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Road vehicles — Unified diagnostic services (UDS) —

Part 5: Unified diagnostic services on Internet Protocol implementation (UDSonIP)

Véhicules routiers — Services de diagnostic unifiés (SDU) — Partie 5: SDU sur l'implémentation du protocol internet (SDUsurPI)

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Contents

Page

Foreword

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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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 14229 consists of the following parts, under the general title *Road vehicles — Unified diagnostic services (UDS)*:

— *Part 1: Specification and requirements*

— *Part 2: Session layer services*

— *Part 3: Unified diagnostic services on CAN implementation (UDSonCAN)*

— *Part 4: Unified diagnostic services on FlexRay implementation (UDSonFR)*

— *Part 5: Unified diagnostic services on Internet Protocol implementation (UDSonIP)*

— *Part 6: Unified diagnostic services on K-Line implementation (UDSonK-Line)*

The following parts are under preparation:

— *Part 7: Unified diagnostic services on Local Interconnect Network implementation (UDSonLIN)*

Introduction

This part of ISO 14229 has been established in order to enable the implementation of unified diagnostic services, as specified in ISO 14229-5, on Internet Protocol (UDSonIP).

To achieve this, it is based on the Open Systems Interconnection (OSI) Basic Reference Model specified in ISO/IEC 7498-1 and ISO/IEC 10731, which structures communication systems into seven layers. When mapped on this model, the services specified by ISO 14229 are divided into the following:

— Application layer (layer 7):
  — Vehicle manufacturer enhanced diagnostics: ISO 14229-1, ISO 14229-5;
  — Legislated OBD: ISO 15031-5;
  — Legislated WWH-OBD: ISO 14229-1 / ISO 27145-3;
— Presentation layer (layer 6):
  — Vehicle manufacturer enhanced diagnostics: vehicle manufacturer specific;
  — Legislated OBD: SAE J1930-DA, SAE J1979-DA, SAE J2012-DA;
  — Legislated WWH-OBD: ISO 27145-2 with reference to SAE J1930-DA, SAE J1939 Companion Spreadsheet (SPNs), SAE J1939-73:2010, Appendix A (FMIs), SAE J1979-DA and SAE J2012-DA;
— Session layer services (layer 5):
  — Vehicle manufacturer enhanced diagnostics: ISO 14229-2;
  — Legislated OBD: ISO 14229-2;
  — Legislated WWH-OBD: ISO 14229-2;
— Transport layer services (layer 4):
  — Vehicle manufacturer enhanced diagnostics: ISO 13400-2;
  — Legislated OBD: ISO 15765-2, ISO 15765-4;
  — Legislated WWH-OBD: ISO 27145-4;
— Network layer services (layer 3):
  — Vehicle manufacturer enhanced diagnostics: ISO 13400-2;
  — Legislated OBD: ISO 15765-2, ISO 15765-4;
  — Legislated WWH-OBD: ISO 27145-4;
— Data link layer (layer 2):
  — Vehicle manufacturer enhanced diagnostics: ISO 13400-3;
  — Legislated OBD: ISO 11898-1, ISO 11898-2, ISO 15765-4;
  — Legislated WWH-OBD: ISO 27145-4;
— Physical layer (layer 1):
  — Vehicle manufacturer enhanced diagnostics: ISO 13400-3;
  — Legislated OBD: ISO 11898-1, ISO 11898-2, ISO 15765-4;

— Legislated WWH-OBD: ISO 27145-4;

in accordance with Table 1.

Table 1 — DoIP enhanced diagnostics, legislated OBD and WWH-OBD specification reference applicable to the OSI layers

<table>
<tr><th>Applicability</th><th>OSI seven layer</th><th>Vehicle manufacturer-enhanced diagnostics</th><th>Legislated OBD</th><th colspan="3">Legislated WWH-OBD</th></tr>
<tr><td rowspan="7">Seven layer according to ISO 7498-1 and ISO/IEC 10731</td><td>Application (layer 7)</td><td>ISO 14229-1/ ISO 14229-5</td><td>ISO 15031-5</td><td colspan="3">ISO 14229-1/ISO 27145-3</td></tr>
<tr><td>Presentation (layer 6)</td><td>Vehicle manufacturer specific</td><td>SAE J1930-DA, SAE J1979-DA, SAE J2012-DA</td><td colspan="3">ISO 27145-2
SAE J1930-DA, SAE J1939 Companion Spreadsheet (SPNs),
SAE J1939-73:2010, Appendix A (FMIs),
SAE J1979-DA, SAE J2012-DA</td></tr>
<tr><td>Session (layer 5)</td><td colspan="5">ISO 14229-2</td></tr>
<tr><td>Transport (layer 4)</td><td rowspan="2">ISO 13400-2</td><td rowspan="2">ISO 15765-2, ISO 15765-4</td><td rowspan="2">ISO 15765-2, ISO 15765-4</td><td rowspan="3">ISO 27145-4</td><td rowspan="2">ISO 13400-2</td></tr>
<tr><td>Network (layer 3)</td></tr>
<tr><td>Data link (layer 2)</td><td rowspan="2">ISO 13400-3/ IEEE 802.3</td><td rowspan="2">ISO 11898-1, ISO 11898-2, ISO 15765-4</td><td rowspan="2">ISO 11898-1, ISO 11898-2, ISO 15765-4</td><td rowspan="2">ISO 13400-3, IEEE 802.3</td></tr>
<tr><td>Physical (layer 1)</td></tr>
</table>

Road vehicles — Unified diagnostic services (UDS) —

Part 5: Unified diagnostic services on Internet Protocol implementation (UDSonIP)

1 Scope

This part of ISO 14229 references ISO 14229-1 and ISO 14229-2 and specifies the implementation requirements of a common set of unified diagnostic services (UDS) on Internet Protocol (UDSonIP).

NOTE UDSonIP does not specify any requirements of the in-vehicle network architecture.

This part of ISO 14229 does not include any redundant information of the documents as listed in the introduction. It focuses on

— additional requirements specific to the implementation of UDSonIP, and

— specific restrictions in the implementation of UDSonIP.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13400 (all parts), *Road vehicles — Diagnostic communication over Internet Protocol (DoIP)*

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

ISO 14229-2, *Road vehicles — Unified diagnostic services (UDS) — Part 2: Session layer services*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 14229-1, ISO 14229-2, and ISO 13400 (all parts) apply.

3.2 Abbreviated terms

DID	data identifier
DoIP	diagnostic communication over Internet Protocol
DoIP_AI	DoIP address information
IP	Internet Protocol
OSI	Open System Interconnection
pDID	periodic data identifier
UDS	unified diagnostic services
VM	vehicle manufacturer

4 Conventions

This part of ISO 14229 is based on the conventions discussed in ISO/IEC 10731:1994 as they apply for diagnostic services.

5 Document overview

Figure 1 provides an overview of the documents needed for the implementation of UDSonIP.

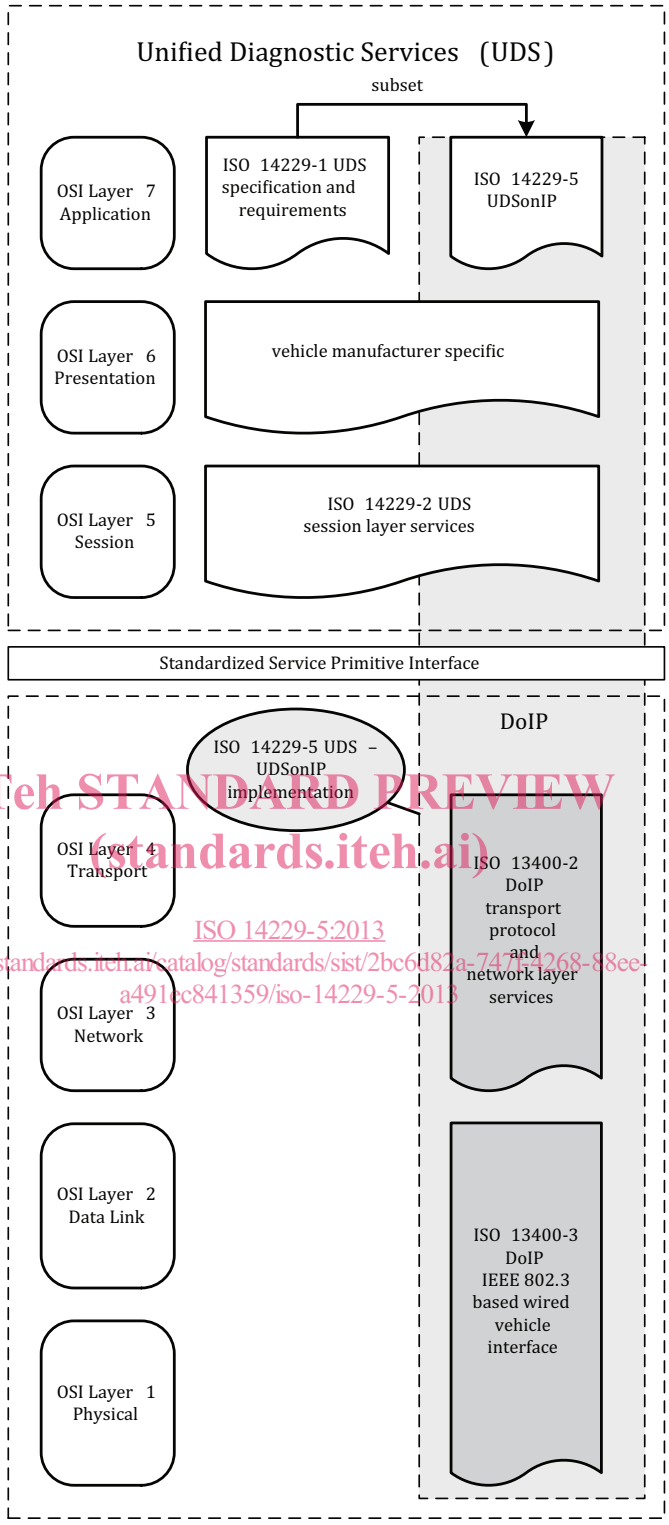

Figure 1 — ISO 14229-5 UDSonIP document reference according to OSI model

6 Unified diagnostic services implementation on Internet Protocol

6.1 General

This clause defines how the diagnostic services, as defined in ISO 14229-1, apply to IP. For each service, the applicable sub-function and data parameters are defined.

NOTE The sub-function parameter definitions take into account that the most significant bit is used for the suppressPosRspMsgIndicationBit parameter as defined in ISO 14229-1.

6.2 UDS on IP services overview

The purpose of Table 2 is to reference all ISO 14229-1 and ISO 14229-2 services as they are applicable for an implementation in ISO 14229-5 UDSonIP. Table 2 contains the sum of all applicable services. Certain applications using this part of ISO 14229 to implement UDSonIP may restrict the number of useable services and may categorize them in certain application areas/diagnostic sessions (default session, programming session, etc.).

Services in Table 2 that are marked “No IP-specific requirements” shall be implemented as defined in ISO 14229-1 and ISO 14229-2 with no additional restrictions. Services that are marked “IP-specific requirements” shall be implemented based on the subclause listed in Table 2.

Table 2 — Overview of applicable ISO 14229-1 unified diagnostic services and data ranges

Diagnostic service name (ISO 14229-1)	Comment	Reference in this part of ISO 14229
Diagnostic and communication management functional unit		
DiagnosticSessionControl	IP-specific requirements	see 6.3
ECUReset	IP-specific requirements	see 6.4
SecurityAccess	No IP-specific requirements	—
CommunicationControl	No IP-specific requirements	—
TesterPresent	No IP-specific requirements	—
SecuredDataTransmission	No IP-specific requirements	—
ControlDTCSetting	No IP-specific requirements	—
ResponseOnEvent	No IP-specific requirements	—
Data transmission functional unit		
ReadDataByIdentifier	No IP-specific requirements	—
ReadMemoryByAddress	No IP-specific requirements	—
ReadScalingDataByIdentifier	No IP-specific requirements	—
ReadDataByPeriodicIdentifier	IP-specific requirements	see 6.5
DynamicallyDefineDataIdentifier	No IP-specific requirements	—
WriteDataByIdentifier	No IP-specific requirements	—
WriteMemoryByAddress	No IP-specific requirements	—
Stored data transmission functional unit		
ClearDiagnosticInformation	No IP-specific requirements	—
ReadDTCInformation	No IP-specific requirements	—
Input/output control functional unit		
InputOutputControlByIdentifier	No IP-specific requirements	—
Remote activation of routine functional unit		
RoutineControl	No IP-specific requirements	—
Upload/download functional unit		
RequestDownload	No IP-specific requirements	—
RequestUpload	No IP-specific requirements	—
TransferData	No IP-specific requirements	—
RequestTransferExit	No IP-specific requirements	—
RequestFileTransfer	No IP-specific requirements	—

6.3 DiagnosticSessionControl (0x10) service

In addition to the generic implementation requirements stated in ISO 14229-1, the following shall be considered for UDSonIP implementation:

The TCP connection may be disconnected due to a session change which causes to establish a new TCP connection and routing activation as described in ISO 13400-2 before diagnostic communication can be continued.