Product Catalog 2019

affiliate of

PEAK System

We provide products and services for PEAK-System hardware

- **CANopen (FD) configuration, monitoring, analysis, simulation, test and diagnostic**
- **CANopen (FD) I/O modules, gateways**
- **CANopen (FD) and J1939 library and API solutions for Windows® and Linux®**
- **Training and consulting on many aspects of CAN, CANopen (FD) and J1939**

Catalog Contents

Books:

- Embedded Networking with CAN and CANopen
- Implementing Scalable CAN Security with CANcrypt

Development and test software:

- CANopen Architect, EDS editor
- CANopen Logxaminer, log analyzer
- CANopen Magic, configuration, monitoring, analysis and simulation

Software for PEAK-System hardware:

- CANopen for PCAN-Minidisplay, hand-held
- CANopen Diag for PCAN-Diag 2, hand-held
- CANopen FD Smart Bridge and Gateway
- CANopen FD für PCAN-MicroMod FD
- Industrial CANopen FD modules

Expertise

Our expertise covers embedded networking applications using Controller Area Network (CAN bus), CAN-FD, CANopen (FD), J1939, ISO-TP and Embedded Internetworking solutions.

Application fields include consumer, industrial, medical, sub-sea and after-market automotive. We participate in CiA (CAN in Automation user's group) standardization committees such as CiA 301, CiA 305, CiA 447 and many others.

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www.em-sa.com ▪ www.canopenstore.com ▪ www.canopenstore.eu
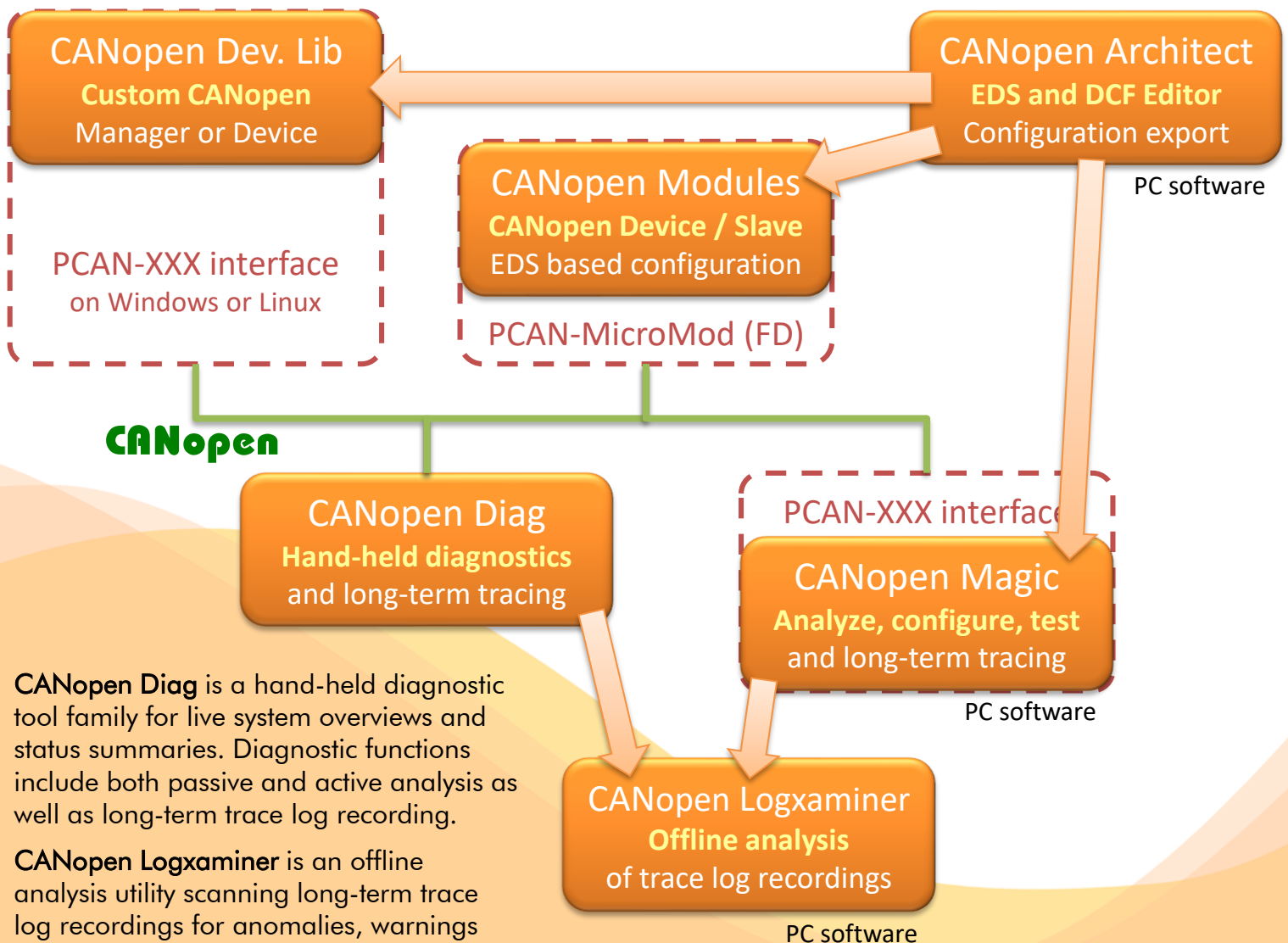
CANopen®FD Overview

Product overview of our entry-level CANopen (FD) solutions: EDS configuration Editor, IO modules, developer lib for custom solutions, diagnostics and analysis tools

CANopen Architect is our generic EDS (Electronic Data Sheet) editor with various configuration export options for our CANopen solutions.

The **CANopen Developer Lib** provides quick and easy access to CANopen devices connected from any Windows® or Linux® system with a PEAK PCAN interface. Build your own app using your favorite compiler system.

CANopen Modules based on PEAK PCAN MicroMod (FD) are ready to use. Some versions can be customized using configurations created by the **CANopen Architect** EDS (Electronic Data Sheet) editor.

The **CANopen Magic** tools are for monitoring, configuring and analyzing CANopen networks. The high-end version also offers device simulation.

CANopen Dev. Lib
Custom CANopen
Manager or Device

PCAN-XXX interface
on Windows or Linux

CANopen Modules
CANopen Device / Slave
EDS based configuration

PCAN-MicroMod (FD)

CANopen Architect
EDS and DCF Editor
Configuration export

PC software

CANopen

CANopen Diag
Hand-held diagnostics
and long-term tracing

PCAN-XXX interface

CANopen Magic
Analyze, configure, test
and long-term tracing

PC software

CANopen Diag is a hand-held diagnostic tool family for live system overviews and status summaries. Diagnostic functions include both passive and active analysis as well as long-term trace log recording.

CANopen Logxaminer is an offline analysis utility scanning long-term trace log recordings for anomalies, warnings and errors. Findings can be exported as a PDF report.

CANopen Logxaminer
Offline analysis
of trace log recordings

PC software

CANopen Book

Embedded Networking with CAN and CANopen
THE CANopen book for beginners and advanced users

CANopen is an open communication standard based on CAN – Controller Area Network. It is maintained by the CiA (CAN in Automation) user's group and features a high number of device and application profiles. Uses include industrial, transportation, maritime, medical, sub-sea, after market automotive and many more.

The book contains three parts:

Part 1: Using CANopen, by Olaf Pfeiffer

This part focuses on CANopen up to the system integrator level. Any technician or engineer who needs to be able to configure and/or maintain a CANopen network will find the required knowledge to do so in this part. The last chapter in this part contains a step-by-step example of a network configuration and test cycle.

- ✓ Understanding Embedded Networking Requirements
- ✓ The CANopen Standard
- ✓ CANopen Beyond DS301
- ✓ CANopen Configuration Example

Part 2: CANopen Engineering, by Christian Keydel

This is the part for engineers who need to have a detailed knowledge of how CAN and CANopen work, especially for those developing their own CANopen devices. It describes and compares various implementation methods in detail.

- ✓ Underlying Technology: CAN
- ✓ Implementing CANopen

Embedded Networking with CAN and CANopen

ISBN 978-0-692-74087-3: Paperback edition. Demo software matching the examples in the book is available for download.

Part 3: CANopen Reference, by Andrew Ayre

A pure reference section for all CANopen users. Key elements of CANopen are summarized in a way that allows a quick look-up. The core of this part is an Object Dictionary reference listing all Object Dictionary entries specified by the CiA CANopen standards DS301 and DS302.

- ✓ Frequently Asked Questions
- ✓ Physical Layer
- ✓ Data Types
- ✓ The Object Dictionary
- ✓ Minimal Object Dictionaries
- ✓ Communication Object Identifiers (COB IDs)
- ✓ Emergency Objects
- ✓ SDO Abort Messages
- ✓ Node States
- ✓ CANopen Glossary (provided by CiA)

CANcrypt Book

Security solutions for CAN, CAN-FD, CANopen, J1939 or other CAN based protocols and secure bootloading solutions

Any new development using embedded networks such as CAN, CAN-FD or any of the higher layer protocols like CANopen or J1939 should also focus on security aspects. Even if the network is considered closed at the time of development and has no "obvious" gateways to other networks: You cannot always rule out that at some point in the future a service technician installs remote access or diagnostics device to make his job easier. Or that a new device is officially developed and added to the network that offers similar access options due to market pressure.

The required system resources are not only minimal in comparison to traditional cryptography methods, they can also be scaled towards the system's security requirements. On the higher end, CANcrypt supports AES-128 based encryption and authentication.
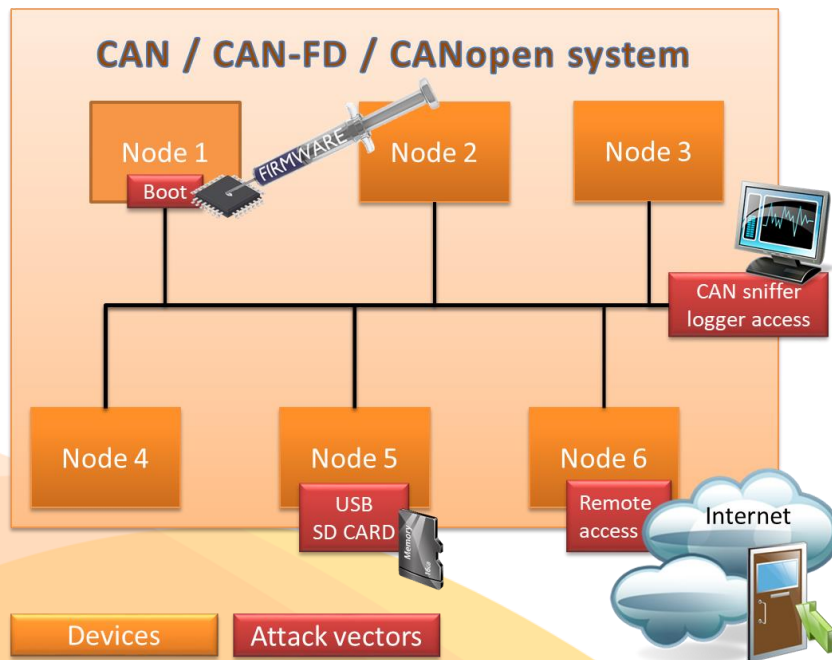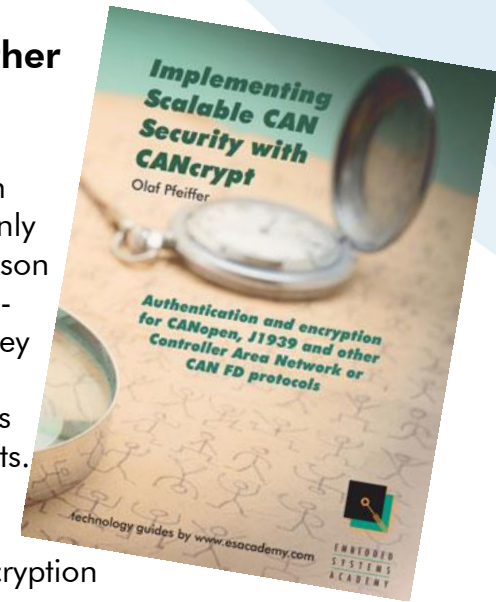
The CANcrypt pairing mode is used to securely connect a configurator or active diagnostic tool to a single device. This ensures that only authorized parties can modify configurations or initiate software updates.

A key hierarchy allows the implementation of a smart, simplified key management supporting manufacturers, system builders/integrators and owners. The CANcrypt system is protocol independent and can be used with CANopen or other higher-layer CAN protocols. Up to 15 devices can participate in the secure communication. A manager / configurator is only required for the generation and exchange of keys, but not during regular operation.

Especially if firmware update support through a bootloader is somewhere on the horizon, ensure right from the start that only authorized parties can activate it in the first place.

The CANcrypt system adds different levels of security features to CAN. The basic functionality provided supports the grouping of multiple devices and authenticated communication between them based on a secure heartbeat.

Implementing Scalable CAN Security with CANcrypt

ISBN 978-0-9987454-0-4: Black and white paperback edition. Demo software matching the examples in the book is available for download.

ISBN 978-0-9987454-1-1: Full color hardcover edition including a commercial CANcrypt software version. The software license covers prototyping and an initial pilot production run of up to 500 devices.

www.cancrypt.eu
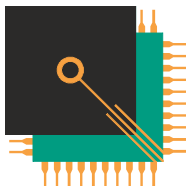
CANopen Architect

CANopen device and system configuration editing tool. EDS (Electronic Datasheet) and DCF (Device Configuration File) import and export and code generation.

- Object Dictionary editor with drag 'n drop, cut, copy and paste
- Edit device configuration, file info and commissioning details
- Auto-correction
- Integrated EDS checker
- Virtual Devices (groups, configurations)
- EDS, DCF or CODB import and ecport
- Various export options for configuration of modules and libraries
- CANopen Magic Ultimate simulation export
- Auto-generate Word documentation (Pro)
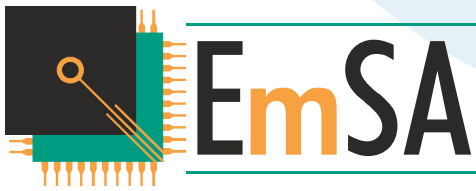- PDO configuration GUI (Pro)
- Command line (Pro)
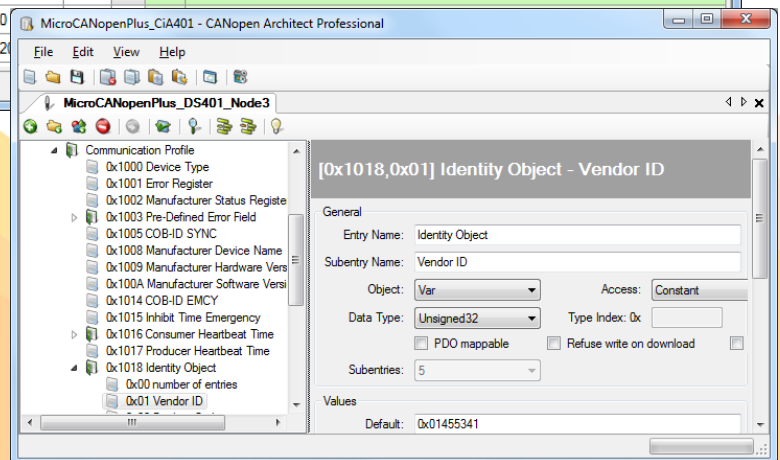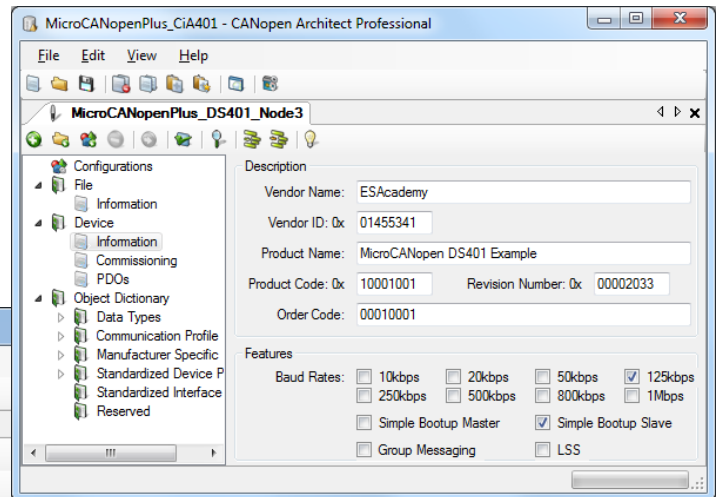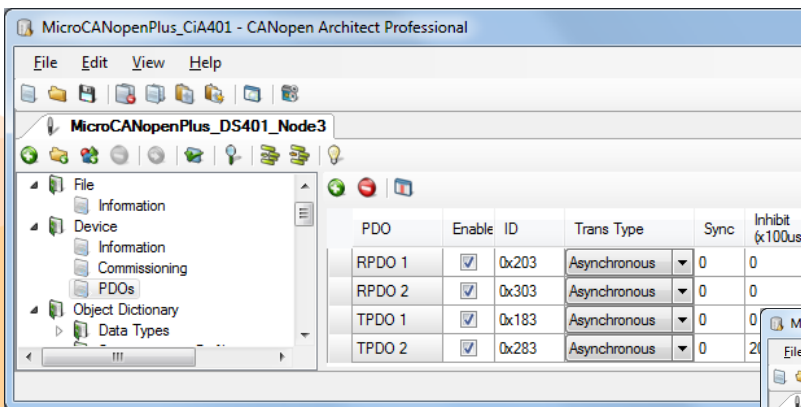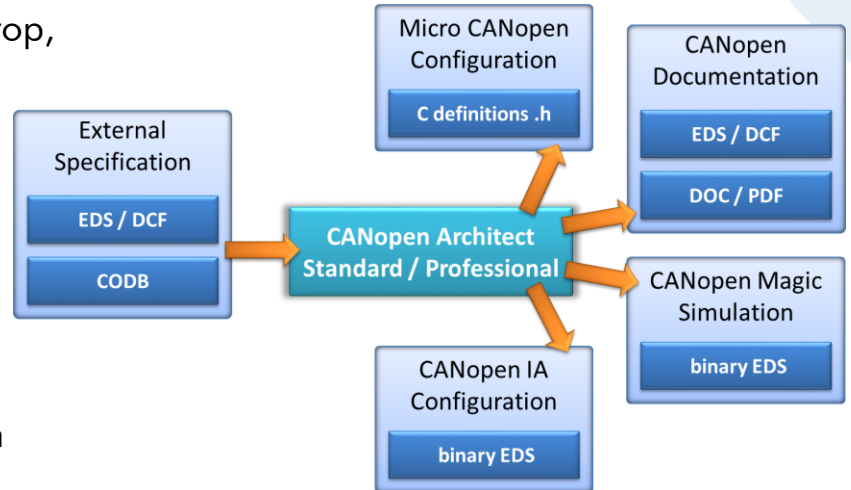
Order codes

ES-SFT-CAEDS: CANopen Architect Standard

ES-SFT-CAEDP: CANopen Architect Professional

www.canopenarchitect.com

CANopen Logxaminer
Automated trace analysis

CANopen Logxaminer is a sophisticated log file analysis tool for CANopen networks

When it comes to long-time system monitoring or testing, a typical approach is to generate long-term logs containing CANopen traffic data covering multiple hours or sometimes even days. However, the often-unsolved question is: how do I efficiently examine a log file with possibly 100s of thousands of CANopen messages? A typical approach is to load the log file into a spread sheet program and do manual searches, color highlighting and sometimes run custom scripts or macros to help locating issues.

EmSA's Logxaminer helps with the post analysis of such recordings. It creates statistics and event lists on a configurable level of detail. This drastically shortens the time to get "real results" out of a CANopen log recording made. Statistics are not only produced globally, there are dedicated statistic views for each node present on the network during the recording.
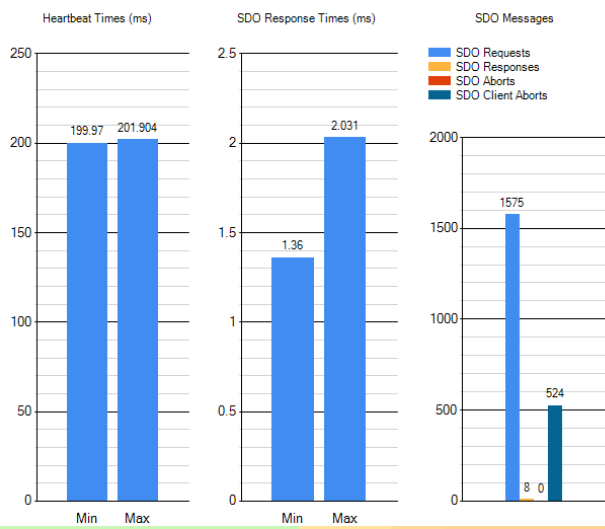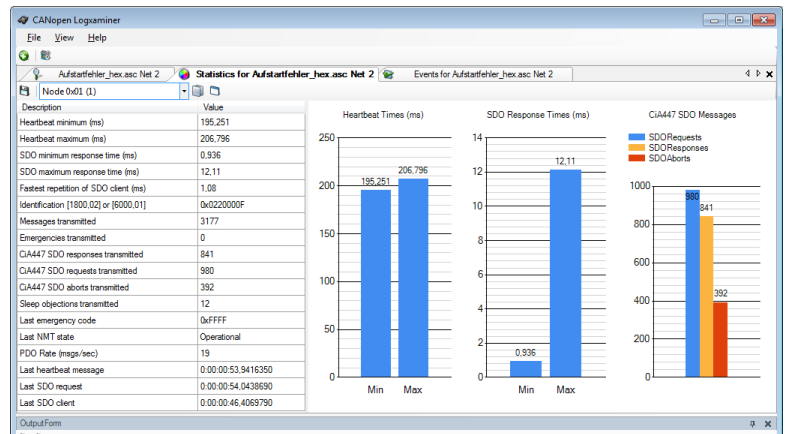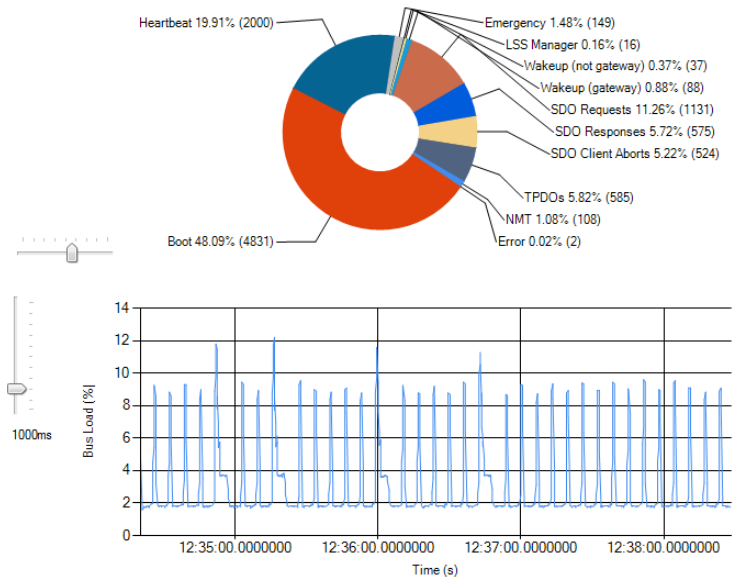
Per node statistics include:

- Minimum/maximum heartbeat time
- Minimum/maximum SDO response time
- Number of bootups
- Number of emergencies transmitted
- PDO message rate

The **Logxaminer** not only produces statistics, it also generates an event listing with all important system events. The event listing filters information from the log including:

- Node ID assignment (by LSS)
- Bootups (expected/unexpected)
- Emergencies
- SDO Aborts
- Unexpected messages
- Errors in LSS or SDO sequences

Order code
ES-SFT-COXM: CANopen Logxaminer

www.em-sa.com
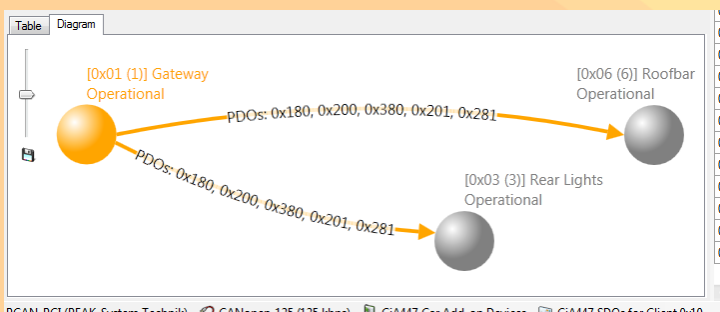
CANopen Magic
Configuration and test tool

Professional CANopen (FD) configurator, monitor, analyzer, test tool and simulator available in three versions and as DLL for the creation of own service tools

CANopen Magic is a versatile software tool to monitor, analyze, trace, configure, simulate and test CANopen and CANopen FD networks and devices. It contains functions for the entire lifetime of a CANopen network: from development and test to system integration and performance analysis. Use sophisticated trace filtering and node access to monitor, analyze and test all aspects of your network. Simulate nodes that are still under development.
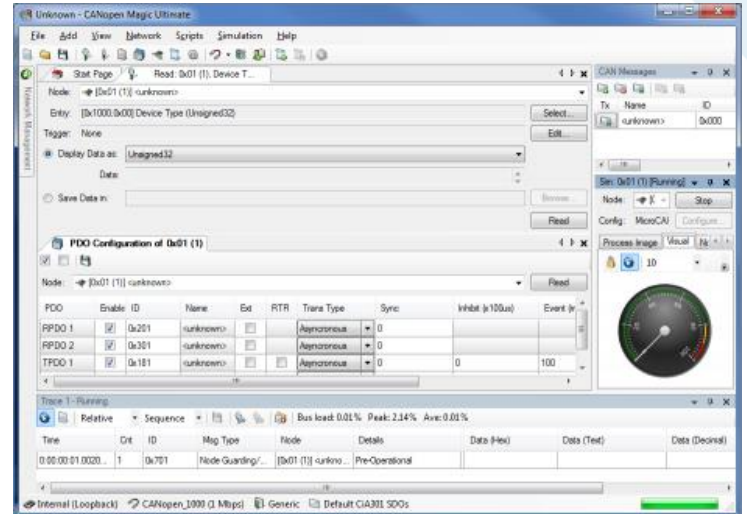
Features (version depending):

- Read and write to nodes using (U)SDOs
- (U)SDO expedited, segmented and block modes
- Transmit CAN messages
- Network overview
- Network management (NMT)
- Trace windows
- PDO configuration windows
- Read/write device configuration files (DCF)
- Custom SDO channels
- Custom vendor names
- Custom device types
- Custom error codes
- Custom abort codes
- Nodes and network description (name, EDS)
- Trace filter scripts
- CANopen manager configuration
- Layer Setting Services (LSS) support
- Display process data meters, graphs, LEDs, etc.
- Replay log files

- Trace window filtering
- Trace window continuous (long term) recording
- CiA 447 Car Add-on Devices support
- Multiple node setup windows
- Multiple node read/write windows
- Node Object Dictionary (live access) window
- Python Script API, Editors and Interpreters
- Node simulations
- Automatic node simulation from an EDS or DCF
- Automatic generation of network diagrams
- Trace analysis graphs and charts
- CAN interface support from PEAK, Kvaser and others
- Command line interface

Order codes

ES-SFT-COML: CANopen Magic Lite
ES-SFT-COMS: CANopen Magic Standard
ES-SFT-COMP: CANopen Magic Professional
ES-SFT-COMU: CANopen Magic Ultimate

Version comparison

www.canopenmagic.com

CANopen Magic
Versions

CANopen Magic is available in the versions Standard, Professional and Ultimate.
The optional DLL version allows the implementation of custom service tools.
All versions support both CANopen and CANopen FD.

Features	Lite/Std	Professional	Ultimate
Read and write to nodes using SDOs	✔	✔	✔
SDO expedited, segmented and block modes	✔	✔	✔
Transmit CAN message lists	✔	✔	✔
Display network overview	✔	✔	✔
Network management (NMT)	✔	✔	✔
Trace windows	✔ (max 1)	✔ (max 4)	✔ (max 4)
Read/write device configuration files (DCF)	-	✔	✔
Custom SDO channels	-	✔	✔
Custom vendor names, device types	-	✔	✔
Custom error codes, abort codes	-	✔	✔
Custom node describtion (name, EDS)	-	✔	✔
Trace filter scripts	-	✔	✔
CANopen manager configuration	-	✔	✔
Layer Setting Services (LSS) support	-	✔	✔
Display process data meters, graphs, LEDs, etc.	-	✔	✔
Replay log files	-	✔	✔
Trace window filtering	-	✔	✔
Trace window continuous (long term) recording	-	✔	✔
CiA 447 Car Add-on Devices support	-	✔	✔
Multiple node setup windows	-	✔ (max 10)	✔ (max 10)
Multiple PDO configuration wizard windows	-	✔ (max 10)	✔ (max 10)
Multiple node read and write windows	-	✔ (max 10)	✔ (max 10)
Node Object Dictionary Overview and Access	-	✔ (max 1)	✔ (max 10)
Python Script API, Editors and Interpreters	-	-	✔ (max 10)
Simulated nodes	-	-	✔ (max 127)
Automatic object dictionary simulation from an EDS or DCF	-	-	✔
Automatic generation of network diagrams	-	-	✔
Trace analysis graphs and charts	-	-	✔
Multiple CAN interfaces supported (Lite version PEAK only)	- / ✔	✔	✔
Command line interface	✔	✔	✔

CANopen MiniDisplay
Hand-held Diagnostics

The CANopen MiniDisplay hand-held unit provides flexible and sophisticated CANopen testing. Ideal for in application testing or workshop environments.

The CANopen MiniDisplay devices are compact, hand-held diagnostic and test devices for CANopen networks. Being a dedicated hand-held device the CANopen MiniDisplay is especially suited for in-the-field use to perform diagnostic functions directly at machinery or vehicles. A continuous logging mode collects data for later analysis, for example with our optional Logxaminer software.

CANopen Network Status Overview
The status overview provides a summary of the most important information: the number of nodes found, number of boot-up messages, current bus load, longest message burst, SDO usage and LSS usage.

For each node found: its NMT status, its min/max heartbeat, its current message rate generated and node info where available (e.g. names of Virtual Devices implemented by a device)

Important Events History
The events history is a trace of the most important network events including LSS node ID assignments, NMT commands, boot-ups, emergencies, SDO aborts, first PDO use and time since reset.

Further functions and features include

- Power: extern 7-30V (not included)
- CiA447 Application Profile support
- Active network scan
- Single device control (NMT commands, LSS Master commands, generic SDO access)
- Executing write/configuration sequences
- Executing bootloader sequences to load firmware into devices
- Recognizing Virtual Devices where supported
- Execute CDCF (Concise Device Configuration File)

CiA 447 Tester and Gateway Simulation

The CANopen MiniDisplay can be set into a CiA 447 tester mode as specified by the CiA 447 documents. It becomes an active test node and can produce specified background traffic.

The gateway simulation turns the Diag into a CiA 447 gateway.

Order code (software only, requires MiniDisplay)

ES-DIAGS-COPM: CANopen for MiniDisplay
ES-DIAGS-447M: Add CiA 447 Tester & Gateway
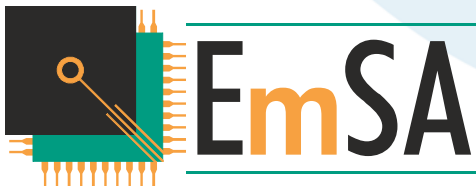
www.canopendiag.de

CANopen (FD) Diag
Hand-held CANopen Tester

The CANopen Diag unit provides all functions of the MiniDiag plus hardware measurements like a CAN oscilloscope. CANopen FD version under development.
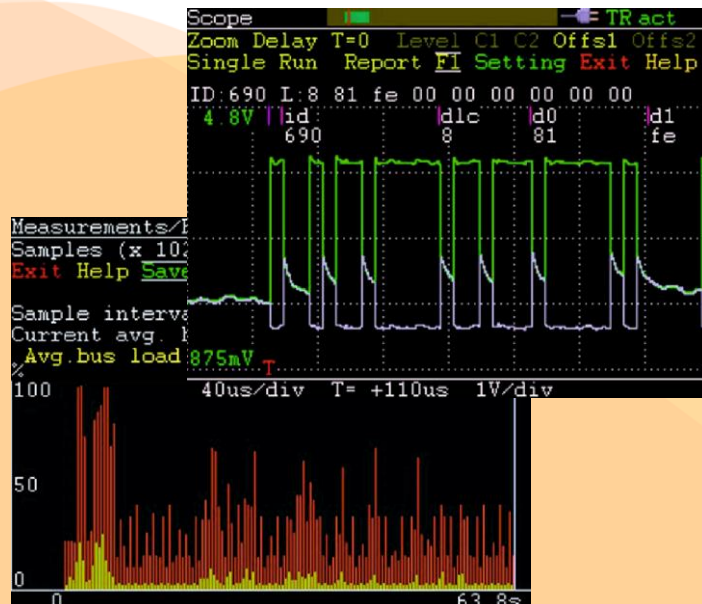
CANopen Diag

The CANopen Diag devicess are compact, hand-held diagnostic and test devices for entire CANopen networks as well as for single Devices Under Test (DUT). It operates on batteries (4 x AA) or external power supply.

The diagnostic functions includes physical layer measurements:

Physical Layer and Generic CAN

- Termination resistor measurement
- Voltage at pins measurements
- Bus load measurements and statistics
- CAN oscilloscope

CANopen FD Diag (under development)

The CANopen FD Diag features a display with a resolution of 800x400 pixels, which can be used in both portrait or landscape mode depending on the function currently used. It is controlled via a turn dial and 4 buttons. It runs of chargeable batteries, a charging station is included with the delivery.

Both versions offer
CANopen (FD) Network Status Overview
The status overview provides a summary of the most important information: the number of nodes found, number of boot-up messages, current bus load, longest message burst, service channel and LSS usage. Status summary info for each node.

Important Events History
The events history is a trace of the most important network events including LSS node ID assignments, NMT commands, boot-ups, emergencies, aborts, first PDO use and time since reset.
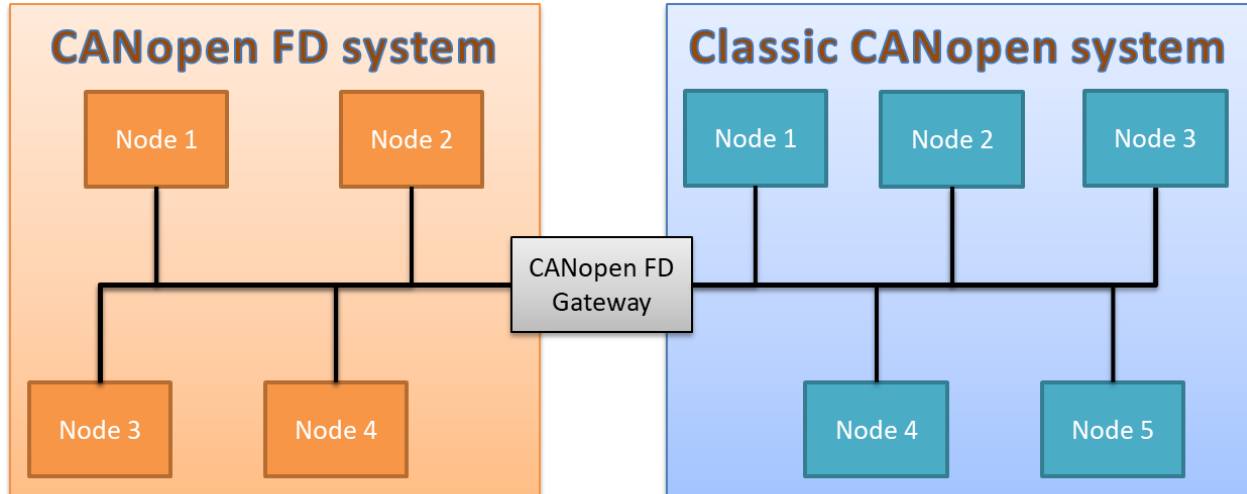
Order codes (software only, requires Diag)

ES-DIAGS-COP2: CANopen for PCAN-Diag2
ES-DIAGS-4472: Add CiA 447 support

www.canopendiag.de

Smart Bridge FD
Smart CANopen FD Routing

The CANopen FD Smart Bridge / Gateway allows easy integration and mix of classic CANopen devices with a CANopen FD network.

The CANopen FD Gateway connects classic CANopen devices to CANopen FD

The CANopen FD USDO protocol (Universal Service Data Object) supports routing of messages through gateways. This gateway allows any CANopen FD node to directly address the nodes on the classic CANopen side using an USDO request. The request gets converted to a regular SDO client request on the CANopen side. The SDO response returned is then passed back to the CANopen FD side as USDO response.

To the CANopen FD side, the gateway is a CANopen device and acts as gateway for routed USDO requests

CANopen FD Gateway

To the CANopen side, the gateway is a CANopen Manger using SDO client requests to address nodes

Hardware

The Gateway FD is based on PEAK's PCAN-Router FD and available in two versions. The difference between the two is the connector used. One uses the common CAN plug D-Sub 9 pin, one for each CAN interface. The other uses a 10pin industrial Phoenix screw-terminal for both CAN ports.

The operating voltage supply can be in the range from 8V to 30V. The operating temperature range is from -40 to 85 °C (-40 to 185 °F).

Order codes (software only, requires router)

ES-FWRT-BR: Bridge / Gateway FD firmware

www.canopendiag.de

CANopenIA-FD
CANopen FD IO or coprocessor

PCAN-MicroMod FD firmware options for generic CANopen FD I/O or serial instant access to CANopen FD for a host microcontroller.

CANopenIA is a concept developed by ESAcademy that helps you to easily build CANopen or CANopen FD devices. Access, test or control the devices/nodes connected to a CANopen network. Build sensors, actuators or other devices with a CANopen (FD) interface. The main benefits of CANopenIA are:

Interfaces supported
- One CANopen FD and one UART
- Up to 8 digital inputs and 8 digital outputs
- Up to 8 analog inputs (12 bit)
- Additional IO on request

Decreased complexity level
- Simple setup through CANopen Architect
- Only minimal CANopen knowledge required
- Simplified software development
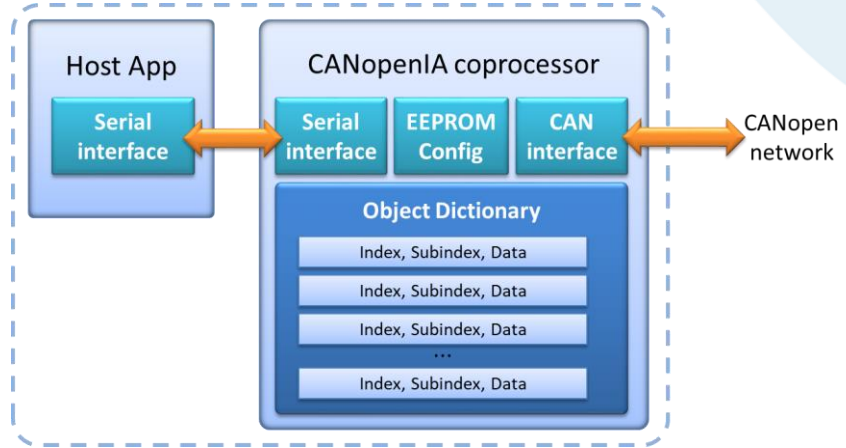
Increased security level
- Fewer attack points for intruders
- In coprocessor mode, CANopenIA acts as a firewall between CANopen and host

Faster time-to-market
- Minimized software development
- Faster test cycles

The serial protocol between host and CANopenIA is the CANopen (FD) remote access protocol by EmSA. It supports reporting events (new data arrived on CANopen side) as well as reading and writing data of the local Object Dictionary.

CANopen Manager or CiA 447 implementations also support read and write accesses to Object Dictionary entries of any node connected to the CANopen network.
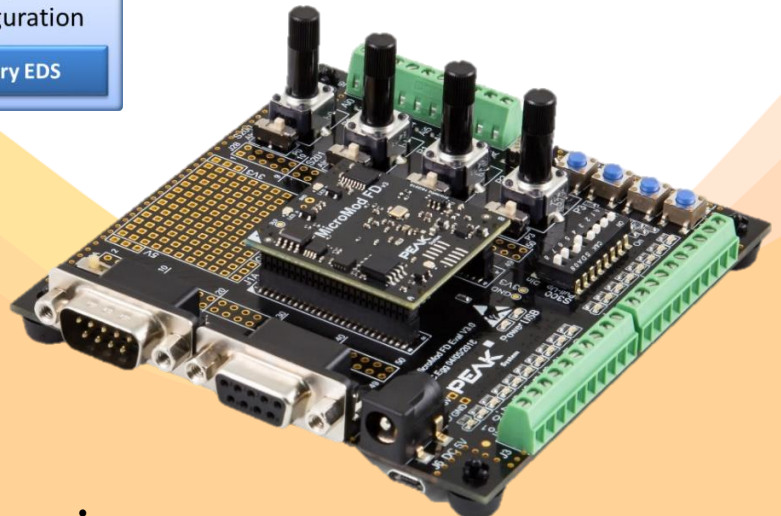

Use the CANopen Architect software to start a new configuration or import an existing one, for example an EDS (Electronic Data Sheet) or CODB (CANopen data base) file. Once the desired configuration is finished, it can be exported and loaded into CANopenIA devices.

Order code

to be determined

www.canopenia.com

MicroMod FD DR
Industrial I/O Modules

This line of products provides DIN rail mounted industrial I/O modules for both CANopen and CANopen FD, based on PEAK-MicroMod FD technology.

The PCAN-MicroMod FD DR line of products can directly be used in industrial control environments. The housing clips on to a standard DIN rail. Each module is an individual input / output device with its own CANopen (FD) interface, no bus coupler required. Configuration of bitrate and node ID can be made by dials or configuration software.

Classical CANopen and CANopen FD
The devices support both classical CANopen and CANopen FD and can therefore also be used to make applications CANopen FD "ready". If a network system currently still uses classical CANopen but is expected to switch to CANopen FD in the future, then these devices can be used to already prepare the system for the future switch to CANopen FD.

CANopen FD and USDO
One of the new services available in CANopen FD is the Universal Service Data Object (USDO). This service allows every node on the network to directly send data to any node connected (no master required). This communication mode supports switching outputs from any node, simplifying integration of systems with distributed control.

Optional CANcrypt FD Security
The CANopen FD firmware is optionally available with support of CANcrypt FD. When enabled, the inputs are transmitted with a digital signature. Outputs received via the network are only processed, if the digital signature received with the data is verified.

PCAN-MicroMod FD DR CANopen Digital 1
- CAN low, high, ground, shield
- Power supply range 12-36V
- 8 Digital Inputs
- 8 Digital Outputs

Order code

to be determined

www.canopenia.com