INTERNATIONAL STANDARD

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Third edition
2019-05

Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles —

Part 1: Physical and data-link layers

Véhicules routiers — Échange d'informations numériques sur les connexions électriques entre véhicules tracteurs et véhicules tractés —

Partie 1: Couche physique et couche de liaison de données

Reference number
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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).

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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 11992-1:2003) which has been technically revised.

The main changes compared to the previous edition are as follows:

— wording improvements and clarifications;

— introduction of requirement statements; and

— addition of informative Annex A, *Implementation examples of the bus failure management*.

A list of all parts in the ISO 11992 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.

Introduction

The ISO 11992 series specifies the interchange of digital information between road vehicles with a maximum authorised total mass greater than 3 500 kg. The series also specifies digital information interchange for towed vehicles, including communication between towed vehicles in terms of parameters and requirements of the lower OSI layers (physical and data link layer) of the electrical connection used to connect the electrical and electronic systems.

This document specifies the data link and physical layer requirements of the CAN communication bus between towing and towed vehicles.

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 application protocol and data link layer framework requirements specified/referenced in a ISO 11992 series standard are structured according to Figure 1.

Figure 1 illustrates the following communication frameworks:

— normal vehicle communication framework;

— vehicle diagnostic communication framework;

— vehicle-specific use case framework; and

— vehicle lower-layers framework.

The normal vehicle communication framework is composed of ISO 11992-2 and ISO 11992-3.

The vehicle diagnostic communication framework is composed of ISO 14229-1[3], ISO 14229-2[12], ISO 14229-3[13] and ISO 11992-4[3].

The vehicle-specific use case framework is composed of ISO 11992-4, ISO 22901-1 or vehicle manufacturer-specific diagnostic data definition.

The vehicle lower-layers framework is composed of ISO 15765-2[14], ISO 11898-1, 1, ISO 7638-1[6] and ISO 12098[10].

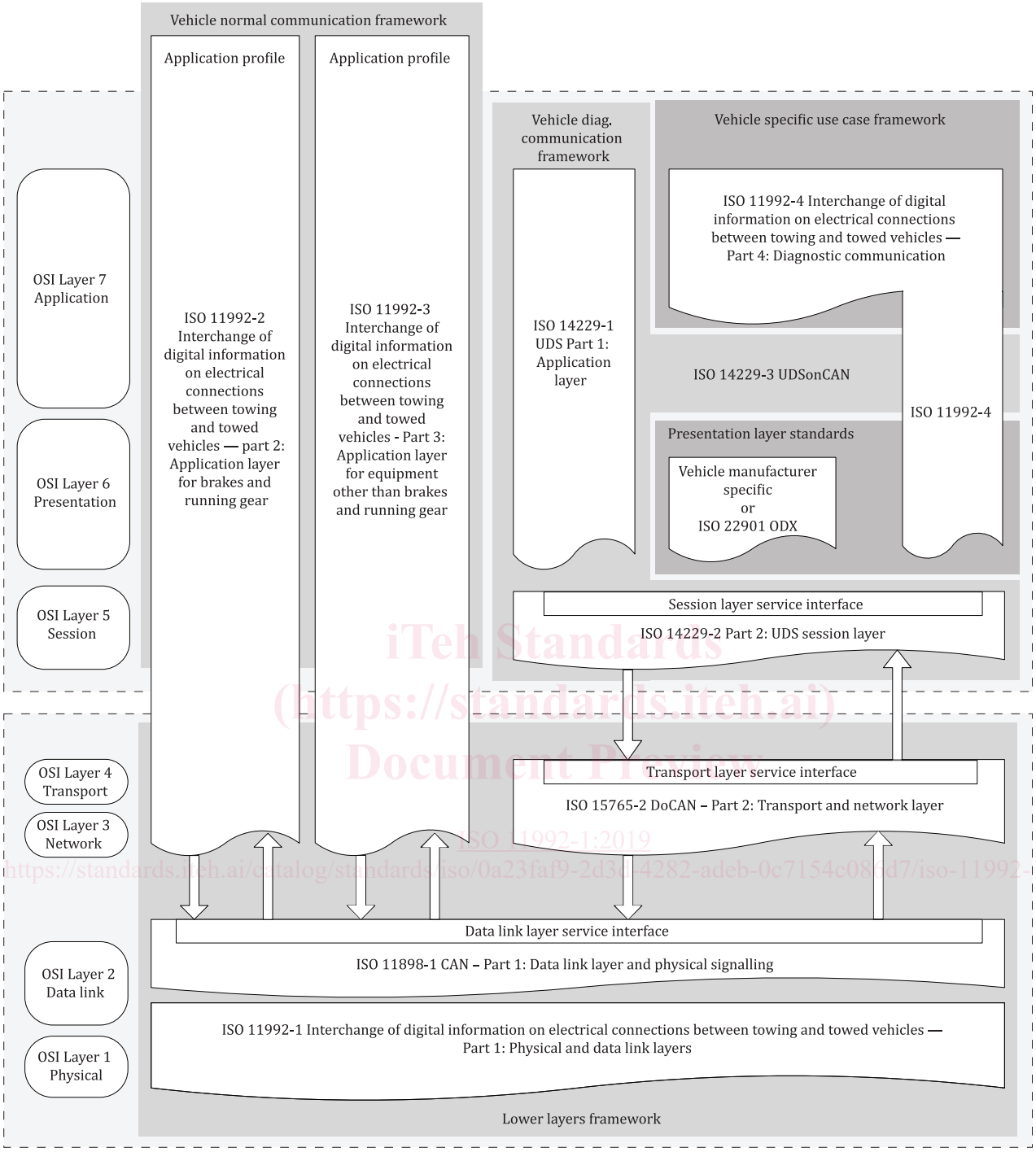

Figure 1 — Towing and towed vehicles framework documents reference according to the OSI model

Figure 2 shows the implementation example of the lower-layers block diagram.

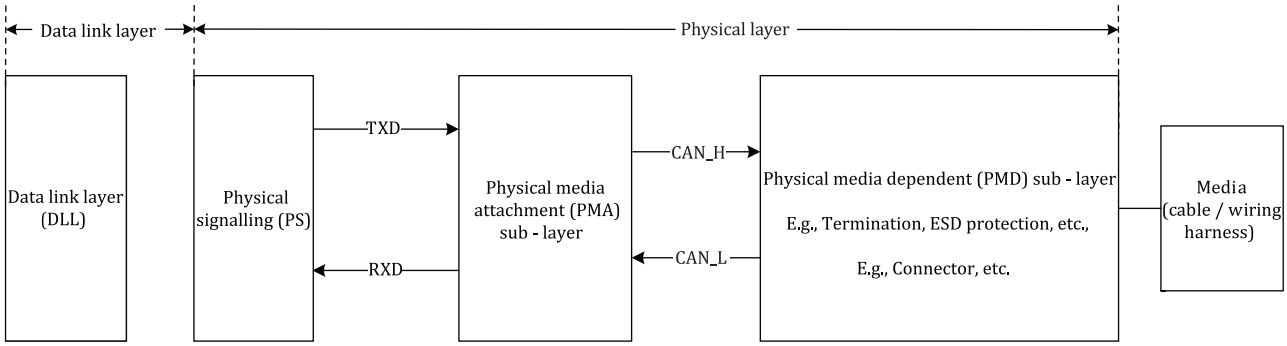

Figure 2 — Implementation example of lower-layers block diagram

The above requirements structure has been chosen to provide the following developers with relevant requirements:

— transceiver developers;

— device (e.g., electronic control unit) developers; and

— towing and towed vehicle network developers.

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

Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles —

Part 1: Physical and data-link layers

1 Scope

This document describes the data link layer (DLL) and physical layer (PHY) for the two CAN-based network interfaces specified in the 11992-series.

The DLL sub-clauses are composed of:

— DLL protocol entity requirements;

— DLL device interface requirements; and

— DLL network system requirements.

Normally, the physical signalling sub-layer is implemented in the CAN protocol controller. The physical medium attachment sub-layer is normally implemented 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.

The physical signalling (PS) sub-clauses are composed of:

— PS entity requirements;

— PS device interface requirements; and

— PS network system requirements.

The physical medium attachment (PMA) sub-clauses are composed of:

— PMA protocol entity requirements; and

— PMA device interface requirements.

The physical medium dependent (PMD) sub-clauses are composed of:

— PMD entity requirements;

— PMD device interface requirements; and

— PMD network system requirements.

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 4141-1, *Road vehicles — Multi-core connecting cables — Part 1: Test methods and requirements for basic performance sheathed cables*

ISO 11898-1, *Road vehicles — Controller area network (CAN) — Part 1: Data link layer and physical signalling*

3 Terms and definitions

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

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

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

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

3.1
1-wire operation
communication on either CAN_L or CAN_H with reference to ground and V_S potential during fault-tolerant operation mode

3.2
2-wire operation
communication on CAN_L and CAN_H, with reference to ground and V_S potential, in nominal (non fault-tolerant) operation mode

3.3
bus
communication link between two communication entities

3.4
CAN_H
CAN_L
particular cable and/or contact of the communication connection

3.5
differential transmission
transmission of digital information carried by voltage between the two conductors of the electrical connections

3.6
maximum authorised total mass
vehicle mass determined as a maximum by the administrative authority for operating conditions laid down by that authority

Note 1 to entry: In some jurisdictions this will be known as the Gross Vehicle Weight Rating or the Gross Combination Weight Rating.

[SOURCE: ISO 1176:1990, 4.8, modified — NOTES 1 and 2 replaced by a new Note 1 to entry]

3.7
data link layer protocol entity
DLL protocol entity
functional part of the electronic component implementing the DLL protocol as standardised in ISO 11898-1

3.8
data link layer device interface
DLL device interface
electronic device interface compliant with ISO 11898-1 optionally with functional restrictions

EXAMPLE No transmission of remote frames or transmission of extended frame formatted messages only.

3.9
data link layer network system
DLL network system
logical DLL system comprising two additional interoperable nodes compliant with ISO 11898-1

3.10
physical signalling entity
PS entity
functional part of the electronic component implementing the DLL protocol as standardised in ISO 11898-1

3.11
physical signalling device interface
PS device interface
electronic interface compliant with ISO 11898-1 and detailed bit-timing configuration including configured re-synchronisation capability

3.12
physical signalling network system
PS network system
network with devices with an interoperable bit-timing and bit synchronisation compliant with ISO 11898-1

3.13
physical medium attachment entity
PMA entity
electronic component (transceiver) or part of an electronic component (system base chip)

3.14
physical medium attachment device interface
PMA device interface
electronic device interface comprising a PMA entity and optionally additional circuitry

3.15
physical medium attachment network system
PMA network system
network system comprising two devices with physical media attachment interfaces compliant to this document

3.16
physical medium dependent entities
PMD entities
connectors, cabling, and other electro-mechanical network components

3.17
physical medium dependent device interface
PMD device interface
connectors, cabling, and other electro-mechanical components

3.18
physical medium dependent network system
PMD network system
electro-mechanical interface of a single device

3.19
towed vehicle
unpowered vehicle that is towed by a towing vehicle or another unpowered vehicle

[SOURCE: ISO 3833:1977, 3.2, modified — definition editorially revised]