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## Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) ~~— =~~

### Part 5: Specification for an in-vehicle network connected to the diagnostic link connector

*Véhicules routiers — Communication de diagnostic sur gestionnaire de réseau de communication (DoCAN)*

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Partie 5: ~~Spécification~~ spécification pour un réseau véhicule connecté sur la prise de diagnostic

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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 documents 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](http://www.iso.org/directives)).

~~Attention is drawn~~ ISO draws attention to the possibility that ~~some of the elements~~ implementation of this document may ~~be involve~~ the subject of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights. ~~Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see).~~

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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](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO 15765-5:2021), which has been technically revised.

The main changes are as follows:

- ~~clarification~~ clarification on network address translation between OSI-layers;
- ~~editorial corrections~~.

A list of all parts in the ISO 15765 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](http://www.iso.org/members.html).

## Introduction

The ISO 15765 series defines common requirements for vehicle diagnostic systems using the controller area network (CAN), as specified in the ISO 11898 series.

The ISO 15765 series presumes the use of external test equipment for inspection, diagnostics, repair and other possible use cases connected to the vehicle.

This document defines the requirements to enable the in-vehicle CAN network to successfully establish, maintain and terminate communication with the devices externally connected to the diagnostic link connector.

This document has been structured according to the open systems interconnection (OSI) basic reference model, in accordance with ISO/IEC 7498-1 and ISO/IEC 10731, which structures communication systems into seven layers. When mapped on this model, the OSI layer 4 to OSI layer 1 framework requirements specified or referenced in the ISO 15765 series are structured according to [Figure 1](#), which shows the related documents of OSI layer 4 to OSI layer 1.

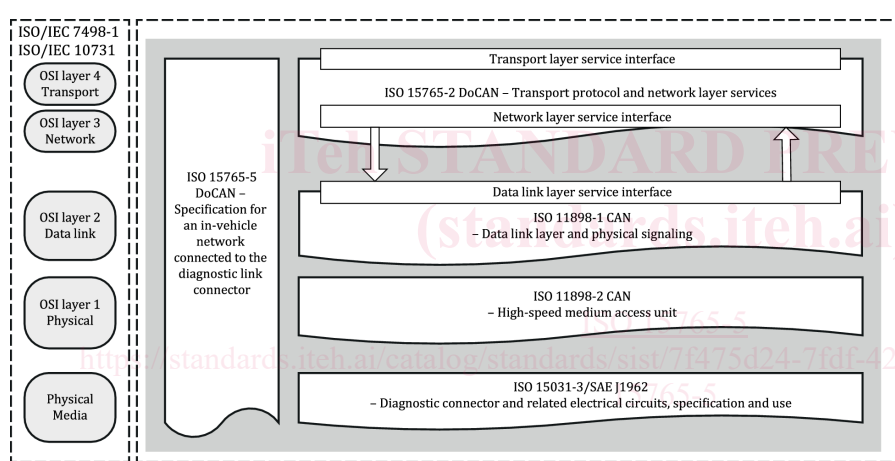


Figure 1 — CAN documents reference according to OSI model

The documents include the following content:

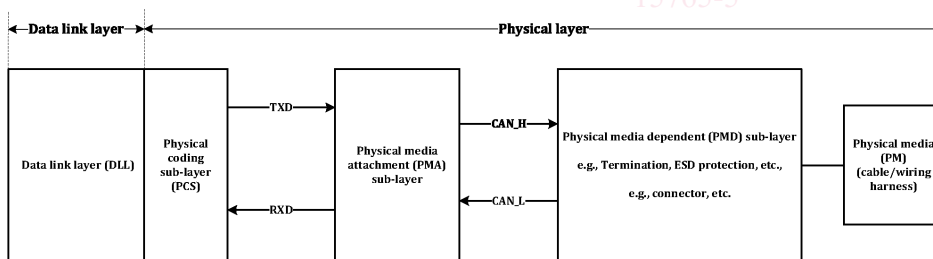
- transport layer (TL) -related requirements with reference to ISO 15765-2;
- network layer (NL) -related requirements with reference to ISO 15765-2;
- data link layer (DLL) -related requirements with reference to ISO 11898-1, which are composed of:
  - DLL protocol entity requirements;
  - DLL device interface requirements;

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- —DLL network system requirements;
- —physical layer (PHY) -related requirements with reference to ISO 11898-2, which are composed of:
  - —physical coding sub-layer (PCS) requirements, which are composed of:
    - —PCS entity requirements;
    - —PCS interface requirements;
    - —PCS network system requirements;
  - —physical media attachment (PMA) requirements, which are composed of:
    - —PMA protocol entity requirements;
    - —PMA device interface requirements;
  - —physical media dependent (PMD) requirements, which are composed of:
    - —PMD entity requirements;
    - —PMD device interface requirements;
    - —PMD network system requirements.

The PCS is implemented in the CAN protocol controller. The PMA sub-layer is implemented normally in the CAN transceiver or the system base chip (SBC). Optionally it can comprise also additional protection circuitry. The media-dependent sub-layer comprises the connectors and the cabling.

Figure 2 shows an implementation example of the data link and physical layers block diagram. -b21c-fb889592ef79/iso-15765-5





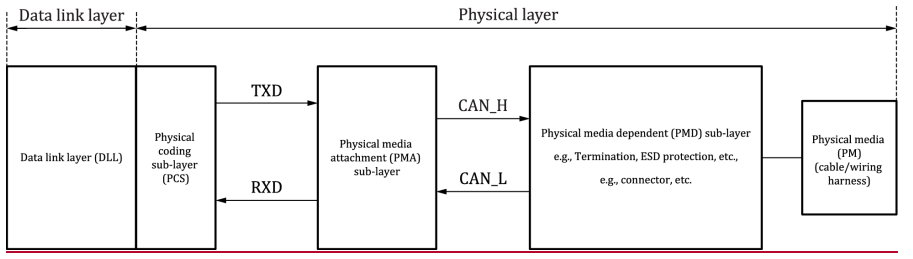


Figure 2 — Implementation example of lower OSI layers block diagram

The above structure is chosen to provide the following implementers with relevant requirements:

- — transceiver developers;
- — device (e.g. electronic control unit) developers;
- — system network developers.

All requirements are numbered and headlined uniquely, so that each implementer can reference them.

[Annex A](#) provides a description of the compatibility between test equipment and in-vehicle network connected to the diagnostic link connector.

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# Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) —

## Part 5: Specification for an in-vehicle network connected to the diagnostic link connector

### 1 Scope

This document specifies the OSI layers 4 to 1 (transport layer, network layer, data link layer, and physical layer) requirements related to the connection between the external test equipment externally connected to the diagnostic link connector and the in-vehicle CAN network to successfully establish and maintain communication utilizing the communication parameters (communication profile) specified in (application-type) standards referencing this document.

The SIC (~~Signal Improvement Capability~~ *signal improvement capability*) transceiver options, as specified in ISO 11898-2, are out of scope in this document.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11898 (all parts), *Road vehicles — Controller area network (CAN)*

ISO 15031-3, *Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics — Part 3: Diagnostic connector and related electrical circuits: Specification and use*

ISO 15765-2, *Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 2: Transport protocol and network layer services*

ISO 15765-4, *Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 4: Requirements for emissions-related systems*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in the ISO 11898 series, ISO 15765-2 and ISO 15765-4 and the following 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

##### segment

~~equals the~~ TL\_PDU which consists of the TL\_PCI and TL\_DATA

### 3.2

#### application-type standard

standard which specifies application-related use cases, requirements, and communication profile parameter values of the protocol stack

## 4 Symbols and abbreviated terms

### 4.1 Symbols

–	empty table cell or feature undefined
$\Delta f$	oscillator tolerance
$f_{Ba}$	nominal arbitration bit rate
$f_{Bd}$	data bit rate
$L_{CABLE}$	cable length between in-vehicle CAN node and diagnostic link connector
$t_{Ba}$	arbitration bit time
$t_{Bd}$	data bit time
$t_{BIT}$	bit time
$t_{BIT\_RX}$	receive bit time
$t_{BIT\_TX}$	transmit bit time
$t_{Qa}$	nominal arbitration bit time quantum length
$t_{Qd}$	nominal data bit time quantum length
$t_{SJWa}$	arbitration bit synchronisation jump width
$t_{SJWd}$	data bit synchronisation jump width
$t_Q$	time quantum
$t_{SPa}$	nominal arbitration bit sample point position
$t_{SPd}$	nominal data bit sample point position
X	table cell selected or feature defined

### 4.2 Abbreviated terms

AE	address extension
AL	application layer
ASP	abstract service primitive
CAN	controller area network
CAN FD	controller area network flexible data-rate
CBFF	CAN classical base frame format
CEFF	CAN classical extended frame format
DCC	diagnostic communication channel