INTERNATIONAL STANDARD

ISO 14229-5

First edition
2013-11-15

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)

Reference number
ISO 14229-5:2013(E)

COPYRIGHT PROTECTED DOCUMENT

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

Published in Switzerland

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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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="8">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.

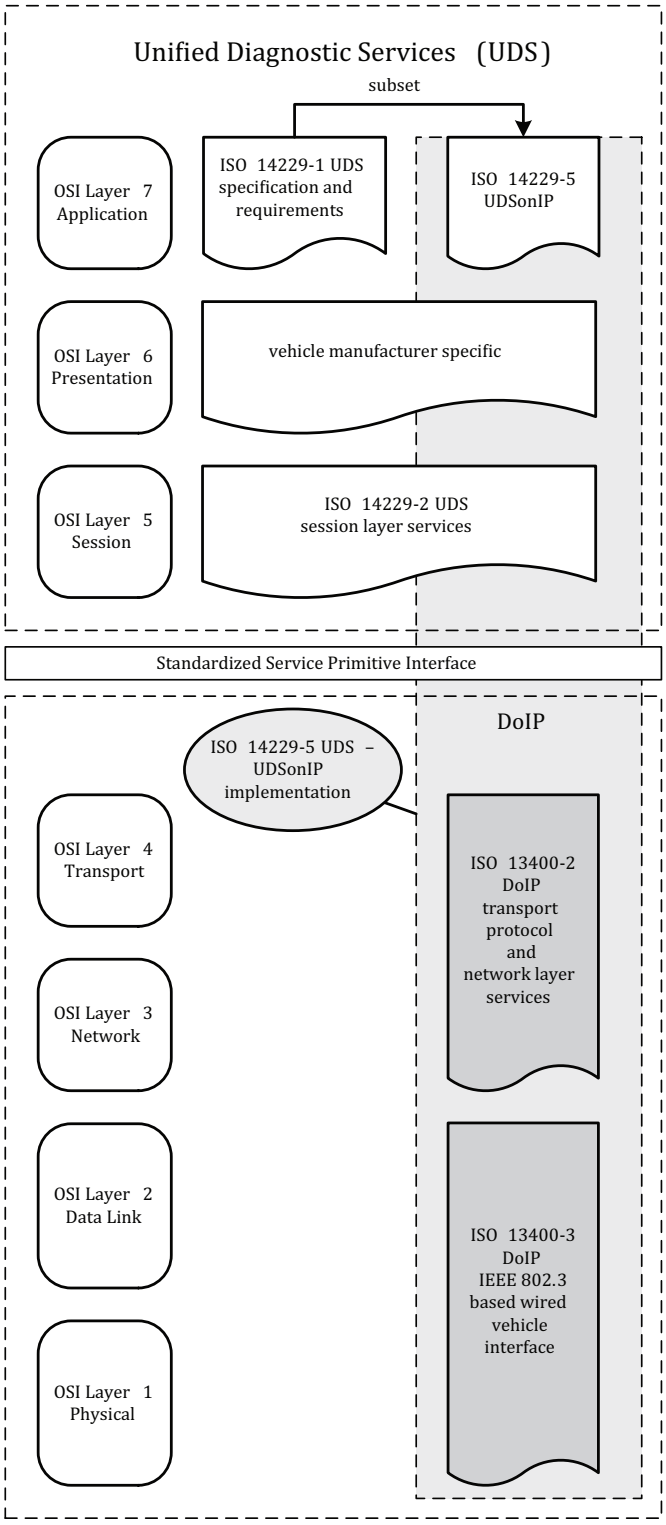


Figure 1 — ISO 14229-5 UDSonIP document reference according to OSI model

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.

6.4 ECUReset (0x11) service

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

With the execution of ECUReset in the server, a TCP connection between client and server will be disconnected. This applies to ECUs which implement router functionalities as well. For this reason, it is necessary to establish a new TCP connection and routing activation as described in ISO 13400-2 before diagnostic communication can be continued for the ECU where the ECU reset has been applied and all other involved ECUs.

6.5 ReadDataByPeriodicIdentifier (0x2A) service DoIP implementation requirements

6.5.1 Periodic data response message

The ReadDataByPeriodicIdentifier service allows the client to request the periodic transmission of data record values from the server identified by one or more pDIDs. For ReadDataByPeriodicIdentifier service implementation on DoIP, the response message utilizes a different message structure from the remaining UDS services and shall use different address information (DoIP_AI).

NOTE If a vehicle manufacturer requires time-stamp information with each periodic response message, then the time-stamp's size, resolution, and position in the dataRecord is vehicle manufacturer specific.

The usage of ReadDataByPeriodicIdentifier service should consider a single data format being supported for the whole vehicle across all in-vehicle networks which may consist of data links other than DoIP, e.g. if CAN is part of the electrical vehicle architecture in addition to DoIP, the total DID data length should not exceed the length limitations of the CAN protocol to ensure a single data format.

Table 3 specifies the requirements for periodic data response messages.

Table 3 — Periodic transmission — Requirements for periodic data response message mapping

Message type	Client request requirements	Server response requirements	Further server restrictions
Periodic data response message uses a different DoIP logical address (DoIP_AI) for periodic message transmissions	No restrictions	Only single DoIP response messages for periodic transmission	The request for periodic transmission is processed as a regular diagnostic request and the response is sent via the network layer (as a DoIP diagnostic message with service identifier 0x6A).
			On receiving the DoIP_Data.confirm that indicates the completion of the transmission of the positive response, the application starts an independent scheduler, which handles the periodic transmission.
			The scheduler in the server processes the periodic transmission as a DoIP diagnostic message with an address (DoIP_AI) that is specific to periodic data responses. The address must be chosen by the vehicle manufacturer to indicate a periodic response message.

6.5.2 Periodic transmission response message handling

6.5.2.1 General

Due to the fact that the periodic response message neither supports protocol control information nor the service identifier information, the following service primitives that make use of individual parameters, as specified in ISO 13400-2, need to be taken into account.

6.5.2.2 DoIP_Data.request

The service primitive requests transmission of <MessageData> with <Length> bytes from the sender to the receiver peer entities identified by the address information in DoIP_SA, DoIP_TA, and DoIP_TAtype (see ISO 13400-2 for parameter definition).

Each time the DoIP_Data.request service is called, the DoIP layer shall signal the completion (or failure) of the message transmission to the service user by issuing a DoIP_Data.confirm service call:

```
DoIP_Data.request     (
                      DoIP_SA
                      DoIP_TA
                      DoIP_TAtype
                      <MessageData>
                      <Length>
                      )
```

6.5.2.3 DoIP_Data.confirm

The DoIP_Data.confirm service is issued by the DoIP layer. The service primitive confirms the completion of a DoIP_Data.request service identified by the address information in DoIP_SA, DoIP_TA, and DoIP_TAtype. The parameter <DoIP_Result> provides the status of the service request (see ISO 13400-2 for parameter definition).

```
DoIP_Data.confir      (
                      DoIP_SA
                      DoIP_TA
                      DoIP_TAtype
                      <DoIP_Result>
                      )
```

6.5.2.4 DoIP_Data.indication

The DoIP_Data.indication service is issued by the DoIP layer. The service primitive indicates <DoIP_Result> events and delivers <MessageData> with <Length> bytes received from a peer protocol entity identified by the address information in DoIP_SA, DoIP_TA, and DoIP_TAtype to the adjacent upper layer (see ISO 13400-2 for parameter definition).

The parameters <MessageData> and <Length> are only valid if <DoIP_Result> equals DoIP_OK.

```
DoIP_Data.indication  (
                      DoIP_SA
                      DoIP_TA
                      DoIP_TAtype
                      <MessageData>
                      <Length>
                      <DoIP_Result>
                      )
```

The DoIP_Data.indication service call is issued after the reception of a DoIP diagnostic message.

If the DoIP layer detects any type of error in a DoIP diagnostic message, then the message shall be ignored by the DoIP layer and no DoIP_Data.indication shall be issued to the adjacent upper layer.

6.5.2.5 DoIP frame format

6.5.2.5.1 Format

The DoIP periodic transmission response message consists of the fields specified in Table 4.

Table 4 — Periodic transmission response message — DoIP message frame example

Message direction:		vehicle -> client		
Message type:		Periodic transmission response message		
ISO 13400-2	ISO 14229-1			
Generic DoIP Header Byte	-	Description	Byte Value	Mnemonic
#1	-	ISO 13400 — Protocol version	0x02	-
#2	-	ISO 13400 — Inverse protocol version	0xFE	-
#3	-	ISO 13400 — Payload type	0x8001	GH_PT
#4	-	ISO 13400 — Payload type		GH_PT
#5	-	ISO 13400 — Payload length	12	GH_PL
#6	-	ISO 13400 — Payload length		GH_PL
#7	-	ISO 13400 — Payload length		GH_PL
#8	-	ISO 13400 — Payload length		GH_PL
DoIP Pay-load Byte	A_Data_Byte	Description	Byte Value	Mnemonic
#1	-	ISO 13400 — Source address	e.g. 0x06A0 (VM address)	SA
#2	-	ISO 13400 — Source address		SA
#3	-	ISO 13400 — Target address	e.g. 0x0E00 (tester address)	TA
#4	-	ISO 13400 — Target address		TA
#5	#1	ISO 13400 — User data / ISO 14229-1 periodicDataIdentifier	0x00 – 0xFF	pDID
#6	#2	ISO 13400 — User data / ISO 14229-1 dataRecord.data#1	0x00 – 0xFF	DATA_1
#7	#3	ISO 13400 — User data / ISO 14229-1 dataRecord.data#2	0x00 – 0xFF	DATA_2
#8	#4	ISO 13400 — User data / ISO 14229-1 dataRecord.data#3	0x00 – 0xFF	DATA_3
#9	#5	ISO 13400 — User data / ISO 14229-1 dataRecord.data#4	0x00 – 0xFF	DATA_4
#10	#6	ISO 13400 — User data / ISO 14229-1 dataRecord.data#5	0x00 – 0xFF	DATA_5
#11	#7	ISO 13400 — User data / ISO 14229-1 dataRecord.data#6	0x00 – 0xFF	DATA_6
#12	#8	ISO 13400 — User data / ISO 14229-1 dataRecord.data#7	0x00 – 0xFF	DATA_7

6.5.2.5.2 Generic DoIP header

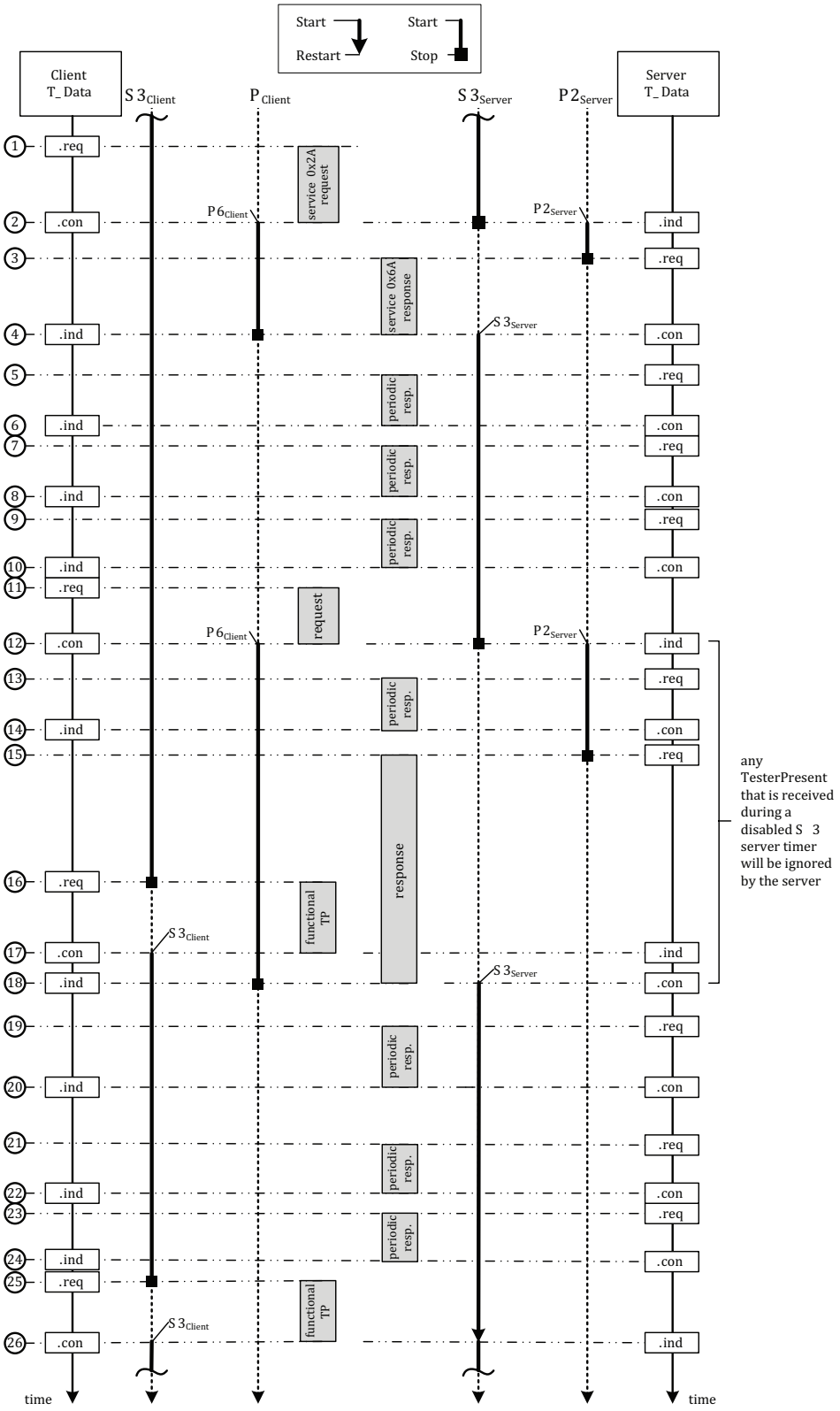
Periodic response messages are differentiated from non-periodic response messages with a specific DoIP_AI. It is up to the discretion of the vehicle manufacturer how this different DoIP_AI is implemented (e.g. different SA, different TA, or both).

In Table 4, the Target Address (TA) is a logical address of test equipment address range as defined in ISO 13400-2. The Source Address (SA) is a logical address of vehicle manufacturer address range as defined in ISO 13400-2, indicating a periodic transmission response and not a non-periodic diagnostic response message.

6.5.2.5.3 DoIP payload

In Table 4, the DoIP Payload contains SA information, TA information, and periodic data information, including a pDID and its corresponding dataRecords.

Figure 2 graphically depicts the DoIP periodic transmission response messages, as the server should handle them. Furthermore, Figure 2 shows that the periodically transmitted response messages do not have any influence on the $S3_{Server}$ timer of the server. For Figure 2, it is assumed that a non-defaultSession has been activated prior to the configuration of the periodic scheduler (the ReadDataByPeriodicIdentifier service requires a non-defaultSession in order to be executed).



Key

1 **Client T_Data.req:** The diagnostic application of the client starts the transmission of the ReadDataByPeriodicIdentifier (0x2A) request message by issuing a T_Data.req to its communication layer. The communication layer transmits the ReadDataByPeriodicIdentifier (0x2A) request message to the server.

2 **Client T_Data.con:** The completion of the request message is indicated in the client via T_Data.con. Now the response timing as described in ISO 14229-2 applies.

Server T_Data.ind: The completion of the request message is indicated in the server via the T_Data.ind. Now the response timing as described in ISO 14229-2 applies. Furthermore, the server stops its $S3_{Server}$ timer.

3 **Server T_Data.req:** It is assumed that the client requires a response from the server. The server shall transmit the ReadDataByPeriodicIdentifier positive response message to indicate that the request has been processed and that the transmission of the periodic messages will start afterwards.

4 **Server T_Data.con:** The completion of the transmission of the ReadDataByPeriodicIdentifier response message is indicated in the server via T_Data.con. Now the server restarts its $S3_{Server}$ timer, which keeps the activated non-default session active as long as it does not time out.

Client T_Data.ind: The reception of the response message is indicated in the client.

5 **Server T_Data.req:** The server starts to transmit the periodic response messages (single DoCAN frame messages). In this example, each periodic message uses a different source address as used for any other response message. All response messages (periodic and non-periodic messages) from the server shall be serialized but using a different Payload Type 0x8001 with different SourceAddresses periodic and non-periodic messages. The transmission of the periodic response messages has no influence on the $S3_{Server}$ timer.

6 **Server T_Data.con:** The completion of the transmission of the periodic response message is indicated in the server.

Client T_Data.ind: The completion of the reception of the periodic response message is indicated in the client.

7 See (5).

8 See (6).

9 See (5).

10 See (6).

11 **Client T_Data.req:** The diagnostic application of the client starts the transmission of the next request message by issuing a T_Data.req to its communication layer. The communication layer transmits the request message to the server.

12 **Client T_Data.con:** The completion of the request message is indicated in the client via T_Data.con. Now the response timing as described in ISO 14229-2 applies.

Server T_Data.ind: The completion of the multi-frame request message is indicated in the server via the T_Data.ind. Now the response timing as described in ISO 14229-2 applies.

13 See (5).

14 See (6).

15 **Server T_Data.req:** For the figure given, it is assumed that the client requires a response from the server. The server shall transmit the positive (or negative) response message by issuing a T_Data.req to its communication layer.

16 **Client T_Data.req:** When the $S3_{Client}$ timer times out in the client, the client then transmits a functionally addressed TesterPresent (0x3E) request message to reset the $S3_{Server}$ timer in the server.

17 **Server T_Data.ind:** The server is in the process of transmitting the response of the previous request. Therefore, the server shall not act on the received TesterPresent (0x3E) request message because its $S3_{Server}$ timer is not yet re-activated.

Client T_Data.con: The reception of the TesterPresent (0x3E) request message is indicated in the server.

18 **Server T_Data.con:** When the diagnostic service is completely processed, the server then restarts its $S3_{Server}$ timer. This means that any diagnostic service, including TesterPresent (0x3E), resets the $S3_{Server}$ timer. A diagnostic service is meant to be in progress any time between the reception of the request message (T_Data.ind receive) and the completion of the transmission of the response message, where a response message is required, or the completion of any action that is caused by the request, where no response message is required (point in time reached that would cause the start of the response message). This includes negative response messages including response code 0x78.

19 See (5).

20 See (6).

21 See (5).

22 See (6).

23 See (5).

24 See (6).

25 **Client T_Data.req:** Once the $S3_{Client}$ timer is started in the client (non-defaultSession active), this causes the transmission of a functionally addressed TesterPresent (0x3E) request message, which does not require a response message, each time the $S3_{Client}$ timer times out.

26 **Client T_Data.con:** Upon the indication of the completed transmission of the TesterPresent (0x3E) request message via T_Data.con of its communication layer, the client once again starts its $S3_{Client}$ timer. This means that the functionally addressed TesterPresent (0x3E) request message is sent on a periodic basis every time $S3_{Client}$ times out.

Server T_Data.ind: The reception of the TesterPresent (0x3E) request message is indicated in the server. The server shall re-activate the $S3_{Server}$ timer.

Figure 2 — Periodic transmission response message handling

7 Application layer requirements

7.1 Application layer services

This part of ISO 14229 uses the application layer services as defined in ISO 14229-1 for client-server based systems to perform functions such as test, inspection, monitoring, diagnosis, or programming of onboard vehicle servers.

7.2 Application layer protocol

This part of ISO 14229 uses the application layer protocol as defined in ISO 14229-1.

7.3 Application layer timing

The application layer timing parameter values shall be in accordance with the definitions in ISO 14229-2.

8 Presentation layer requirements

The presentation layer requirements are the responsibility of the vehicle manufacturer.

9 Session layer requirements

The session layer requirements are specified in ISO 14229-2.

10 Transport/network layer interface adaptation

10.1 General information

This part of ISO 14229 makes use of the network layer services defined in ISO 14229-2 for the transmission and reception of diagnostic messages. This clause defines the mapping of the data link-independent transport/network layer protocol data units (T_PDU) onto the IP data link-specific network layer protocol data units (DoIP_PDU).

NOTE The transport/network layer services are used to perform the application layer and diagnostic session management timing.

10.2 DoIP transport/network layer interface adaptation

10.2.1 Mapping of data link-independent service primitives onto IP data link-dependent service primitives

Table 5 defines the mapping of the transport layer-independent service primitives as defined in ISO 14229-2 onto IP-dependent service primitives defined in ISO 13400-2.

Table 5 — Mapping of T_PDU service primitives onto DoIP_PDU service primitives

Session to transport layer service primitives (data link-independent according to ISO 14229-2)	DoIP network layer service primitives (data link-dependent according to ISO 13400-2)
T_Data.indication	DoIP_Data.indication
T_Data.confirm	DoIP_Data.confirm
T_Data.request	DoIP_Data.request

10.2.2 Mapping of T_PDU onto DoIP_PDU for message transmission

The parameters of the application layer protocol data unit defined to request the transmission of a diagnostic service request/response are mapped in accordance with Table 6 onto the parameters of the communication layer protocol data unit for the transmission of a message in the client/server.

Table 6 — Mapping of T_PDU parameter onto DoIP_PDU parameter

T_PDU parameter (data link-independent according to ISO 14229-2)	DoIP_PDU parameter (IP data link-dependent according to ISO 13400-2)
T_Mtype	DoIP_Mtype[a]
T_SA	DoIP_SA
T_TA	DoIP_TA
T_TAtype	DoIP_TAtype
T_AE	N/A [b]
T_Data [ ]	<MessageData>
T_Length	<Length>
T_Result	<DoIP_Result>

[a] Remote diagnostic feature is not supported by DoIP.

[b] Extended addressing is not supported by DoIP.

11 Data link layer diagnostic implementation requirements

The IP data link implementation shall follow the requirements stated in ISO 13400-3.

Bibliography

[1] ISO 7498-1:1984, *Information processing systems — Open systems interconnection — The basic model*

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

[3] ISO 11898-2, *Road vehicles — Controller area network (CAN) — Part 2: High-speed medium access unit*

[4] ISO 15765-2, *Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 2: Transport protocol and network layer services*

[5] ISO 15765-4, *Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 4: Requirements for emissions-related systems*

[6] ISO/IEC 10731:1994, *Information technology — Open Systems Interconnection — Basic Reference Model — Conventions for the definition of OSI services*

[7] SAE J1930-DA, *Digital Annex of Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms Web Tool Spreadsheet*

[8] SAE J1939, *Companion Spreadsheet (CS1939)*

[9] SAE J1939-73:2010, *Application layer — Diagnostics*

[10] SAE J1979-DA, *Digital Annex of E/E Diagnostic Test Modes*

[11] SAE J2012-DA, *Digital Annex of Diagnostic Trouble Code Definitions and Failure Type Byte Definitions*

ICS 43.180

Price based on 15 pages