

March 1992

September 2024

# CAN in Automation

*International users' and manufacturers' group*



*The nonprofit association  
promotes CAN's image  
and provides a path  
for future developments  
of the CAN technology.*

*We shape the future!*

[www.can-cia.org](http://www.can-cia.org)

## *CiA networks not only devices*

The international users' and manufacturers' group for Controller Area Network (CAN) – CAN in Automation (CiA) – has been established in March 1992. The nonprofit association provides technical, product, and marketing information about CAN, internationally standardized in the ISO 11898 series. CiA promotes CAN's image and provides a path for future developments of the CAN technology. Therefore, the association takes part in and supports the development of CAN-related standards and specifications. Additionally, an important part of the organization's effort is spent to develop and maintain the CANopen-related specifications.

CiA organizes joint marketing activities in all parts of the world. This includes joint stands at tradeshows,

joint information events, workshops, and contributions to magazines and conferences. An important source of information is the CiA website.

An essential aim of the organization is the social networking of CAN-interested parties. In CiA's technical and marketing groups, engineers exchange experiences and knowledge to the benefit of all members. Additionally, CiA organizes different events, such as seminars, conferences, and information days. During them, CAN newcomers can meet CAN experts. One of the most important advantages of being a member is the possibility to take part in CiA's social network, to get in touch with CAN experts, and to gain knowledge that helps to manage challenges in your CAN-related projects.



### *If others can't, we CAN!*

The internationally standardized CAN technology is suitable for all kinds of embedded real-time control systems. Due to its robustness and reliable data transfer, it is not only the dominating communication technology in road vehicles, but also in many other mission-critical applications from the domains transportation, manufacturing, con-

struction, and agriculture over healthcare and science to retail and finances, communication, and last but not least entertainment. Due to the introduction of CAN FD and CAN XL, these application domains rely in the future on this serial communication technique that is available for reasonable prices.

## Controller Area Network – The embedded network

In 1986, Bosch introduced the Controller Area Network (CAN) protocol, which is named nowadays CAN CC (classic). In 2012, Bosch presented the second CAN protocol generation, CAN FD (flexible data rate), at CiA's 13<sup>th</sup> international CAN Conference. CAN FD data frames offer a payload of up to 64 byte. Since 2015, both protocol versions are standardized in ISO 11898-1. CAN FD supports an increased data throughput combined with a high physical network design flexibility. CAN FD controllers can be combined with CAN HS (high-speed), CAN FD, or CAN SIC (signal improvement capability) transceivers - they are all standardized in ISO 11898-2:2024. CAN SIC transceivers enables bit rates of up to 8 Mbit/s in the data phase.

With the introduction of software-defined architectures, sometimes there is a need to map Ethernet frames to CAN-based networks. Under patronage of CiA, car makers, suppliers, and

chipmakers developed CAN XL (extended data-field length), offering a payload of up to 2048 byte. The CAN XL data frames, standardized in ISO 11898-1:2024, comprise several layer-management functions that ease the handling of many challenges in modern system design. Furthermore, CAN XL will support the CANsec DLL (data link layer) sub-layer providing cybersecurity measures. Another optional feature is the frame fragmentation, to improve the real-time capability of long data frames. CAN XL networks can use any CAN transceiver technology. CAN SIC XL transceivers, intended for the use in conjunction with CAN XL controllers, and specified in ISO 11898-2:2024, enable bit rates of up to 20 Mbit/s in the data phase, depending on the network design.

Some CAN-based higher-layer protocols have already been extended to use features, offered by CAN FD; for example, CANopen FD (CiA 1301) or J1939-22.

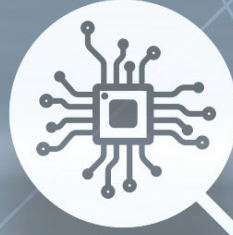


### Standardized CAN-based application layer protocols

Internationally standardized CAN-based higher-layer protocols

- ◆ EN 50325-4: CANopen application layer, dedicated to embedded machine control
- ◆ IEC 62026-3: DeviceNet application layer, dedicated to factory automation
- ◆ SAE J1939 series: Surface vehicle recommended practice
- ◆ ARINC-825 series: General standardization of CAN bus protocol for airbourne use
- ◆ IEC 61162-3 (NEMA 2000): Maritime navigation and radiocommunication equipment and systems - Part 3: Serial data instrument network
- ◆ ISO 11783 series (Isobus): J1939-based application profile, dedicated to agriculture and forestry machines
- ◆ ISO 11992 series: J1939-based application profile, dedicated to truck/trailer communication
- ◆ ISO 15765 series: Transport protocol and unified diagnostic services on CAN

*CiA Interest Groups (IG) shape the future for em*



***CiA IG CANopen***

Maintains the CANopen CC (classic) application layer and add-on functions.



AUTOMAT



***CiA IG CANopen FD***

Develops the CANopen FD application layer and add-on functions.



***CiA IG J1939***

Observes and comments J1939-based standards and specifications.



***CiA IG profiles***

Develops device and application profiles for CANopen CC, CANopen FD, and J1939.





### ***CiA IG lower layers***

Develops CAN FD and CAN XL specifications and recommendations for device and system designers.

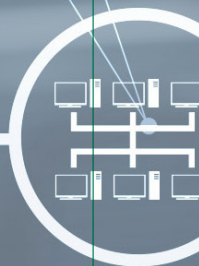


ION



### ***CiA IG high availability***

Develops specifications and recommendations on redundancy for CAN-based network systems.



### ***CiA IG safety/security***

Develops specifications and recommendations for functional safety and cybersecurity.



## *Simplify your life!*

CiA provides professional services for users and manufacturers. CiA assists you in interpreting CAN-related standards and specifications. CiA publications and email services provide information about applications,

products, and trends in CAN markets. If there are any technical questions, CiA answers them or finds the answer in the CiA community. CiA is the social network for CAN fellows.



### *In-house seminars and consulting*

In-house seminars are offered to companies with specific training requirements. The agenda of an in-house seminar is tailored to the customer's needs. CiA trainers can educate device designers, system integrators, sales forces, marketing departments, and technical management. CiA also provides general consultancy services. This includes evaluation of proprietary CAN-based higher-layer protocols and company-specific CANopen profiles. CiA consultancy services are device-, and manufacturer-independent!

### *Training and education*

CiA provides seminars at reasonable prices. The list of scheduled seminars is available on CiA's website. CiA seminars are product- and vendor-independent. They are mainly addressing newcomers in CAN technologies including HLPs.

Additionally, CiA organizes free-of-charge webinars and CiA technology days, providing basic instructions about new CAN-related developments.

### *CiA publications*

The CAN Newsletter, published since 1992, is the leading worldwide publication for CAN design engineers and users. The magazine is published as downloadable pdf-version. It provides readers with detailed technical articles and reports about new CAN products. The three-weekly CAN Community News (CCN) email service contains an overview of latest trends in CAN-technology as well as of upcoming CiA activities. The CiA Product Guides for CANopen, J1939, and CAN assist users in finding devices, software, tools, and development services. All these CiA publications are available free of charge.

### *Marketing opportunities*

CiA offers its members the opportunity to take part in several marketing activities to increase the public awareness of their brand. The members can promote their products and services at stands on tradeshows, in publications, and in videos provided by CiA. Furthermore, it is possible to sponsor CiA events, for example the international CAN Conference (iCC). Additionally, members may participate in tabletop exhibitions organized by CiA.

---

## *Join the community!*

---

There are benefits to become a CiA member (see list in the insert below). The most important reason is to be part of the community, in order to get in touch with other CAN product and service providers. In particular, small and

medium sized companies need to be networked to partners to be successful in a world, which becomes increasingly smaller. In order not to miss the CAN business, you need to be informed well and in time.



---

## *We CAN open markets!*

---

CAN is the mainstream network technology for embedded control systems. All carmakers use CAN networks to interconnect many electronic control units (ECUs). CAN was, is, and will be the dominating serial network for in-vehicle networking. Latest automotive embedded networks employing CAN FD. In this decade, carmakers will start using CAN XL. CiA and its members supported the propagation of the CAN technology to many non-automotive application fields. In most of these applications, CAN networks are used to interconnect generic I/O

modules, electrical, and hydraulic drives to programmable host controllers. Many of these control systems make use of the internationally standardized CANopen application layer and the well-proven CiA device and application profiles. CiA profiles may give CANopen devices a certain degree of plug-and-play functionality. In particular, in medium- and low-volume applications end users require standardized higher-layer protocols and profiles. System designers benefit by selecting off-the-shelf interoperable products for reasonable prices.

### *Benefits of CiA membership*

- ◆ Initiating and influencing CiA specifications
- ◆ Getting discounts on CiA training and education events
- ◆ Having access to CiA specifications in any status
- ◆ Getting discounts on some CiA publications
- ◆ Getting CANopen vendor-IDs free of charge
- ◆ Taking part in a company- and product-neutral information platform
- ◆ Participating in plugfests and workshops
- ◆ Getting the CANopen CC conformance test tool
- ◆ Participating in joint marketing activities
- ◆ Developing partnerships with other CiA members
- ◆ Getting discounts on CiA testing services
- ◆ Supporting international standardization of CAN technology
- ◆ Development of CAN markets by region, by application, or by higher-layer protocols

## CAN in Automation (CiA) membership application form

The membership fee depending on the company size applies for the current calendar year. Parties applying for membership after July 1<sup>st</sup>, pay 50 percent of the membership fee for that year.

If you do not cancel the membership by December 31<sup>th</sup> of the current calendar year in written form, the contract is renewed automatically for the next calendar year. This means that the membership fee is due for the following calendar year.

Company:* .....	E-mail:* .....
First name:* .....	Phone:* .....
Last name:* .....	Fax: .....
Street:* .....	URL: .....
Zip, City, State:* .....	VAT number:* .....
Country:* .....	We accept the CiA formalities as given on the CiA website ( <a href="http://www.can-cia.org/about-us">www.can-cia.org/about-us</a> ).
Date:* .....	Authorized signature:* .....

\* mandatory

### Please check off:

#### Number of employees at your company:

	Annual fee	incl. 19 % German VAT
<input type="checkbox"/> More than 100.000 employees:	9.900,00 Euro	11.781,00 Euro
<input type="checkbox"/> 10.000 to 99.999 employees:	7.200,00 Euro	8.568,00 Euro
<input type="checkbox"/> 5.000 to 9.999 employees:	5.600,00 Euro	6.664,00 Euro
<input type="checkbox"/> 1.000 to 4.999 employees:	4.300,00 Euro	5.117,00 Euro
<input type="checkbox"/> 500 to 999 employees:	3.200,00 Euro	3.808,00 Euro
<input type="checkbox"/> 100 to 499 employees:	2.350,00 Euro	2.796,00 Euro
<input type="checkbox"/> 50 to 99 employees:	1.700,00 Euro	2.023,00 Euro
<input type="checkbox"/> 10 to 49 employees:	1.100,00 Euro	1.309,00 Euro
<input type="checkbox"/> 1 to 9 employees:	700,00 Euro	833,00 Euro
<input type="checkbox"/> Schools and universities (nonprofit):	550,00 Euro	654,50 Euro



CAN in Automation e. V.  
Kontumazgarten 3  
DE-90429 Nuremberg  
Phone: +49-911-928819-0  
Fax: +49-911-928819-79  
[headquarters@can-cia.org](mailto:headquarters@can-cia.org)  
[www.can-cia.org](http://www.can-cia.org)