IN : 159.2	0.1
Slave_1002 [EL1014].Channel 4.Input	BOOL	IN : 159.3	0.1
Slave_1003 [EL1008].Channel 1.Input	BOOL	IN : 159.4	0.1
Slave_1003 [EL1008].Channel 2.Input	BOOL	IN : 159.5	0.1
Slave_1003 [EL1008].Channel 3.Input	BOOL	IN : 159.6	0.1
Slave_1003 [EL1008].Channel 4.Input	BOOL	IN : 159.7	0.1
Slave_1003 [EL1008].Channel 5.Input	BOOL	IN : 160.0	0.1
Slave_1003 [EL1008].Channel 6.Input	BOOL	IN : 160.1	0.1
Slave_1003 [EL1008].Channel 7.Input	BOOL	IN : 160.2	0.1
Slave_1003 [EL1008].Channel 8.Input	BOOL	IN : 160.3	0.1
Slave_1004 [EL1809].Channel 1.Input	BOOL	IN : 160.4	0.1
Slave_1004 [EL1809].Channel 2.Input	BOOL	IN : 160.5	0.1
Slave_1004 [EL1809].Channel 3.Input	BOOL	IN : 160.6	0.1

If user wants to export the variables, he will see the following dialog:



Export Process Data Image [Close]

Format: [v]

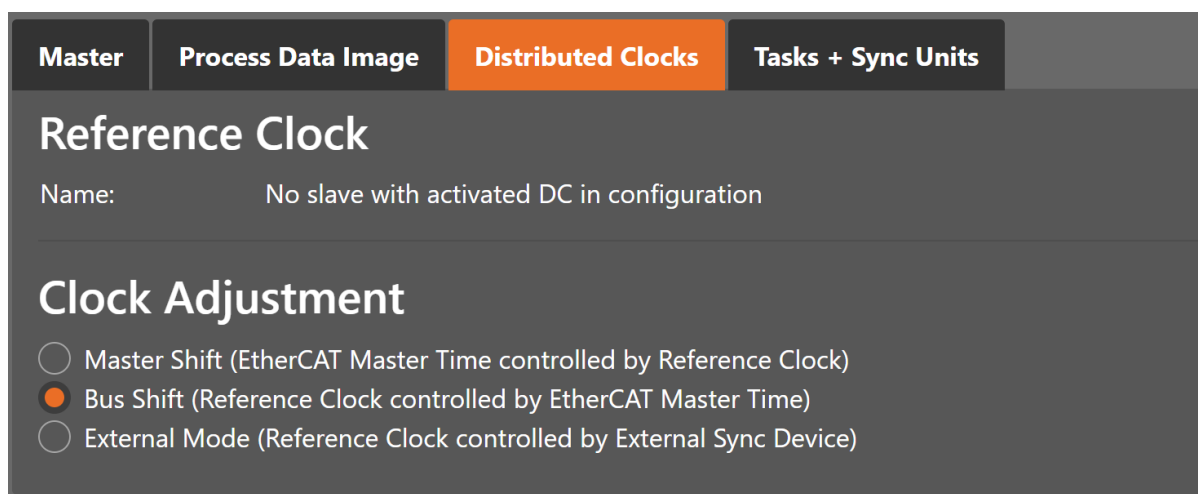
[Ok] [Cancel]

Export Formats:

- CSV File (Semicolon separated text file)
- CSV PLC File (Semicolon separated text file, where offsets are in PLC format)
- PD Layout File (C-Header file which can be used from EC-Master-Demo application)
- XML File (Like ProcessImage in ENI)

5.2.3 Distributed Clocks

In this tab, the user can change distributed clock related settings:



The screenshot shows a software interface with a top navigation bar containing four tabs: 'Master', 'Process Data Image', 'Distributed Clocks' (which is highlighted in orange), and 'Tasks + Sync Units'. Below the tabs, the main content area is titled 'Reference Clock' and shows 'Name: No slave with activated DC in configuration'. Underneath, there is a section titled 'Clock Adjustment' with three radio button options: 'Master Shift (EtherCAT Master Time controlled by Reference Clock)', 'Bus Shift (Reference Clock controlled by EtherCAT Master Time)' (which is selected), and 'External Mode (Reference Clock controlled by External Sync Device)'.

Reference Clock

Name:

Name of the reference clock. By default, this is the first slave with DC support.

Clock Adjustment

Master Shift:

The reference clock controls the Master time

Bus Shift:

The Master time controls the reference clock

External Mode:

The reference clock is controlled by an external sync device

Options

Sync Window Monitoring:

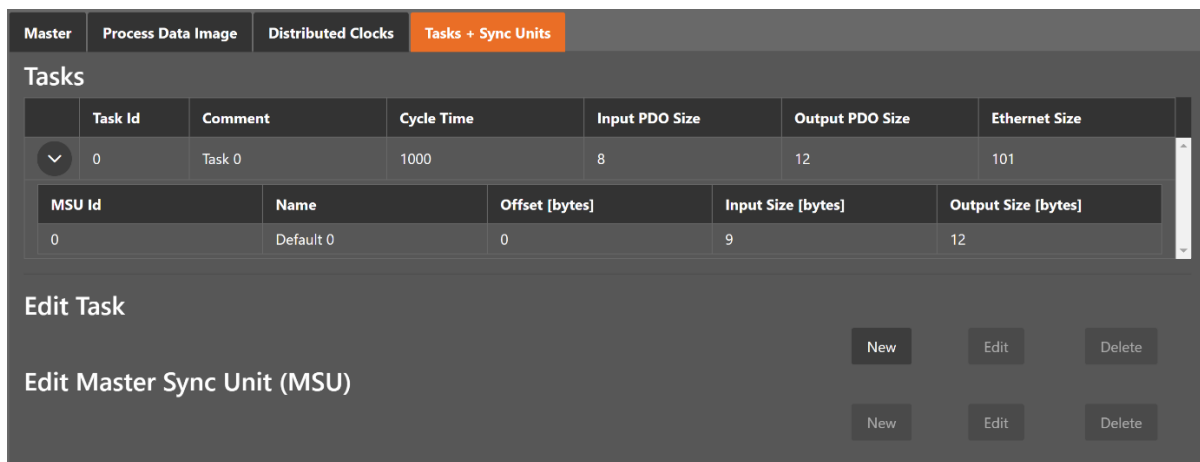
A command (datagram) will be inserted in the cyclic frame to read the ESC registers 0x092C. If this is selected the master will throw a notification.

Show 64Bit System Time:

Master supports slaves with 32bit and 64bit system time register (0x0910). If this is selected he will interpret it as 64bit system time.

5.2.4 Tasks + Sync Units

In this tab, the user can define additional cyclic tasks and master sync units. After adding a new master sync unit, the user can assign one or more slave sync units on tab *Slave Sync ▶ Units* to this master sync unit:



Tasks:

List of cyclic tasks and master sync units.

Buttons:

New/Edit/Delete: Used for changing the list.

If user wants to edit a task, he will see the following dialog:



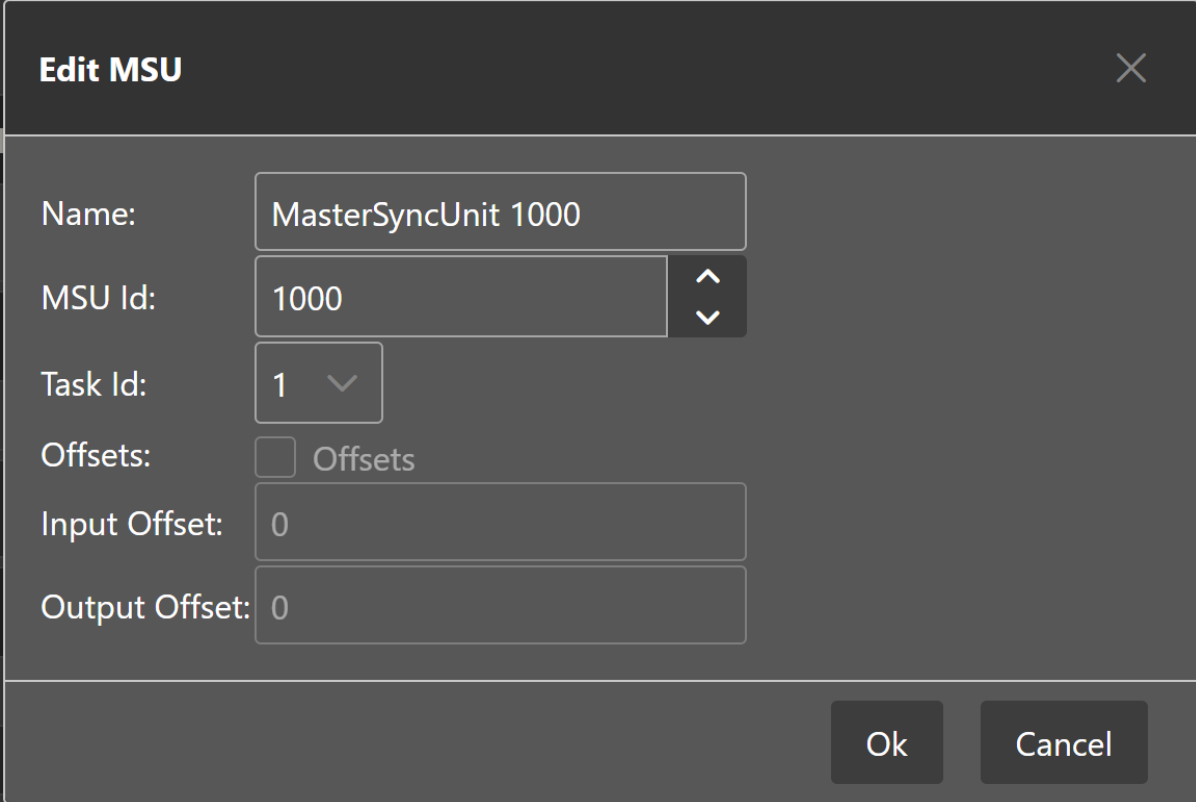
Comment:

Comment of this task (will be written to ENI file)

Cycle Time:

Cycle time of this task

If user wants to edit a master sync unit, he will see the following dialog:



Edit MSU ✕

Name:

MSU Id: ^
v

Task Id: v

Offsets: Offsets

Input Offset:

Output Offset:

Name:

Name of this master sync unit (will be written to ENI file)

Sync Unit Id:

Id of this master sync unit (will be written to ENI file).

- ID 0 .. 9: Generated / internal master sync unit
- ID 10 .. 999: Generated / internal master sync unit for groups
- ID 1000 .. 2000: User defined master sync unit

Task Id:

Task Id to which is this master sync unit assigned

Offsets:

Activate to pin this master sync unit to a specific offset

Input:

Input offset of pinned master sync unit

Output:

Output offset of pinned master sync unit

5.3 Slave Settings

This section includes slave related settings. The most of all settings will affect the “Slave” section of the ENI.

5.3.1 General

In this tab, the user can change general slave settings like station address or the name of the slave. He has also the possibility to change his predecessor device:

General	PDO Mapping	Variables	Advanced Options	Distributed Clock	Init Commands	CoE Object-Dictionary	Sync Units	Simulator
Address								
Station Address		<input type="text" value="1001"/>						
Information								
Name		<input type="text" value="Slave_1001 [SGDV-E1 CoE Drive]"/>						
Description		SGDV-E1 EtherCAT(CoE) SERVOPACK Rev3						
Vendor		Yaskawa Electric Corporation (0x00000539)						
Product Code		0x02200001 (35651585)						
Revision Number		0x00030005 (196613)						
ESI File		Yaskawa SGDV-E1_CoE rev3.05.xml						
Identification Value		Not Used						
Ports								
A		EC-Master						
D		Not Available						
B		Not Connected						
C		Not Available						

Address

Station Address:

Station address of the slave. By default, the first station address is 1001.

Information

Name:

Name of the slave. By default the following format is used “Slave_N [TYPE]”

Description:

Description of the slave (Read from ESI file)

Vendor:

Name of the vendor the slave

Product Code:

Product Code of the slave

Revision Number:

Revision Number of the slave

ESI File:

Name of the ESI `file` where the description of the slave is stored.
:file:`ESI files can be managed by using the *ESI-Manager*

Identification Value:

Identification Value of the slave

Ports

Connected Devices:

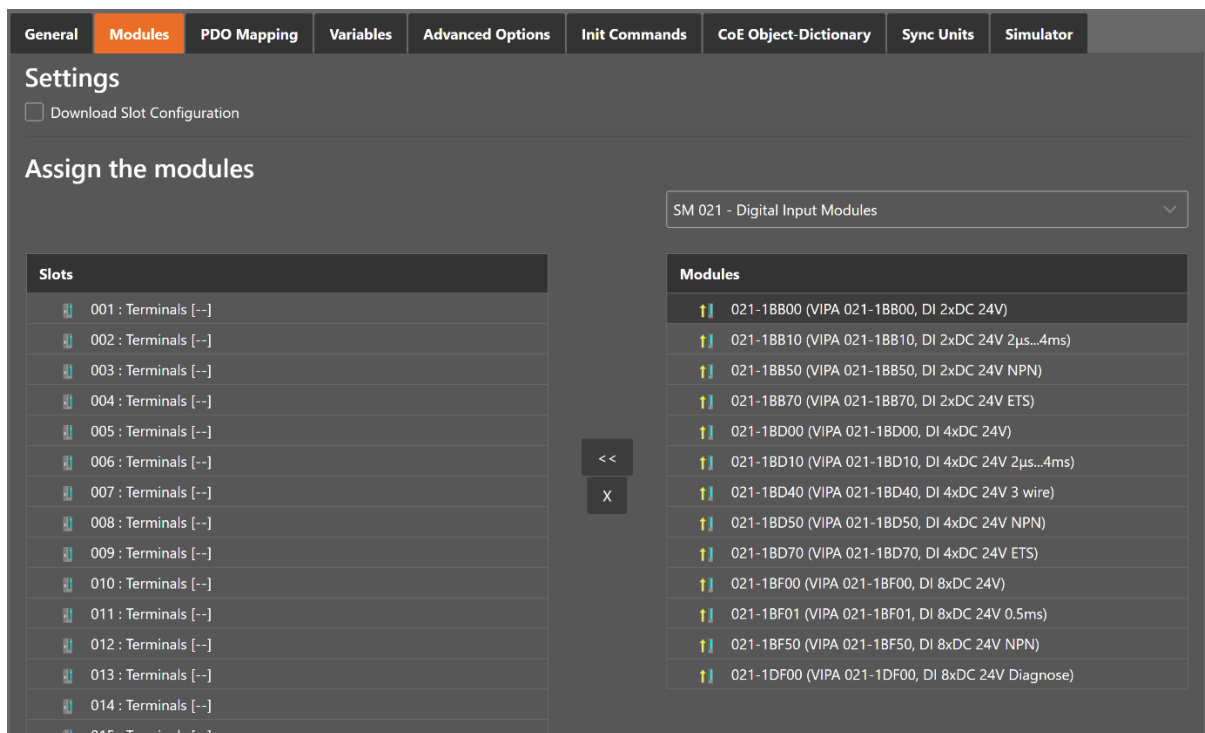
List of connected devices

Predecessor Device:

Name of the predecessor device

5.3.2 Modules

In this tab, the user has can assign modules into the specific slots. He can also change the setting for downloading the slot configuration to the slave:



Connect module to slot (“<<”)

Used for connecting the selected module (from the right list) to the selected slot (from the left list). If the slot is already connected, the module will be inserted and the subsequent modules will be moved (if this is supported from the slave)

Disconnect module from slot (“X”)

Used for disconnecting the selected slot (left list)

5.3.3 PDO Mapping

This tab consists of 2 views:

PDO

In this tab, the user can see the current PDO mappings. For some Slave types the user can activate or deactivate some PDO configurations:

	Name	Index	Bit Length
> <input type="checkbox"/>	1st Transmit PDO mapping (excluded by 0x1A01)	IN: 0x1A00	
> <input checked="" type="checkbox"/>	2nd Transmit PDO mapping	IN: 0x1A01	
> <input type="checkbox"/>	3rd Transmit PDO mapping (excluded by 0x1A01)	IN: 0x1A02	
> <input type="checkbox"/>	4th Transmit PDO mapping (excluded by 0x1A01)	IN: 0x1A03	
> <input type="checkbox"/>	1st Receive PDO mapping (excluded by 0x1601)	OUT: 0x1600	
> <input checked="" type="checkbox"/>	2nd Receive PDO mapping	OUT: 0x1601	
> <input type="checkbox"/>	3rd Receive PDO mapping (excluded by 0x1601)	OUT: 0x1602	
> <input type="checkbox"/>	4th Receive PDO mapping (excluded by 0x1601)	OUT: 0x1603	

Edit PDOs

Download PDO Configuration

Add Delete Edit Up Down

Lists of inputs or outputs

Checkbox:

Signals if PDO will be used for the current configuration or not.

Buttons

Add/Delete/Edit:

Used for changing the lists, if it is allowed by the ESI. First the list which should be changed must be selected.

Up/Down:

Moving the selected PDO in the selected list up or down

If user wants to add or edit a PDO, he will see the following dialog:

Edit PDO
✕

General

Name

Index Dec Hex

Direction

TxPdo (Input)

RxPdo (Output)

Flags

Mandatory

Fixed Content

Virtual PDO

Exclude

<input type="checkbox"/>	0x1A01
<input checked="" type="checkbox"/>	0x1A02
<input checked="" type="checkbox"/>	0x1A03

Entries

Name	Index	Bit Length	Comment
Status	0x3101:01	8	
Value	0x3101:02	16	

Add Delete Edit Up Down

OK Cancel

General:**Name:**

Name of the PDO

Index:

Index of the PDO (can be entered in hexadecimal or decimal)

Flags:**Mandatory:**

PDO cannot be deleted

Fixed Content:

Content of PDO cannot be changed

Virtual PDO:

PDO has no entries

Direction:**TxPdo:**

Input PDO

RxPdo:

Output PDO

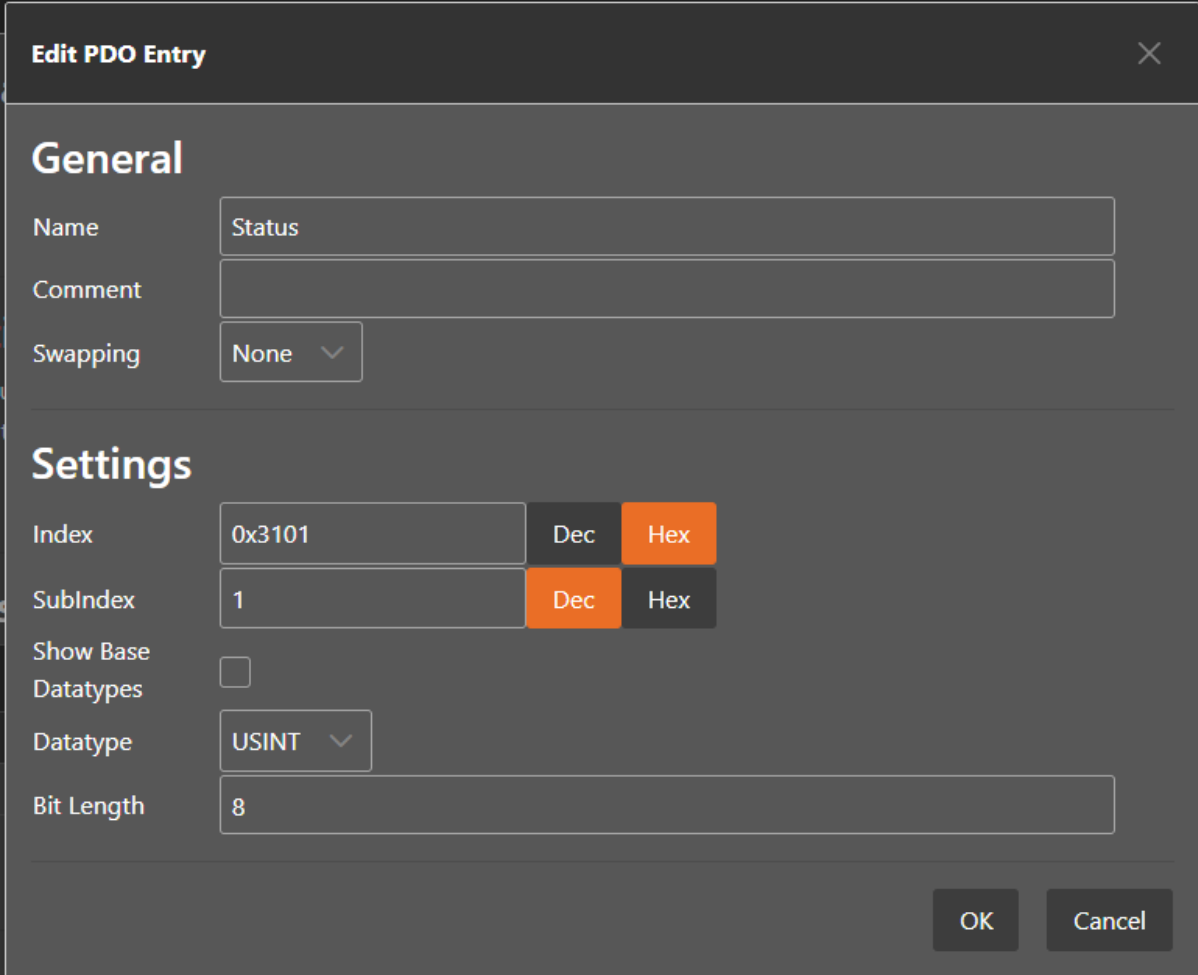
Exclude:

Select the PDOs which cannot be activated if this PDO is activated

Entries:

List of configured PDO entries

If user wants to add or edit a PDO entry, he will see the following dialog:



Edit PDO Entry

General

Name: Status

Comment:

Swapping: None

Settings

Index: 0x3101 (Dec, Hex)

SubIndex: 1 (Dec, Hex)

Show Base Datatypes:

Datatype: USINT

Bit Length: 8

OK Cancel

General**Name:**

Name of the PDO entry

Comment:

Comment of the PDO entry

Swapping:

Swapping mode of the PDO entry

Settings**Index:**

Index of the PDO entry (can be entered in hexadecimal or decimal)

Subindex:

Subindex of the PDO entry (hexadecimal)

Datatype:

List of available datatypes

Bit Length:

Length of the PDO entry in bits

FMMU/SM

In this tab, the user can see some information about FMMU and SyncManager:

No	Type	Logical Start Address	Length	Logical End bit	Physical Address	Sm	Su
0	Outputs	0x10000800.0	6	7	0x1100	-	-
1	Inputs	0x10001000.0	6	7	0x1400	-	-
2	Mailbox State	0x09000000.0	1	0	0x080D	-	-

No	Type	Start Address	Length	Buffer Mode	Enable
0	Mailbox Outputs	0x1000	128	1	1
1	Mailbox Inputs	0x1080	128	1	1
2	Outputs	0x1100	6	3	1
3	Inputs	0x1400	6	3	1

Lists of FMMUs

Available FMMUs comes from the ESI file.

Lists of SyncManagers

Available SyncManagers comes from the ESI file.

5.3.4 Variables

In this tab, the user can see the variables of the slave and if it is allowed he can also add/edit/delete/move variables:

Name	Datatype	Offset	Size
Slave_1012 [SGDV-E1 CoE Drive].2nd Transmit PDO mapping.Status word	UINT	IN : 9.0	2.0
Slave_1012 [SGDV-E1 CoE Drive].2nd Transmit PDO mapping.Position actual value	DINT	IN : 11.0	4.0
Slave_1012 [SGDV-E1 CoE Drive].2nd Receive PDO mapping.Control word	UINT	OUT : 12.0	2.0
Slave_1012 [SGDV-E1 CoE Drive].2nd Receive PDO mapping.Target position	DINT	OUT : 14.0	4.0

Edit Variable

Edit

Lists of Variables

Variables comes from the ESI file or will be generated from the configurator.

5.3.5 Advanced Slave Options

In this tab, the user can change advanced options of the slave:

General	PDO Mapping	Variables	Advanced Options	Distributed Clock	Init Commands	CoE Object-Dictionary	Sync Units	Simulator
Startup Checking								
<input checked="" type="checkbox"/> Check Vendor ID <input checked="" type="checkbox"/> Check Product Code <input type="checkbox"/> Check Revision Number == <input type="checkbox"/> Check Serial No								
Identification Checking								
<input type="checkbox"/> Check Identification Identification Value: <input type="text"/> Select Local Address: <input type="text" value="0x0012"/>								
Process Data Mode								
<input checked="" type="checkbox"/> Disable LRW								
Overwrite Watchdog								
<input type="checkbox"/> Set Multiplier (Reg.: 0x400): <input type="text" value="2498"/>								
<input type="checkbox"/> Set PDI Watchdog (Reg.: 0x410): <input type="text" value="1000"/>								
<input type="checkbox"/> Set SM Watchdog (Reg.: 0x420): <input type="text" value="1000"/>								
Distributed Clocks								
<input type="checkbox"/> Potential Reference Clock								

Startup Checking

Master will check the Vendor ID, Product code, Revision number if the state machine changes from INIT to PREOP of the slave. Revision number can be verified by six ways:

- “==” -> HI word is equal, LO word is equal
- “>=” -> HI word is equal or greater, LO word is equal or greater
- “LW ==” -> HI word is equal
- “LW ==, HW >=” -> LO word is equal, HI word is equal or greater
- “HW ==” -> LO word is equal
- “HW ==, LW >=” -> HI word is equal, LO word is equal or greater

Identification Checking

If ‘Check Identification is selected, the Identification Value of the slave is checked. In the ‘Select Local Address’ Box is the register of the Identification Value.

Process Data Mode

Disable LRW: Determines whether LRD/LWR command or the LRW command is used for accessing process data. Cable redundancy needs LRD/LWR, Slave-to-slave-copy needs LRW.

Watchdog

Set Multiplier:

Writes the configured value to the corresponding slave register: 0x0400

Set PDI Watchdog:

Writes the configured value to the corresponding slave register: 0x0410 (0 = Watchdog is disabled)

Set SM Watchdog:

Writes the configured value to the corresponding slave register: 0x0420 (0 = Watchdog is disabled)

Distributed Clocks**Potential Reference Clock: Set to use slave as a potential reference clock**

- This might be useful, if e.g. a hot connect slave, which is used as reference clock, was disconnected from the network
- In that case the EC-Master searches for the first potential reference clock
- If no potential reference clock slave was found, the first DC slave will be used

Timeouts**SDO Access:**

Internal master timeout which is used for accessing the SDO (0 = Use internal default value of the master)

Init -> PreOp:

Internal master timeout with is used for changing slave state

Pre-Op -> Save-Op or Safe-Op ->Op:

Internal master timeout with is used for changing slave state

Back to Pre-Op, Init:

Internal master timeout with is used for changing slave state

Op -> Safe-Op:

Internal master timeout with is used for changing slave state

Mailbox Mode**Cyclic:**

Interval in milliseconds within the input mailbox will be read (polling mode)

State Change:

The input mailbox will be read only if the status bit is set

Overwrite Mailbox Size**Output Size:**

Overwrites mailbox output size

Input Size:

Overwrites mailbox input size

Process Data Sync Manager Mode**Default:**

Uses sync manager mode from ESI file

Buffered (3 buffer mode):

Enables 3 buffer mode

Mailbox (Single buffer mode):

Enables single buffer mode

5.3.6 (Hot Connect) Groups

In this tab, the user can choose if this group has a fixed offset in the process data image or if this group is a hot connect group:

Remove Group

General

MSU Id 10

Name

Pinned Group

Input Offset (byte)

Output Offset (byte)

Hot Connect Group

Identification Offset 0x0012

Identification Value

Position in Topology Fixed to 'Slave_1011 [VIPA 053-1EC00] (1011)'

Detach HC Group

Note: Tab is only visible if slave is the first member of a group.

General

MSU Id:
Generated Master Sync Unit Id

Name:
Name of the group

Pinned Group

Input Offset:
Fixed input offset of the group in the process data image in bytes

Output Offset:
Fixed output offset of the group in the process data image in bytes

Hot Connect Group

Identification Offset:

Register offset where the identification can be read from the slave

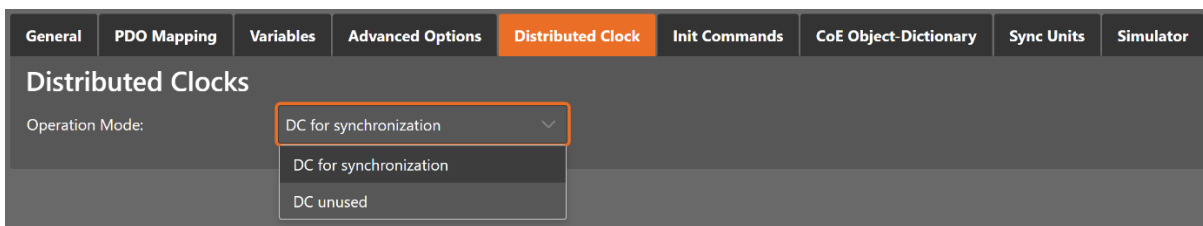
Identification Value:

Hardware identification value or configured station alias address can be used. For more information about the configured station alias address, see [EEPROM](#)

A new group can be created by clicking *Create Group* in the toolbar. Select all slaves you like in the group and click *Confirm* in the toolbar. Now a group has been created. On the group tab (first slave) are more settings like Hot Connect, Pinned Group and also remove the group or detach it.

5.3.7 Distributed Clock

In this tab, the user can change distributed clock related settings:

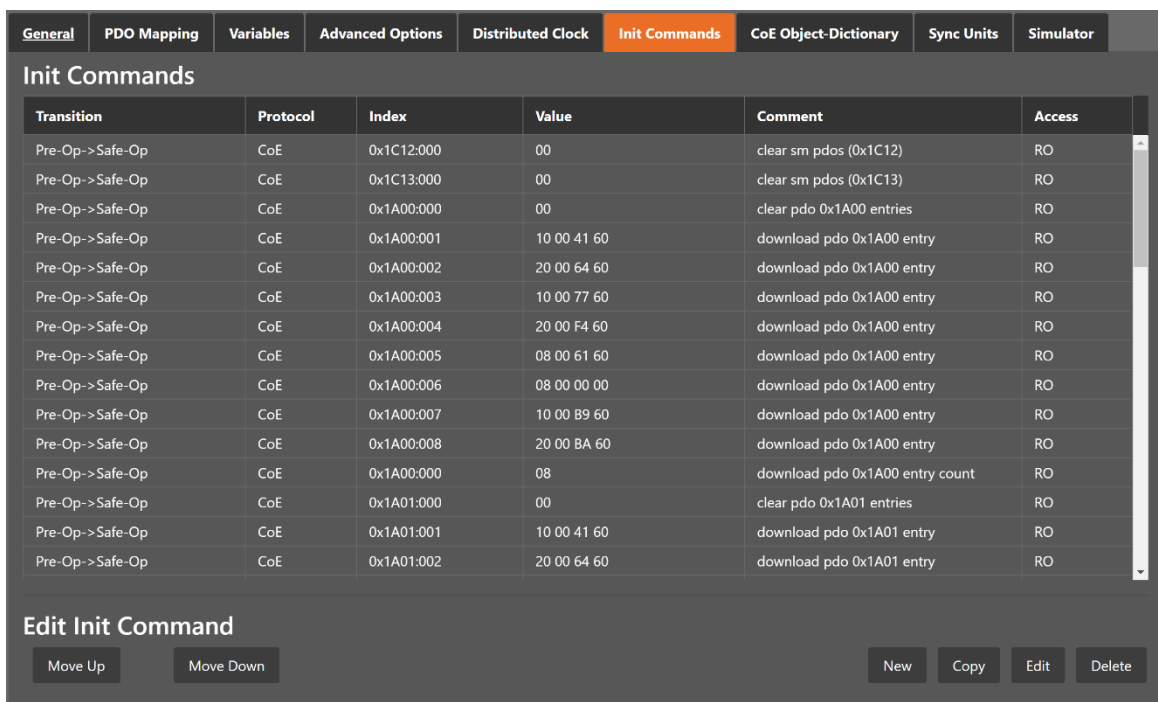


Operation Mode:

Selectable DC operation modes. The modes cannot be edited.

5.3.8 Init Commands

In this tab, the user can view the current configured init commands and if it is allowed he can also add/edit/delete init commands:



Lists of Init Commands

Init Commands comes from the ESI file or will be generated from the configurator. The “Access” column tells the user if this Init Command can be edited (RW = Read/Write) or not (RO = Read-Only).

Buttons

New/Copy/Edit/Delete:

Used for changing the list

Up/Down:

Moving the selected Init Command up or down

At the moment only Init Commands of the CoE- Protocol can be added or changed. If the user wants to do this he will see the following dialog (CoE):

General

Index:

CoE-Index of the Init Command

SubIndex:

CoE-SubIndex of the Init Command

Value:

Value of the Init Command, which should be written in the chose transition (only available if direction is set to “Download”). If type of value is unknown, the hex format must be used like “00 11 22 33 ...”.

Comment:

Comment of the Init Command

Transition

Determines in which transition the Init Command will be executed

Further Settings

Determines if the complete SDO object should be written/read

Direction

Determines the direction of the Init Command

Download:

Writes value to slave

Upload:

Reads value from slave (e.g. necessary if value must be confirmed)

5.3.9 CoE Object-Dictionary

In this tab, the user can see and edit the offline CoE object dictionary.

The screenshot shows the 'CoE Object-Dictionary' tab in a software interface. It features a table with columns for Index, Name, Value, Type, and Flags. Below the table is an 'Edit Value' section with a text input field and 'Write' and 'Reset' buttons.

Index	Name	Value	Type	Flags
0x1000	Device Type	131474 (0x20192)	UDINT	-- (RO RO RO)
0x1001	Error Register	-	USINT	-- (RO RO RO)
0x1008	Manufacturer Device Name	-	STRING(0)	-- (RO RO RO)
0x100A	Manufacturer Software Version	-	STRING(0)	-- (RO RO RO)
> 0x1010	Store Parameters	-	USINT	-- (RO RO RO)
> 0x1011	Restore Default Parameters	-	USINT	-- (RO RO RO)
> 0x1018	Identity Object	-	USINT	-- (RO RO RO)
> 0x10F1	Sync Error Settings	-	USINT	-- (RO RO RO)
> 0x1600	1st receive PDO Mapping	-	USINT	-- (RW RW RW)
> 0x1601	2nd receive PDO Mapping	-	USINT	-- (RW RW RW)
> 0x1602	3rd receive PDO Mapping	-	USINT	-- (RW RW RW)
> 0x1603	4th receive PDO Mapping	-	USINT	-- (RW RW RW)
> 0x1A00	1st transmit PDO Mapping	-	USINT	-- (RW RW RW)
> 0x1A01	2nd transmit PDO Mapping	-	USINT	-- (RW RW RW)
> 0x1A02	3rd transmit PDO Mapping	-	USINT	-- (RW RW RW)

Edit Value

Value: Write Reset

Lists of CoE Object-Dictionary entries

- Entries comes from the ESI file or will be generated from the configurator.
- The “Flags” column tells the user if this entry is an PDO entry and if it can be edited
 - “AA BB C D (EE FF GG)”
 - AA = Mapping as RX PDO or not

- BB = Mapping as TX PDO or not
- C = Backup Flag
- D = Settings Flag
- EE = Access rights for PreOp (RO, WO, RW)
- FF = Access rights for SafeOp (RO, WO, RW)
- GG = Access rights for Op (RO, WO, RW)

Buttons

Update:

Changes the selected entry

Reset:

Resets the selected entry to ESI default

5.3.10 Sync Units

In this tab, the user can assign a slave sync unit to a specific master sync unit by using the combobox column “Master Sync Unit” (only visible if user has defined additional master sync units).

Name	Input Size	Output Size	MSU
SyncUnit 0	6.0	6.0	Id 0: Default 0

Name	Datatype	Offset	Size
Slave_1012 [SGDV-E1 CoE Drive].2nd Transmit PDO mapping.Status word	UINT	IN : 9.0	2.0
Slave_1012 [SGDV-E1 CoE Drive].2nd Transmit PDO mapping.Position actual value	DINT	IN : 11.0	4.0
Slave_1012 [SGDV-E1 CoE Drive].2nd Receive PDO mapping.Control word	UINT	OUT : 12.0	2.0
Slave_1012 [SGDV-E1 CoE Drive].2nd Receive PDO mapping.Target position	DINT	OUT : 14.0	4.0

5.4 Export ENI

To run the EC-Master you basically need an EtherCAT-Network-Information (ENI) file to initialize and control an EtherCAT network. After configuring the EtherCAT network with EC-EngineerWeb, you can export this ENI file and copy it on the control system to run the EC-Master.

Note: The EtherCAT-Network-Information (ENI) File will be generated according to ETG.2100 standard V1.0.1

5.5 Export EXI

To run the EC-Simulator you basically need an ENI or better an EXI file to simulate an EtherCAT network. After configuring the EtherCAT network with EC-EngineerWeb, you can export this EXI file and use it to start the EC-Simulator.

5.6 Export EBI

To run the EniBuilder you basically need an EBI file to create an ENI. After configuring the EtherCAT network with EC-EngineerWeb, you can export this EBI file and use it to start the EniBuilder.

6 Diagnosis Mode

6.1 Overview

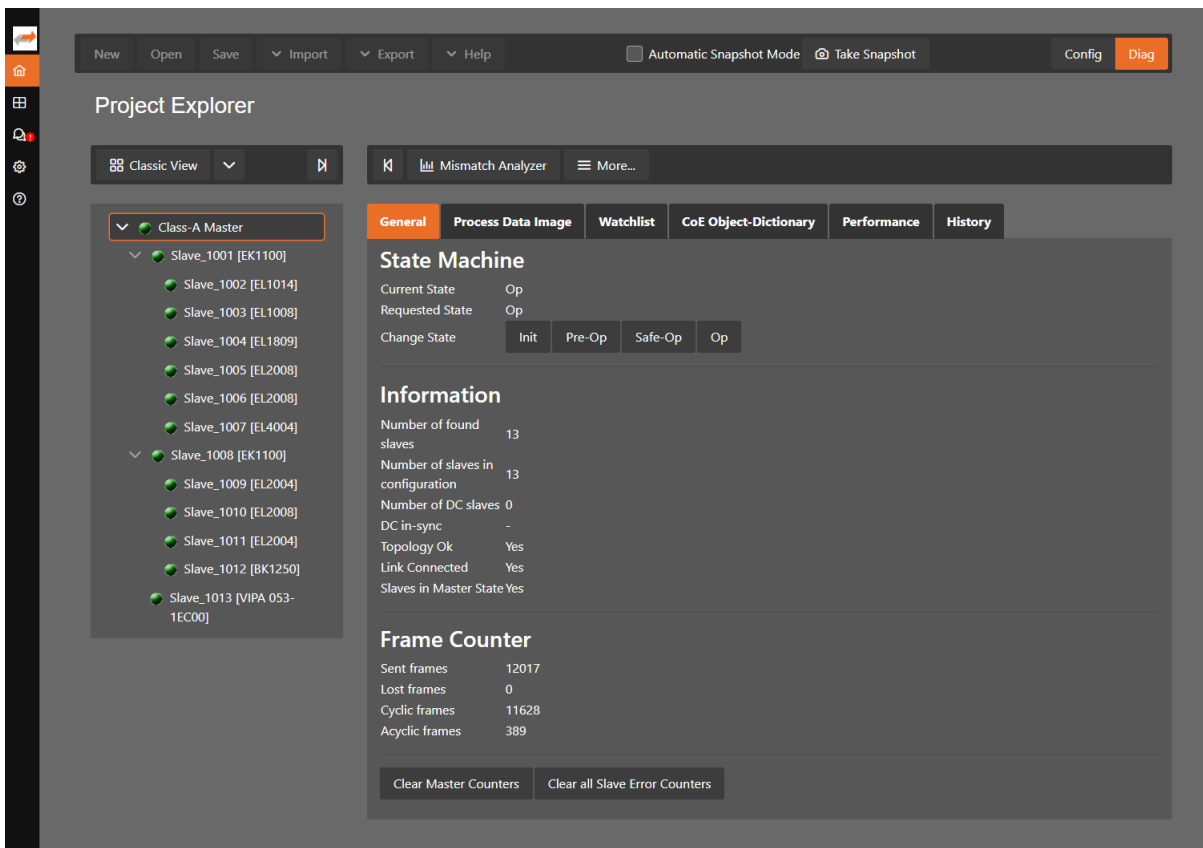
EC-EngineerWeb is also a diagnosis application specifically developed to analyze EtherCAT networks that are controlled by the EC-Master. Automated control systems usually require high availability of the whole system. Due to the rough industrial environment this is often hardly to achieve.

If high availability shall be guaranteed for an automated control system it is important to verify and maintain the field bus. Using EC-EngineerWeb it is possible to take a look into the “health” of the EtherCAT system. Detection of signs of system degradation prior to running into a system failure will be of great benefit. In that case it is possible to exchange the problematic components (cables, slave devices).

Many aspects of diagnosis are covered by the EC- Engineer:

- Useful for setting up the system
- System analysis and maintenance
- Error detection
- Documentation

After switching into diagnosis mode of EC-EngineerWeb, the user will see this page:



The screenshot shows the EC-EngineerWeb interface in diagnosis mode. The top menu bar includes options like New, Open, Save, Import, Export, Help, Automatic Snapshot Mode, Take Snapshot, Config, and Diag. The Project Explorer on the left shows a tree view of the system components:

- Class-A Master
 - Slave_1001 [EK1100]
 - Slave_1002 [EL1014]
 - Slave_1003 [EL1008]
 - Slave_1004 [EL1809]
 - Slave_1005 [EL2008]
 - Slave_1006 [EL2008]
 - Slave_1007 [EL4004]
 - Slave_1008 [EK1100]
 - Slave_1009 [EL2004]
 - Slave_1010 [EL2008]
 - Slave_1011 [EL2004]
 - Slave_1012 [BK1250]
 - Slave_1013 [VIPA 053-1EC00]

The main area displays the State Machine, Information, and Frame Counter sections:

State Machine

Current State	Op
Requested State	Op
Change State	<input type="button" value="Init"/> <input type="button" value="Pre-Op"/> <input type="button" value="Safe-Op"/> <input type="button" value="Op"/>

Information

Number of found slaves	13
Number of slaves in configuration	13
Number of DC slaves	0
DC in-sync	-
Topology Ok	Yes
Link Connected	Yes
Slaves in Master State	Yes

Frame Counter

Sent frames	12017
Lost frames	0
Cyclic frames	11628
Acyclic frames	389

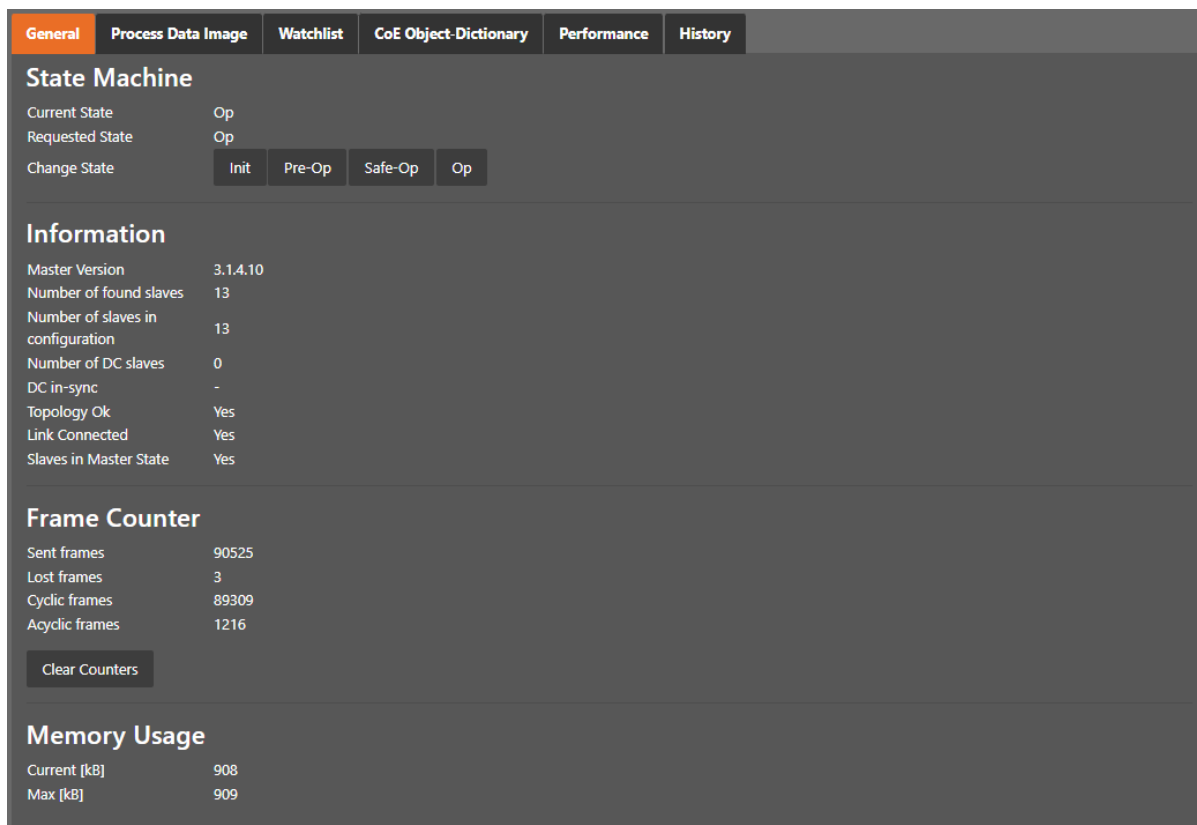
Buttons at the bottom: Clear Master Counters, Clear all Slave Error Counters

6.2 Master

This section shows the current “health” state of the master and helps the user to analyze master related problems.

6.2.1 General (Master)

In this tab, the user can see and change the current state of the state machine of the master. He has also an overview over the current “health” state of his EtherCAT network:



State Machine	
Current State	Op
Requested State	Op
Change State	<input type="button" value="Init"/> <input type="button" value="Pre-Op"/> <input type="button" value="Safe-Op"/> <input type="button" value="Op"/>

Information	
Master Version	3.1.4.10
Number of found slaves	13
Number of slaves in configuration	13
Number of DC slaves	0
DC in-sync	-
Topology Ok	Yes
Link Connected	Yes
Slaves in Master State	Yes

Frame Counter	
Sent frames	90525
Lost frames	3
Cyclic frames	89309
Acyclic frames	1216

Memory Usage	
Current [kB]	908
Max [kB]	909

State Machine

Current State:

Current state of the master

Requested State:

Requested state of the master

Change State:

Master can reach the states INIT, PRE-OP, SAFE-OP and OP.

Information

Master version:

Version number of the running master

Number of found slaves:

Number of slaves, which were found from master on the network

Number of slaves in configuration:

Number of slaves, which are configured in the ENI file

Number of DC slaves:

Number of slaves with DC support, which were found from master on the network

DC in-sync:

Signals that all slaves with DC support are correctly synchronized or not. If not all slaves are correctly synchronized, please refer the message window for more information.

Topology OK:

Signals that topology is “okay” or not. If topology is not “okay”, you have a mismatch between the configured bus and the currently connected bus. Please open the ‘Network Mismatch Analyzer’ (Menu Network Network Mismatch Analyzer) to solve the problem.

Link Connected:

Signals the link is connected.

Slaves in Master State:

Signals that all slaves are in master state.

Frame Counter**Sent frames:**

Number of sent frames

Lost frames:

Number of lost frames

Cyclic frames:

Number of cyclic frames

Acyclic frames:

Number of acyclic frames

Memory Usage**Current:**

Current memory usage in bytes

Max:

Maximum memory usage in bytes

6.2.2 Process Data Image

In this tab, the user can see and change the values of the process variables. The variables will be forced to the value the user entered. The user can press release to release the variable. If one or two variables are selected, a chart of the values is shown. Also resize and zoom is possible to see more details. The chart will be updated every 250 milliseconds:

General
Process Data Image
Watchlist
CoE Object-Dictionary
Performance
History

Variables

Name	Datatype	Offset	Size	Value	Forced
Slave_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 2	BOOL	IN : 12.2	0.1	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 2 (021-1BD00).Inputs.DI 3	BOOL	IN : 12.3	0.1	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Status byte	USINT	IN : 13.0	1.0	136	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 1	USINT	IN : 14.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 2	USINT	IN : 15.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 3	USINT	IN : 16.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 4	USINT	IN : 17.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 5	USINT	IN : 18.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 6	USINT	IN : 19.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 7	USINT	IN : 20.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 8	USINT	IN : 21.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 9	USINT	IN : 22.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 10	USINT	IN : 23.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 11	USINT	IN : 24.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 12	USINT	IN : 25.0	1.0	0	<input type="checkbox"/>
Slave_1019 [VIPA 053-1EC00].Module 4 (040-1BA00).Inputs.Input byte 13	USINT	IN : 26.0	1.0	0	<input type="checkbox"/>

Add to watchlist

Chart

Edit Variable

Value:

Dec
Hex

Force
Release

It is also possible to add the variables to a watch list (next chapter).

6.2.3 Watch list

In this tab, the user can monitor selected variables. He can go through the slaves and add variables to the watch list to monitor them. The user can also export or import the watch list, so changes can be saved:

General
Process Data Image
Watchlist
CoE Object-Dictionary
Performance
History

Variables

Name	Datatype	Offset	Size	Value	Forced
Slave_1001 [SGDV-E1 CoE Drive].2nd Transmit PDO mapping.Status word	UINT	IN : 0.0	2.0	0	<input type="checkbox"/>
Slave_1001 [SGDV-E1 CoE Drive].2nd Receive PDO mapping.Target position	DINT	OUT : 2.0	4.0	0	<input type="checkbox"/>

Remove from watchlist
Save watchlist
Load watchlist

Chart

Edit Variable

Value:
Dec
Hex

Force
Release

6.2.4 Performance

In this tab, the user can see the busload per cycle and per second:

General
Process Data Image
Watchlist
CoE Object-Dictionary
Performance
History

Busload

Cycle Time [us]

Bytes per cycle

Average [B/cycle]
 Max [B/cycle]

Bytes per second

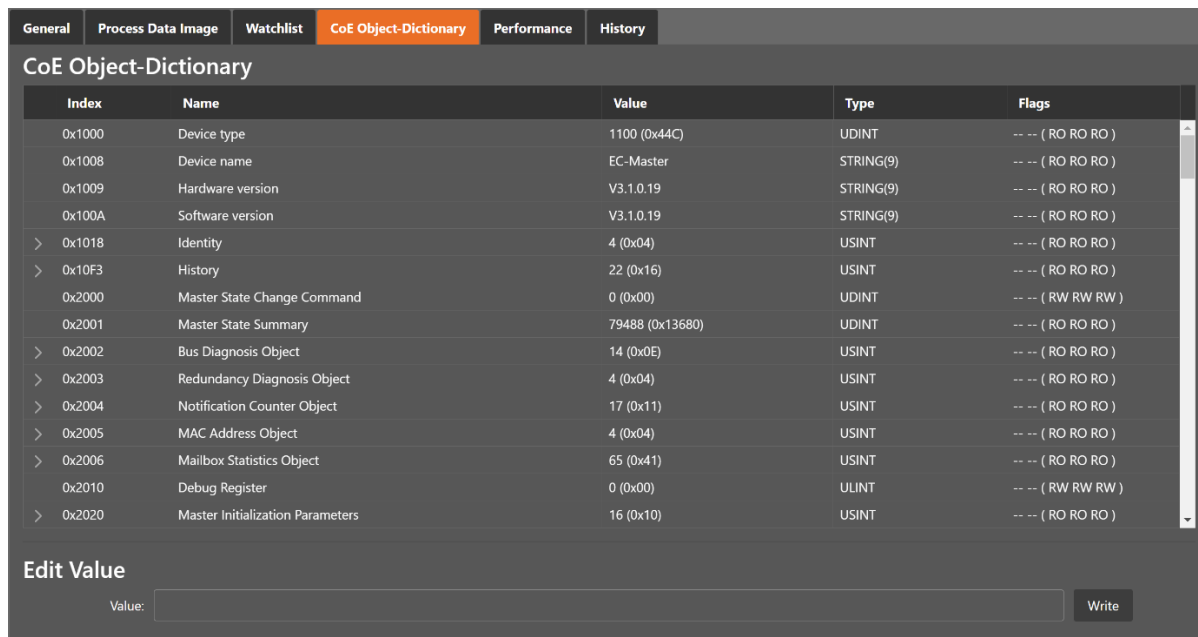
Average [B/s]
 Max [B/s]

Busload in percent

Metric	Average (%)	Max (%)
Busload per cycle (100% = 10000 B/Cycle)	~5	~18
Busload per second (100% = 10 MB/s)	~1	~2

6.2.5 CoE Object-Dictionary

In this tab, the user can see and change the values of the object dictionary of the master:



Index	Name	Value	Type	Flags
0x1000	Device type	1100 (0x44C)	UDINT	-- (RO RO RO)
0x1008	Device name	EC-Master	STRING(9)	-- (RO RO RO)
0x1009	Hardware version	V3.1.0.19	STRING(9)	-- (RO RO RO)
0x100A	Software version	V3.1.0.19	STRING(9)	-- (RO RO RO)
> 0x1018	Identity	4 (0x04)	USINT	-- (RO RO RO)
> 0x10F3	History	22 (0x16)	USINT	-- (RO RO RO)
0x2000	Master State Change Command	0 (0x00)	UDINT	-- (RW RW RW)
0x2001	Master State Summary	79488 (0x13680)	UDINT	-- (RO RO RO)
> 0x2002	Bus Diagnosis Object	14 (0x0E)	USINT	-- (RO RO RO)
> 0x2003	Redundancy Diagnosis Object	4 (0x04)	USINT	-- (RO RO RO)
> 0x2004	Notification Counter Object	17 (0x11)	USINT	-- (RO RO RO)
> 0x2005	MAC Address Object	4 (0x04)	USINT	-- (RO RO RO)
> 0x2006	Mailbox Statistics Object	65 (0x41)	USINT	-- (RO RO RO)
0x2010	Debug Register	0 (0x00)	ULINT	-- (RW RW RW)
> 0x2020	Master Initialization Parameters	16 (0x10)	USINT	-- (RO RO RO)

Edit Value

Value: Write

Lists of CoE Object-Dictionary entries

- Entries are uploaded by the master from the slave
- **The “Flags” column tells the user if this entry is an PDO entry and if it can be edited**
 - “AA BB (CC DD EE)”
 - AA = Mapping as RX PDO or not
 - BB = Mapping as TX PDO or not
 - CC = Access rights for PreOp (RO, WO, RW)
 - DD = Access rights for SafeOp (RO, WO, RW)
 - EE = Access rights for Op (RO, WO, RW)

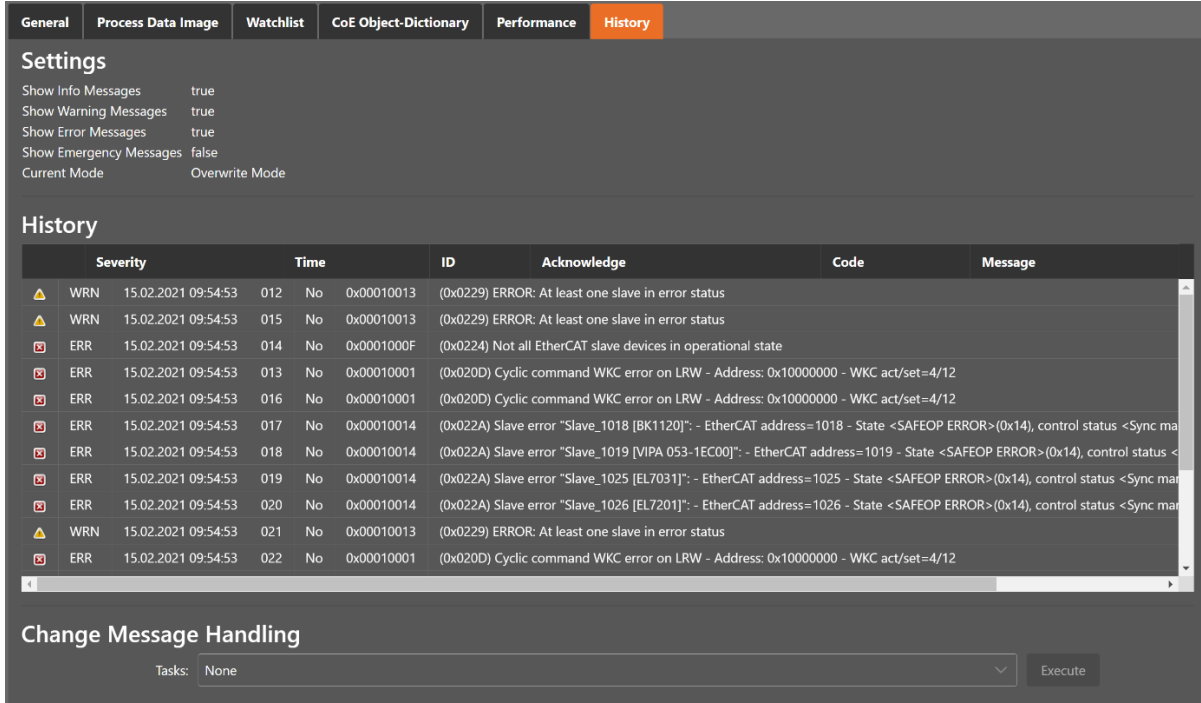
Buttons

Update:

Changes the selected entry

6.2.6 Master History

In this tab, the user can see and change the diagnosis history of the master (Supported from EC-Master V2.7 and above). It is also possible to export the data:



Settings

Show Info Messages: true
 Show Warning Messages: true
 Show Error Messages: true
 Show Emergency Messages: false
 Current Mode: Overwrite Mode

History

Severity	Time	ID	Acknowledge	Code	Message
WRN	15.02.2021 09:54:53	012	No	0x00010013	(0x0229) ERROR: At least one slave in error status
WRN	15.02.2021 09:54:53	015	No	0x00010013	(0x0229) ERROR: At least one slave in error status
ERR	15.02.2021 09:54:53	014	No	0x0001000F	(0x0224) Not all EtherCAT slave devices in operational state
ERR	15.02.2021 09:54:53	013	No	0x00010001	(0x020D) Cyclic command WKC error on LRW - Address: 0x10000000 - WKC act/set=4/12
ERR	15.02.2021 09:54:53	016	No	0x00010001	(0x020D) Cyclic command WKC error on LRW - Address: 0x10000000 - WKC act/set=4/12
ERR	15.02.2021 09:54:53	017	No	0x00010014	(0x022A) Slave error "Slave_1018 [BK1120]": - EtherCAT address=1018 - State <SAFEOP ERROR>(0x14), control status <Sync ma
ERR	15.02.2021 09:54:53	018	No	0x00010014	(0x022A) Slave error "Slave_1019 [VIPA 053-1EC00]": - EtherCAT address=1019 - State <SAFEOP ERROR>(0x14), control status <
ERR	15.02.2021 09:54:53	019	No	0x00010014	(0x022A) Slave error "Slave_1025 [EL7031]": - EtherCAT address=1025 - State <SAFEOP ERROR>(0x14), control status <Sync ma
ERR	15.02.2021 09:54:53	020	No	0x00010014	(0x022A) Slave error "Slave_1026 [EL7201]": - EtherCAT address=1026 - State <SAFEOP ERROR>(0x14), control status <Sync ma
WRN	15.02.2021 09:54:53	021	No	0x00010013	(0x0229) ERROR: At least one slave in error status
ERR	15.02.2021 09:54:53	022	No	0x00010001	(0x020D) Cyclic command WKC error on LRW - Address: 0x10000000 - WKC act/set=4/12

Change Message Handling

Tasks:

6.3 Slave

This section shows the current “health” state of the selected slave and helps the user to analyze slave related problems.

6.3.1 General (Slave)

In this tab, the user can see and change the current state of the state machine of the slave. He can see and clear also the current error state of the slave:

General
Variables
ESC Register
EEPROM
Extended Diagnosis
CoE Object-Dictionary
FoE
DC Diagnosis

State Machine

Current State Op

Requested State Op

Change State Init
Pre-Op
Safe-Op
Op

Bootstrap

Software Diagnostics ?

State Machine Error No error

Hardware Diagnostics ?

Summary No error

A No error

D Not available

B No error

C Not available

Acknowledge

State Machine

Current State:

Current state of the selected slave

Requested State:

Requested state of the selected slave

Change State:

Slave can reach the states INIT, BOOTSTRAP, PRE-OP, SAFE-OP and OP.

Note: The BOOTSTRAP mode can only be reached from the INIT state.

Software Diagnostics

State Machine Error:

Slave error which occurred during state transition

Hardware Diagnostics

Summary:

Summary of hardware diagnostics

Port A:

Port specific error

Port D:

Port specific error

Port B:

Port specific error

Port C:

Port specific error

Buttons

Acknowledge:

Acknowledge the current error state and notify the user again if error state was changed again.

Possible warning and errors:

Disturbed Connection:

There may be problems in the connection between two slaves. The message will tell either that there is a problem between two slaves or two ports. The warning appears if error counters are increased (Invalid Frame: 0x300-0x306, RX Errors: 0x301-0x307, Lost Link: 0x308-0x30B). The value from which a warning is issued can be set in the User.xml files in C:\ProgramData\EC-EngineerWeb. More information below.

Bad Connection:

The same as “Disturbed Connection” but the error counters are higher. The value from which an error is issued can be set in the User.xml files in C:\ProgramData\EC-EngineerWeb. More information below.

Line break:

A line break is detected before a slave. This error is detected by looking at the topology.

Link missing:

A link is missing on input port of the slave. This error is detected by looking at the topology.

Multiple warnings:

There are multiple warning for this port.

Multiple errors:

There are multiple errors for this port.

Multiple warnings and errors:

There are multiple warning and errors for this port.

State Machine:

See ETG1020 “Description of AL Status Codes” or ETG.1000.6. This error is detected by looking at the AL Status (0x130).

How to solve errors?

- Lost Link errors are often caused by the power supply system
- Helpful might be the usage of an extra power supply
- It is recommended to clear all error counters after startup

How to change amount of errors leading to a warning or error:

- Open C:\ProgramData\EC-EngineerWeb
- Search for DiagGeneral
- **Change the values which should be adjusted**
 - LostLink: The value entered is used
 - All others are calculated depending on the amount of cyclic frames: $(\text{Value} / \text{CyclicFrames}) \times 10^6$

Note: Please refer also the “ETG.1600 EtherCAT Installation Guideline”: <http://www.ethercat.org/ETG1600>.

6.3.2 Variables

In this tab, the user can see the values of the process variables. The variables will be forced to the value the user entered. The user can press release to release the variable.

The chart will be updated every second. It is also possible to add variables to the watchlist.

General
Variables
ESC Register
EEPROM
Extended Diagnosis
DC Diagnosis

Variables

Name	Datatype	Offset	Size	Value	Forced
Slave_1003 [EL2008].Channel 1.Output	BOOL	OUT : 154.0	0.1	0	<input type="checkbox"/>
Slave_1003 [EL2008].Channel 2.Output	BOOL	OUT : 154.1	0.1	0	<input type="checkbox"/>
Slave_1003 [EL2008].Channel 3.Output	BOOL	OUT : 154.2	0.1	0	<input type="checkbox"/>
Slave_1003 [EL2008].Channel 4.Output	BOOL	OUT : 154.3	0.1	0	<input type="checkbox"/>
Slave_1003 [EL2008].Channel 5.Output	BOOL	OUT : 154.4	0.1	0	<input type="checkbox"/>
Slave_1003 [EL2008].Channel 6.Output	BOOL	OUT : 154.5	0.1	0	<input type="checkbox"/>
Slave_1003 [EL2008].Channel 7.Output	BOOL	OUT : 154.6	0.1	0	<input type="checkbox"/>
Slave_1003 [EL2008].Channel 8.Output	BOOL	OUT : 154.7	0.1	0	<input type="checkbox"/>

Chart

Edit Variable

Value:

6.3.3 ESC Register

In this tab, the user can see and change the values of the registers. In the settings section he can set the offset and the length. If he activates the compact view, he will only see the registers which have a description:

General Variables **ESC Register** EEPROM Extended Diagnosis DC Diagnosis

Settings

Offset:

Length:

Compact:

Registers

Index	Bits	Name	Value	Type
> 0x0000		Type	18 (0x12)	USINT
> 0x0001		Revision	0 (0x00)	USINT
> 0x0002		Build	0 (0x0000)	UINT
> 0x0004		FMMUs supported	3 (0x03)	USINT
> 0x0005		SyncManagers supported	4 (0x04)	USINT
> 0x0006		RAM Size	1 (0x01)	USINT
> 0x0007		Port Descriptor	74 (0x4A)	USINT
> 0x0008		ESC Features supported	252 (0x00FC)	UINT
> 0x0010		Configured Station Address	1003 (0x03EB)	UINT
> 0x0012		Configured Station Alias	6 (0x0006)	UINT
> 0x0020		Write Register Enable	0 (0x00)	USINT
> 0x0021		Write Register Protection	0 (0x00)	USINT
> 0x0030		ESC Write Enable	0 (0x00)	USINT
> 0x0031		ESC Write Protection	0 (0x00)	USINT
> 0x0040		ESC Reset ECAT	0 (0x00)	USINT

Edit Register

Value: Write

6.3.4 EEPROM

In this view, the user can see and change the values of the EEPROM. At the moment only the “Configured Stations Alias” is changeable.

General Variables ESC Register **EEPROM** Extended Diagnosis DC Diagnosis

EEPROM Values

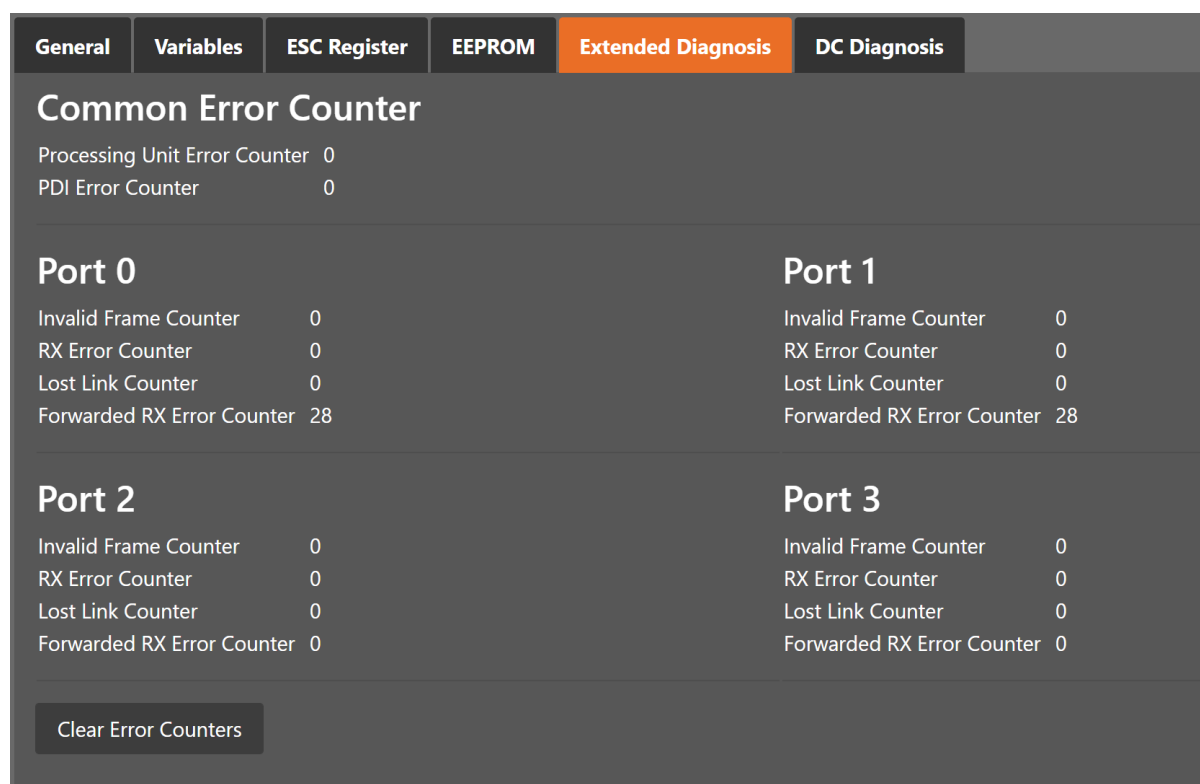
Index	Name	Value	Type
0x0000	PDI Control	260 (0x0104)	UINT
0x0001	PDI Configuration	0 (0x0000)	UINT
0x0002	Pulse Length of SYNC Signals	0 (0x0000)	UINT
0x0003	Extended PDI Configuration	15 (0x000F)	UINT
0x0004	Configured Station Alias	6 (0x0006)	UINT
0x0005	Reserved	0 (0x00000000)	UDINT
0x0007	Checksum	46 (0x002E)	UINT
0x0008	Vendor ID	2 (0x00000002)	UDINT
0x000A	Product Code	131608658 (0x07D83052)	UDINT
0x000C	Revision Number	1048576 (0x00100000)	UDINT
0x000E	Serial Number	0 (0x00000000)	UDINT
0x0010	Execution Delay	0 (0x0000)	UINT
0x0011	Port0 Delay	0 (0x0000)	UINT
0x0012	Port1 Delay	0 (0x0000)	UINT
0x0013	Reserved	0 (0x0000)	UINT

Edit EEPROM Value

Value: Write

6.3.5 Extended Diagnosis

In this tab, the user can see the extended diagnosis information:



Category	Counter Name	Value
Common Error Counter	Processing Unit Error Counter	0
	PDI Error Counter	0
Port 0	Invalid Frame Counter	0
	RX Error Counter	0
	Lost Link Counter	0
	Forwarded RX Error Counter	28
Port 1	Invalid Frame Counter	0
	RX Error Counter	0
	Lost Link Counter	0
	Forwarded RX Error Counter	28
Port 2	Invalid Frame Counter	0
	RX Error Counter	0
	Lost Link Counter	0
	Forwarded RX Error Counter	0
Port 3	Invalid Frame Counter	0
	RX Error Counter	0
	Lost Link Counter	0
	Forwarded RX Error Counter	0

Common Error Counter

Processing Error Counter:

Indicates that slave received “not EtherCAT frames”, which are not allowed in the EtherCAT segment (of course acceptable in a test environment)

PDI Error Counter:

Counts if a PDI access has an interface error (read from register: 0x30D)

Port 0..3

- Invalid Frame Counter of Port y (read from register: 0x0300+y*2)
- RX Error Counter of Port y (read from register: 0x0300+y*2+8Bit)
- Lost Link Counter of Port y (read from register: 0x0310+y)
- Forwarded RX Error Counter of Port y (read from register: 0x0308+y)

Note: All error counters can be cleared by clicking on *Clear Error Counters* of the context menu of the master.

6.3.6 DC Diagnosis

In this tab, the user can see all DC related values of the slave:

General	Variables	ESC Register	EEPROM	Extended Diagnosis	DC Diagnosis
Distributed Clocks					
Sync Pulse active	<input type="text" value="true"/>				
DC Sync 0 Period	<input type="text" value="2000000"/>			US	
DC Sync 1 Period	<input type="text" value="0"/>			US	
System Time Difference	<input type="text" value="0"/>			US	

Note: The option “Sync Window Monitoring” must be enabled (see *Variables*).

6.3.7 CoE Object-Dictionary (Slave)

This tab consists of 3 modes (in user mode, only the description from ESI or slave is available):

Description from ESI

In this tab, the user can see the description of the object dictionary from ESI and the values from the slave. He can also change the values.

General	Variables	ESC Register	EEPROM	Extended Diagnosis	CoE Object-Dictionary	FoE	DC Diagnosis																																																																																
<div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 5px;"> Description from ESI Description from Slave Single Object </div> <p>CoE Object-Dictionary</p> <table border="1"> <thead> <tr> <th>Index</th> <th>Name</th> <th>Value</th> <th>Type</th> <th>Flags</th> </tr> </thead> <tbody> <tr><td>0x1000</td><td>Device Type</td><td>5001 (0x1389)</td><td>UDINT</td><td>--- (RO RO RO)</td></tr> <tr><td>0x1008</td><td>Device Name</td><td>VIPA 053-1EC00</td><td>STRING(17)</td><td>--- (RO RO RO)</td></tr> <tr><td>0x1009</td><td>Hardware Version</td><td>03</td><td>STRING(3)</td><td>--- (RO RO RO)</td></tr> <tr><td>0x100A</td><td>Software Version</td><td>1.30</td><td>STRING(12)</td><td>--- (RO RO RO)</td></tr> <tr><td>0x100B</td><td>System Version</td><td>3 (0x03)</td><td>USINT</td><td>--- (RO RO RO)</td></tr> <tr><td>> 0x1018</td><td>Identity</td><td>4 (0x04)</td><td>USINT</td><td>--- (RO RO RO)</td></tr> <tr><td>> 0x1600</td><td>RxPDO Map</td><td>5 (0x05)</td><td>USINT</td><td>--- (RO RO RO)</td></tr> <tr><td>> 0x1602</td><td>RxPDO Map</td><td>5 (0x05)</td><td>USINT</td><td>--- (RO RO RO)</td></tr> <tr><td>> 0x1603</td><td>RxPDO Map</td><td>60 (0x3C)</td><td>USINT</td><td>--- (RW RW RW)</td></tr> <tr><td>> 0x1604</td><td>RxPDO Map</td><td>2 (0x02)</td><td>USINT</td><td>--- (RO RO RO)</td></tr> <tr><td>> 0x1606</td><td>RxPDO Map</td><td>45 (0x2D)</td><td>USINT</td><td>--- (RW RW RW)</td></tr> <tr><td>> 0x1607</td><td>RxPDO Map</td><td>5 (0x05)</td><td>USINT</td><td>--- (RO RO RO)</td></tr> <tr><td>> 0x1A01</td><td>TxPDO Map</td><td>5 (0x05)</td><td>USINT</td><td>--- (RO RO RO)</td></tr> <tr><td>> 0x1A03</td><td>TxPDO Map</td><td>60 (0x3C)</td><td>USINT</td><td>--- (RW RW RW)</td></tr> <tr><td>> 0x1A05</td><td>TxPDO Map</td><td>5 (0x05)</td><td>USINT</td><td>--- (RO RO RO)</td></tr> </tbody> </table> <div style="margin-top: 10px;"> <p>Edit Value</p> <p>Value: <input style="width: 500px;" type="text"/> Write</p> </div>								Index	Name	Value	Type	Flags	0x1000	Device Type	5001 (0x1389)	UDINT	--- (RO RO RO)	0x1008	Device Name	VIPA 053-1EC00	STRING(17)	--- (RO RO RO)	0x1009	Hardware Version	03	STRING(3)	--- (RO RO RO)	0x100A	Software Version	1.30	STRING(12)	--- (RO RO RO)	0x100B	System Version	3 (0x03)	USINT	--- (RO RO RO)	> 0x1018	Identity	4 (0x04)	USINT	--- (RO RO RO)	> 0x1600	RxPDO Map	5 (0x05)	USINT	--- (RO RO RO)	> 0x1602	RxPDO Map	5 (0x05)	USINT	--- (RO RO RO)	> 0x1603	RxPDO Map	60 (0x3C)	USINT	--- (RW RW RW)	> 0x1604	RxPDO Map	2 (0x02)	USINT	--- (RO RO RO)	> 0x1606	RxPDO Map	45 (0x2D)	USINT	--- (RW RW RW)	> 0x1607	RxPDO Map	5 (0x05)	USINT	--- (RO RO RO)	> 0x1A01	TxPDO Map	5 (0x05)	USINT	--- (RO RO RO)	> 0x1A03	TxPDO Map	60 (0x3C)	USINT	--- (RW RW RW)	> 0x1A05	TxPDO Map	5 (0x05)	USINT	--- (RO RO RO)
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Lists of CoE Object-Dictionary entries

- Entries comes from ESI
- **The “Flags” column tells the user if this entry is an PDO entry and if it can be edited**
 - “AA BB C D (EE FF GG)”
 - AA = Mapping as RX PDO or not
 - BB = Mapping as TX PDO or not
 - C = Backup Flag
 - D = Settings Flag
 - EE = Access rights for PreOp (RO, WO, RW)
 - FF = Access rights for SafeOp (RO, WO, RW)
 - GG = Access rights for Op (RO, WO, RW)

Buttons

Write:

Writes the selected entry

Description from Slave

In this tab, the user can see the description of the object dictionary and the values from slave. He can also change the values and has the possibility to export the object dictionary.

The screenshot shows the 'CoE Object-Dictionary' tab selected in a software interface. It features a table with columns for Index, Name, Value, Type, and Flags. Below the table is an 'Edit Value' section with a text input field and a 'Write' button.

Index	Name	Value	Type	Flags
0x1000	Device Type	5001 (0x1389)	UDINT	--- (RO RO RO)
0x1008	Device Name	VIPA 053-1EC00	STRING(30)	--- (RO RO RO)
0x1009	Hardware Version	03	STRING(8)	--- (RO RO RO)
0x100A	Software Version	1.30	STRING(8)	--- (RO RO RO)
0x100B	System Version	3 (0x03)	USINT	--- (RO RO RO)
> 0x1018	Identity	4 (0x04)	USINT	--- (RO RO RO)
> 0x1600	RxPDO Map	5 (0x05)	USINT	--- (RO RO RO)
> 0x1602	RxPDO Map	5 (0x05)	USINT	--- (RO RO RO)
> 0x1603	RxPDO Map	60 (0x3C)	USINT	--- (RW RO RO)
> 0x1604	RxPDO Map	2 (0x02)	USINT	--- (RO RO RO)
> 0x1606	RxPDO Map	45 (0x2D)	USINT	--- (RW RO RO)
> 0x1607	RxPDO Map	5 (0x05)	USINT	--- (RO RO RO)
> 0x1A01	TxPDO Map	5 (0x05)	USINT	--- (RO RO RO)
> 0x1A03	TxPDO Map	60 (0x3C)	USINT	--- (RW RO RO)
> 0x1A05	TxPDO Map	5 (0x05)	USINT	--- (RO RO RO)

Edit Value

Value: Write

Lists of CoE Object-Dictionary entries

- Entries are uploaded from the slave (if “SDO Information Service” is supported)
- **The “Flags” column tells the user if this entry is an PDO entry and if it can be edited**
 - “AA BB C D (EE FF GG)” - AA = Mapping as RX PDO or not - BB = Mapping as TX PDO or

not - C = Backup Flag - D = Settings Flag - EE = Access rights for PreOp (RO, WO, RW) - FF = Access rights for SafeOp (RO, WO, RW) - GG = Access rights for Op (RO, WO, RW)

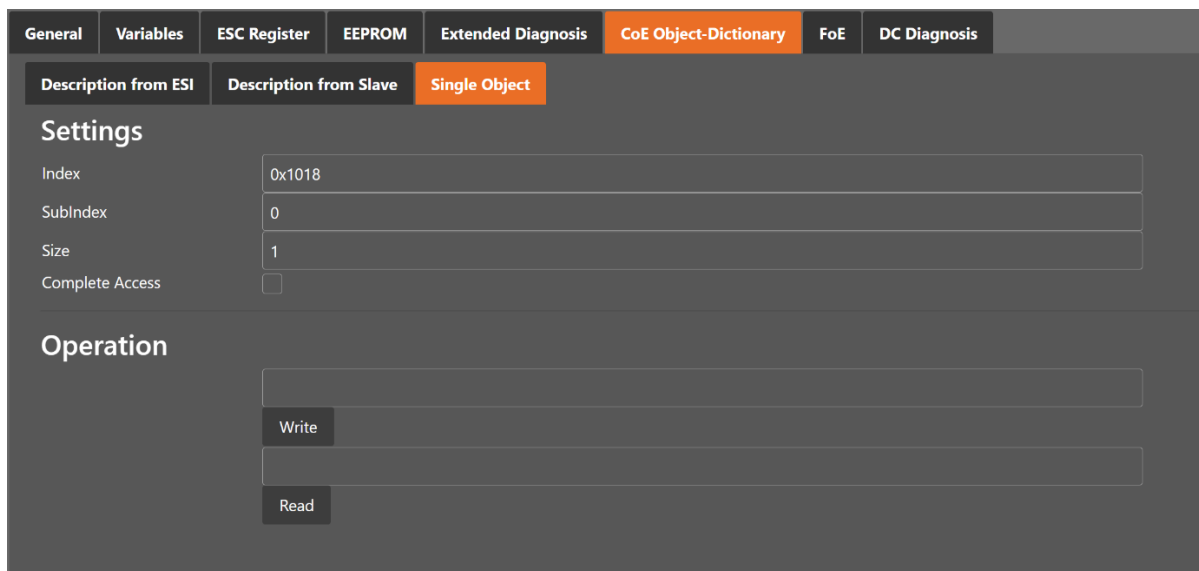
Buttons

Write:

Writes the selected entry

Single Object

In this tab, the user can read and write the values of the object dictionary of the slave.



Settings

Index:

Index of the CoE value

SubIndex:

SubIndex of the CoE value

Size:

Size of the CoE value (only used for reading)

Complete Access:

Activate, if complete access mode should be used for reading or writing the CoE value (can be used only if it is supported from slave)

Operation

Write:

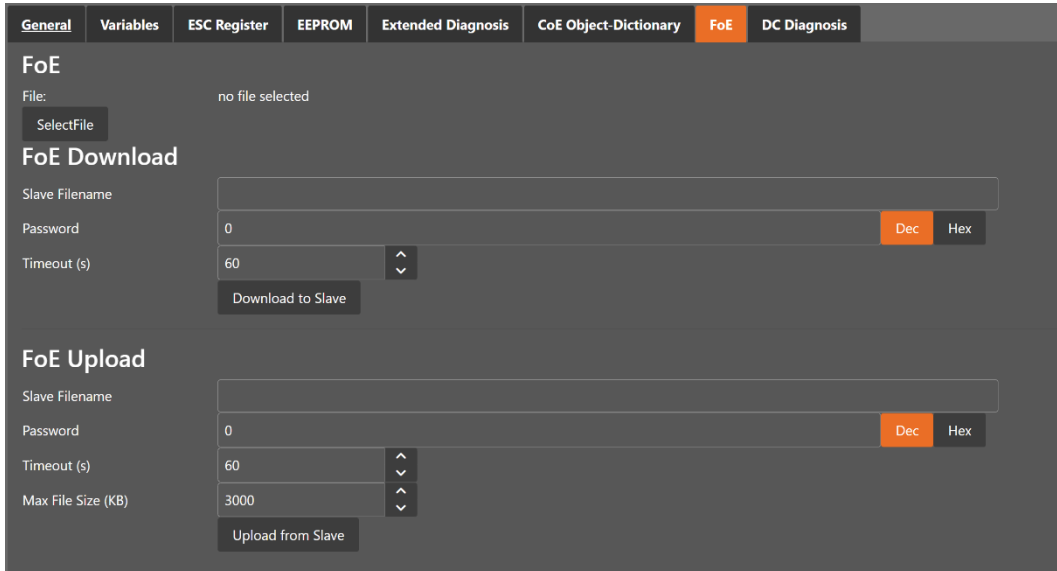
Writes the value to the slave (Hex format, like: "00 11 22 33 ...")

Read:

Reads the value from slave (Hex format, like: "00 11 22 33 ...")

6.3.8 File over Ethernet (FoE)

In this tab, the user has the possibility to download or upload a file to the slave:



The screenshot shows the 'FoE' (File over Ethernet) interface. It features a navigation bar with tabs: General, Variables, ESC Register, EEPROM, Extended Diagnosis, CoE Object-Dictionary, FoE (selected), and DC Diagnosis. The main content area is divided into three sections:

- FoE**: A 'File:' field with the text 'no file selected' and a 'SelectFile' button.
- FoE Download**: Fields for 'Slave Filename', 'Password' (with 'Dec' and 'Hex' buttons), and 'Timeout (s)' (with up/down arrow buttons). A 'Download to Slave' button is at the bottom.
- FoE Upload**: Fields for 'Slave Filename', 'Password' (with 'Dec' and 'Hex' buttons), 'Timeout (s)' (with up/down arrow buttons), and 'Max File Size (KB)' (with up/down arrow buttons). An 'Upload from Slave' button is at the bottom.

FoE Operations

Local Filename:

Name of the file on the harddrive

Slave Filename:

Name of the file on the slave

Password:

Password on the slave as a hex-number

Timeout:

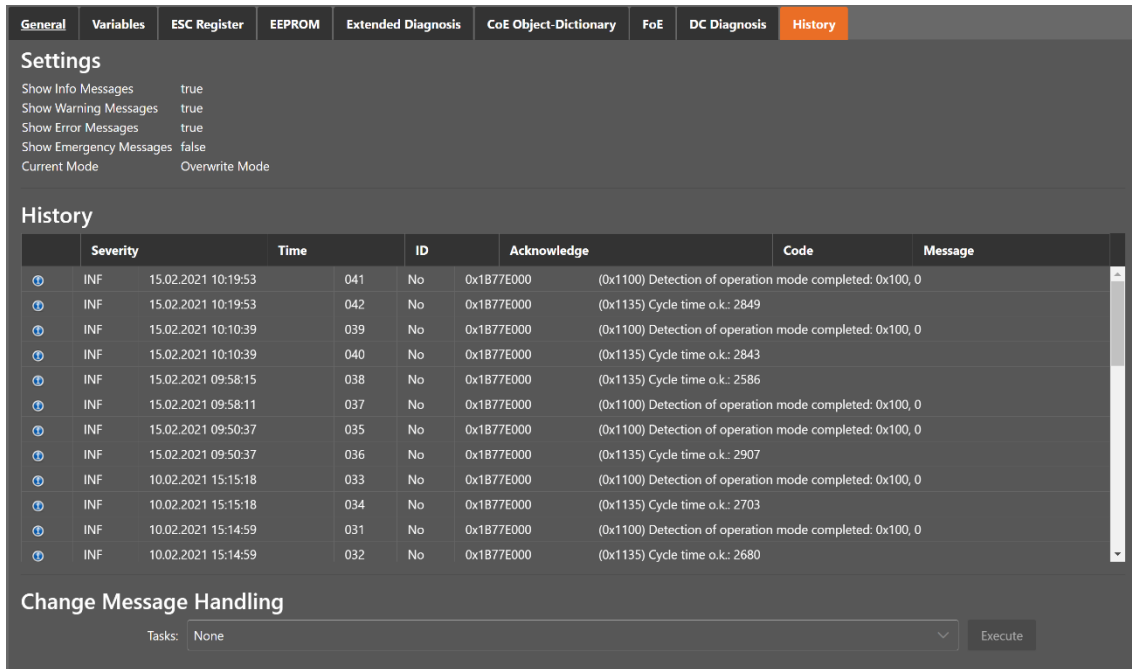
Timeout for downloading or uploading the file in milliseconds

Max File Size:

Maximal file size which should be uploaded from the slave in kilo bytes

6.3.9 Slave History

In this tab, the user can see and change the diagnosis history of the slave. It is also possible to export the data:



Settings

Show Info Messages: true
 Show Warning Messages: true
 Show Error Messages: true
 Show Emergency Messages: false
 Current Mode: Overwrite Mode

History

	Severity	Time	ID	Acknowledge	Code	Message
ⓘ	INF	15.02.2021 10:19:53	041	No	0x1B77E000	(0x1100) Detection of operation mode completed: 0x100, 0
ⓘ	INF	15.02.2021 10:19:53	042	No	0x1B77E000	(0x1135) Cycle time o.k.: 2849
ⓘ	INF	15.02.2021 10:10:39	039	No	0x1B77E000	(0x1100) Detection of operation mode completed: 0x100, 0
ⓘ	INF	15.02.2021 10:10:39	040	No	0x1B77E000	(0x1135) Cycle time o.k.: 2843
ⓘ	INF	15.02.2021 09:58:15	038	No	0x1B77E000	(0x1135) Cycle time o.k.: 2586
ⓘ	INF	15.02.2021 09:58:11	037	No	0x1B77E000	(0x1100) Detection of operation mode completed: 0x100, 0
ⓘ	INF	15.02.2021 09:50:37	035	No	0x1B77E000	(0x1100) Detection of operation mode completed: 0x100, 0
ⓘ	INF	15.02.2021 09:50:37	036	No	0x1B77E000	(0x1135) Cycle time o.k.: 2907
ⓘ	INF	10.02.2021 15:15:18	033	No	0x1B77E000	(0x1100) Detection of operation mode completed: 0x100, 0
ⓘ	INF	10.02.2021 15:15:18	034	No	0x1B77E000	(0x1135) Cycle time o.k.: 2703
ⓘ	INF	10.02.2021 15:14:59	031	No	0x1B77E000	(0x1100) Detection of operation mode completed: 0x100, 0
ⓘ	INF	10.02.2021 15:14:59	032	No	0x1B77E000	(0x1135) Cycle time o.k.: 2680

Change Message Handling

Tasks:

6.3.10 Simulator (Simulator only)

In this tab, the user can see and change the simulator settings of the slave. He can manipulate the slave e.g. power, disconnect and produce errors:

General
Variables
ESC Register
EEPROM
Extended Diagnosis
CoE Object-Dictionary
Simulator

State Machine

Current State Op

Slave Power

Change the power condition of the slave. After a power cycle the slave is in INIT.

Power off
Power on

Slave Connection

Change slave connection. Unplug or change connection to previous slave. Does not power off the slave.

Connect to slave address:

Port: B ▼

Connect
Disconnect

CRC Error

Generate a CRC error at a specific port (once or probability).

Port: A ▼

Probability (%): ▲▼

Set once
Set random
Reset random

Lost Link

Generate a Link Loss at a specific port for a specific time (once or probability).

Port: A ▼

Down time (s): ▲▼

Probability (%): ▲▼

Set once
Set random
Reset all ports

State Machine

Shows the current state of the slave

Slave Power

Power off:

Turn the slave power off

Power on:

Turn the slave on to Init state

Slave Connection

Disconnect:

Disconnect the slave. Slave will not be turned off

Connect:

Connect slave to selected address and port. Default is the port where the slave was connected before

CRC Error

Set once:

Create one CRC error at the selected port

Set random:

Generate CRC errors at the selected port with the selected probability until reset is executed

Reset random:

Reset the CRC generation

Link Loss

Set once:

Create one Link Loss at the selected port for the selected time

Set random:

Generate Link Losses at the selected port with the selected probability for the selected time until reset is executed

Reset random:

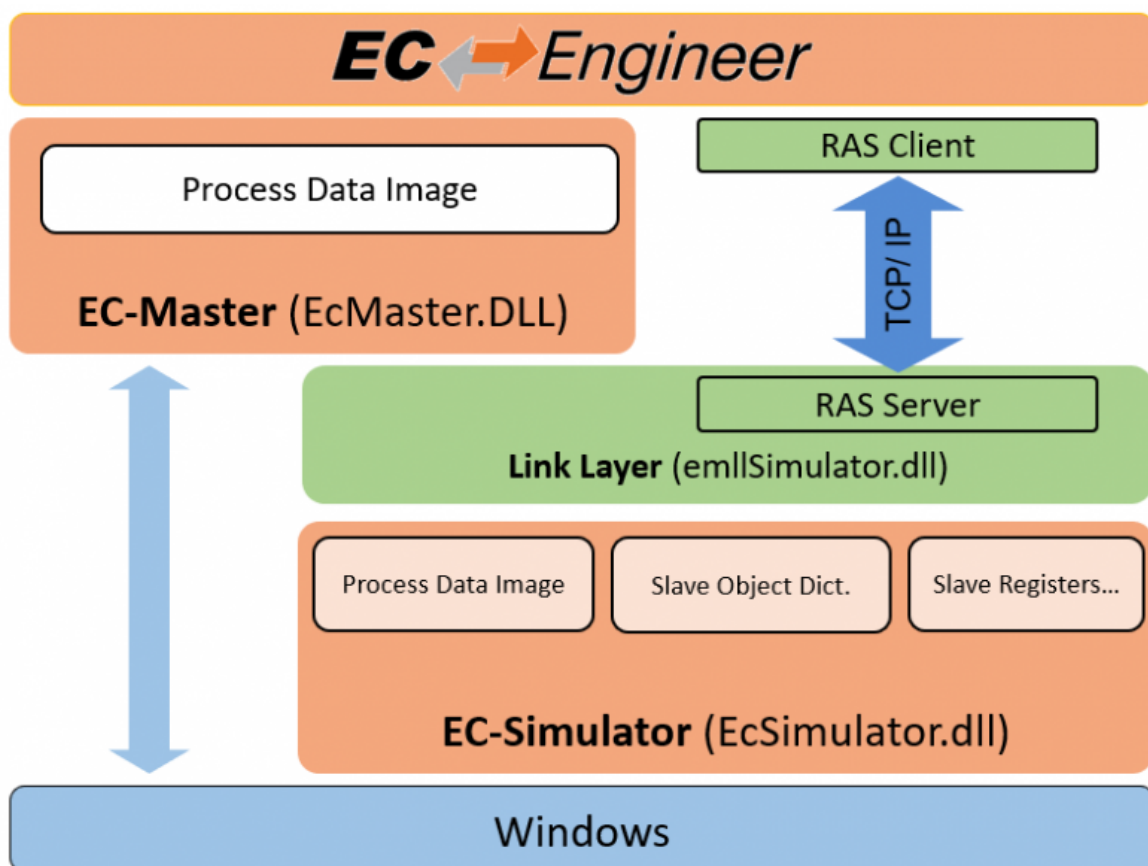
Reset the Link Loss on all ports

7 Simulator Mode

With the new EC-EngineerWeb it is possible to use the EC-Simulator.

There are two possibilities:

1. The user can use the Simulator EMI file and create an EXI File to start the simulator. It is also possible to connect to a remote system with the running Simulator. More information about offline configuration and remote diagnosis can be found in the Getting Started Chapter.
2. The second possibility is, that the user has already a configuration with a master unit. Now the user can do a right click on the master unit and select: "Add EC-Simulator Unit (linked)". A linked simulator unit is added. The user can change the connection settings of the simulator. Now, it is possible to start the master with the simulator link layer and also connect via RAS with the simulator node.

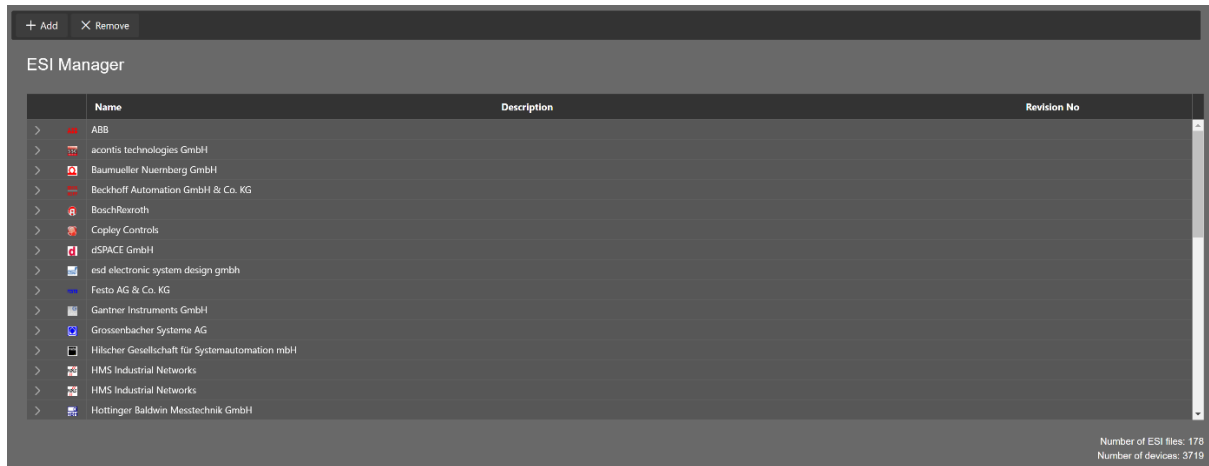


8 Additional Tools

8.1 ESI-Manager

ESI-Manager can be found through the main menu File -> ESI-Manager.

This dialog helps the user to administrate his ESI files. Here, he can add/delete/export ESI files.



8.2 Network Mismatch Analyzer

If you have a network mismatch in your EtherCAT network it is not so easy to find the problem. For this you have the Network Mismatch Analyzer. If you see here some “red” entries, means that this is the start point of your network mismatch:

Network Mismatch Analyzer ✕

List of slaves

Please, compare the configured slaves with the connected slaves. If something is red, you have a network configuration mismatch!

Slave Name	Config Type	Config Revision	Config Ident.	Network Type	Network Revision	Network Ident.
Slave_1001 [EK1100]	EK1100 [1001]	0x00100000	0	EK1100 [1001]	0x00100000	1001
Slave_1002 [EL1014]	EL1014 [1002]	0x00120000	0	EL1014 [1002]	0x00120000	0
Slave_1003 [EL2008]	EL2008 [1003]	0x00100000	0	EL2008 [1003]	0x00100000	2
Slave_1004 [EL2008]	EL2008 [1004]	0x00100000	0	EL2008 [1004]	0x00100000	9
Slave_1005 [EL4004]	EL4004 [1005]	0x00100000	0	EL4004 [1005]	0x00100000	1005
Slave_1006 [EK1100]	EK1100 [1006]	0x00110000	0			
Slave_1007 [EL2004]	EL2004 [1007]	0x00100000	0			

Close

8.3 Capture File

A capture file could be helpful, if you have a very large system or system is not always available. In that case you can connect to your system, save one or more snapshots into a capture file and analyse the created capture file later.

Another use case is, that your system from time to time some problems. In that case you can activate the automatic mode and create the snapshots every specific interval or based on specific master notifications.

At the moment there are the following options:

Capture File Settings

Filename

Base Filename

Add Date to Filename
 Add Time to Filename

Content

Process Data

EEPROM Size

ESC Size

CoE OD of Slaves

User def (e.g.: 1001;1003-1005)

CoE OD Objects

SDO Info Service

Automatic Mode

Interval (min)

Maximum Snapshots

Notifications

Filename

Base file name:

Base file name of the generated capture file name

Date:

Activate, to add the date to the generated capture file name

Time:

Activate, to add the time to the generated capture file name

Content

Process data:

Activate to add process data to the capture file (read-only)

EEPROM size:

Enter size of the EEPROM (0x86 = default, 0 = no EEPROM)

ESC Register size:

Enter size of the ESC Registers (0x400 = default, 0 = no ESC register)

CoE OD of slaves:**Select the slaves of which the CoE OD information will be captured****None:**

CoE OD will be not captured

All:

CoE OD will be captured of all slaves

User defined:

CoE OD will be captured of the defined slaves by physical address (e.g. 1001-1003; 1005)

CoE OD objects:

Enter index of specific objects or all objects will be collected (e.g. 0x1018; 0x7000-0x7FFF)

SDO Info Service:

Activate to use the SDO Info Service for loading the CoE Object Dictionary instead of reading the information from the ESI file.

Automatic Mode**Interval (min):**

Time to wait until next snapshot will be taken

Maximum Snapshots:

Enter count of maximum snapshots

Notifications:

Select the notifications, which will trigger a snapshot. The following notifications are available (for more information about notifications please refer the manual of EC-Master):

- STATECHANGED
- ETH_LINK_CONNECTED
- ETH_LINK_NOT_CONNECTED
- SLAVE_STATECHANGED
- SLAVE_PRESENCE
- SLAVE_INITCMD_RESPONSE_ERROR
- STATUS_SLAVE_ERROR
- SLAVE_UNEXPECTED_STATE
- DC_SLV_SYNC
- DCM_SYNC
- FRAME_RESPONSE_ERROR

- CYCCMD_WKC_ERROR

9 Command Line Interface

For helping users in some special situations and to do not confuse other users the EC-EngineerWeb supports a small command line interface:

/HELP, /?

Shows the help dialog

/CFG = config.ecc

Open a specific configuration file `config.ecc` directly after starting EC-EngineerWeb

/EMI = emi.xml

Sets the path to the EMI file which should be used (Mandatory if ecc does not already exist)

/REMOTE = "127.0.0.1:6000:0"

Activates the remote system, where IP address is "127.0.0.1", port is 6000, master instance is set to 0

/ENIEXPORT = config.eni

Activates an automatic ENI export on close

/CYCLETIME = "2000"

Changes the cycle time from ecc or EMI in config

/FORCECFG= config.ecc

Activates the "integration" mode, to be able create an ENI file automatically on closing EC-EngineerWeb

Some menu entires are also hidden, like

- "New/Open/Save"
- "Export Process Variables / Import ENI file / Export ENI file"

Further supported parameters:

/EMI = emi.xml

Sets the path to the EMI file which should be used (Mandatory)

/LOCAL = "127.0.0.1"

Activates the local system and the network adapter with IP address "127.0.0.1" will be chosen. If you use the optimized LinkLayer you can write `/LOCAL="I8254x"` or `/LOCAL="RTL8169"` (`/LOCAL` or `/REMOTE` or `/CAPTURE` is mandatory).

/REMOTE = "127.0.0.1:6000:0:0"

Activates the remote system, where IP address is "127.0.0.1", port is 6000, master instance is set to 0 and protocol is 0 (RAS). It is also supported to use the DNS name instead of the IP address (`/LOCAL` or `/REMOTE` or `/CAPTURE` is mandatory). It is also possible to set the parameter for more master instances (only if ecc exists with more master units). Therefore just add the additional parameter with a ';'. E.g.: `/REMOTE="127.0.0.1:6000:1;127.0.0.2:6001:2"` or `/REMOTE="127.0.0.1:6000:1:0;127.0.0.2:6001:2:0"`

/CAPTURE = C:/myfile.ccd:0

Activates the offline diagnosis system, where the path to the capture file is `c:/myfile.ccd` and the selected snapshot is "0" (`/LOCAL` or `/REMOTE` or `/CAPTURE` is mandatory)

/ENIEXPORT = config.eni

Activates the ENI export (Mandatory)

/VAREXPORT = config.var

Activates the process variables export (Optional)

/VARTYPE = "csv|plc|pd|xml" (default=csv)

Sets the format of the process variables export slave (for more information about the supported formats

/EBIEXPORT = config.ebi
Activates the EBI (EniBuilder input file) export

/SCAN
Scans the bus after startup

/CYCLETIME ="1000"
Sets the master cycle time and locks it for the user

Samples

Run "EC-EngineerWeb", scan automatically the local system with IP address 127.0.0.1, export ENI file and export process variables (as CSV Format) on closing

```
> EcEngineerWeb.exe /FORCECFG="cfg_local.ecc" /EMI="emi.xml"  
↪ /LOCAL=127.0.0.1 /SCAN /ENIEXPORT="cfg_local.eni"  
↪ /VAREXPORT="cfg_local.var" /VARTYPE="csv"
```

Run "EC-EngineerWeb", scan automatically the remote system with IP address 127.0.0.1, Port 6000, MasterInstance 0, export ENI file and export process variables (as PLC Format) on closing

```
> EcEngineerWeb.exe /FORCECFG="cfg_remote.ecc" /EMI="emi.xml"  
↪ /REMOTE=127.0.0.1:6000:0:0 /SCAN /ENIEXPORT="cfg_remote.eni"  
↪ /VAREXPORT="cfg_remote.var" /VARTYPE="plc"
```

In case of an error, EC-EngineerWeb will do the following

- Add error message to the log file (message level must be set to "All Messages")
- If the GUI is already visible, he will show a message box
- Set exit code to "-1"

10 Licensing

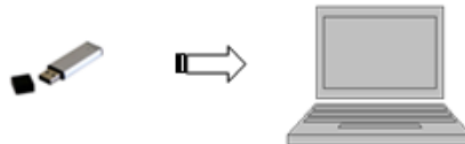
10.1 Overview

For EC-EngineerWeb we have two license models:

- Node Locked License
- Floating License

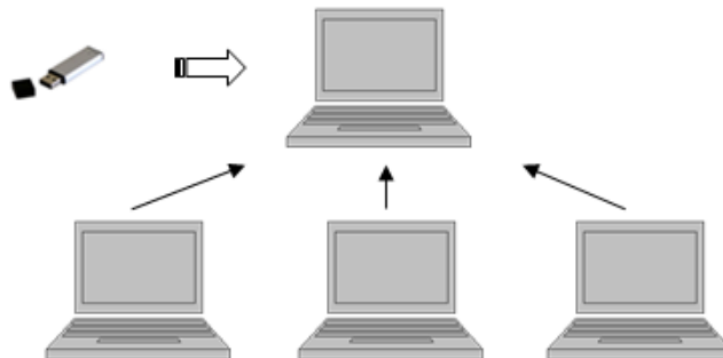
10.2 Node Locked License

If you choose this license model, you need an USB dongle for every single computer. This dongle must be plugged into the computer where you want to use EC-EngineerWeb.



10.3 Floating License

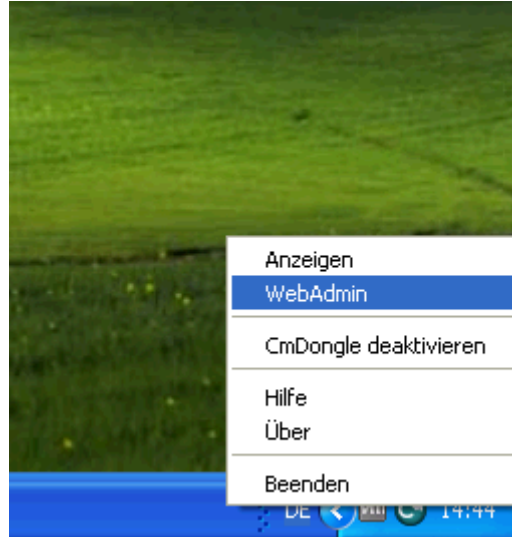
If you choose this license model, you need only one USB dongle with multiple floating licenses. This dongle must be plugged into your license server and all client computers will connect to this license server.



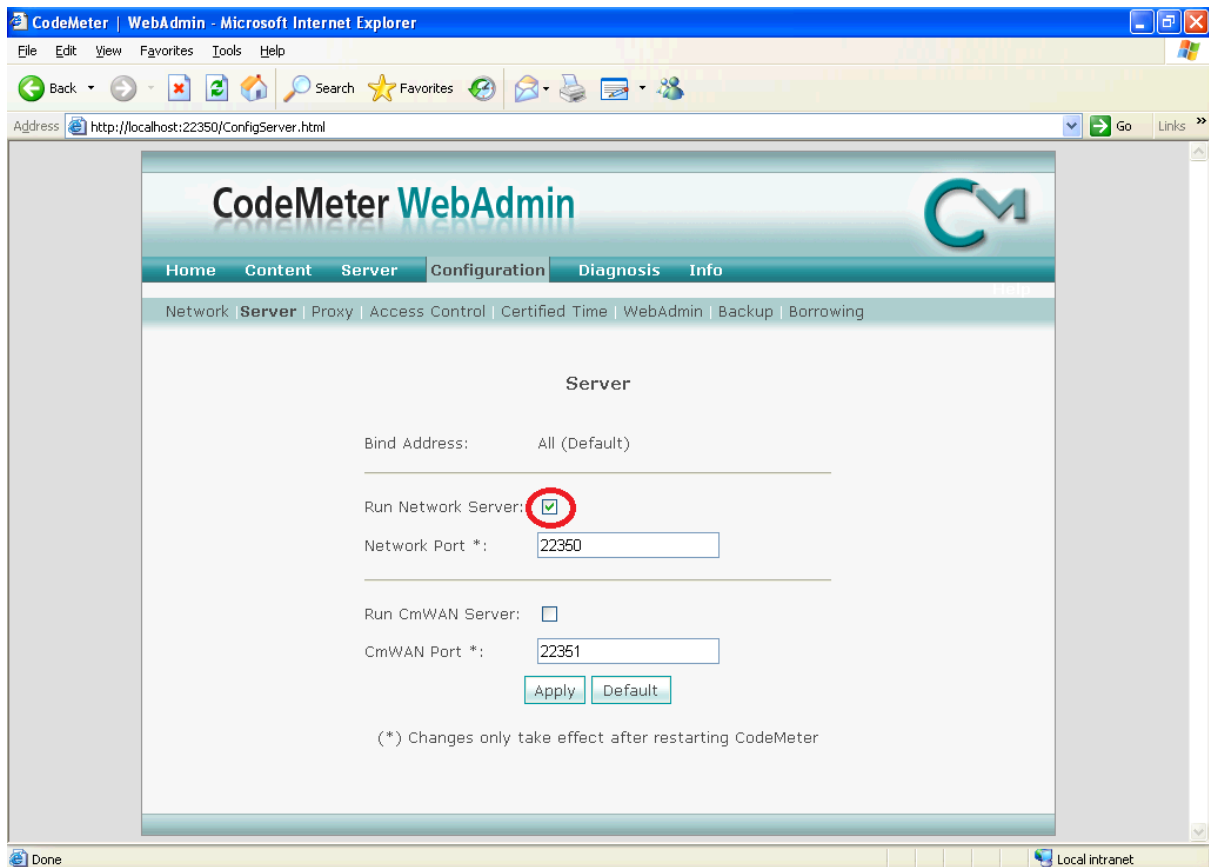
Note: This requires that the “WebAdmin” of the “Code Meter” is installed on the system. Please download and install the “Code Meter Runtime” from WIBU: <https://www.wibu.com/>

10.3.1 Configure License Server

Install the “Dongle-Version” of EC-EngineerWeb on your license server, plug-in your USB dongle and open the “WebAdmin”:

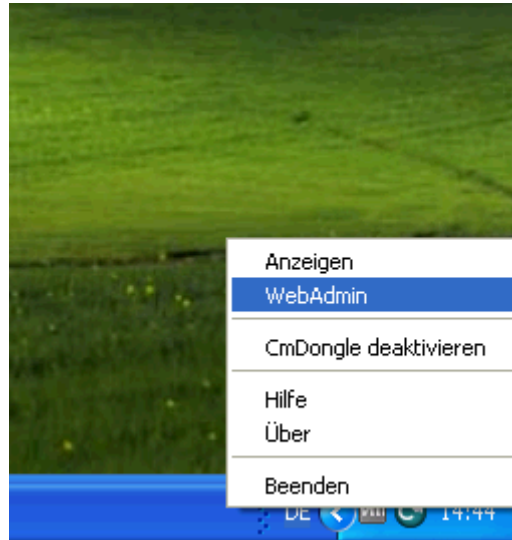


In the “WebAdmin” navigate to “Configuration Server”, select the option “Run Network Server” and press *Apply*:

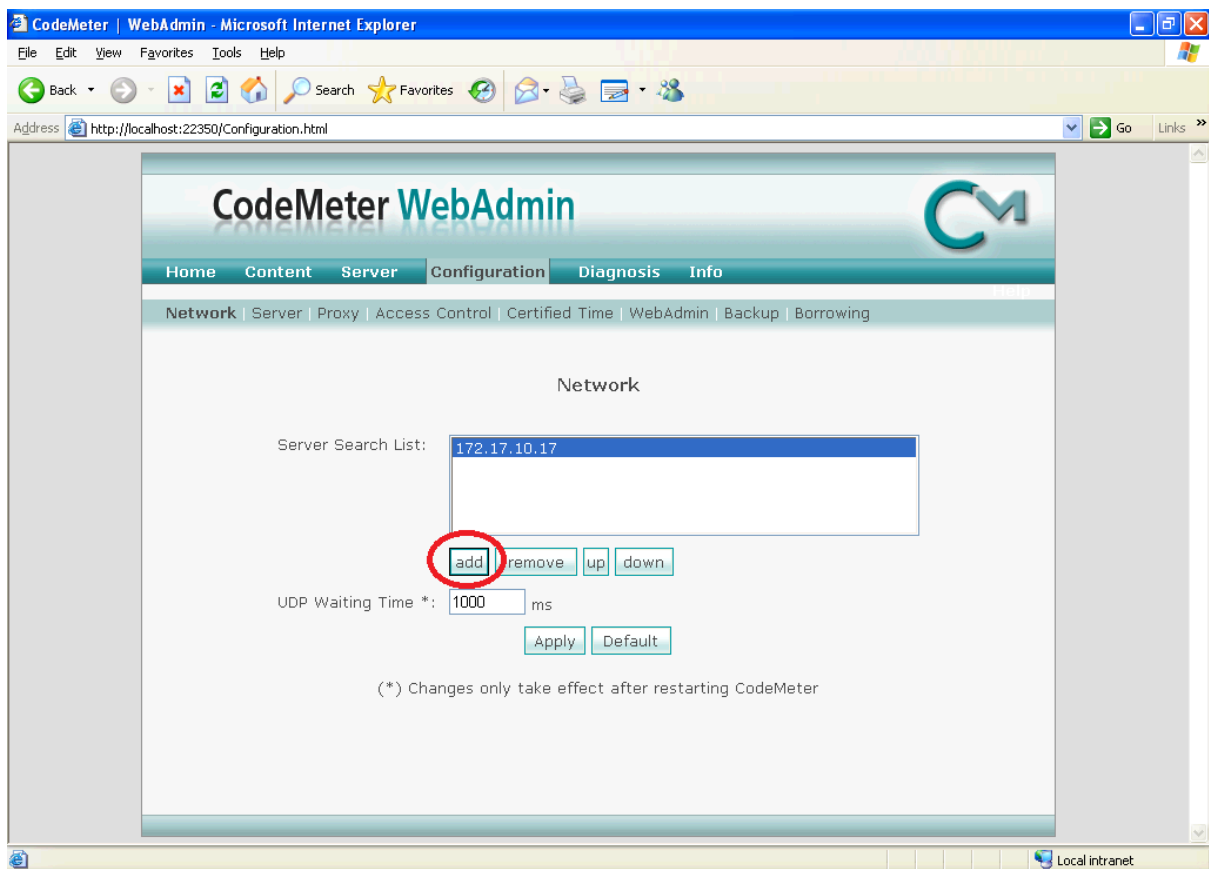


10.3.2 Configure Client Computer

Install the “Dongle-Version” of EC-EngineerWeb and open the “WebAdmin”:

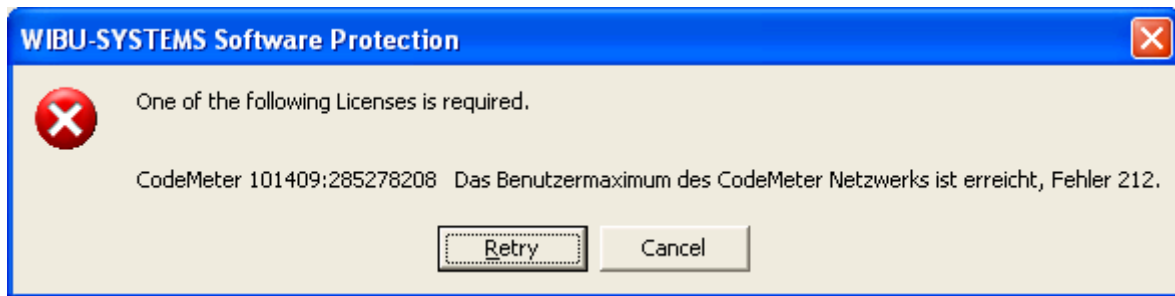


In the “WebAdmin” navigate to “Configuration Network”, press *add*, enter your IP address of your license server and press *Apply*:



Now, you should be able to start EC-EngineerWeb.

Note: If too many clients are connected you will, you will receive the following error message:

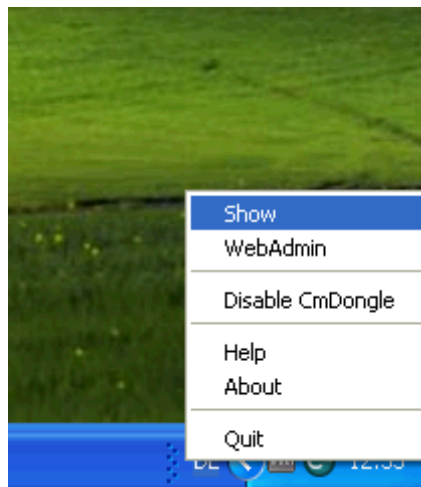


In that case, you should try to close unused EC-EngineerWeb instances or buy more floating licenses.

10.4 License Update

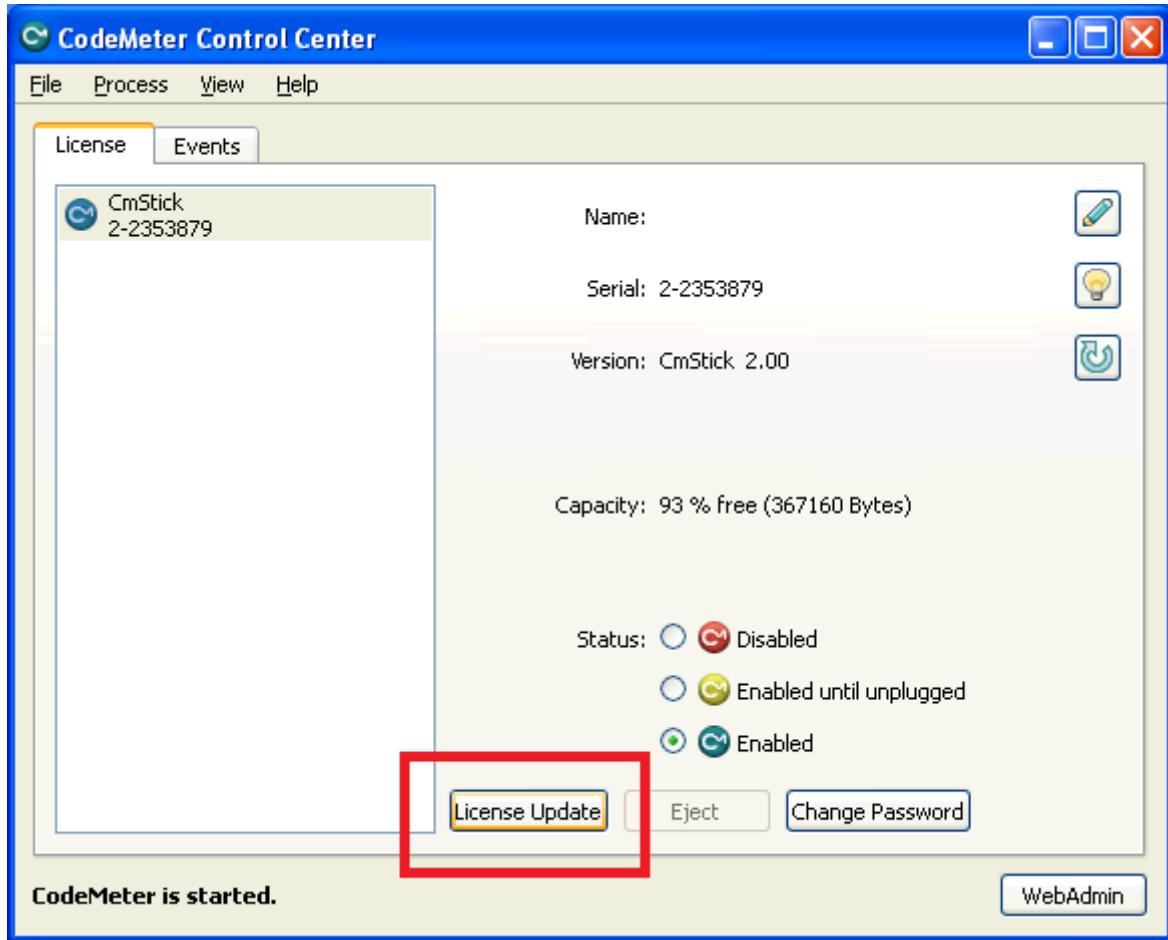
10.4.1 Request License Update

Step 1: Install the “Dongle-Version” of EC-EngineerWeb and open the “CodeMeter Control Center”:

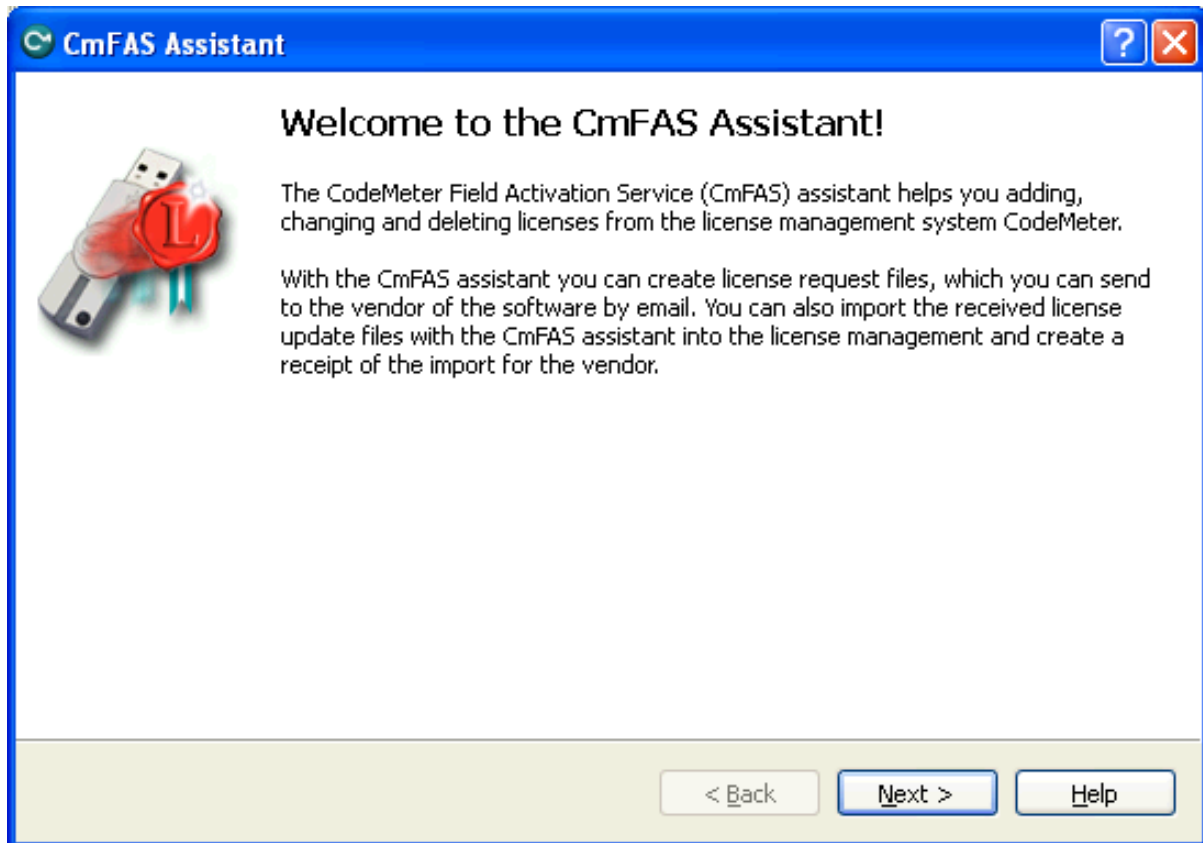


If the selected license is a virtual dongle, simply drag and drop the WibuCmLIF file onto the CodeMeter Control Center. Otherwise, the dongle should already be visible.

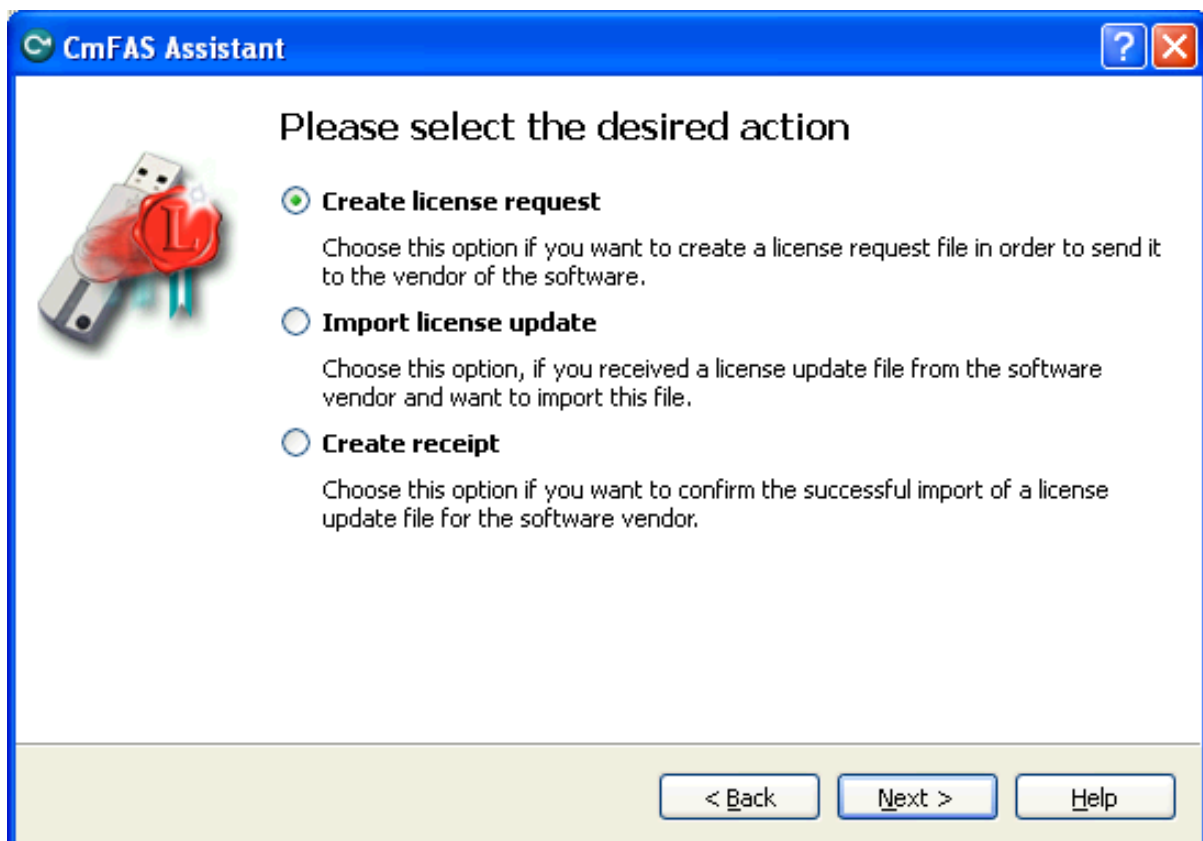
Step 2: In the “CodeMeter Control Center” open the “CmFAS Assistant” by clicking on *License Update*:



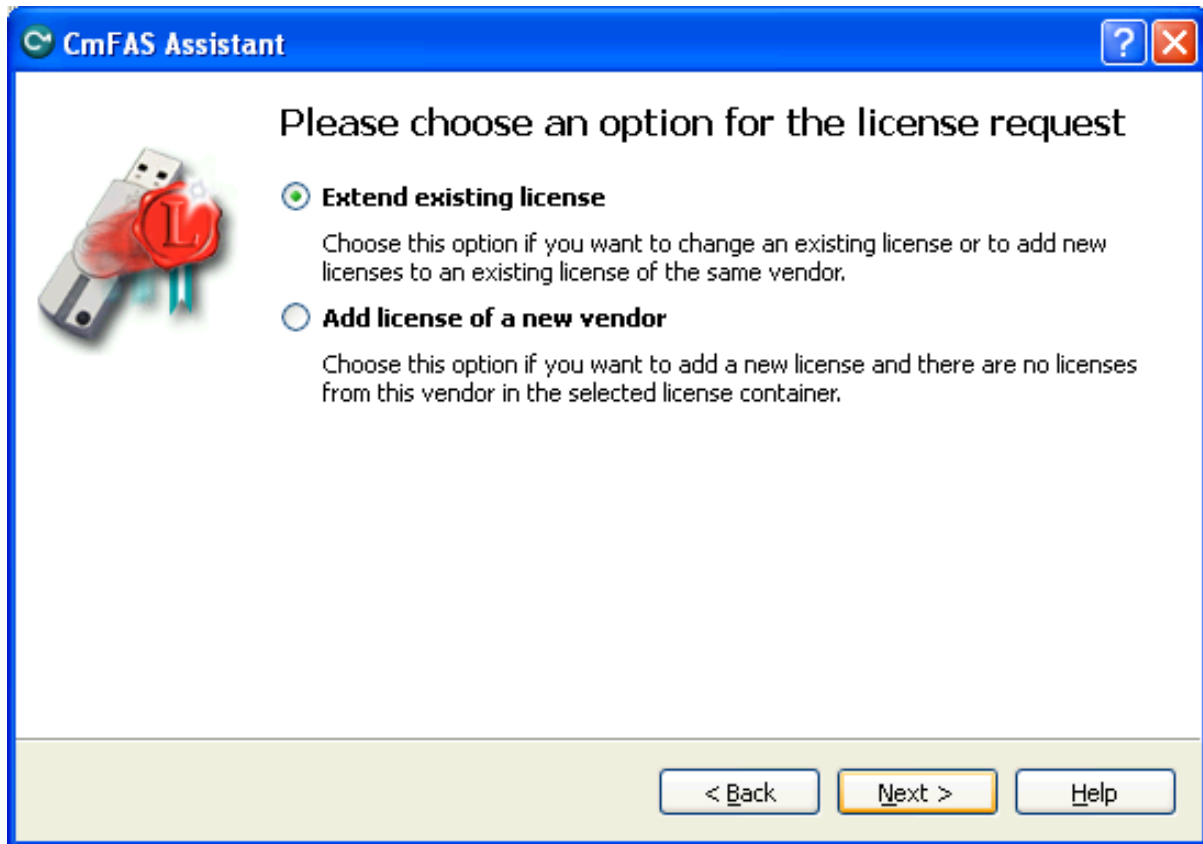
Step 3: Now, follow the assistant until you can select a file name:



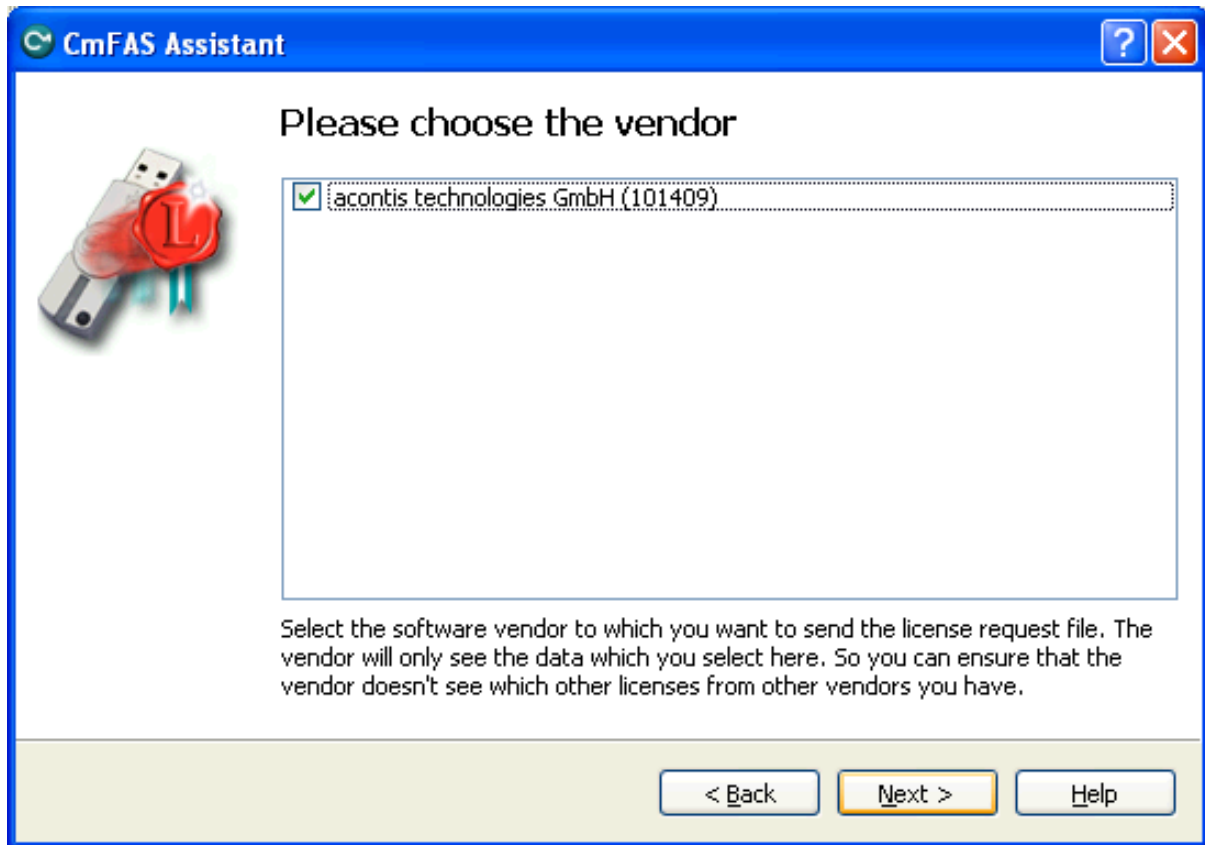
Step 4: Select “Create license request”:



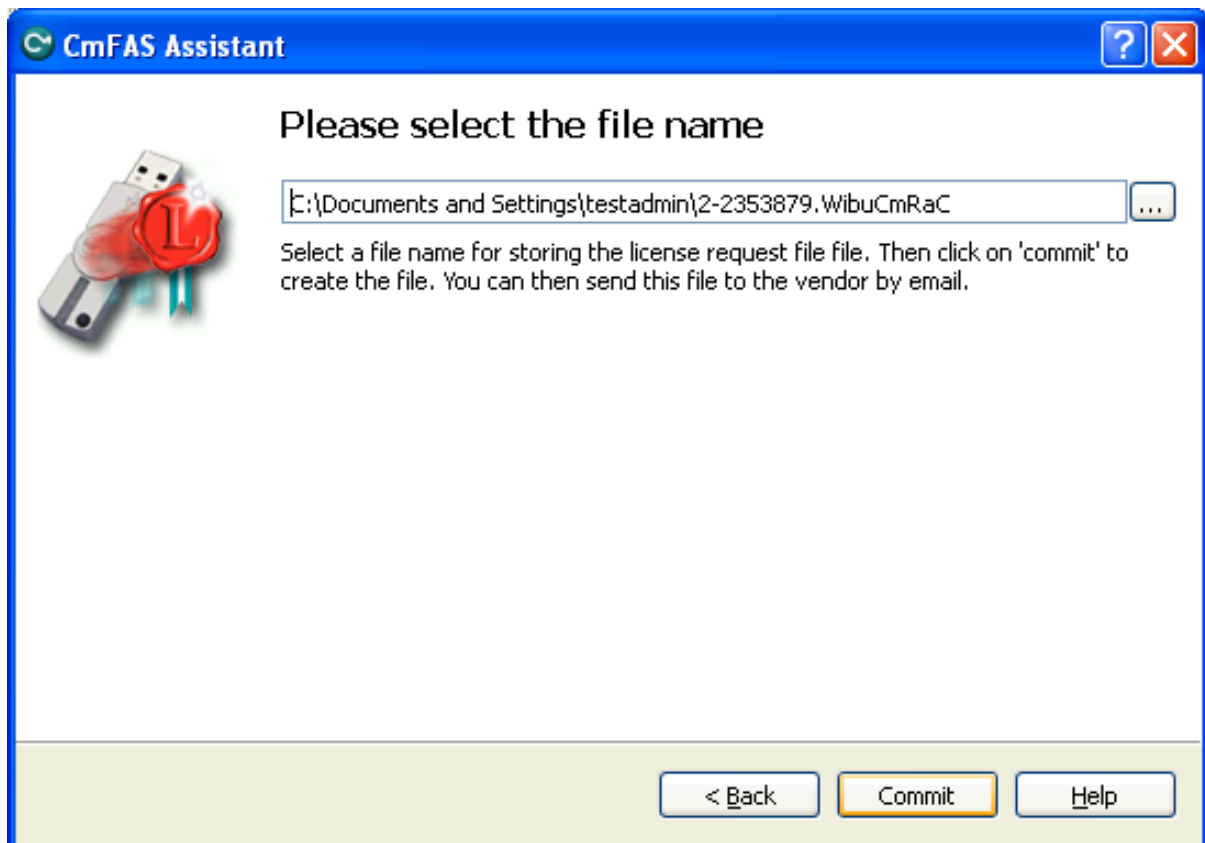
Step 5: Select “Extend existing license”:

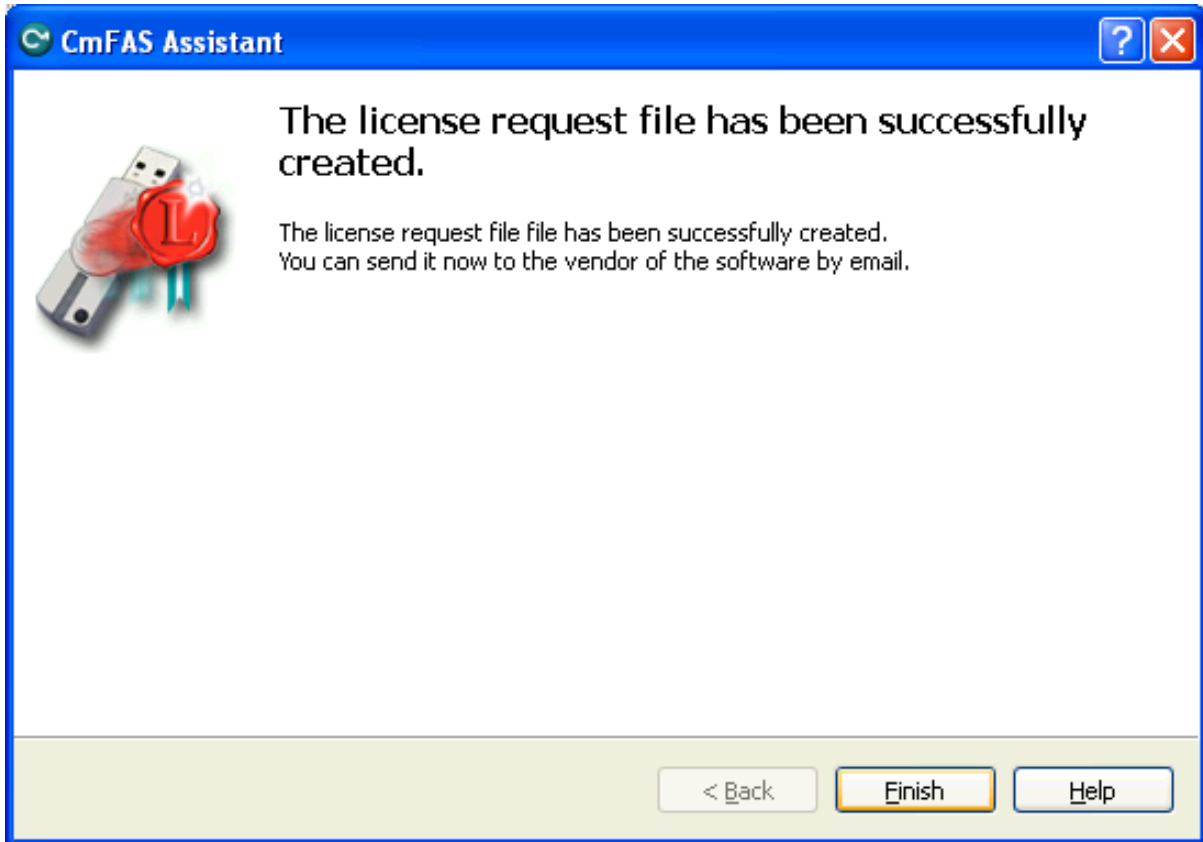


Step 6: Keep the selected the vendor:



Step 7: Select the file name:



Step 8: Finish the assistant:

Step 9: Your license request file * .WibuCmRaC has been successfully created. Please send it to sales@acontis.com

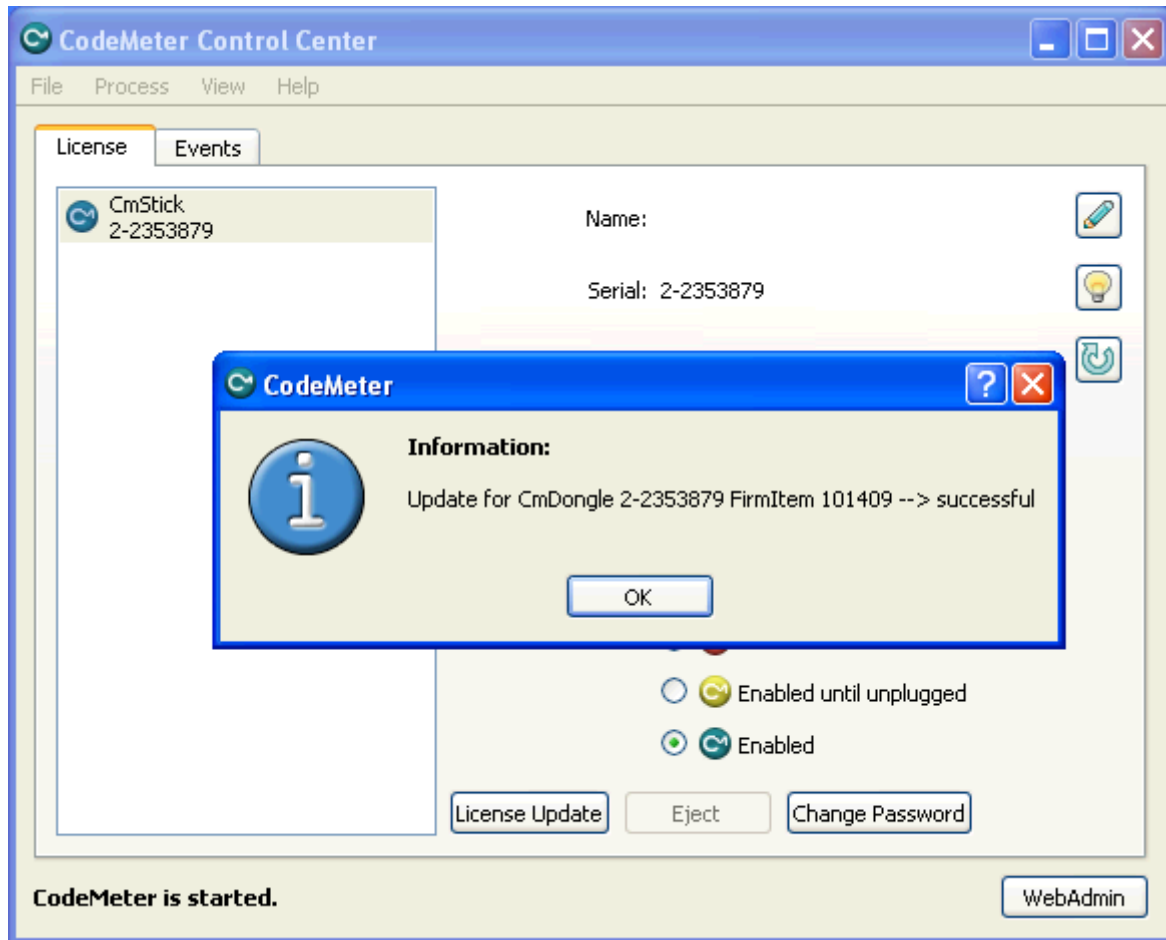
10.4.2 Install License Update

After you have been sent your license request file you will receive the license update file * .WibuCmRaU.

Step 1: Connect your dongle.

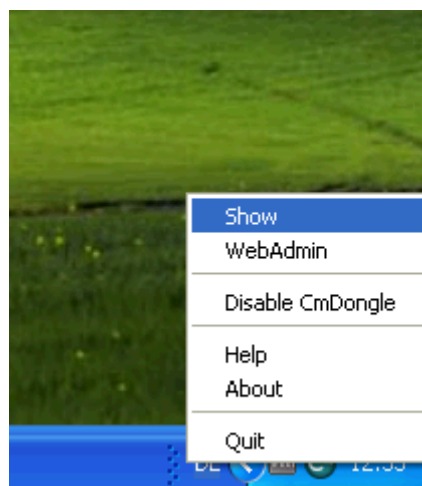
Step 2: Copy the license update file to your desktop.

Step 3: Double-click on the license update file:

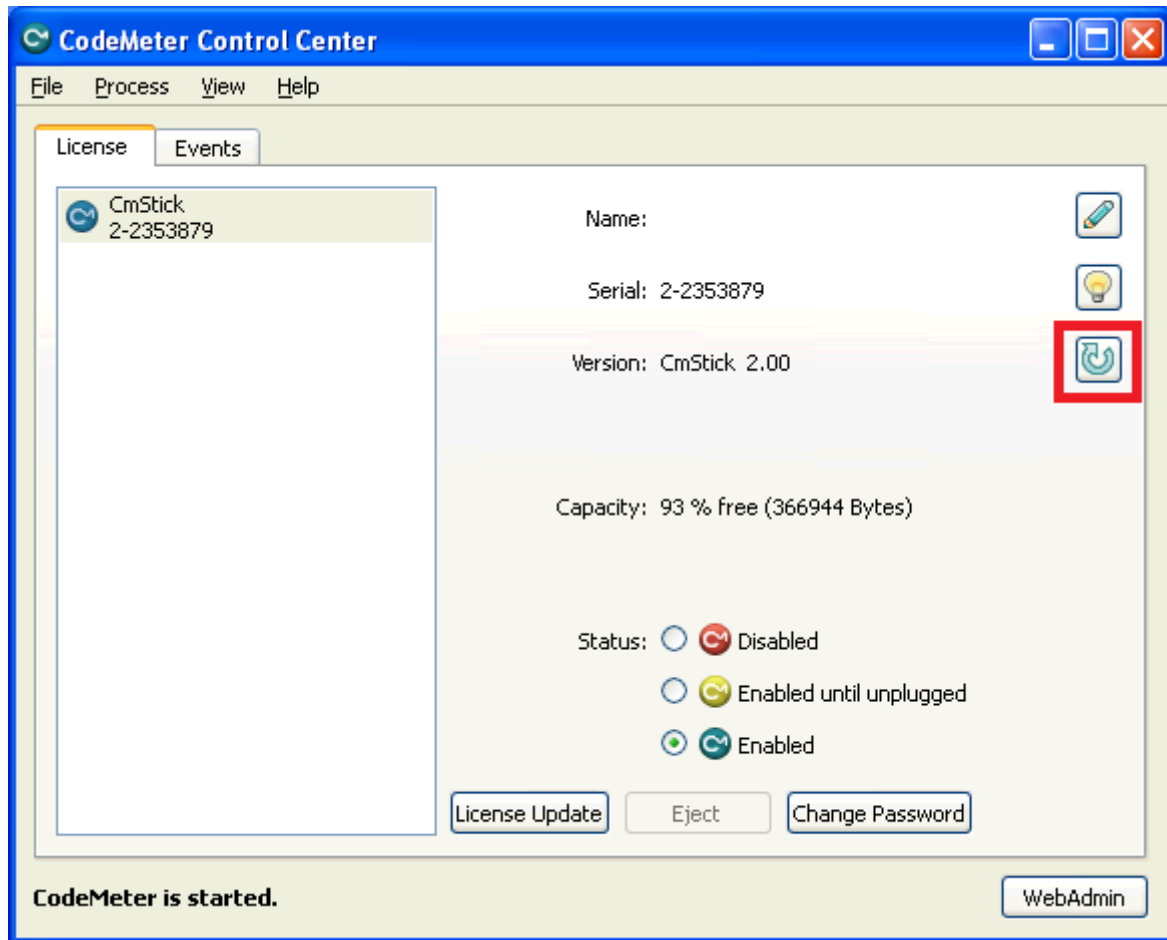


10.5 Dongle Firmware Update

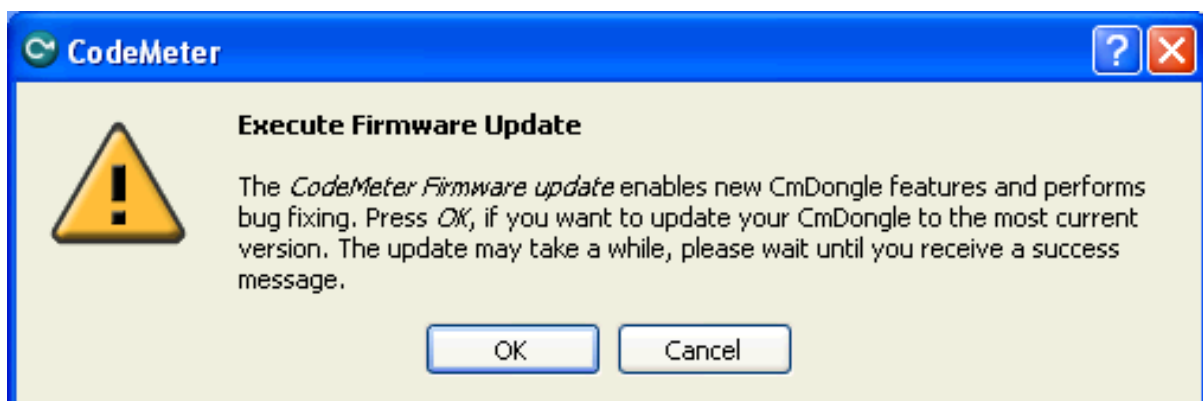
Step 1: Install the “Dongle-Version” of EC-EngineerWeb and open the “CodeMeter Control Center”:



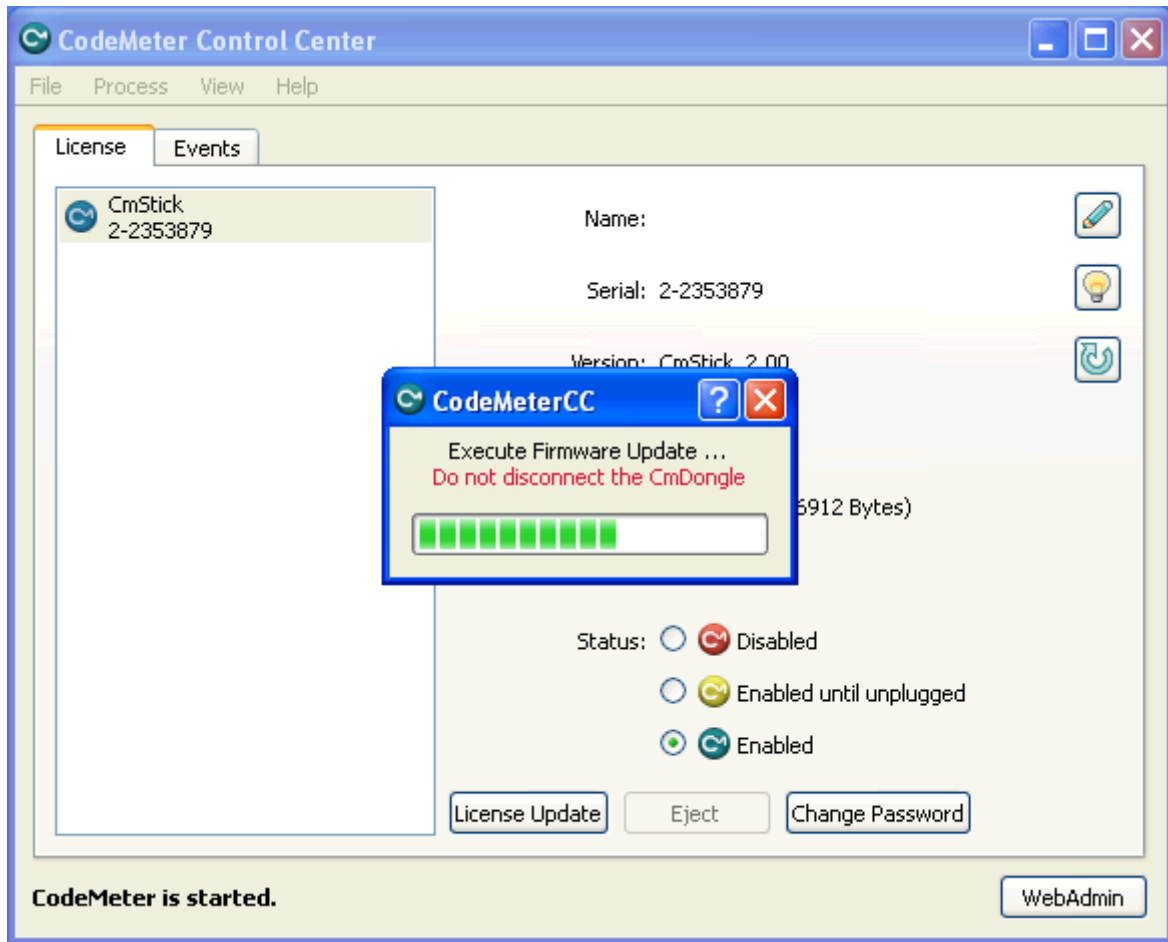
Step 2: In the “CodeMeter Control Center” click on *Update Firmware of selected Cm Dongle*:



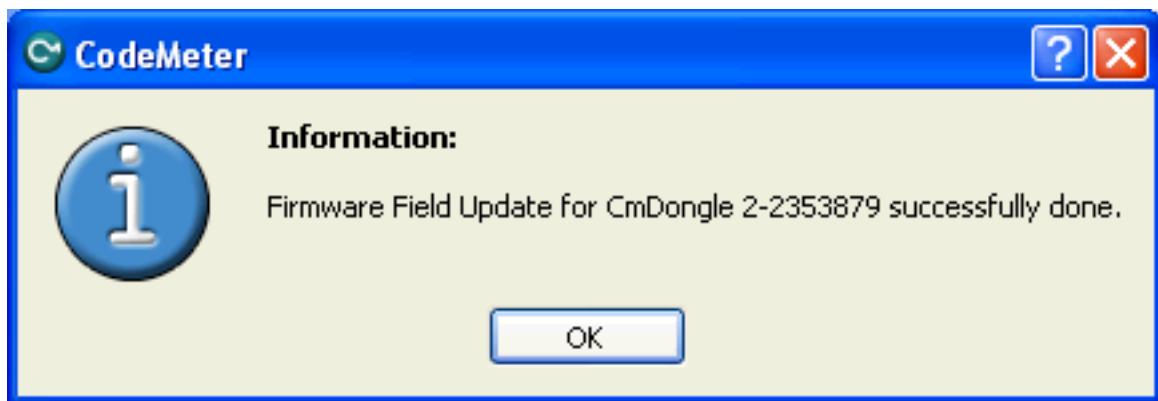
Step 3: Execute firmware update by pressing *OK*:



Step 4: Wait until firmware update was executed:

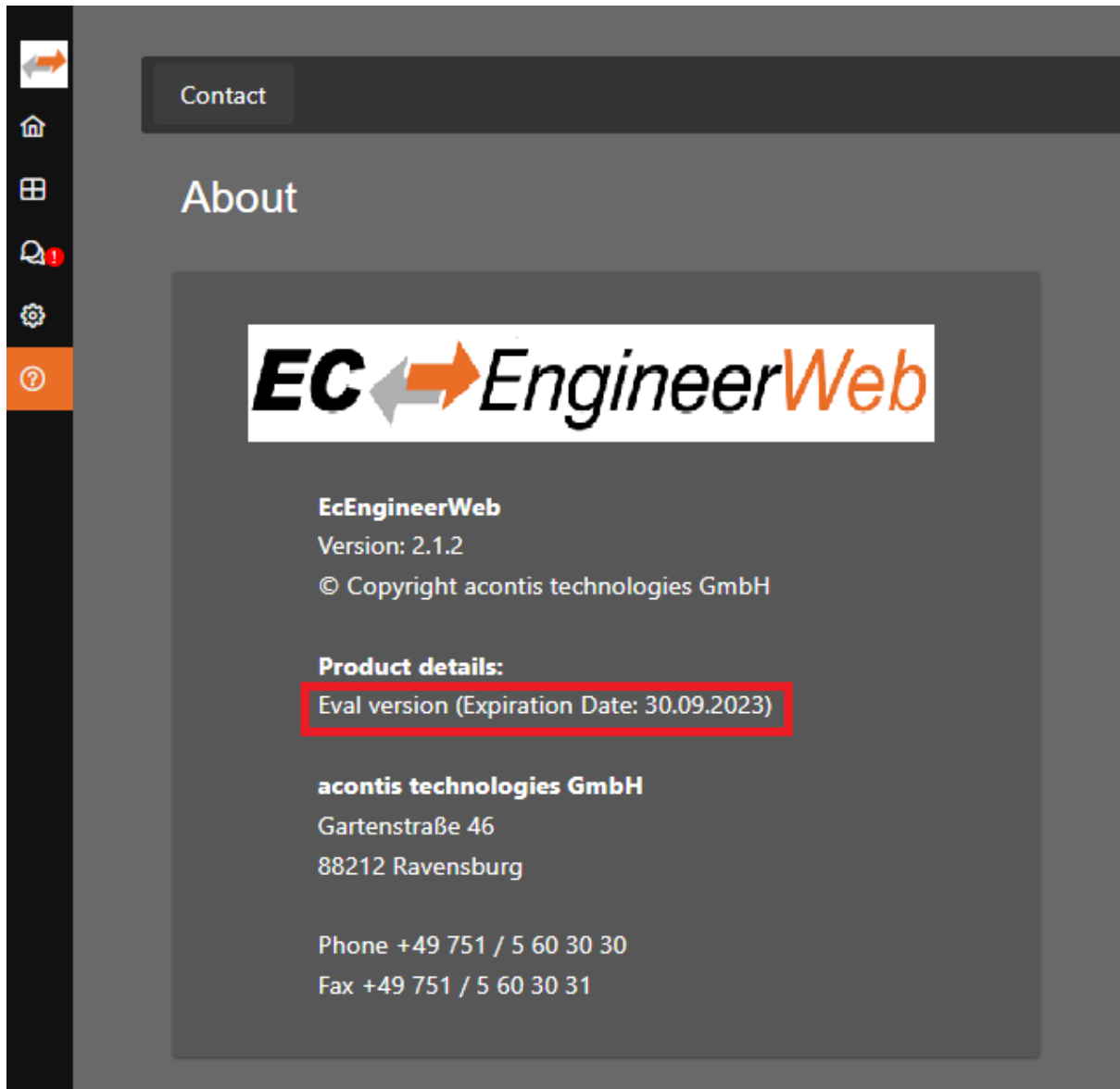


Step 5: Firmware update was done and dongle can be removed:



10.6 Expiration Date Dongle

If you chose a expiration dongle you can find your expiration date in the 'About Dialog'. If you have an unlimited dongle you will not see a date in the dialog.



If you see this date you can not use an Engineer which was released after the expiration date, but all older ones are possible.

If you try to start an Engineer which is newer than the expiration date, you will get the following error:



11 FAQ, Tips

11.1 Help in case of a problem

If you have a problem with EC-EngineerWeb or something does not run as expected, please try first the following things:

- Read messages in message window
- Increase message level *Menu ▶ Settings ▶ All Messages*
- Read log file for more information *Menu ▶ Help ▶ Show Log File*
- Restart EC-EngineerWeb and try to do it again
- **Contact support by sending a mail to ecsupport@acontis.com and attach the following information**
 - Project file `.ecc`
 - EC-EngineerWeb Version *Menu ▶ Help ▶ About*
 - Log file *Menu ▶ Help ▶ Show Log File*
 - Short description how the reproduce it

11.2 Internal User Specific Settings

EC-EngineerWeb saves all user specific settings in a subfolder of the all users directoy `%ALLUSERSPROFILE%/EC-EngineerWeb` like `C:/ProgramData/EC-EngineerWeb`.

In this directoy there is a XML file called `User.myusername.xml`. In this file, the user can find additional settings, which can be helpful for solving some problems:

MasterUnitLocalCycleTime = 1

Bus cycle time of the internal master in milliseconds

MasterUnitLocalWorkerSleepTimeMs = 100

Cycle time of the local master thread in milliseconds

MasterUnitRemoteWorkerSleepTimeMs = 300

Cycle time of the remote master thread in milliseconds

MasterUnitTimerNormalCount = 4

- Time shift to cycle time of the normal refresh cycle
- E.g. local master = 100 ms, normal refresh cycle is every 400 ms
- Used e.g. for updating master information, error counters of slave, ...

MasterUnitTimerSlowerCount = 20

- Time shift to cycle time of the slower refresh cycle
- E.g. local master = 100 ms, slower refresh cycle is every 2 seconds
- Used e.g. for updating the slave information, EEPROM data, register data, ...

MasterUnitTimerSlowestCount = 120

- Time shift to cycle time of the slowest refresh cycle
- E.g. local master = 100 ms, slower refresh cycle is every 12 seconds
- Used e.g. for updating the CoE Object Dictionary, ...

MasterUnitScanBusTimeout = 5000

Timeot for bus scan in milliseconds

MasterUnitMailboxTimeout = 5000

Timeout for mailbox access in milliseconds

MasterUnitStateChangeTimeout = 5000

Timeout for changing state machines in milliseconds

MasterUnitRegisterTimeout = 3000

Timeout for register access in milliseconds

MasterUnitProcessDataTimeout = 1000

Timeout for process data access in milliseconds

MasterUnitEepromTimeout = 3000

Timeout for EEPROM access in milliseconds

MasterUnitRasCycleTime = 0

Internal RAS cycle time for polling

MasterUnitRasWatchDog = 0

Internal RAS watchdog interval

MasterUnitRasWdToLimit = 0

Internal RAS watchdog limit

DiagGeneralErrorLvlLostLink = 10

Theshold value for the “Lost Link Errors”, which leads to an error

DiagGeneralWarningLvlLostLink = 1

Theshold value of the “Lost Link Errors”, which leads to a warning

DiagGeneralErrLvlRxError = 10

Theshold value for the “RX Errors”, which leads to an error

DiagGeneralWarnLvlRxError = 0.001

Theshold value of the “RX Errors”, which leads to a warning

DiagGeneralErrLvlInvalidFrame = 10

Theshold value for the “Invalid Frames”, which leads to an error

DiagGeneralWarnLvlInvalidFrame = 0.001

Theshold value of the “Invalid Frames”, which leads to a warning

DiagGeneralErrLvlProcUnitErr = 1000

Theshold value for the “Processing Unit Errors”, which leads to an error

DiagGeneralWarnLvlProcUnitErr = 100

Theshold value of the “Processing Unit Errors”, which leads to a warning

MasterDebugMessageLevel = 0

Activates extended debug messages of the EC-Master (0 = Silent, 1 = Any, 2 = Critical, 3 = Error, 4 = Warning, 5 = Info, 6 = InfoApi, 7 = Verbose, 8 = VerboseCyc)

GuiDebugMessageLevel = 0

Activates extended debug messages of the GUI (0 = Off, 1 = Errors, 2 = All)

IndentXmlFiles = False

Activates indenting of XML files (makes exported XML files readable, but increases size)

EnhancedUtf8Support = False

Activates the enhanced UTF-8 support, which might be necessary if characters will be not displayed correctly

11.3 Security Optimizations

If you want to make EC-EngineerWeb more secure, we recommend the following things:

- Run EC-EngineerWeb without root privileges
- **Use our optimized link layers**
Usually it is easier to use our link layers with root privileges, but it is also possible to use them without root privileges, for more information look into the User Manual [EC-Master](#).
- Run EC-EngineerWeb in your LAN only, maybe in combination with a VPN connection
- **Set up a 3rd party webserver (e.g. Apache or Nginx) as a reverse proxy server to redirect HTTP traffic to EC-EngineerWeb, for more information look e.g. in:**
Host ASP.NET Core on Linux with Apache: <https://learn.microsoft.com/en-us/aspnet/core/host-and-deploy/linux-apache?view=aspnetcore-7.0>
Host ASP.NET Core on Linux with Nginx: <https://learn.microsoft.com/en-us/aspnet/core/host-and-deploy/linux-nginx?view=aspnetcore-7.0&tabs=linux-ubuntu>

11.4 FAQ

Here you can find solutions of possible problems:

- **The integrated EC-Master does not react as estimated**
Increase the message level (Menu Settings All Messages) and try it again.
- **EC-EngineerWeb reports a message with ErrorCode: 0x...**
Error Codes comes directly from the EC-Master. If you want to know what to know how to solve this problem, please refer the manual of EC-Master.
- **EC-EngineerWeb reports the following message: Not all EtherCAT slave devices are in operational state**
Check if all slaves have a green icon. If the color is not green, open tab “Diagnosis Slave General”. Here you can see the error state of the slave. If it has no error, try to change the state to OP again.
- **EC-EngineerWeb reports the following message: Changing topology failed: Bus configuration mismatch (ErrorCode: 0x9811001E)**
The configured bus and the currently connected bus does not match. Please open the ‘Network Mismatch Analyzer’ (Menu Network Network Mismatch Analyzer) to solve the problem.
- **EC-EngineerWeb reports the following message: Slave ‘...’ has unexpected state (Current state: ‘...’, Expected state: ‘...’)**
Select the slave and open the tab “General”. Here you can see the error state of the slave. If it has no error, try to change the state again.
- **Slave reports the error state: “Sync manager watchdog” (Diagnosis Slave General)**
You need a realtime operating system. If you still want to use your slave on Windows, you can turn off this watchdog (Slave->Advanced Settings: Set PDI Watchdog = 0).
- **How can I configure the modules of a BK1120 slave?**
EC-EngineerWeb supports only the MDP-Version of BK1120 slave. If you want to add this slave, enter “BK1120” into the search field, enable option “Show Hidden Slaves” and double-click on slave “BK1120 EtherCAT Fieldbus Coupler (MDP)” (Revision Number: 0x120001). The modules of this slave can be configured in tab “Modules” like in all other MDP slaves.

If you have one of the other versions of BK1120 and you want to use it, please contact our support.
- **How can I update the firmware of my slave via FoE?**

For updating the firmware of your slave via FoE, please follow these steps:

- Enable diagnosis mode
 - Set master state to INIT
 - Select your slave, and set his state machine to BOOTSTRAP
 - Enter path of file on slave (optional)
 - Enter password (optional)
 - Press button “Download” (it will open the FileOpen-Dialog, where you can choose the file which contains the new firmware and uploads this file)
- **Connect to local system is not possible**
 - Is WinPcap / Npcap / NDIS installed?
 - Is at least one network adapter installed?
 - **Why is the process image size different between EC-EngineerWeb and EC-Master?**

EC-EngineerWeb shows on tab *Process Data Image* not the real size of the process data image. It show only the offsets and the size of the variables.

If you want to get the real size of the process data image, which is used from EC-Master, you have to look into the ENI file: `EtherCATConfig/Config/ProcessImage/Inputs/ByteSize` or `EtherCATConfig/Config/ProcessImage/Outputs/ByteSize`. This is the offset + size of the last variable and additional administration data depending on the slaves which are used (ALStatus, DC Support, Mailbox, ...).
 - **EC-EngineerWeb reports the following message: Failed to query EtherCAT Slaves. No slaves found.**

Verify that WinPcap is correctly installed.

Try to restart you operating system, because this is sometimes necessary if you e.g. using a USB network adapter

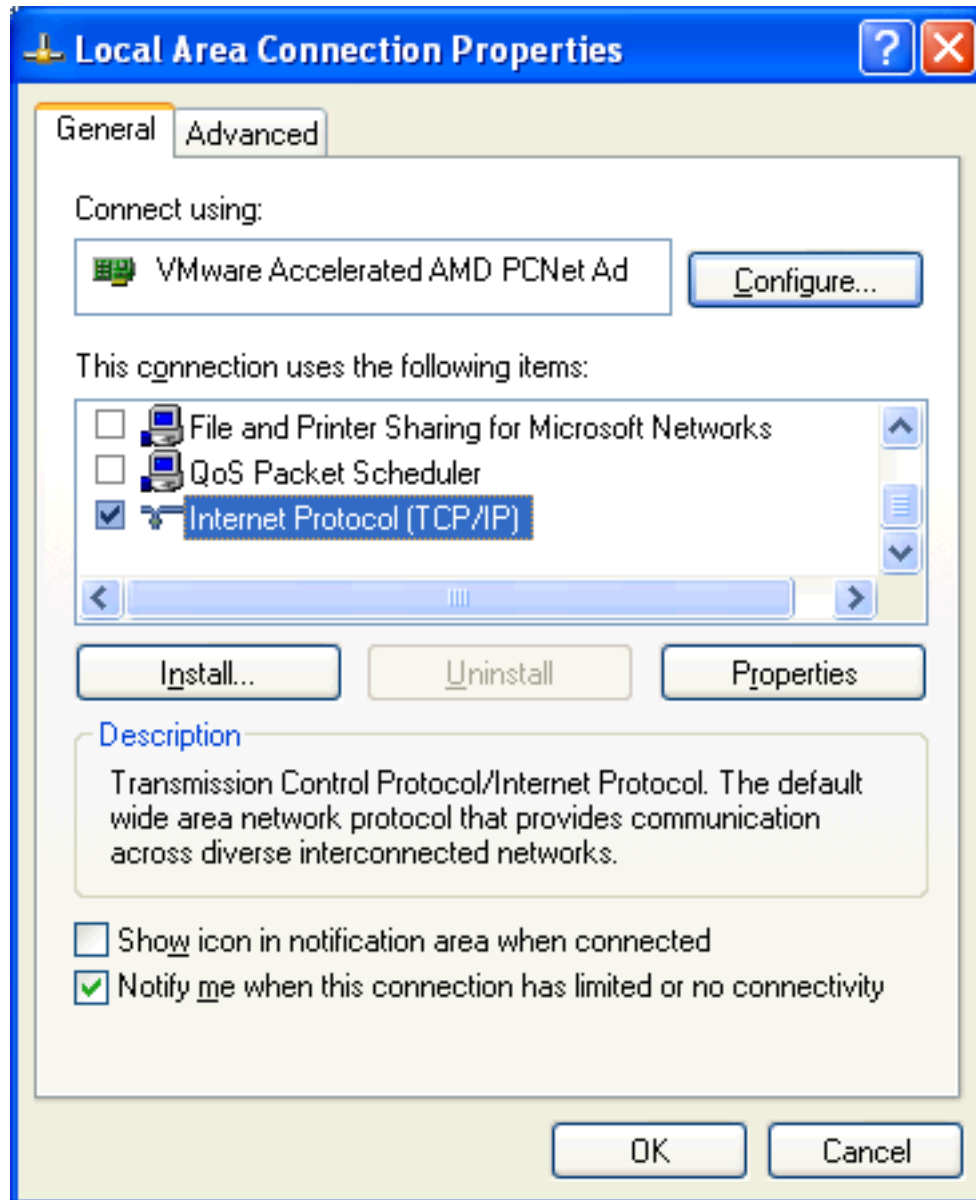
Increase the message level (Menu Settings All Messages)

Turn on debug message of the master

 - Stop “EC-EngineerWeb”
 - Set “MasterDebugMessageLevel” to “7” (verbose) in `%ProgramData%/EC-EngineerWeb/user.myusername.xml`
 - Start “EC-EngineerWeb” again
 - **EC-EngineerWeb reports the following message: Network scan successful - 0 slaves found.**

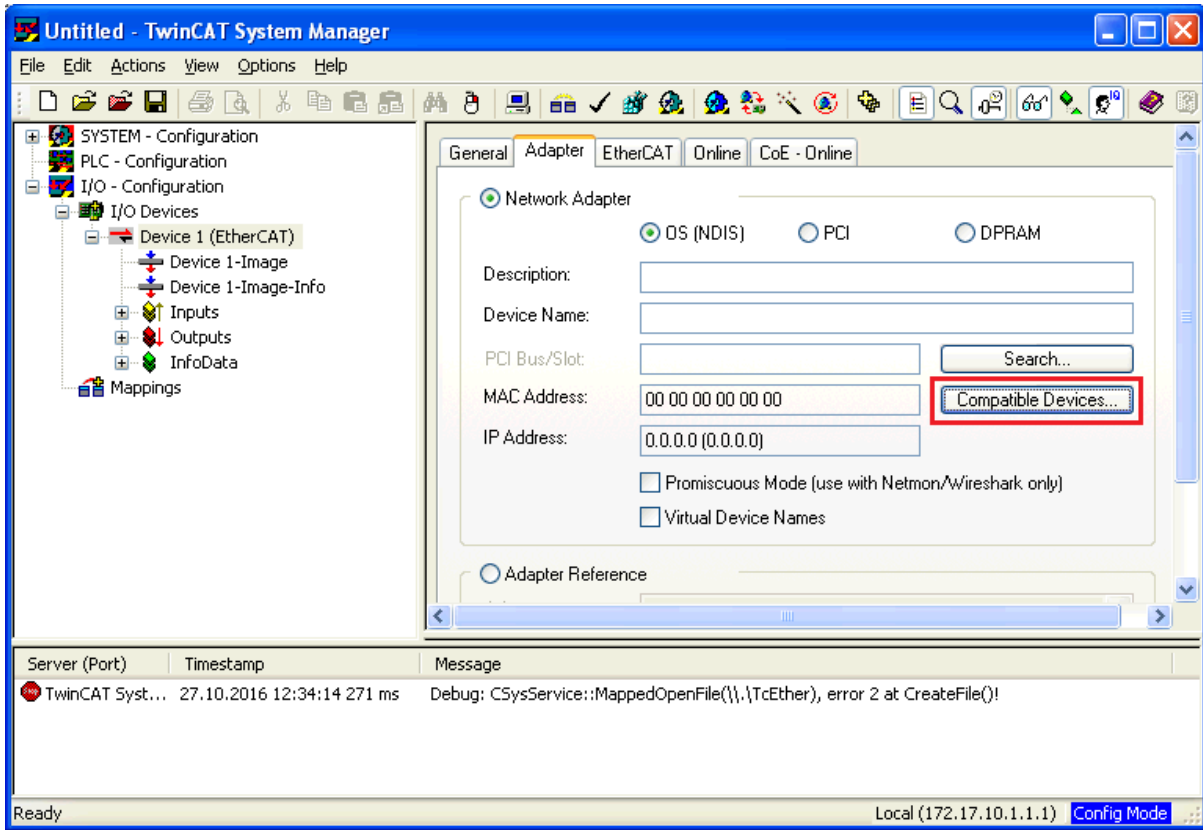
Make sure you have connected the input and not the output port of your first slave to the computer.

Open “Network and Internet Connections Network Connections” and open the properties of your network adapter and uncheck all protocols except “Internet Protocol (TCP/IPv4)”

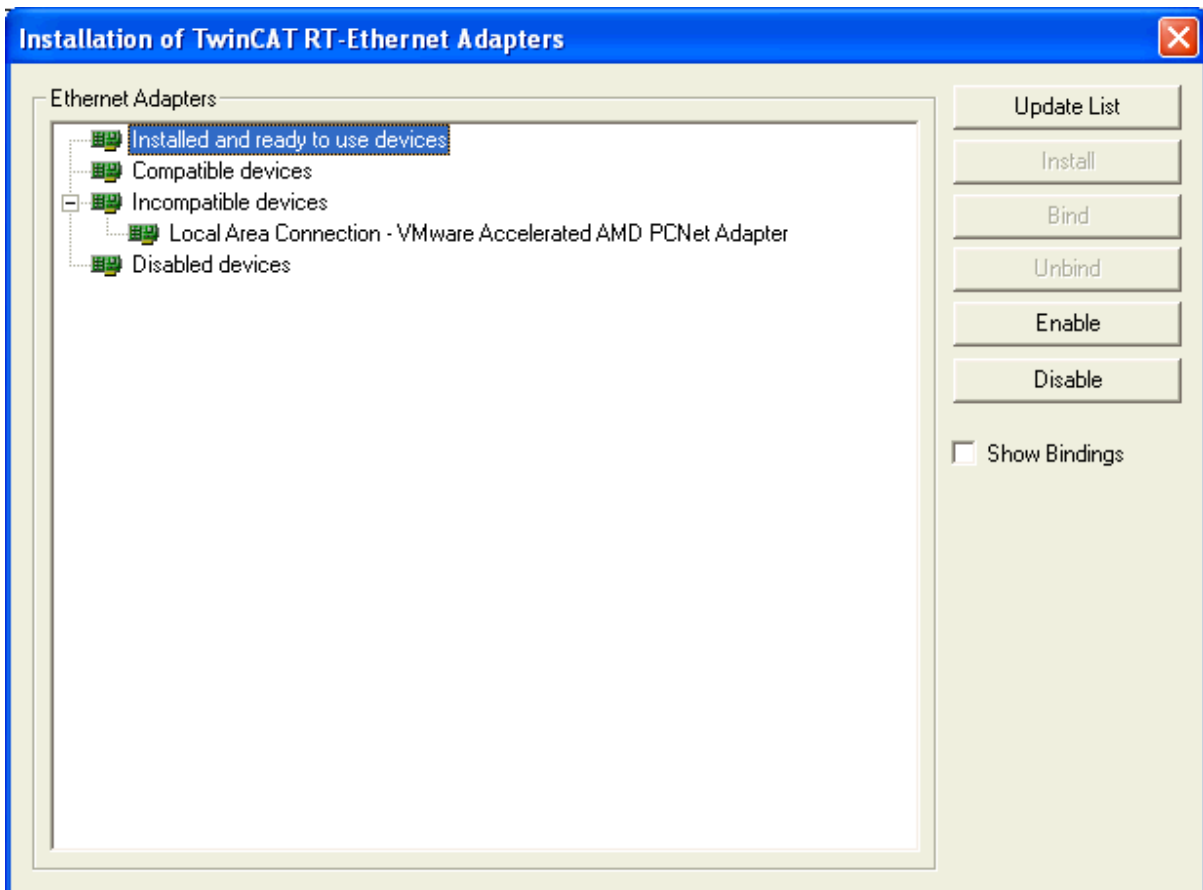


Do you have TwinCAT installed on this machine?

Open “Compatible Devices”:



Uninstall or disable the “TwinCAT RT-Ethernet Adapter” for your network adapter:



If this doesn't help, try to disable the "TwinCAT RT-Ethernet Driver" in the properties of your network adapter and reboot your system.

Run EC-EngineerWeb with administrative rights? Does it help?

Do you have a some kind of security software (like firewall, antivirus, ...) installed on this machine?

Try to turn it off and check if problem is solved

Do you have problems on sending or receiving pakets?

Install "Wireshark" and check which pakets are missing

Do you have only problems on sending packets?

Try to exclude ethernet protocol type "0x88a4" from your firewall. For more information see <https://en.wikipedia.org/wiki/EtherCAT/>

Try it with Npcap instead of WinPcap. Make sure you chose "Install Npcap in WinPcap API-compatible Mode"

- **How can I create ENI files for slaves from the Beckhoff CX5000 series?**

The ENI file of those slaves must start with an Ebus slave, but EC-Master exports only an MII port. This problem can be solved by first adding a helper slave "EK1200". The "real" EBus slaves can be connected afterwards to this helper slave.

- **WebAdmin in Dongle-Version shows page not found, what can I do?**

You have to download and install the Code Meter Runtime from WIBU <https://www.wibu.com/>

- **UTF8 characters e.g. in variables or PDOs will be not displayed correctly**

This requires the enhanced UTF-8 support and can be enabled by setting "EnhancedUtf8Support = True", (see *Internal User Specific Settings*)

- **Ubuntu doesn't show any images. What can I do?**

On Ubuntu (and other Linuxes) you may need to install those libraries:

- sudo apt install libc6-dev
- sudo apt install libgdiplus

- **MacOS doesn't show any images. What can I do?**

On MacOS you may need to install the library 'libgdiplus':

brew install mono-libgdiplus

If package manager 'Homebrew' is not installed, enter:

```
/usr/bin/ruby -e "$ (curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install )
```

- **Ubuntu 22.04 reports "No usable version of libssl was found". What can I do?**

.NET core 3.1 supports only OpenSSL 1. It can be installed manually:

- wget "http://security.ubuntu.com/ubuntu/pool/main/o/openssl1.0/libssl1.0.0_1.0.2n-1ubuntu5.10_amd64.deb"
- sudo dpkg -i libssl1.0.0_1.0.2n-1ubuntu5.10_amd64.deb