INTERNATIONAL STANDARD

ISO 15765-1

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

Part 1: General information and use case definition

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

Partie 1: Informations générales et définition de cas d'usage

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15765-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

This second edition cancels and replaces the first edition (ISO 15765-1:2004), which has been technically revised.

ISO 15765 consists of the following parts, under the general title *Road vehicles — Diagnostic communication over Controller Area Network (DoCAN)*:

— *Part 1: General information and use case definition*

— *Part 2: Transport protocol and network layer services*

— *Part 3: Implementation of unified diagnostic services (UDS on CAN)*

— *Part 4: Requirements for emissions-related systems*

Introduction

This document set includes the communication between the vehicle's on-board diagnostic (OBD) systems and test equipment implemented across vehicles within the scope of the legislated OBD.

It has been established in order to apply the emissions-related diagnostic services as specified in ISO 15031-5.

To achieve this, it is based on the Open Systems Interconnection (OSI) Basic Reference Model in accordance with ISO/IEC 7498-1 and ISO/IEC 10731, which structure communication systems into seven layers as shown in Table 1.

Table 1 — Enhanced and legislated-OBD diagnostic specifications applicable to the OSI layers

<table>
<tr><th>Applicability</th><th>OSI 7 layers</th><th>Vehicle manufacturer enhanced diagnostics</th><th colspan="2">Legislated OBD (on-board diagnostics)</th><th colspan="2">Legislated WWH-OBD (on-board diagnostics)</th></tr>
<tr><td rowspan="7">Seven layer according to ISO/IEC 7498-1 and ISO/IEC 10731</td><td>Application (layer 7)</td><td>ISO 14229-1, ISO 14229-3</td><td colspan="2">ISO 15031-5</td><td colspan="2">ISO 27145-3, ISO 14229-1</td></tr>
<tr><td>Presentation (layer 6)</td><td>Vehicle manufacturer specific</td><td colspan="2">ISO 15031-2, ISO 15031-5, ISO 15031-6, SAE J1930-DA, SAE J1979-DA, SAE J2012-DA</td><td colspan="2">ISO 27145-2, SAE 1930-DA, SAE J1979-DA, SAE J2012-DA, SAE J1939:2011, Appendix C (SPN), SAE J1939-73:2010, Appendix A (FMI)</td></tr>
<tr><td>Session (layer 5)</td><td colspan="5">ISO 14229-2</td></tr>
<tr><td>Transport protocol (layer 4)</td><td rowspan="2">ISO 15765-2</td><td rowspan="2">ISO 15765-2</td><td rowspan="4">ISO 15765-4</td><td rowspan="2">ISO 15765-4, ISO 15765-2</td><td rowspan="4">ISO 27145-4</td></tr>
<tr><td>Network (layer 3)</td></tr>
<tr><td>Data link (layer 2)</td><td rowspan="2">ISO 11898-1, ISO 11898-2, ISO 11898-3, ISO 11898-5, or user defined</td><td rowspan="2">ISO 11898-1, ISO 11898-2</td><td rowspan="2">ISO 15765-4, ISO 11898-1, ISO 11898-2</td></tr>
<tr><td>Physical (layer 1)</td></tr>
</table>

The application layer services covered by ISO 14229-3 have been defined in compliance with diagnostic services established in ISO 14229-1 and ISO 15031-5, but are not limited to use only with them. ISO 14229-3 is also compatible with most diagnostic services defined in national standards or vehicle manufacturer's specifications.

The transport protocol and network layer services covered by this part of ISO 15765 have been defined to be independent of the physical layer implemented, and a physical layer is only specified for legislated OBD.

For other application areas, ISO 15765 can be used with any CAN physical layer.

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

Part 1:
General information and use case definition

1 Scope

This part of ISO 15765 gives an overview of the structure and the partitioning of ISO 15765, and shows the relationships between the different parts. It also defines the diagnostic network architecture. The terminology defined in this part of ISO 15765 is common for all diagnostic networks and is used throughout all parts of ISO 15765.

The diagnostic communication over controller area network (DoCAN) protocol supports the standardized service primitive interface as specified in ISO 14229-2.

2 Normative references

The following referenced documents are indispensable for the application 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/IEC 7498-1, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 7498-1 apply.

3.2 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

DoCAN	diagnostic communication over controller area network
CAN	controller area network
ECU	electronic control unit
FMI	failure mode indicator
OBD	on-board diagnostics
SPN	suspect parameter number
WWH-OBD	world-wide harmonized on-board diagnostics

4 Conventions

ISO 15765 is based on the conventions discussed in the OSI Service Conventions (ISO/IEC 10731) as they apply for diagnostic services.

5 Overview of ISO 15765

5.1 General

ISO 15765 is applicable to vehicle diagnostic systems implemented on a CAN communication network as specified in ISO 11898.

ISO 15765 has been established in order to define common requirements for vehicle diagnostic systems implemented on a CAN communication link as specified in ISO 11898.

Although primarily intended for diagnostic systems, ISO 15765 has been developed to also meet requirements from other CAN-based systems needing a network layer protocol.

5.2 Open Systems Interconnection (OSI) model

ISO 15765 is based on the Open Systems Interconnection (OSI) Basic Reference Model as specified in ISO/IEC 7498-1 which structures communication systems into seven layers.

All parts of ISO 15765 are guided by the OSI service conventions as specified in ISO/IEC 10731 to the extent that they are applicable to diagnostic services. These conventions define the interaction between the service user and the service provider through service primitives.

The aim of this subclause is to give an overview of the OSI model and show how it has been used as a guideline for this part of ISO 15765. It also shows how the OSI service conventions have been applied to ISO 15765.

The OSI model structures data communication into seven layers called, from top down, *application layer* (layer 7), *presentation layer* (layer 6), *session layer* (layer 5), *transport protocol layer* (layer 4), *network layer* (layer 3), *data link layer* (layer 2) and *physical layer* (layer 1).

A subset of these layers is used in ISO 15765, which specifies the application, session, transport protocol, network, data link and physical layers for DoCAN.

The purpose of each layer is to provide services to the layer above. The application layer provides services to the diagnostic application. The active parts of each layer, implemented in software, hardware or any combination of software and hardware, are called *entities*. In the OSI model, communication takes place between entities of the same layer in different nodes. Such communicating entities of the same layer are called *peer entities*.

The services provided by one layer are available at the *Service Access Point* (SAP) of that layer. The layer above can use them by exchanging data parameters.

ISO 15765 distinguishes between the services provided by a layer to the layer above it and the protocol used by the layer to send a message between the peer entities of that layer. The reason for this distinction is to make the services, especially the application layer services and the transport layer services, reusable for CAN and for other network types. In this way, the protocol is hidden from the service user and it is possible to change the protocol if special system requirements demand it.

Figure 1 illustrates the most applicable application implementations utilizing the DoCAN protocol.

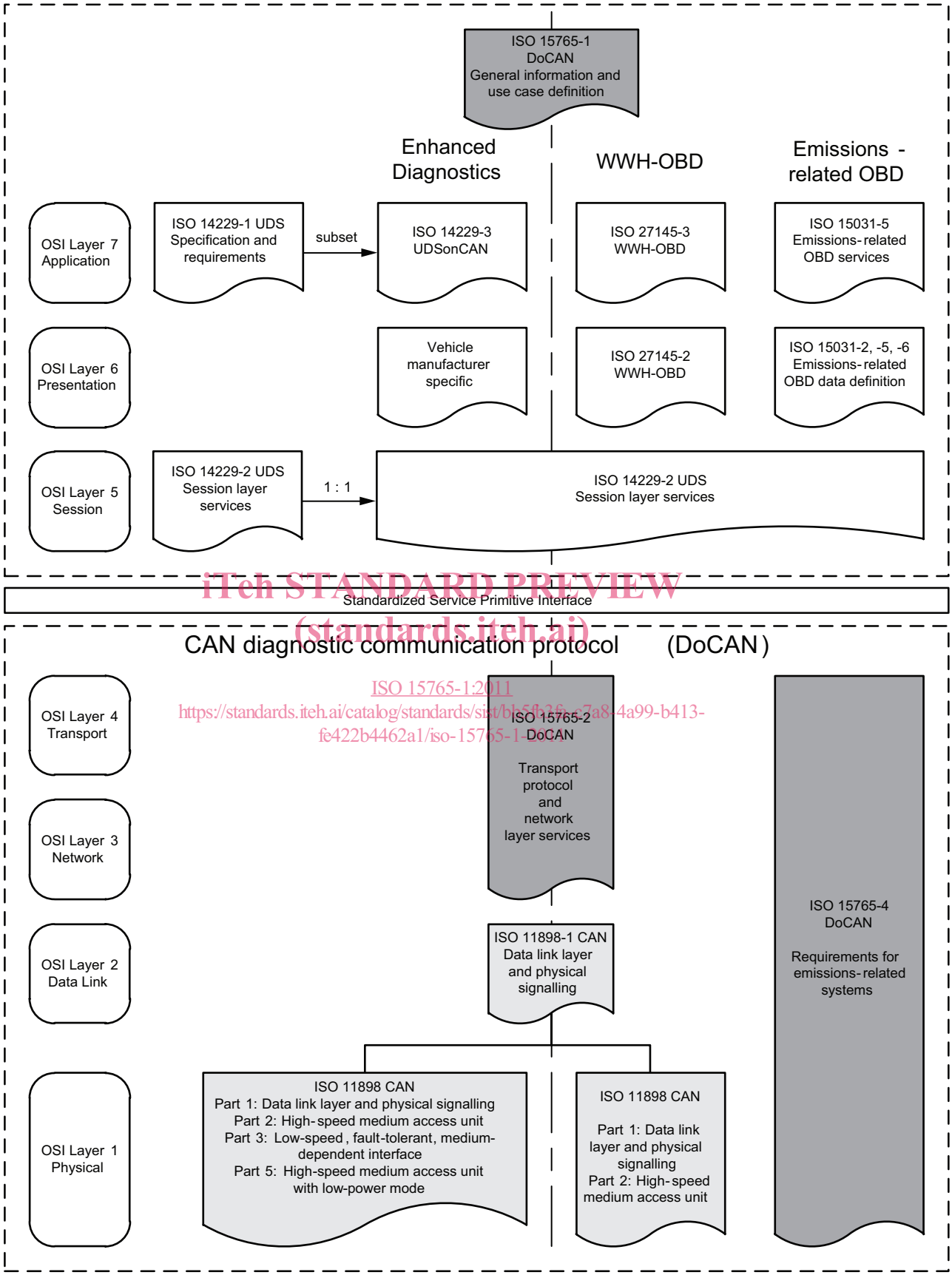

Figure 1 — DoCAN document reference according to the OSI model