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Road vehicles — Diagnostics on Controller Area Networks (CAN) —

Part 1: General information

Véhicules routiers — Diagnostic sur gestionnaire de réseau de communication (CAN) —

Partie 1: Informations générales

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Foreword

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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*.

ISO 15765 consists of the following parts, under the general title *Road vehicles — Diagnostics on Controller Area Networks (CAN)*:

— *Part 1: General information*

— *Part 2: Network layer services*

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

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

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Road vehicles — Diagnostics on Controller Area Networks (CAN) —

Part 1: General information

1 Scope

This part of ISO 15765 gives an overview of the structure and the partitioning of ISO 15765, and shows the relation 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.

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

ISO 14229-1, *Road vehicles — Unified diagnostic services (UDS) — Specification and requirements*[1)]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14229-1 apply.

4 Overview of ISO 15765

4.1 General

ISO 15765 is applicable to vehicle diagnostic systems implemented on a Controller Area Network (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.

1) To be published. (Revision of ISO 14229:1998)

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To achieve this, ISO 15765 is based on the Open Systems Interconnection (OSI) Basic Reference Model specified in ISO/IEC 7498 and ISO/IEC 10731, which structures communication systems into seven layers. When mapped on this model, the services specified by ISO 15765 are divided into

— diagnostic services (layer 7), specified in ISO 15765-3,

— network layer services (layer 3), specified in ISO 15765-2,

— CAN services (layers 1 and 2), specified in ISO 11898-1,

in accordance with Table 1.

Table 1

Open Systems Interconnection (OSI) layers	Vehicle manufacturer enhanced diagnostics	Legislated on-board diagnostics (OBD)
Diagnostic application	User defined	ISO 15031-5
Application layer	ISO 15765-3	ISO 15031-5
Presentation layer	N/A	N/A
Session layer	N/A	N/A
Transport layer	N/A	N/A
Network layer	ISO 15765-2	ISO 15765-4
Data link layer	ISO 11898-1	ISO 15765-4
Physical layer	User defined	ISO 15765-4

The application layer services have been defined in compliance with diagnostic services defined in ISO 14229-1 and ISO 15031-5, but are not limited to be used only with these International Standards. ISO 15765-3 is also compatible with most diagnostic services defined in national standards or in vehicle manufacturer specifications.

The network layer services have been defined to be independent of the physical layer implemented. A physical layer is only specified for legislated on-board diagnostics (OBD). For other application areas, ISO 15765 can be used with any CAN physical layer.

4.2 Open Systems Interconnection (OSI) model

ISO 15765 is based on the Open Systems Interconnection (OSI) Basic Reference Model as specified in ISO/IEC 7498 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 (top down) *Application layer* (layer 7), *Presentation layer*, *Session layer*, *Transport layer*, *Network layer*, *Data Link layer* and *Physical layer* (layer 1). A subset of these layers is used in ISO 15765.

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ISO 15765 specifies Application layer, Session layer, Transport layer, Network layer, Data Link layer and Physical layer for diagnostics on CAN.

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 also for other types of networks than CAN. 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.

5 Diagnostic network architecture

5.1 Diagnostic network

The diagnostic network, as a whole, contains all clients and servers that can communicate with each other.

A diagnostic network can range from a simple point-to-point connection between a client and a server to a complex distributed network architecture with several physical sub-networks inter-connected by diagnostic gateways.

5.2 Diagnostic sub-network

All clients and servers of a sub-network are connected to the same physical communication link.

For ISO 15765 all clients and servers of a sub-network are connected to the same physical CAN network and are able to communicate directly with each other.

The term sub-network shall also apply to other physical communication links like fibre-optic buses and networks complying with SAE J1850 or ISO 14230.

5.3 Diagnostic gateway

A diagnostic gateway is a node in the network that is physically connected to two (or more) sub-networks and has the ability to transfer diagnostic messages between the sub-networks.

Connecting individual sub-networks via diagnostic gateways creates larger diagnostic network architectures.

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[1] ISO 14230 (all parts), *Road vehicles — Diagnostic systems — Keyword Protocol 2000*

[2] ISO 15031-5, *Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics — Part 5: Emissions-related diagnostic services*

[3] ISO 15765-2, *Road vehicles — Diagnostics on Controller Area Networks (CAN) — Part 2: Network layer services*

[4] ISO 15765-3, *Road vehicles — Diagnostics on Controller Area Networks (CAN) — Part 3: Implementation of unified diagnostic services (UDS on CAN)*

[5] ISO 15765-4, *Road vehicles — Diagnostics on Controller Area Networks (CAN) — Part 4: Requirements for emissions-related systems*

[6] ISO/IEC 7498 (all parts), *Information technology — Open Systems Interconnection — Basic Reference Model*

[7] ISO/IEC 10731, *Information technology — Open Systems Interconnection — Basic Reference Model — Conventions for the definition of OSI services*

[8] SAE J1850: *Class B Data Communications Network Interface*

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