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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/SAE DIS 1979-3

Road vehicles — On-board diagnostic communication —

Part 3: Zero emissions vehicle propulsion systems on UDS (ZEVonUDS)

*Véhicules routiers — Communication pour (le) diagnostic
embarqué —*

*Partie 3: Systèmes de propulsion des véhicules zéro-émission sur
SDU (ZEVonUDS)*

ICS: 43.040.15

ISO/TC 22/SC 31

Secretariat: **DIN**

Voting begins on:
2025-05-07

Voting terminates on:
2025-07-30

This document is circulated as received from the committee secretariat.

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Reference number
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Contents

Page

Foreword	5
Introduction.....	6
1 Scope.....	11
2 Normative references.....	11
3 Terms and definitions	12
4 Symbols and abbreviated terms.....	13
4.1 Symbols.....	13
4.2 Abbreviated terms.....	15
5 Conventions	16
6 Basic principles and use cases overview.....	16
6.1 Basic principles.....	16
6.2 Use case groups and associated use cases.....	17
7 Use cases definition (UC).....	18
7.1 UCG 1 – Discover protocol communication interface and ZEV propulsion system.....	18
7.1.1 UC 1.1 – Discover DoCAN communication interface.....	18
7.1.2 UC 1.2 – Discover DoLP communication interface.....	18
7.1.3 UC 1.3 – Discover ZEV propulsion system server(s)/ECU(s)	19
7.2 UCG 2 – Report ZEV propulsion system information	19
7.2.1 UC 2.1 – Report ZEV propulsion system supported data identifier(s) (DIDs)	19
7.2.2 UC 2.2 – Report ZEV propulsion system data.....	20
7.2.3 UC 2.3 – Report ZEV propulsion system information	20
7.3 UCG 3 – Report ZEV propulsion system error information	21
7.3.1 UC 3.1 – Report ZEV propulsion system fault information.....	21
7.3.2 UC 3.2 – Erase ZEV propulsion system fault information.....	21
8 Abstract Service Primitive (ASP) interface definition between application and OSI layers.....	22
8.1 A_Data.req, A_Data.ind, and A_Data.con service interface.....	22
8.2 A_Data.req, A_Data.ind, and A_Data.con ASP parameter mapping	22
8.3 ASP parameters.....	23
8.3.1 General.....	23
8.3.2 Data type definitions	23
9 Technical requirements and use case coverage.....	25
10 ZEV propulsion system diagnostic application.....	25
10.1 Functional description	25
10.2 General requirements.....	26
10.3 ZEV communication interface, protocol and ZEVonUDS server(s)/ECU(s) identification	26
10.4 OBD market regulation identification	28
10.5 Diagnostic data parameter validity	28
10.5.1 Maximum data parameter value.....	28
10.5.2 Invalid data parameter value	29
11 ZEV propulsion system diagnostic application layer	29
11.1 General	29
11.2 ZEV propulsion system diagnostic application layer framework	29
11.3 ZEV diagnostic application layer communication profile.....	29
11.3.1 ZEV diagnostic application layer supported services	29
11.3.2 ZEV propulsion system addressing scheme.....	30

11.3.3	General diagnostic services requirements	30
11.3.4	ReadDataByIdentifier service.....	31
11.3.5	ReadDTCInformation service	34
11.3.6	ClearDiagnosticInformation service	40
11.4	ZEV diagnostic application layer performance timing.....	42
11.4.1	General.....	42
11.4.2	ZEV_L7_ComProfile default timing	43
11.4.3	ZEV_L7_ComProfile enhanced timing.....	43
11.4.4	ZEV_L7_ComProfile exception timing.....	44
11.4.5	ZEV DoIP logical address assignment.....	45
12	ZEV diagnostic presentation layer	46
12.1	General.....	46
12.2	ZEV diagnostic presentation layer framework	46
12.3	ZEV diagnostic presentation layer communication profile.....	46
13	ZEV diagnostic session layer	46
13.1	General.....	46
13.2	ZEV diagnostic session layer framework	46
13.3	ZEV diagnostic session layer communication profile	47
13.4	T_DATA interface	47
14	Setup DoCAN communication interface	48
14.1	DoCAN ZEV framework.....	48
14.2	DoCAN ZEV transport layer communication profile	48
14.2.1	General.....	48
14.2.2	DoCAN_ZEV_L4_ComProfile transport protocol configuration parameters.....	48
14.2.3	DoCAN_ZEV_L4_ComProfile transport protocol timing parameters	49
14.3	DoCAN ZEV network layer ComProfile.....	50
14.3.1	DoCAN_ZEV_L3_ComProfile network layer addressing configuration parameters.....	50
14.4	DoCAN ZEV data link layer ComProfile	51
14.4.1	DoCAN_ZEV_L2_ComProfile data link layer configuration parameters.....	51
14.5	DoCAN ZEV physical layer ComProfile	52
14.5.1	DoCAN_ZEV_L1_ComProfile definition.....	52
14.5.2	DoCAN ZEV media dependent interface definition	52
14.5.3	DoCAN PMD DLC cable requirements.....	52
14.6	DoCAN ZEV protocol support	53
15	Setup DoIP communication interface	54
15.1	DoIP ZEV framework.....	54
15.2	DoIP ZEV routing activation.....	54
15.3	DoIP ZEV protocol support.....	54
15.4	DoIP ZEV transport layer communication profile.....	54
15.4.1	General.....	54
15.4.2	DoIP_ZEV_L4_ComProfile transport protocol configuration parameters	54
15.5	DoIP ZEV network layer ComProfile	55
15.6	DoIP ZEV data link layer ComProfile.....	55
15.7	DoIP ZEV physical layer ComProfile.....	55
15.7.1	DoIP_ZEV_L1_ComProfile definition.....	55
15.7.2	DoIP ZEV media dependent interface definition	56
15.7.3	DoIP PMD DLC cable requirements.....	56
Annex A (normative)	Message timing definition	57
A.1	Server/ECU application layer performance timing	57
A.2	Vehicle application layer performance timing.....	58
A.2.1	DoIP physical addressed short request with long response message calculation	58
A.2.2	DoIP response message transmission time calculation	60
Annex B (informative)	ZEV propulsion system application layer examples	61

ISO/SAE DIS 1979-3:2025(en)

B.1	ReadDataByIdentifier message flow examples	61
B.1.1	Current diagnostic data message flow example	61
B.1.2	ReadDataByIdentifier negative response message	61
B.1.3	Supported InfoTypes from ZEV	63
B.1.4	Request vehicle information – VIN	63
B.1.5	Request vehicle information – CALID ECU#1	64
B.1.6	Request vehicle information – CALID ECU#2	66
B.1.7	Request vehicle information – ECU#1 Name	67
B.1.8	Request vehicle information – ECU#2 Name	68
B.2	Request vehicle information with unsupported DID	70
B.2.1	Read vehicle information message flow examples	70
B.3	ReadDTCInformation message flow examples	72
B.3.1	ReadDTCInformation with confirmed/pending status	72
B.3.2	ReadDTCInformation positive response message with DTC P014211 stored	72
B.3.3	ReadDTCInformation positive response message with no DTC stored	73
B.3.4	ReadDtcInformation with unsupported data parameters	73
B.4	ClearDiagnosticInformation message flow examples	74
B.5	DoIP ZEVonUDS example	75
B.5.1	DoIP server to ECU relationship	75
B.5.2	DoIP Step 1: routing activation	76
B.5.3	DoIP Step 2: functional request to discover all regulated ZEVonUDS ECUs	80
B.5.4	DoIP Step 3: physical request to discover all ZEVonUDS ECUs	84
Bibliography		91

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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This document was prepared by Technical Committee [or Project Committee] ISO/TC [or ISO/PC] ###, [name of committee], Subcommittee SC ##, [name of subcommittee].

This second/third/... edition cancels and replaces the first/second/... edition (ISO #####:#####), which has been technically revised.

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

— xxx xxxxxxxx xxx xxx

A list of all parts in the ISO ##### 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

ISO/SAE 1979 series

The ISO/SAE 1979 series is intended to satisfy the data reporting requirements of regulations in the United States and Europe, and any other market that may adopt similar requirements in the future.

This document has been developed and published in SAE and ISO under the PSDO (Partner Standards Development Organization) for the purpose of:

- leveraging joint development under equal conditions;
- achieving acceptance in other countries (considering local regulation(s));
- strengthen the expertise in communication protocols as well as zero emissions propulsion systems.

This document includes capabilities required to satisfy OBD requirements for multiple regions, model years, propulsion types, and vehicle types. At the time of publication many regional regulations are not yet final and are expected to change in the future. This document makes no attempt to interpret the regulations and does not include applicability of the included diagnostic services and data parameters for various vehicle applications. The user of this document is responsible to verify the applicability of each section of this document for a specific vehicle, propulsion system, model year, and region.

This document provides an implementation guidance based on the principles of ISO 14229 Unified diagnostic services series, focusing on standardization of data to ensure access to important repair information by independent repair facilities. The purpose of this standard is to focus on providing the necessary content and performance requirements. ISO/SAE 1979 series specifies diagnostic functionalities, which utilize communication facilities over either Controller Area Network (CAN) or Ethernet data links.

These requirements apply to all ECU's that provide operational data and diagnose those components that are integral to provide propulsion on zero emissions (ZEV) vehicles. In general, if an ECU monitors a component, whose failure directly affects the propulsion system, the information reporting uses the diagnostic communication services as specified in ISO/SAE 1979 series.

A government agency may have policy reasons for specifically tracking ZEV propulsion componentry (i.e., unique warranty requirements). In order to track the linkage between a diagnostic trouble code and a covered repair under ZEV component warranty, provisions are made in ISO/SAE 1979 series to highlight those failures that are specifically related to electrified propulsion. These linkages can be thought of analogously to emissions-related failures requiring emissions-related warranty repair.

NOTE Global regulations may vary in the definition of propulsion componentry. This document provides a standard to satisfy known country-specific certification regulations. This document is not considered a final authority for interpretation of the certification regulations, so users of this document should determine the applicability of capabilities defined in this document for their specific OBD regulatory requirements.

In order to satisfy OBD requirements for multiple regions, model years, propulsion types, and vehicle types, the communication is based on the Open Systems Interconnection (OSI) Basic Reference Model specified in accordance with ISO/IEC 7498-1^[1] and ISO/IEC 10731^[2], which structures communication systems into seven layers. When mapped on this model, the services specified are broken into:

- Diagnostic applications specified in:
 - ISO/SAE 1979-2 Emissions propulsion system (potential future standard)

ISO/SAE DIS 1979-3:2025(en)

- ISO/SAE 1979-3 Zero emissions propulsion system (this document)
- Application (layer 7), specified in:
 - ISO 14229-1 UDS;
- Presentation layer (layer 6), specified in:
 - SAE J1930DA Terms, definitions, acronyms
 - SAE J1979DA Data Identifiers (DIDs) and routine identifiers (RIDs)
 - SAE J2012DA Diagnostic Trouble Codes (DTCs) and Failure Type Bytes (FTBs)
 - SAE J2403 Medium/Heavy-Duty E/E Systems Diagnosis Nomenclature
 - SAE J2403DA Digital Annex of Medium/Heavy-Duty E/E Systems Diagnosis Nomenclature
 - SAE J1939-73 Failure Mode Identifiers (FMIs)
 - SAE J1939DA Parameter Group Numbers (PGNs) and Suspect Parameter Numbers (SPNs)
- Session layer services (layer 5), specified in:
 - ISO 14229-2 UDS – Session layer services
- Transport layer services (layer 4), specified in:
 - ISO 15765-2 DoCAN – Transport protocol and network layer services
 - ISO 15765-4 DoCAN – Requirements for emissions related systems
 - ISO 13400-2 DoIP – Transport protocol and network layer services
- Network layer services (layer 3), specified in:
 - ISO 15765-4 DoCAN – Requirements for emissions related systems
 - ISO 13400-2 DoIP – Transport protocol and network layer services
- Data link layer (layer 2), specified in:
 - ISO 15765-4 DoCAN – Requirements for emissions related systems
 - ISO 11898-1 CAN – Data link layer and physical coding sublayer
 - ISO 13400-3 DoIP – Wired vehicle interface based on IEEE 802.3
- Physical layer (layer 1), specified in:
 - ISO 15765-4 DoCAN – Requirements for emissions related systems
 - ISO 11898-2 CAN – High-speed physical medium attachment (PMA) sublayer
 - ISO 13400-3 DoIP – Wired vehicle interface based on IEEE 802.3
- Physical Media Dependent (PMD) Interface, specified in:

ISO/SAE DIS 1979-3:2025(en)

- ISO 15031-3 Communication between vehicle and external equipment for emissions-related diagnostics — Diagnostic connector and related electrical circuits: Specification and use
- SAE J1962 Diagnostic connector
- ISO 13400-4 DoIP – Ethernet-based high-speed data link connector

Figure 1 shows the propulsion system communication standards referenced by regulation(s).

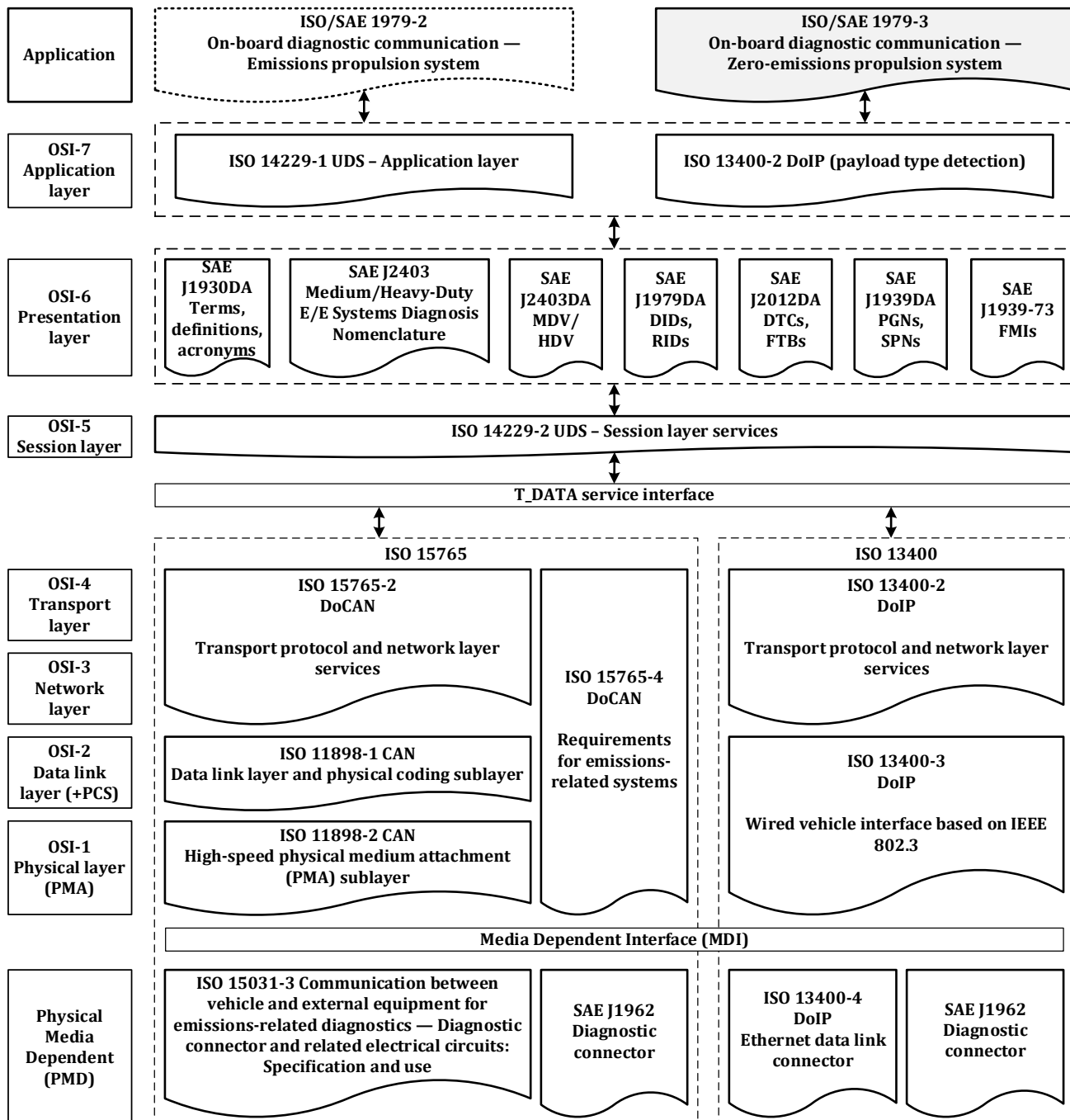


Figure 1 — Propulsion system communication standards referenced by regulation(s)

SAE Digital Annexes

This document references various Digital Annexes as follows:

- SAE J1930DA is concerned with terms definition;
- SAE J1979DA is concerned with the definition of:
 - Data Identifiers (DIDs);
 - Parameter Identifiers (PIDs);
 - Info Types (ITIDs);
 - Routine Identifiers (RIDs).
- SAE J2012DA is concerned with the definition of:
 - Diagnostic Trouble Codes (DTCs);
 - Failure Type Bytes (FTBs).
- SAE J1939DA is concerned with the definition of Suspect Parameter Numbers (SPNs);
- SAE J2403DA is concerned with the definition of Medium/Heavy-Duty E/E Systems Diagnosis Nomenclature.

SAE Digital Annex Revision Procedure

New ZEV regulatory requirements require monitoring of the componentry that facilitates zero emission transportation. New ZEV technology parameters and diagnostic trouble codes need to be standardized to support the external (off-board) “generic” test equipment. All relevant information is proposed by the automotive industry who are represented by members of the appropriate SAE task force.

This document references a “Change Request Form” to be used for new data items to be defined by the SAE task force for standardization. The standardized terms and definitions are defined in the SAE J1930DA, the standardized data items are defined in the SAE J1979DA, and the standardized Diagnostic Trouble Codes are defined in the SAE J2012DA. Once the information has been balloted and approved, the documents are published on the SAE Store Web Site.

The revision request form and instructions for this document can be obtained on the Registration Authority’s website at: <https://standardsworks.sae.org/standards-committees/j1979-review-task-force>.

Located within the overview tab in the public resources section, a document with the title: *J1979-DA Revision Request Form* is available for change requests. Click on the name to download the document.

Fill out the revision request form with your request.

Please send an email with the completed revision request form as an attachment to: saej1979@sae.org.

Those users who use SAE_J1939-73_DTCFormat to communicate DTCs may also request new Suspect Parameter Number (SPN) values from the SAE Truck and Bus Control and Communications Network Committee. Request forms are available to the public at the committee’s SAE Standards Works webpage. The webpage, which can be found at <https://standardsworks.sae.org/standards-committees/truck-bus-control-communications-network-committee>, provides the following forms:

- Request Processing Guidelines

- General Request Form
- Bulk Request Form

The index of SPN assignments is published quarterly in SAE J1939DA. SAE J1939DA includes all the SPN labels defined in SAE J2403 and SAE J2403DA. SAE J1939DA also defines a range of manufacturer proprietary SPNs that are occasionally used for diagnostic conditions that do not map unambiguously into the standardized list of SPNs.

Road vehicles — On-board diagnostic communication — Part 3: Zero-emissions vehicle propulsion systems on UDS (ZEVonUDS)

1 Scope

This document specifies the zero emissions vehicle (ZEV) propulsion system diagnostic application protocol from a vehicle's point of view between the ZEV propulsion systems and test equipment required by government regulations. Standardization regulations require passenger cars and light-, medium-, and heavy-duty trucks to support a minimum set of diagnostic information to external (off-board) "generic" test equipment (ETE).

This document specifies:

- ZEV propulsion system diagnostic communication use cases;
- message formats for request and response messages;
- timing requirements between request messages from ETE and response messages from the vehicle, and between those messages and subsequent request messages;
- behavior of both, the ZEV propulsion system and ETE if data is not available;
- a set of diagnostic services with corresponding content of request and response messages; and
- standardized source and target addresses for client and ZEV propulsion system.

This document is based on the content of SAE J1979-3 (2nd edition: 202310) while considering the following potential improvements:

- explicit drafting of requirements (shall) that allows (e.g.) unique references in conformance test plan documents;
- restructured layout as diagnostic application-type document including the definition of ZEV propulsion system diagnostic communication use cases;
- improvement of references to communication protocol-type documents to accomplish single sources of requirements.

This document specifies support for the 2nd generation OBD application layer protocol (ISO 14229-1 UDS) with the underlying ISO 15765 DoCAN or ISO 13400 DoIP protocols as illustrated in Figure 1.

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

ISO 11898-2, *Road vehicles — Controller area network (CAN) — Part 2: High-speed medium attachment (PMA) sublayer*

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

ISO 14229-1, *Road vehicles — Unified diagnostic services (UDS) — Part 1: Application layer*

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

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*

SAE J1939DA, *Digital Annex of Serial Control and Communications Heavy Duty Vehicle Network*

SAE J1939-73, *Application Layer — Diagnostics*

SAE J1962, *Diagnostic Connector*

SAE J1979DA, *Digital Annex of E/E Diagnostic Test Modes*

SAE J2012, *Diagnostic Trouble Code Definitions*

SAE J2012DA, *Digital Annex of Diagnostic Trouble Code Definitions*

3 Terms and definitions

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

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

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

ZEV

zero emission vehicle

vehicle that does not emit exhaust gas or other pollutants from the onboard source of power

3.2

propulsion system

componentry to deliver vehicle tractive and regenerative braking force

3.3

zero emission vehicle on unified diagnostic services

ZEVonUDS

zero emission vehicle with support of unified diagnostic services in ZEV ECU(s)

3.4

ZEV propulsion component (ZEV-P component)

component identified on a zero emissions vehicle to have a noteworthy impact on propulsion functionality

4 Symbols and abbreviated terms

4.1 Symbols

%	percentage
C	communication parameter (ComParam)
C _{L2_CAN_DLC}	OSI layer 2 ComParam controller area network data length code
C _{L2_CAN_NomBitRate}	OSI layer 2 ComParam controller area network nominal bit rate
C _{L2_CAN_11Bit_CANID}	OSI layer 2 ComParam controller area network 11-bit CAN identifier
C _{L2_CAN_29Bit_CANID}	OSI layer 2 ComParam controller area network 29-bit CAN identifier
C _{L2_ETH_NomBitRate}	OSI layer 2 ComParam Ethernet nominal bit rate
C _{L3_AI_ADDRtype}	OSI layer 3 ComParam address information address type
C _{L3_AI_TAtype}	OSI layer 3 ComParam address information target address type
C _{L3_AI_SA}	OSI layer 3 ComParam address information source address
C _{L3_AI_TA}	OSI layer 3 ComParam address information target address
C _{L4_PTPtype}	OSI layer 4 ComParam protocol packet type
C _{L4_TX_SegDL}	OSI layer 4 ComParam transmit segment data length
C _{L4_PCI_SegType}	OSI layer 4 ComParam protocol control information segment type
C _{L4_FCBS}	OSI layer 4 ComParam flow control block size
C _{L4_WFT_Max}	OSI layer 4 ComParam wait frame transmission maximum
C _{L4_FCST_Min}	OSI layer 4 ComParam flow control separation time minimum
C _{PMD_DLC_CAN_HI}	ComParam physical media dependent interface diagnostic link connector controller area network contact high
C _{PMD_DLC_CAN_LO}	ComParam physical media dependent interface diagnostic link connector controller area network contact low
C _{PMD_DLC_ETH_Opt1_RX_HI}	ComParam physical media dependent interface diagnostic link connector Ethernet contacts option 1 receiver high
C _{PMD_DLC_ETH_Opt1_RX_LO}	ComParam physical media dependent interface diagnostic link connector Ethernet contacts option 1 receiver low
C _{PMD_DLC_ETH_Opt1_TX_HI}	ComParam physical media dependent interface diagnostic link connector Ethernet contacts option 1 transmitter high
C _{PMD_DLC_ETH_Opt1_TX_LO}	ComParam physical media dependent interface diagnostic link connector Ethernet contacts option 1 transmitter low

ISO/SAE DIS 1979-3:2025(en)

$C_{PMD_DLC_ETH_Opt2_RX_Hi}$	ComParam physical media dependent interface diagnostic link connector Ethernet contacts option 2 receiver high
$C_{PMD_DLC_ETH_Opt2_RX_Lo}$	ComParam physical media dependent interface diagnostic link connector Ethernet contacts option 2 receiver low
$C_{PMD_DLC_ETH_Opt2_TX_Hi}$	ComParam physical media dependent interface diagnostic link connector Ethernet contacts option 2 transmitter high
$C_{PMD_DLC_ETH_Opt2_TX_Lo}$	ComParam physical media dependent interface diagnostic link connector Ethernet contacts option 2 transmitter low
$C_{PMD_DLC_ETH_Ident_ACL}$	ComParam physical media dependent interface diagnostic link connector Ethernet identification and activation line contact
t	time
$t_{L4_As_Server_Max}$	OSI layer 4 DoCAN sender timing maximum value A_s
$t_{L4_As_Server_Min}$	OSI layer 4 DoCAN sender timing minimum value A_s
$t_{L4_Ar_Server_Max}$	OSI layer 4 DoCAN receiver timing maximum value A_r
$t_{L4_Ar_Server_Min}$	OSI layer 4 DoCAN receiver timing minimum value A_r
$t_{L4_Br_Server}$	OSI layer 4 DoCAN receiver timing value B_r
$t_{L4_Bs_Server_Max}$	OSI layer 4 DoCAN sender timing maximum value B_s
$t_{L4_Bs_Server_Min}$	OSI layer 4 DoCAN sender timing minimum value B_s
$t_{L4_Cs_Server}$	OSI layer 4 DoCAN sender timing value C_s
$t_{L4_Cr_Server_Max}$	OSI layer 4 DoCAN sender timing maximum value C_s
$t_{L4_Cr_Server_Min}$	OSI layer 4 DoCAN receiver timing minimum value C_r
$t_{L4_STmin_Server}$	OSI layer 4 DoCAN separation time minimum
$t_{L7_P2_DoCAN_Max}$	OSI layer 7 DoCAN vehicle response time maximum value
$t_{L7_P2_DoIP_Max}$	OSI layer 7 DoIP vehicle response time maximum value
$t_{L7_P2_Server}$	OSI layer 7 DoCAN server response timer
$t_{L7_P2_Server_Max}$	OSI layer 7 DoCAN server response time maximum value
$t_{L7_P2_Server_Min}$	OSI layer 7 DoCAN server response time minimum value
$t_{L7_P2^*_Server_Max}$	OSI layer 7 DoCAN server response time enhanced maximum value
$t_{L7_P2^*_Server_Min}$	OSI layer 7 DoCAN server response time enhanced minimum value
$t_{L7_P4_Server_Max}$	OSI layer 7 DoCAN performance requirement: maximum time between the reception of a request ($T_Data.ind$) and the start of transmission of the final response ($T_Data.req$).

$t_{L7_P4_Server_Min}$

OSI layer 7 DoCAN performance requirement: minimum time between the reception of a request ($T_{Data.ind}$) and the start of transmission of the final response ($T_{Data.req}$).

4.2 Abbreviated terms

BECM	Battery Energy Control Module
CALID	Calibration Identifier
CAN	Controller Area Network
CAN CC	Controller Area Network ClassiC
ComParam	communication parameter
ComProfile	communication profile
Cvt.	convention
DID	Data Identifier
DoCAN	Diagnostic communication over Controller Area Network
DoIP	Diagnostic communication over Internet Protocol
DTC	Diagnostic Trouble Code
DTCSM	Diagnostic Trouble Code Status Mask
DTCSVM	Diagnostic Trouble Code Severity Mask
EBCM	electronic brake control module
ECU	electronic control unit
ETE	external test equipment
Fct.	functional
FMI	Failure Mode Identifier
FTB	Failure Type Byte
FGID	Functional Group Identifier
GODTC	Group of DTC
HB	High Byte
L1	OSI layer 1 – Physical layer
L2	OSI layer 2 – Data link layer
L3	OSI layer 3 – Network layer

L4	OSI layer 4 – Transport layer
L5	OSI layer 5 – Session layer
L6	OSI layer 6 – Presentation layer
L7	OSI layer 7 – Application layer
LB	Low Byte
ms	milliseconds
NRC	Negative Response Code
OBD	On-Board Diagnostics
Phy.	physical
SF	subfunction
SID	Service Identifier
SPN	Suspect Parameter Number
TCM	Transmission Control Module
UDS	Unified Diagnostic Services
VIN	Vehicle Identification Number
ZEV	Zero Emission Vehicle

For additional abbreviated terms, also refer to SAE J1930DA.

5 Conventions

This document is based on OSI service conventions as specified in ISO/IEC 10731:1994.

The abbreviation "ZEV" is a synonym for "ISO_SAE_1979-3" and used as a prefix to "REQ" (requirement numbering).

6 Basic principles and use cases overview

6.1 Basic principles

Basic principles are established as a guideline to develop this document.

- BP1: use cases describe the interaction between the external test equipment (ETE) and the ZEV's propulsion system ZEVonUDS server(s)/ECU(s) utilising the vehicle's communication interface at the diagnostic link connector (DLC).
- BP2: use cases of the same subject are combined in one use case group.
- BP3: use cases described in this document are described from a vehicle's point of view.
- BP4: use cases are described independently of the vehicle system group, e.g. zero emissions vehicle (ZEV) propulsion system.

- BP5: all communication messages comply with the ISO 14229 series.
- BP6: all data definitions comply with SAE J1979DA, SAE J2012DA, SAE J1939DA, and SAE J1939-73.
- BP7: fixed parameter values, for example VIN, are assigned to standardized identifiers (DIDs) and are mandatory for applicable use cases and interface requirements unless otherwise noted.
- BP8: requirements inherit the classification of the corresponding use cases.
- BP9: a "ZEV_REQ X.Y" requirement specifies a single requirement (not multiple).
- BP10: only diagnostic services and data that are within the scope of the ISO/SAE 1979-3 are guaranteed to work in the context of ZEV propulsion system diagnostics.
- BP11: External test equipment (ETE) should rely only what is specified as "required by this standard".
- BP12: The protocol test part of conformance tests/test plans (e.g. SAE J1699-5 tests) should be derived only from the requirements given in this standard.

6.2 Use case groups and associated use cases

Table 1 provides an overview of the main use case groups, associated use cases.

Table 1 — Use case groups and associated use cases

#	Use case group (UCG)	Use case reference
1	UCG 1 – Discover protocol communication interface	UC 1.1 – Discover DoCAN communication interface UC 1.2 – Discover DoIP communication interface UC 1.3 – Discover ZEV propulsion system server(s)/ECU(s)
2	UCG 2 – Report ZEV propulsion system information	UC 2.1 – Report ZEV propulsion system supported data identifier(s) (DIDs) UC 2.2 – Report ZEV propulsion system data UC 2.3 – Report ZEV propulsion system information
3	UCG 3 – Report ZEV propulsion system error information	UC 3.1 – Report ZEV propulsion system fault information UC 3.2 – Erase ZEV propulsion system fault information

7 Use cases definition (UC)

7.1 UCG 1 – Discover protocol communication interface and ZEV propulsion system

7.1.1 UC 1.1 – Discover DoCAN communication interface

Table 2 defines the UC 1.1 – Discover DoCAN communication interface.

Table 2 — UC 1.1 – Discover DoCAN communication interface

Item	Description
Name	UC 1.1 – Discover DoCAN communication interface
Goal	The ZEVonUDS server(s)/ECU(s) listen on the DoCAN communication interface connected to the vehicle's diagnostic link connector to discover the ETE selected protocol.
Actor	ETE and ZEVonUDS server(s)/ECU(s)
Input	The ZEVonUDS server(s)/ECU(s) listen on the DoCAN communication interface for a request message send by the ETE.
Output	Transmission of a positive response message on the DoCAN communication interface by the ZEVonUDS server(s)/ECU(s).
Function	The ZEVonUDS server(s)/ECU(s) (depends on in-vehicle network architecture implementation) listens on the DoCAN communication interface(s) connected to the vehicle diagnostic link connector according to ISO 15031-3 and SAE J1962 for a request message send by the ETE. The ZEVonUDS server(s)/ECU(s) respond with a positive response message on the DoCAN communication interface.
Classification	Mandatory, if DoCAN is used for vehicle communication

7.1.2 UC 1.2 – Discover DoIP communication interface

Table 3 defines the UC 1.2 – Discover DoIP communication interface.

Table 3 — UC 1.2 – Discover DoIP communication interface

Item	Description
Name	UC 1.2 – Discover DoIP communication interface
Goal	The ZEVonUDS server(s)/ECU(s) listen on the DoIP communication interface connected to the vehicle's diagnostic link connector to discover the ETE selected protocol.
Actor	ETE and ZEVonUDS server(s)/ECU(s)
Input	The ZEVonUDS server(s)/ECU(s) listen on the DoIP communication interface for a request message send by the ETE.
Output	Transmission of positive response message on the DoIP communication interface by the ZEVonUDS server(s)/ECU(s).
Function	The ZEVonUDS server(s)/ECU(s) (depends on in-vehicle network architecture implementation) listens on the DoIP communication interface connected to the vehicle diagnostic link connector according to ISO 13400-4 and SAE J1962 for a request message send by the ETE. The ZEVonUDS server(s)/ECU(s) respond with a positive response message on the DoIP communication interface.
Classification	Mandatory, if DoIP is used for vehicle communication

7.1.3 UC 1.3 – Discover ZEV propulsion system server(s)/ECU(s)

Table 4 defines the UC 1.3 – Discover ZEV propulsion system server(s)/ECU(s).

Table 4 — UC 1.3 – Discover ZEV propulsion system server(s)/ECU(s)

Item	Description
Name	UC 1.3 – Discover ZEV propulsion system server(s)/ECU(s)
Goal	ZEV propulsion system reports data related to an identifier via the electronic interface in the ZEV as defined in this document to determine relevant ZEVonUDS server(s)/ECU(s) for the ZEV under test.
Actor	ETE and ZEVonUDS server(s)/ECU(s)
Input	ZEVonUDS server(s)/ECU(s) receive(s) request message with DID F810 ₁₆ as specified in SAE J1979DA.
Output	ZEVonUDS server(s)/ECU(s) report the DID F810 ₁₆ and associated data, which are required for ZEV diagnostic communication from each installed ZEV propulsion system. The ZEV propulsion system installed in the vehicle identify themselves using the DIDs defined in SAE J1979DA.
Function	The external test equipment uses the standardized ZEV propulsion system data identifier as specified in SAE 1979DA to request the protocol identification information.
Classification	Mandatory

7.2 UCG 2 – Report ZEV propulsion system information

7.2.1 UC 2.1 – Report ZEV propulsion system supported data identifier(s) (DIDs)

Table 5 defines the UC 2.1 – Report ZEV propulsion system supported data identifier(s) (DIDs).

Table 5 — UC 2.1 – Report ZEV propulsion system supported data identifier(s) (DIDs)

Item	Description
Name	UC 2.1 – Report ZEV propulsion system supported data identifier(s) (DIDs)
Goal	ZEV propulsion system reports ZEVonUDS server(s)/ECU(s)-relevant data identifiers (DID).
Actor	ETE and ZEVonUDS server(s)/ECU(s)
Input	Standardised DID, as specified in SAE J1979DA, to request supported ZEV-relevant data identifier(s) (DID) from the vehicle.
Output	Supported ZEV-relevant data identifiers (DID) from the vehicle as specified in SAE J1979DA.
Function	The ETE requests the ZEV-relevant data identifier(s) supported by the vehicle. The vehicle responds with the supported ZEV-relevant data identifier(s) (DID).
Classification	Mandatory

7.2.2 UC 2.2 – Report ZEV propulsion system data

Table 6 defines the UC 2.2 – Report ZEV propulsion system data.

Table 6 — UC 2.2 – Report ZEV propulsion system data

Item	Description
Name	UC 2.2 – Report ZEV propulsion system data
Goal	ZEV propulsion system reports the vehicle identification number (VIN) to uniquely identify the ZEV under test.
Actor	ETE and ZEVonUDS server(s)/ECU(s)
Input	ZEVonUDS server(s)/ECU(s) receive(s) request message with DID = VIN.
Output	One ZEVonUDS server/ECU transmits the positive response message with DID = VIN and its information to the ETE.
Function	The ETE requests the VIN. The ZEVonUDS server(s)/ECU(s) responds with the VIN. The VIN is used to uniquely identify the vehicle.
Classification	Mandatory

7.2.3 UC 2.3 – Report ZEV propulsion system information

Table 7 defines the UC 2.3 – Report ZEV propulsion system information.

Table 7 — UC 2.3 – Report ZEV propulsion system information

Item	Description
Name	UC 2.3 – Report ZEV propulsion system information
Goal	Report ZEV propulsion system information, for example, current and/or stored values.
Actor	ETE and ZEVonUDS server(s)/ECU(s)
Input	Data identifier(s) as specified in SAE J1979DA
Output	ZEVonUDS server(s)/ECU(s) report current and/or stored values of the ZEV propulsion system
Function	The ETE requests ZEV propulsion system information by data identifier. The ZEV propulsion system responds with the requested ZEV propulsion system current and/or stored values.
Classification	Mandatory

7.3 UCG 3 – Report ZEV propulsion system error information

7.3.1 UC 3.1 – Report ZEV propulsion system fault information

Table 8 defines the UC 3.1 – Report ZEV propulsion system fault information.

Table 8 — UC 3.1 – Report ZEV propulsion system fault information

Item	Description
Name	UC 3.1 – Report ZEV propulsion system fault information
Goal	The ZEV propulsion system reports the standardized fault information (e.g. DTC).
Actor	ETE and ZEVonUDS server(s)/ECU(s)
Input	ZEV propulsion system fault information as specified in SAE J2012DA or SAE J1939DA/SAE J1939-73.
Output	Status of the ZEV propulsion system fault information (e.g. DTC) of the ZEVonUDS server(s)/ECU(s).
Function	The ETE requests the ZEV propulsion system status and/or the error information (e.g. DTC and/or DID information) of the ZEVonUDS server(s)/ECU(s). The ZEV propulsion system responds with the requested information.
Classification	Mandatory

7.3.2 UC 3.2 – Erase ZEV propulsion system fault information

Table 9 defines the UC 3.2 – Erase ZEV propulsion system fault information.

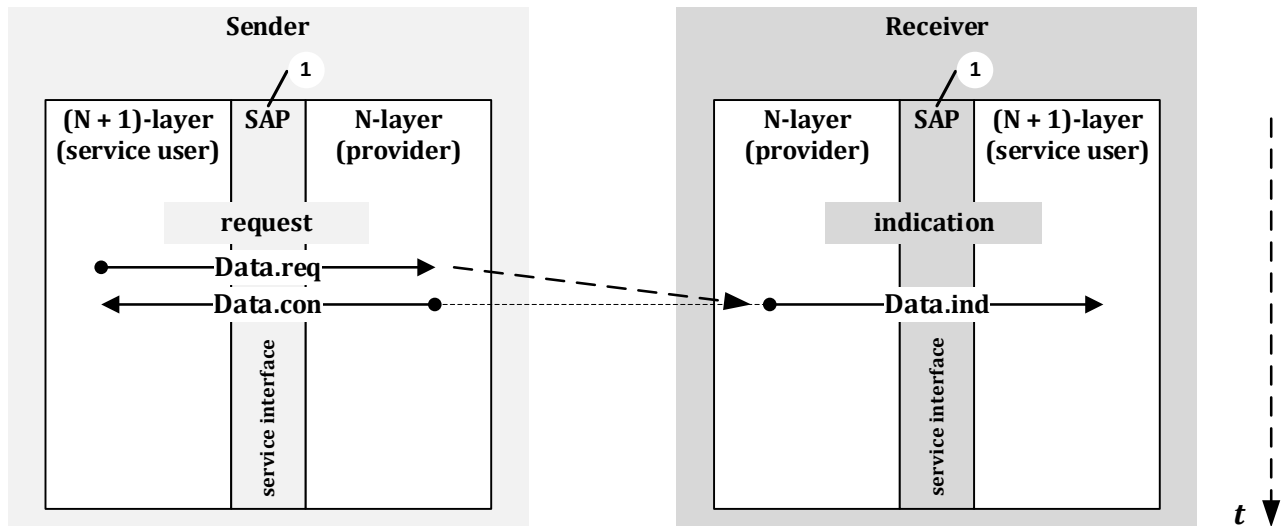
Table 9 — UC 3.2 – Erase ZEV propulsion system fault information

Item	Description
Name	UC 3.2 – Erase ZEV propulsion system fault information
Goal	The ZEV propulsion system erases the standardized fault information (e.g. DTC) in its memory.
Actor	ETE and ZEVonUDS server(s)/ECU(s)
Input	Request to ZEV propulsion system to erase fault information as defined in SAE J2012DA.
Output	ZEV propulsion system reports fault information (e.g. DTC) of the ZEVonUDS server(s)/ECU(s) being erased.
Function	The ETE requests the ZEV propulsion system to erase the fault information (e.g. DTC and/or DID information) in the ZEVonUDS server(s)/ECU(s) memory. The ZEV propulsion system responds with a positive response message to confirm acceptance of the request.
Classification	Mandatory

8 Abstract Service Primitive (ASP) interface definition between application and OSI layers

8.1 A_Data.req, A_Data.ind, and A_Data.con service interface

The abstract service primitive interface defines the service and parameter mapping to the application and the lower OSI layers. Figure 2 shows the A_Data.req, A_Data.ind, and A_Data.con ASPs.



Key
t time
1 service access point

Figure 2 — A_Data.req, A_Data.ind, and A_Data.con ASP interface

8.2 A_Data.req, A_Data.ind, and A_Data.con ASP parameter mapping

This requirement specifies the ASP parameter mapping between application and OSI layers.

ASP 0.1 A_Data.req, A_Data.ind, and A_Data.con parameter mapping between application and OSI layers

The Data.req, Data.ind, and Data-conf ASP parameter mapping between application and OSI layers shall be supported as specified in Table 10. The requirements stated are in accordance with ISO/IEC 7498-1.

Table 10 — A_Data.req, A_Data.ind, and A_Data.con ASP parameter mapping between application and OSI layers

APP	AL (L7)	PL (L6)	SL (L5)	TL (L4)	NL (L3)	DLL (L2)	Description
Mtype	A_Mtype	A_Mtype	S_Mtype	T_Ptype	N_Ptype	L_Ftype	message, segment, packet, frame type
TAtype	A_TAtype	A_TAtype	S_TAtype	T_TAtype	N_TAtype	TAtype	addressing type
TA	A_TA	A_TA	S_TA	T_TA	N_TA	— ^a	target address
SA	A_SA	A_SA	S_SA	T_SA	N_SA	— ^a	source address
Length	A_Length	A_Length	S_Length	T_Length	N_Length	L_Length	length of protocol data unit
PDU	A_PDU	A_PDU	S_PDU	T_PDU	N_PDU	L_PDU	protocol data unit
Result	A_Result	A_Result	S_Result	T_Result	N_Result	L_Result	result of OSI layer transaction
^a not applicable = “—”.							

8.3 ASP parameters

8.3.1 General

The following subclauses specify the ASP parameters and data types, which are used between application and OSI layer services.

8.3.2 Data type definitions

ASP 0.2 Data type definitions

The following data types shall be supported:

- Enum: 8-bit enumeration,
- Unsigned Byte: 8-bit unsigned numeric value,
- Unsigned Word: 16-bit unsigned numeric value,
- Unsigned Long: 32-bit unsigned numeric value,
- Byte Array: sequence of 8-bit aligned data,
- Bit String: bit-wise binary coded.

The requirements stated are in accordance with SAE J1939-73, SAE J1979DA, and SAE J2012DA.

ASP 0.3 Mtype, message type

The Mtype parameter shall be of data type Enum and shall be used to identify the message type and range of address information included in a service call. The requirements stated are in accordance with ISO 14229-1.

Range: [DiagNormAddr, DiagNormFixAddr, DiagExtAddr, RDiagMixAddr]

ASP 0.4 TAtype, target address type

The TAtype parameter shall be of data type Enum and shall be used to identify the target address type to be used with the request address. The requirements stated are in accordance with ISO 14229-1.

Range: [functional, physical]

ASP 0.5 TA, target address

The TA parameter shall be of data type `Unsigned Word` and shall contain the target address of the node. The requirements stated are in accordance with ISO 14229-1.

Range: [0000₁₆ to FFFF₁₆]

ASP 0.6 SA, source address

The SA parameter shall be of data type `Unsigned Word` and shall contain the source address of the node. The requirements stated are in accordance with ISO 14229-1.

Range: [0000₁₆ to FFFF₁₆]

ASP 0.7 Length, length of PDU

The Length parameter shall be of data type `Unsigned Long` and shall contain the length of the PDU to be transmitted/received. The requirements stated are in accordance with ISO 14229-1.

Range: [0000 0000₁₆ to FFFF FFFF₁₆]

ASP 0.8 PDU, protocol data unit

The PDU parameter shall be of data type `Byte Array` and shall contain the message data (PDU) content of the request or response message to be transmitted/received. The requirements stated are in accordance with ISO 14229-1.

Range: [00₁₆ to FF₁₆]

ASP 0.9 Result, result

The Result parameter shall be of data type `Bit String` and shall contain the status relating to the outcome of a service execution (request field and response field sequence). If two or more errors are discovered at the same time, then the application layer entity shall set the appropriate error bit in the Result parameter. The requirements stated are in accordance with ISO 14229-1.

Range: [OK, Err_AL_Length, Err_TL_PCI_Type, Err_TL_PCI_SF_DL_Value, Err_NL_AddrFmt, Err_DLL_Byte]

The result OK shall be issued to the service user when the service execution is successfully completed. The OK shall be issued to a service user on both the sender and receiver side.

The ERR_... shall be issued to the service user when an error is detected by a lower layer (provider). The ERR_... shall be issued to the service user on both the sender and receiver side.

9 Technical requirements and use case coverage

Table 11 provides an overview about the technical requirements, associated requirement number and use case coverage. The "SEQ" column represents the order of requirements as they should occur in the communication between the ZEV propulsion system and the ETE. The "Technical requirement title" column contains the main title of the related requirement and shows the requirement number for reference purposes by other documents. The "Use case # and title" column lists all use cases related to the requirement in the same row.

NOTE Table 11 does not provide a complete list of all use cases-related requirements.

Table 11 — Technical requirements and use case coverage

Use case # and title	Technical requirement title
UC 1.1 – Discover DoCAN communication interface	ZEV_REQ 8.10 ZEV communication interface, protocol and ZEVonUDS server/ECU identification
UC 1.2 – Discover DoIP communication interface	ZEV_REQ 8.10 ZEV communication interface, protocol and ZEVonUDS server/ECU identification
UC 1.3 – Discover ZEV propulsion system server(s)/ECU(s)	ZEV_REQ 8.10 ZEV communication interface, protocol and ZEVonUDS server/ECU identification
UC 2.1 – Report ZEV propulsion system supported data identifier(s) (DIDs)	ZEV_REQ 7.19 ReadDataByIdentifier – General requirement to ZEV_REQ 7.33
UC 2.2 – Report ZEV propulsion system data	ZEV_REQ 7.19 ReadDataByIdentifier – General requirement to ZEV_REQ 7.33
UC 2.3 – Report ZEV propulsion system information	ZEV_REQ 7.19 ReadDataByIdentifier – General requirement to ZEV_REQ 7.33
UC 3.1 – Report ZEV propulsion system fault information	ZEV_REQ 7.35 ReadDTCInformation – General requirement to ZEV_REQ 7.57
UC 3.2 – Erase ZEV propulsion system fault information	ZEV_REQ 7.58 ClearDiagnosticInformation – General requirement to ZEV_REQ 7.65

10 ZEV propulsion system diagnostic application

10.1 Functional description

This document specifies requirements related to the vehicle's ZEV propulsion system diagnostic application and protocol communication stack.

The purpose of the vehicle's ZEV propulsion system diagnostic application is

- ZEV communication interface support,
- diagnostic protocol identification,
- ZEVonUDS server(s)/ECU(s) as part of the vehicle's ZEV propulsion system,
- OBD market regulation identification,
- to initialize the DoCAN or DoIP protocol communication stack in the ZEVonUDS server(s)/ECU(s),