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Road vehicles — Controller area network (CAN) —

Part 1: Data link layer and physical coding sublayer

Véhicules routiers — Gestionnaire de réseau de communication (CAN) —

Partie 1: Couche liaison de données et sous-couche de codage physique

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

This third edition cancels and replaces the second edition (ISO 11898-1:2015), which has been technically revised.

The main changes are as follows:

— CAN XL requirements added;

— CAN FD light protocol (Annex A) requirements added;

— editorial corrections.

A list of all parts in the ISO 11898 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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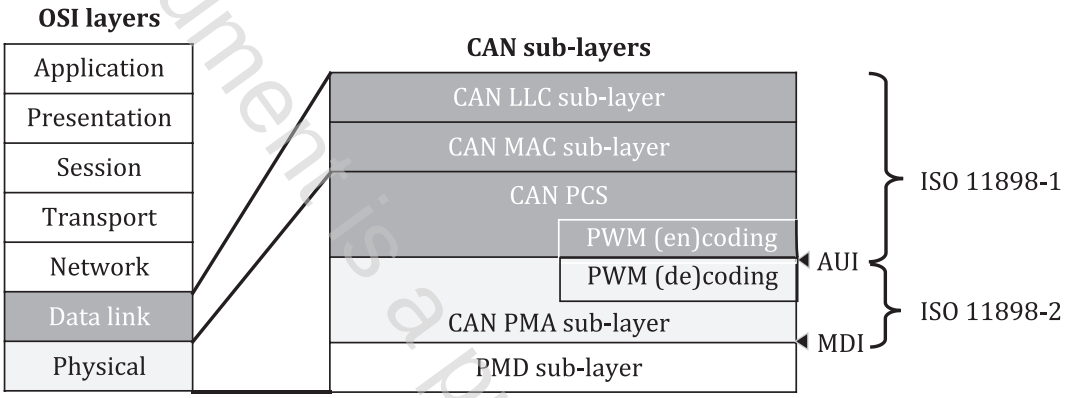
Introduction

The ISO 11898 series provides requirement specifications for the controller area network (CAN) data link layer and physical layer. It is intended for chip implementers, e.g. this document can be used for CAN protocol controllers and ISO 11898-2 for CAN transceivers. The CAN data link layer models the open systems interconnection (OSI) data link layer; it is internally subdivided into logic link control (LLC) and medium access control (MAC). This document also specifies the physical coding sub-layer (PCS) by means of the attachment unit interface (AUI). The PCS also provides the pulse-with modulation (PWM) encoding to be linked to a CAN SIC XL transceiver, which provides the PWM decoding.

The OSI layers above the data link layer (e.g. the network layer) are not specified in the ISO 11898 series of specifications.

Figure 1 shows the relationship between the OSI layers and the CAN sub-layers.



Key

AUI	attachment unit interface
LLC	logic link control
MAC	medium access control
MDI	medium dependent interface
PCS	physical coding sub-layer
PMA	physical medium attachment
PMD	physical medium dependent
PWM	pulse-width modulation

Figure 1 — CAN data link and physical sub-layers in relation to the OSI model

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Road vehicles — Controller area network (CAN) —

Part 1:
Data link layer and physical coding sublayer

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1 Scope

This document specifies the controller area network (CAN) data link layer (DLL) and the physical coding sub-layer (PCS). The CAN DLL features data fields of up to 2048 byte when the CAN extended data field length (XL) frame format is used.

This document divides the CAN DLL into the logical link control (LLC) and the medium access control (MAC) sub-layers. The DLL's service data unit (SDU), which interfaces the LLC and the MAC, is implemented by means of the LLC frame. The LLC frame also features the service data unit type (SDT) and the virtual CAN channel identifier (VCID), which provide higher-layer protocol configuration and identification information. How the higher-layer functions are handled is not specified in this document. There are five implementation options:

1 support of the CAN classic frame format only, not tolerating the CAN flexible data rate (FD) frame format;

2 support of the CAN classic frame format and tolerating the CAN FD frame format;

3 support of the CAN classic frame format and the CAN FD frame format;

4 support of the CAN classic frame format, the CAN FD frame format and the CAN XL frame format;

5 support of the CAN FD frame format for CAN FD light responders (Annex A).

NOTE Nodes of the first option can communicate with nodes of the third and fourth option when only the CAN classic frame format is used. Nodes of the first option cannot communicate with nodes of the fifth option: any attempt at communication generates error frames. Therefore, new designs implementing the fourth option can communicate with all other nodes.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
arbitration mode
operating mode of the physical coding sub-layer (PCS) in which it is allowed that dominant bits can overwrite recessive bits

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