INTERNATIONAL STANDARD

ISO 27145-4

First edition
2012-08-15

Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements —

Part 4: Connection between vehicle and test equipment 车辆与测试设备的连接

Véhicules routiers — Mise en application des exigences de communication pour le diagnostic embarqué harmonisé à l'échelle mondiale (WWH-OBD) —

Partie 4: Connexion entre véhicule et équipement d'essai

Reference number
ISO 27145-4:2012(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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

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

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

ISO 27145-4 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

This first edition of ISO 27145-4 cancels and replaces ISO/PAS 27145-4:2006, which has been technically revised.

ISO 27145 consists of the following parts, under the general title *Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements*:

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

— *Part 2: Common data dictionary*

— *Part 3: Common message dictionary*

— *Part 4: Connection between vehicle and test equipment*

The following parts are under preparation:

— *Part 6: External test equipment*

0 Introduction

0.1 Overview

The ISO 27145 series includes the communication between the vehicle's on-board diagnostics (OBD) systems and external test equipment within the scope of the World-Wide Harmonized On-Board Diagnostics Global Technical Regulations (WWH-OBD GTR).

It has been established in order to apply the unified diagnostic services (specified in ISO 14229-1) to WWH-OBD systems.

The ISO 27145 series includes the communication between the vehicle's WWH-OBD systems and external (off-board) "generic" test equipment within the scope of the country-specific regulatory requirements.

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 27145 are broken into

— diagnostic services (layer 7), specified in ISO 27145-3 with reference to ISO 14229-1,

— presentation layer (layer 6), specified in 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), specified in ISO 14229-2,

— transport layer services (layer 4), specified in this part of ISO 27145 with reference to ISO 13400-2, ISO 15765-2 and ISO 15765-4,

— network layer services (layer 3), specified in this part of ISO 27145 with reference to ISO 15765-4, ISO 15765-2 and ISO 13400-2,

— data link layer (layer 2), specified in this part of ISO 27145 with reference to ISO 11898-1, ISO 11898-2, ISO 15765-4, ISO 13400-3 and IEEE 802.3, and

— physical layer (layer 1), specified in this part of ISO 27145 with reference to ISO 11898-1, ISO 11898-2, ISO 15765-4, ISO 13400-3 and IEEE 802.3,

in accordance with Table 1.

Table 1 — WWH-OBD specification reference applicable to the OSI layers

<table>
<tr><th>Applicability</th><th>OSI 7 layer</th><th colspan="3">WWH-OBD document reference</th></tr>
<tr><td rowspan="8">Seven layers according to ISO/IEC 7498-1 and ISO/IEC 10731</td><td>Application (layer 7)</td><td colspan="3">ISO 14229-1, ISO 27145-3</td></tr>
<tr><td>Presentation (layer 6)</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="3">ISO 14229-2</td></tr>
<tr><td>Transport (layer 4)</td><td rowspan="2">ISO 15765-2 DoCAN,
ISO 15765-4 DoCAN,</td><td rowspan="4">ISO 27145-4</td><td rowspan="2">ISO 13400-2 DoIP
TCP & IP</td></tr>
<tr><td>Network (layer 3)</td></tr>
<tr><td>Data link (layer 2)</td><td rowspan="2">ISO 11898-1 CAN DLL,
ISO 11898-2 CAN HS,
ISO 15765-4 DoCAN</td><td rowspan="2">ISO 13400-3 DoIP,
IEEE 802.3</td></tr>
<tr><td>Physical (layer 1)</td></tr>
</table>

0.2 SAE document reference concept

ISO 27145 makes reference to several SAE documents which contain the terms, data and diagnostic trouble code (DTC) definitions.

ISO 27145-2 defines a common data dictionary for the ISO 27145 series, according to the definitions in the following documents (see Figure 1).

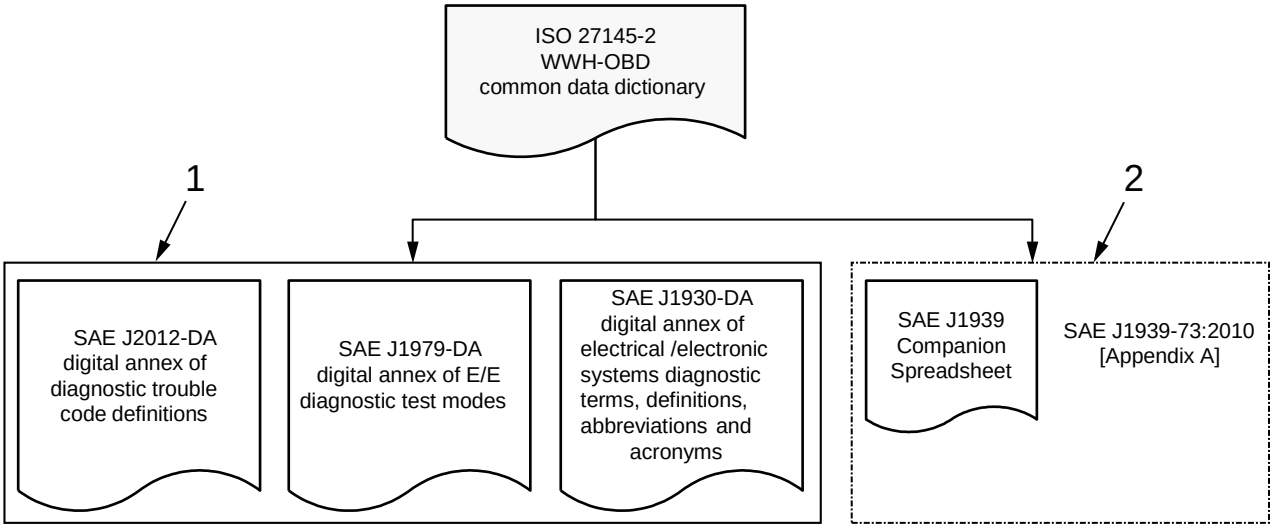
— SAE J1930-DA: this digital annex contains all standardized naming objects, terms and abbreviated terms.

— SAE J1939 Companion Spreadsheet and SAE J1939-73: SAE J1939 Companion Spreadsheet indexes names for suspect parameter numbers (SPNs) that provide an alternative presentation format for SAE J2012-DA DTCs. SPNs are combined with failure mode indicators (FMIs) to form the full alternative presentation. FMIs are described in SAE J1939-73:2010, Appendix A.

NOTE The SAE J1939 Companion Spreadsheet is a document which supplements the SAE J1939 family of standards and contains SPNs and parameter group numbers (PGNs).

— SAE J1979-DA: this digital annex contains all standardized data items such as data identifiers (DIDs), test identifiers (TIDs), monitor identifiers (MIDs) and infotype identifiers (ITIDs).

— SAE J2012-DA: this digital annex contains all standardized data items such as DTC definitions and FTB (failure type byte) definitions.



Key

1 SAE digital annexes: data definitions

2 SAE J1939 series of documents: DTC definitions

Figure 1 — SAE digital annex document reference

0.3 SAE digital annex revision procedure

New regulatory requirements drive new in-vehicle technology to lower emissions, improve safety, etc. It is important to standardize new technology-related OBD monitor data and DTCs in order to support the external (off-board) “generic” test equipment. All relevant information is proposed by the automotive industry, represented by members of the appropriate SAE task force.

ISO 27145-2 references a “Change request form” for use with new data items to be defined by the SAE task force for standardization. It is intended that the standardized data items be defined in SAE J1930-DA, SAE J1979-DA, SAE J2012-DA and SAE J1939. It is intended that the documents be published on the SAE store website once the information has been balloted and approved.

The revision request forms and instructions for updating the registers to ISO 27145 can be obtained on the following data registration websites:

— For SAE J1930-DA: http://www.sae.org/servlets/works/committeeHome.do?comtID=TEVDS7

  The column entitled “Resources” shows a document with the title: J1930-DA_Revision_Request_Form. doc. Double click on the name to download the document with the filename: “SAE_J1930-DA_Revision_ Request_Form.doc”.

— For SAE J1939: http://www.sae.org/

  Search “J1939 Request”, select “J1939 Request Processing Group”, select “J1939 Request Processing Form and Guidelines”.

— For SAE J1979-DA: http://www.sae.org/servlets/works/committeeHome.do?comtID=TEVDS14

  The column entitled “Resources” shows a document with the title: J1979-DA_Revision_Request_Form. doc. Double click on the name to download the document with the filename: “SAE_J1979-DA_Revision_ Request_Form.doc”.

— For SAE J2012-DA: http://www.sae.org/servlets/works/committeeHome.do?comtID=TEVDS9

  The column entitled “Resources” shows a document with the title: J2012-DA_Revision_Request_Form. doc. Double click on the name to download the document with the filename: “SAE_J2012-DA_Revision_ Request_Form.doc”.

It is intended that the revision request form be filled out with the request.

It is intended that e-mails with completed revision request forms as attachments be sent to:

E-mail:

saej1930@sae.org

E-mail:

saej1979@sae.org

E-mail:

saej2012@sae.org

E-mail:

saej1939@sae.org

Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements —

Part 4: Connection between vehicle and test equipment

1 Scope

This part of ISO 27145 defines the requirements to successfully establish, maintain and terminate communication with a vehicle that implements the requirements of the WWH-OBD GTR (Global technical regulation No. 5; see Reference [16]). This requires plug and play communication capabilities for the vehicle as well as for any test equipment that intends to establish communication with a vehicle. This part of ISO 27145 details all the OSI layer requirements to achieve this goal.
ISO 27145 的这一部分定义了成功地建立、维护和终止与实现 WWH-OBD的要求的车辆通信的要求 (全球技术法规5号; 请参阅参考资料 [16])。这要求车辆的即插即用通信能力, 以及任何打算与车辆建立通信的测试设备。ISO 27145 的这一部分详细说明了实现这个目标的所有 OSI 层要求。

This part of ISO 27145 is intended to become the single communication standard for access to information relating to vehicle on-board diagnostics (VOBD). To allow for a smooth migration from the existing communication standards to this future world-wide standardized communication standard, the communication concept as specified in this part of ISO 27145 is based on two different data links:
ISO 27145 的这一部分旨在成为获取与车载诊断 (VOBD) 有关的信息的单一通信标准。为了允许从现有通信标准顺利迁移到这个未来的全球标准化通信标准, ISO 27145 这一部分中指定的通信概念基于两个不同的数据链接:

— Diagnostic communication over Controller Area Network (DoCAN), ISO 15765-4;基于CAN诊断通信
— Diagnostic communication over Internet Protocol (DoIP), ISO 13400 (all parts).基于互联网协议诊断通信

NOTE It is intended that this part of ISO 27145 will be extended as necessary upon introduction of additional communication media. 请注意：在引入额外的通信媒体时, 将根据需要扩展 ISO 27145 的这一部分。

IMPORTANT — Use cases deriving from country-specific implementation of GTR No. 5 into local legislation are not included in this part of ISO 27145. 在 ISO 27145 的这一部分中不包括从国家具体执行5号标准到地方立法的重要用例。

2 Normative references规范性参考

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. 以下参考文档对于本文档的应用是必不可少的。对于日期引用, 仅适用引用的版本。对于未注明日期的引用, 引用文档的最新版本 (包括任何修订) 适用。

ISO 13400-2:2012, *Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 2: Transport protocol and network layer services*

ISO 13400-3, *Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 3: Wired vehicle interface based on IEEE 802.3*

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*

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

ISO 15765-4:2011, *Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 4: Requirements for emissions-related systems*

ISO 27145-1, *Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements — Part 1: General information and use case definition*

ISO 27145-2, *Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements — Part 2: Common data dictionary*

ISO 27145-3, *Road vehicles — Implementation of World-Wide Harmonized On-Board Diagnostics (WWH-OBD) communication requirements — Part 3: Common message dictionary*

3 Terms, definitions and abbreviated terms术语、定义和缩写术语

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 27145-1, ISO 27145-2 and ISO 14229-1 apply.

3.2 Abbreviated terms

CAN	controller area network 控制器区域网络
DHCP	dynamic host configuration protocol 动态主机配置协议
DID	data identifier 数据标识符
DoCAN	diagnostic communication over CAN 基于CAN的诊断通信
DoIP	diagnostic communication over internet protocol 基于因特网协议的诊断通信
DTC	diagnostic trouble code 诊断故障代码
ECU	electronic control unit 电子控制单元
FMI	failure mode indicator 故障模式指示器
FTB	failure type byte 故障类型字节
GTR	global technical recommendation 全球技术建议
IP	internet protocol 互联网协议
N_PDU	network layer protocol data unit 网络层协议数据单元
NRC	negative response code 负响应代码
OBD	on-board diagnostics 在线诊断系统
OSI	open systems interconnection 开放系统互联
SA	source address 源地址
SPN	suspect parameter number 可疑参数编号
T_PDU	transport/network layer protocol data unit 传输/网络层协议数据单元
TA	target address 目标地址
TCP	transmission control protocol 传输控制协议
WWH-OBD	world-wide harmonized on-board diagnostics 全球统一的在线诊断程序
VOBD	vehicle on-board diagnostics 车辆在线诊断

4 Conventions 约定

The ISO 27145 series is based on the conventions discussed in the OSI Service Conventions (ISO/IEC 10731) as they apply to diagnostic services. ISO 27145 系列基于OSI服务公约 (ISO/IEC 10731) 中讨论的约定, 因为它们适用于诊断服务。

5 Document overview

Figure 2 shows the reference documents for the ISO 27145 series.

The ISO 27145 series specifies or includes the following references:

a) ISO 27145-1 specifies the general structure of the ISO 27145 series and the WWH-OBD GTR applicable use cases.

b) ISO 27145-2 specifies the common data dictionary with references to:

   1) SAE J1930-DA, which defines the terms, definitions, abbreviated terms, etc.;

   2) SAE J1939 Companion Spreadsheet, which specifies the SPNs;

   3) SAE J1939-73:2010, Appendix A, which specifies the FMIs;

   4) SAE J1979-DA, which specifies all data items;

   5) SAE J2012-DA, which specifies the DTC definitions and FTB definitions.

NOTE The SAE J1939 series of documents is concerned with the definition of emissions-related SPNs and FMIs for use as DTCs.

c) ISO 27145-3 specifies the diagnostic services defined in ISO 14229-1 that are applicable to WWH-OBD GTR.

d) ISO 14229-2 specifies the standardized service primitive interface to separate application and session layers from protocol transport and network layers.

e) This part of ISO 27145 specifies the initialization procedure and includes references to:

   1) ISO 15765-4 DoCAN;

   2) ISO 13400 (all parts) DoIP.

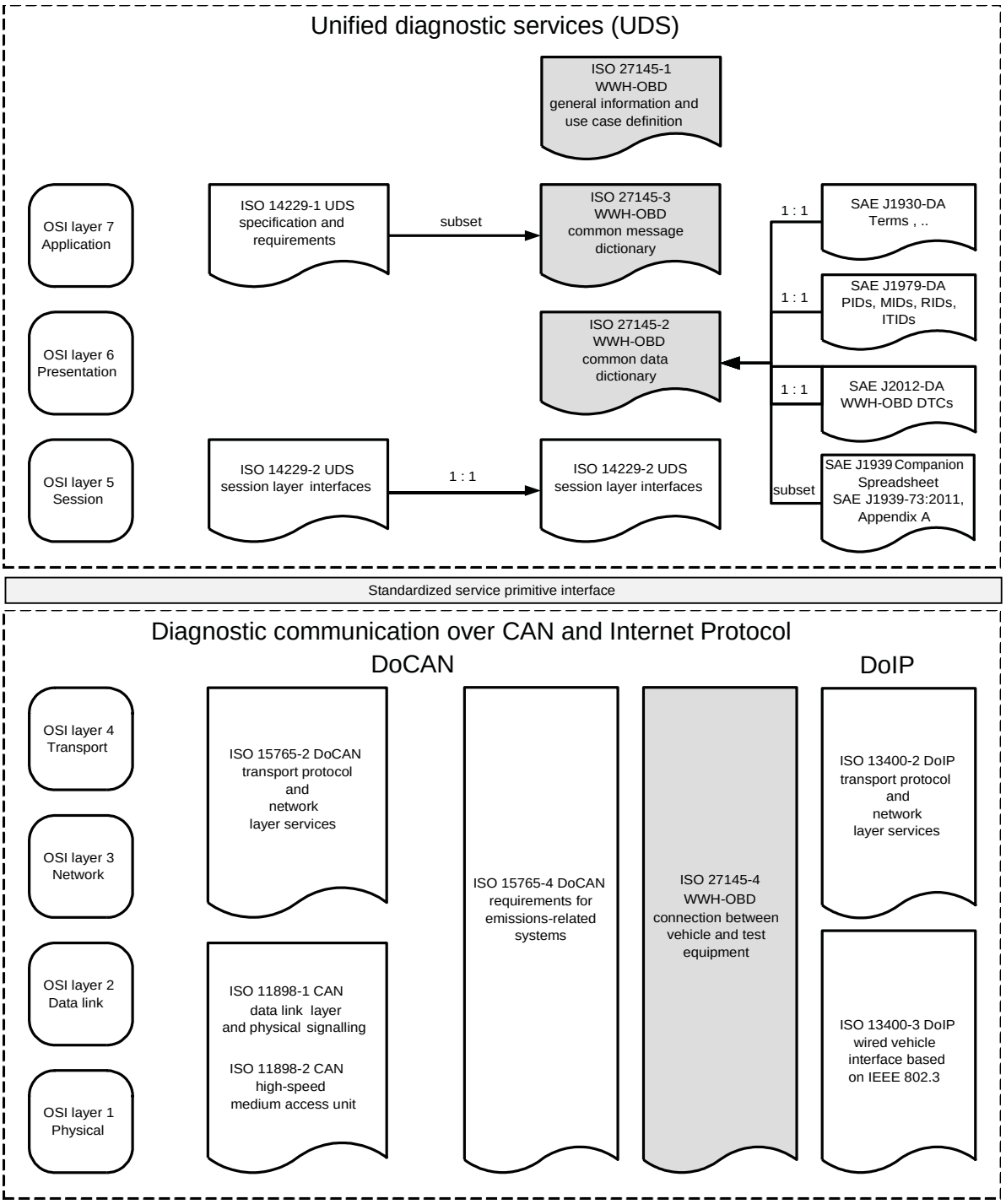


Figure 2 — Implementation of WWH-OBDonCAN and WWH-OBDonIP document reference according to OSI model

6 Vehicle and external test equipment connection requirements车辆和外部测试设备连接要求

6.1 Overview

To provide a future-oriented long-term stable communication standard which is based on existing industry communication standards while allowing for backward-compatibility to existing automotive networks, ISO 27145

is designed to support different types of connections between external test equipment and a vehicle. Regardless of the underlying physical layer, data link and network layer the other parts of ISO 27145 remain unaltered.
为了提供一个面向未来的长期稳定的通信标准, 根据现有的行业通信标准, 同时允许向后兼容现有的汽车网络, ISO 27145 旨在支持不同类型的外部测试设备和车辆之间的连接。不管底层的物理层、数据链路和网络层, ISO 27145 的其他部分保持不变。

a) CAN-based wired connection (see Clause 7)基于CAN的有线连接（参见目录7）
This is the type of connection which describes the use of WWH-OBD communication services on an existing ISO 15765-4-compliant vehicle interface. It has been defined to allow for a smooth migration from a CAN-based vehicle interface to an Ethernet-based connection to a vehicle. 这个连接类型,描述了在现有的 ISO 15765-4 兼容的车辆接口上使用 WWH-OBD 的通信服务。它已定义为允许从基于 CAN 的车辆接口顺利迁移到基于以太网的与车辆的连接。

b) DoIP over Ethernet wired connection (see Clause 8)基于DoIP互联网有线连接（参见目录8）
This is the type of connection which utilizes the Internet Protocol as the network layer on a Fast Ethernet (IEEE 802.3) connection. 这是在快速以太网 (IEEE 802.3) 连接上利用 Internet 协议作为网络层的连接类型。

6.2 Data link independent requirements 数据链路独立要求

WWH-OBD-compliant servers/ECUs are required to support the InfoType “ECUNAME” with services readDataByIdentifier 0x22 and dataIdentifier 0xF80A (see SAE J1979-DA). The mapping between a server/ECU logical address and the name (ECUNAME) of the server/ECU shall be performed by the external test equipment.
WWH-OBD符合标准的控制器/ECUs 需要支持信息类型 "ECUNAME", 服务通过标识符0x22 和数据标识符 0xF80A (参见 SAE J1979-DA) 来读取数据。控制器/ECU逻辑地址与控制器/ECU 名称 (ECUNAME) 之间的映射应由外部测试设备执行。

6.3 Support of only one WWH-OBD-compliant external test equipment at a time
一次只支持一个 WWH 符合标准的外部测试设备

The in-vehicle WWH-OBD system shall support only one type of WWH-OBD-compliant external test equipment at a time:

— If the vehicle supports DoCAN, then the WWH-OBD-compliant external test equipment shall use the source addresses (SA) specified in ISO 15765-4:2011, 10.5, which deals with mapping of diagnostic addresses.
如果车辆支持 DoCAN, 则 WWH-OBD符合标准的外部测试设备应使用 ISO 15765-4 中指定的源地址 (SA): 2011、10.5, 其中涉及诊断地址的映射。

— If the vehicle supports DoIP, then the WWH-OBD-compliant external test equipment shall use the SA 0xE000 specified in ISO 13400-2:2012, Table 39, which gives an overview of logical addressing.
如果车辆支持 DoIP, 则 WWH-OBD符合标准的外部测试设备应使用 ISO 13400-2 中指定的 SA 0xE000: 2012, 表 39, 它提供了逻辑寻址的概述。

7 Wired CAN connection based on ISO 15765-4 基于 ISO 15765-4 的有线 CAN 连接

7.1 Network scenario requirements 网络方案要求

Using ISO 11898-1 and ISO 11898-2 (CAN) and ISO 15765-4 (DoCAN), a variety of network scenarios can be used to access vehicles for the use cases defined in ISO 27145-1. See ISO 14229-2 for network scenario examples.
使用ISO11898-1 和ISO11898-2 (CAN) 和ISO15765-4 (DoCAN), 各种网络方案可用于访问 ISO 27145-1 中定义的用例的车辆。有关网络方案示例, 请参见 ISO 14229-2。

7.2 Initialization sequence 初始化序列

The external test equipment shall support the initialization sequence as specified in ISO 15765-4.
外部测试设备应支持 ISO 15765-4 中指定的初始化序列

7.3 ISO 27145-3 WWH-OBD protocol validation sequence ISO 27145-3 WWH 协议验证序列

The external test equipment shall support the ISO 27145-3 WWH-OBD protocol validation sequence specified in ISO 15765-4. 外部测试设备应支持指定的 ISO 27145-3 WWH 协议验证序列ISO 15765-4。

7.4 Application layer — DoCAN

7.4.1 General

All application-specific requirements for data content and formatting shall be supported as specified in ISO 27145-2 and ISO 27145-3. 对于数据内容和格式，所有应用程序特定要求应按照 iso 27145-2 和 iso 27145-3 中的规定予以支持。

7.4.2 Diagnostic protocol communication types 诊断协议通信类型

The following communication types shall be supported for the diagnostic protocol implementation for WWH-OBD on CAN as specified in ISO 14229-2:
在ISO 14229-2中指定的CAN通信WWH-OBD的诊断协议实施时, 应支持以下通信类型:

a) functional communication;功能性通讯

b) physical communication.物理通信

The following WWH-OBD communication types on DoCAN shall be supported by WWH-OBD-compliant servers/ECUs (for details, see ISO 14229-2):
符合WWH-OBD的控制器/ECUs要支持基于DoCAN的WWH-OBD通信（详情，见ISO14229-2）
— functional communication during defaultSession;默认会话期间的功能通信
— functional communication during defaultSession with enhanced response timing;默认会话期间的增强响应时间通信
— physical communication during defaultSession;默认会话期间的物理通信
— physical communication during defaultSession with enhanced response timing.默认会话期间增强响应时间进行物理通信

Each diagnostic service specified in ISO 27145-3 shall be transmitted by the external test equipment with the addressing method (functionally, physically) as specified in ISO 27145-3. Specific requirements on the use of individual services with either functional or physical addressing are given in ISO 27145-3.
ISO 27145-3 中指定的每种诊断服务都应由外部测试设备以ISO 27145-3 中指定的寻址方法 (功能上、物理上) 传输。ISO 27145-3 给出了使用功能性或物理寻址的个别服务的具体要求。

EXAMPLE Short diagnostic requests (less than 7 bytes) which are supported by most of the ECUs can be transmitted using functional addressing, while requests for multiple data identifiers (DIDs) (see ISO 27145-2) which are explicitly requested from a single server/ECU shall be requested using physical addressing.
示例: 大多数 ECUs 支持的短诊断请求 (少于7字节) 可以使用功能寻址进行传输, 同时请求来自单个控制器/ECU的多个数据标识符 (DIDs) (参见 ISO 27145-2)应使用物理寻址请求。

7.4.3 Maximum number of WWH-OBD servers/ECUs
The maximum number of WWH-OBD-compliant servers/ECUs is limited by the address range definitions in ISO 15765-4. 在ISO 15765-4中WWH-OBD符合标准的控制器/ECUs 的最大数目受地址范围定义的限制。

7.4.4 Diagnostic protocol timing parameters
The application layer timing parameter values for the default diagnostic session shall be in accordance with ISO 27145-3. 默认诊断会话的应用层计时参数值应符合与 ISO 27145-3

For all diagnostic services specified in ISO 27145-3, the possibility of the server requesting an enhanced response-timing window via a negative response message, including a negative response code (NRC) 0x78 (requestCorrectlyReceived-ResponsePending), shall be supported if specified for the diagnostic service in ISO 14229-2 (see $P4_{Server}$). 对于 ISO 27145-3 中指定的所有诊断服务，控制器通过负响应消息请求增强的响应时间窗口的可能行，包括一个负响应代码（NRC）0x78（请求正确接收的响应待定），如果为ISO14229-2诊断服务指定的话，应该予以支持。（见 $P4_{Server}$）

7.4.5 External test equipment logical addresses 外部测试设备逻辑地址
The external test equipment implementing the use cases defined in ISO 27145-1 shall implement the CAN identifiers and the address as specified in ISO 15765-4 for the external legislated diagnostic test equipment when requesting WWH-OBD data from a WWH-OBD-compliant vehicle.外部测试设备在执行ISO 27145-1中指定的测试用例时，应该使用ISO15764-4中指定的CAN标识符和地址，用于外部立法诊断测试设备请求符合WWH-OBD的数据从一辆符合WWH-OBD的车辆中。

7.4.6 Server/ECU logical addressing 控制器/ECU逻辑寻址
A WWH-OBD-compliant vehicle shall implement the CAN identifiers and the address as specified in ISO 15765-4 for each WWH-OBD-compliant server/ECU. 一辆WWH-OBD符合的车辆应该实现ISO15765-4给一个符合WWH-OBD的控制器/ECU定义的CAN标识符和地址。

7.5 Presentation layer表示层

All presentation-layer-specific requirements for data content and formatting shall be supported as defined in ISO 27145-2. 所有表示层具体数据内容和格式的请求应该被支持，如ISO27145-2的定义。

7.6 Session layer 会话层

All WWH-OBD communication shall take place during the default diagnostic session; therefore, no session layer timing handling is required for WWH-OBD communication. Further details are given in ISO 14229-2. 在默认的诊断会话期间，所有的WWH-OBD通信都应进行，因此，WWH-OBD通话时没有会话层定时请求。更详细细节在ISO 14229-2中。

There shall always be exactly one diagnostic session active in a WWH-OBD-related server/ECU. A WWH-OBD-related server/ECU shall always start the default diagnostic session when powered up. If no other diagnostic session is started, then the default diagnostic session shall run as long as the WWH-OBD-related server/ECU is powered. 在与WWH-OBD相关的控制器/ECU中，始终有一个诊断会话处于激活状态。一个WWH-OBD相关的控制器/ECU应该始终处于启动默认的诊断会话中。如果没有其它的诊断会话启动，只要与WWH-OBD相关的控制器/ECU已通电，则默认的会话将运行。

A WWH-OBD-related server/ECU shall be capable of providing all diagnostic functionality defined for WWH-OBD in the default diagnostic session and under normal operating conditions. 在默认诊断会话和正常操作条件下，一个WWH-OBD相关的控制器/ECU应该能够提供所有的WWH-OBD定义的诊断功能。

NOTE If in multi-tester environments (e.g. additional on-vehicle monitoring unit) a different session is active while external test equipment transmits requests, then the default diagnostic session need only be entered if the WWH-OBD communication requirements (including application requirements) cannot be fulfilled in the currently active non-default session.
注意：如果在多测试环境中（例如 额外的车载监控单元），当外部测试设备传输请求时，一个不同的会话被激活，然后只有在WWH-OBD通信请求（包括应用请求）无法被当前默认会话满足时，默认的诊断会话才会被输入。

There shall be no need to send any diagnostic service to the WWH-OBD-related server/ECU to keep the default diagnostic session active. 不需要向与 WWH-OBD 相关的控制器/ECU 发送任何诊断服务, 以保持默认诊断会话处于活动状态。

7.7 Transport layer 传输层

7.7.1 General information

All transport-layer-specific-requirements shall be supported as defined in ISO 15765-2. This part of ISO 27145 makes use of the session layer T_PDU (transport/network layer protocol data unit) service primitives defined in ISO 14229-2 for the transmission and reception of diagnostic messages. Subclauses 7.7.2 and 7.7.3 define the mapping of the data-link-independent T_PDUs onto the data-link-specific N_PDUs (network layer protocol data units) defined in this part of ISO 27145. 所有运输层特定要求应根据 ISO 15765-2 中的定义予以支持。ISO 27145 的这一部分使用了ISO 14229-2 中定义的会话层 T_PDU (传输/网络层协议数据单元) 服务基元来传输和接收诊断消息。 第7.7.2 和7.7.3 定义了数据链路无关的 T_PDUs 在 ISO 27145 这一部分定义的数据链路特定 N_PDUs (网络层协议数据单元) 上的映射。

NOTE The transport/network layer services are used to perform the application layer and diagnostic session management timing. 注意：传输层/网络层服务用于执行应用层和诊断会话管理时间。

7.7.2 Mapping of data-link-independent service primitives onto DoCAN data-link-dependent service primitives 将数据链路独立服务单元映射到DoCAN数据链路依赖的服务单元。

Table 2 defines the mapping of T_PDU service primitives onto N_PDU service primitives.
表2 定义了T_PDU服务基元映射到N_PDU服务基元

Table 2 — Mapping of T_PDU service primitives onto N_PDU service primitives

Session to transport layer service primitives (data-link-independent according to ISO 14229-2)	**DoCAN network layer service primitives** (data-link-dependent according to ISO 15765-2)
T_Data.indication	N_USData.indication
T_DataSOM.indication	N_USDataFF.indication
T_Data.confirm	N_USData.confirm
T_Data.request	N_USData.request

7.7.3 Mapping of T_PDU onto N_PDU for message transmission T_PDU到N_PDU的消息传输映射

The parameters of the application layer protocol data unit for requesting the transmission of a diagnostic service request/response are mapped in accordance with Table 3 onto the parameters of the DoCAN network layer protocol data unit for the transmission of a message by the client/server. 应用层协议数据单元用于请求传输诊断服务请求/响应的参数按照表3映射到 DoCAN 网络层协议数据单元的参数, 用于传输一个客户端/服务器的消息。

Table 3 — Mapping of T_PDU parameter onto N_PDU parameter T_PDU 参数在 N_PDU 参数上的映射

T_PDU parameter (data-link-independent according to ISO 14229-2)	**N_PDU parameter** (DoCAN data-link-dependent according to ISO 15765-2)
T_Mtype	N_Mtype
T_SA	N_SA
T_TA	N_TA
T_TAtype	N_TAtype
T_AE	N_AE
T_Data [ ]	<MessageData>
T_Length	<Length>
T_Result	<N_Result>

The address mapping between the network layer and the OSI higher layers is not necessarily an exact copy of the address values as encoded on the data link layer and therefore depends on the implementation concept.
网络层和 OSI 较高层之间的地址映射不一定是数据链路层上编码的地址值的确切副本, 因此取决于实现概念。

The mapping and the values for emissions-related WWH-OBD are defined in ISO 15765-4.
在 ISO 15765-4 中定义了与排放相关的 WWH-OBD的映射和值。

7.8 Network layer 网络层

The network layer of the external test equipment and the legislated OBD/WWH-OBD-compliant vehicle server(s)/ECU(s) — from the external test equipment point of view — shall be in accordance with ISO 15765-4.

外部测试设备的网络层和由外部测试设备 (WWH-OBD) 所规定的与符合标准的车载控制器/ECU (s) 相一致的车辆, 应符合 ISO 15765-4。

A vehicle compliant with ISO 27145 shall only respond to ISO 27145-3 requests from external test equipment if the external test equipment uses the assigned functional address as specified for the WWH-OBD GTR-defined functional system group, e.g. 0x33 for an emissions-related functional system group. If the external test equipment uses other server/ECU addresses, it may request messages as defined by that protocol.

符合ISO 27145 的车辆只应对外部测试设备的ISO 27145-3 请求作出反应, 如果外部测试设备使用指定的功能地址为 WWH 的 GTR 定义的功能系统组, 例如0x33与排放相关的功能系统组。如果外部测试设备使用其他服务器/ECU 地址, 它可能会请求该协议定义的消息。

7.9 Data link layer 数据链路层

The definition of data link layer parameter values shall be in accordance with ISO 15765-4.
数据链路层参数值的定义应符合ISO 15765-4。

7.10 Physical layer 物理层

The physical layer and physical signalling of the external test equipment and the servers/ECUs shall be in accordance with ISO 15765-4.
外部测试设备和控制器/ECUs 的物理层和物理信号应符合 ISO 15765-4。

7.11 Diagnostic connector 诊断连接器

The diagnostic connector provides the connection between the external test equipment and the WWH-OBD-compliant vehicle. The connector shall be implemented in accordance with ISO 15765-4.
诊断连接器提供外部测试设备与 WWH-OBD符合标准的车辆之间的连接。连接器应按照 ISO 15765-4 执行。

8 Wired Ethernet connection based on ISO 13400 基于ISO 13400的有线以太网连接

8.1 Network scenario requirements网络方案要求

Using Ethernet and DoIP, a variety of network scenarios can be used to access vehicles for the use cases

defined in ISO 27145-1. Due to the complexity of certain network architectures and presence of other network nodes (i.e. other than the vehicle under inspection and the external test equipment), which heavily impacts the message timing, IP address setup and data throughput, the initialization sequence is specified with the following restrictions:
使用以太网和 DoIP, 各种网络方案可用于访问 ISO 27145-1 中定义的用例的车辆。由于某些网络体系结构的复杂性和其他网络节点 (如检测到的车辆和外部测试设备除外) 的存在, 严重影响了消息定时、IP 地址设置和数据吞吐量, 因此初始化序列以下列限制指定:

— The vehicle under inspection is directly connected to the external test equipment through a dedicated wire with no additional network equipment installed in the connection path. (See the direct physical connection scenario in ISO 13400-1:2011, 9.2. See also ISO 13400-2:2012, 8.3.1 for further details on connection establishment and vehicle discovery in a direct connection scenario.)
正在检查的车辆通过专用导线直接连接到外部测试设备, 连接路径中没有安装额外的网络设备。(请参见 ISO 13400-1 中的直接物理连接方案: 2011、9.2。参见 ISO 13400-2: 2012, 8.3.1 有关连接建立和车辆发现在直接连接情况下的进一步详细信息。)

NOTE This means that the definitions given in the list items below do not take into account the presence of any type of hub, switch or wireless LAN access point (if Ethernet to WLAN adapters are used) in infrastructure mode or similar equipment. This also implies that DoIP entities of a single vehicle will only be detected during the discovery sequence specified in ISO 13400-2. If more than one vehicle is detected, this is a clear indication of a network setup that does not adhere to the aforementioned requirement.
注意: 这意味着下面列表项中给出的定义在基础结构模式或类似设备中不考虑任何类型的集线器、交换机或无线 LAN 接入点 (如果使用以太网到 WLAN 适配器) 的存在。这也意味着只有在 ISO 13400-2 中指定的发现序列中才会检测到单个车辆的 DoIP 实体。如果检测到不止一辆车辆, 这显然表明网络设置不符合上述要求。

— Due to the nature of a direct wired connection, the Ethernet transceivers of both the external test equipment and the vehicle under inspection will detect the Ethernet activation almost at the same time.
由于直接有线连接的性质, 外部测试设备和检测车辆的以太网收发器将几乎同时检测到以太网的激活。

— The external test equipment and vehicle will assign link-local IP addresses as specified in ISO 13400-2. Dynamic protocol delays and IP address changes caused by a dynamic host configuration protocol (DHCP) server are not considered in the initialization sequence.
外部测试设备和车辆将分配 ISO 13400-2 中指定的链路本地 IP 地址。动态主机配置协议 (DHCP) 服务器导致的动态协议延迟和 IP 地址更改在初始化序列中不被考虑。

— The external test equipment supports both IPv4 and IPv6 addressing to support vehicles with all DoIP entities using either IPv4 or IPv6. DoIP entities on a vehicle using IPv6 will not be capable of communicating with external test equipment that supports only IPv4, and vice versa.
外部测试设备支持 IPv4 和 IPv6 寻址, 以支持使用 IPv4 或 IPv6 的所有 DoIP 实体的车辆。使用 IPv6 的车辆上的 DoIP 实体将无法与仅支持 IPv4 的外部测试设备进行通信, 反之亦然。

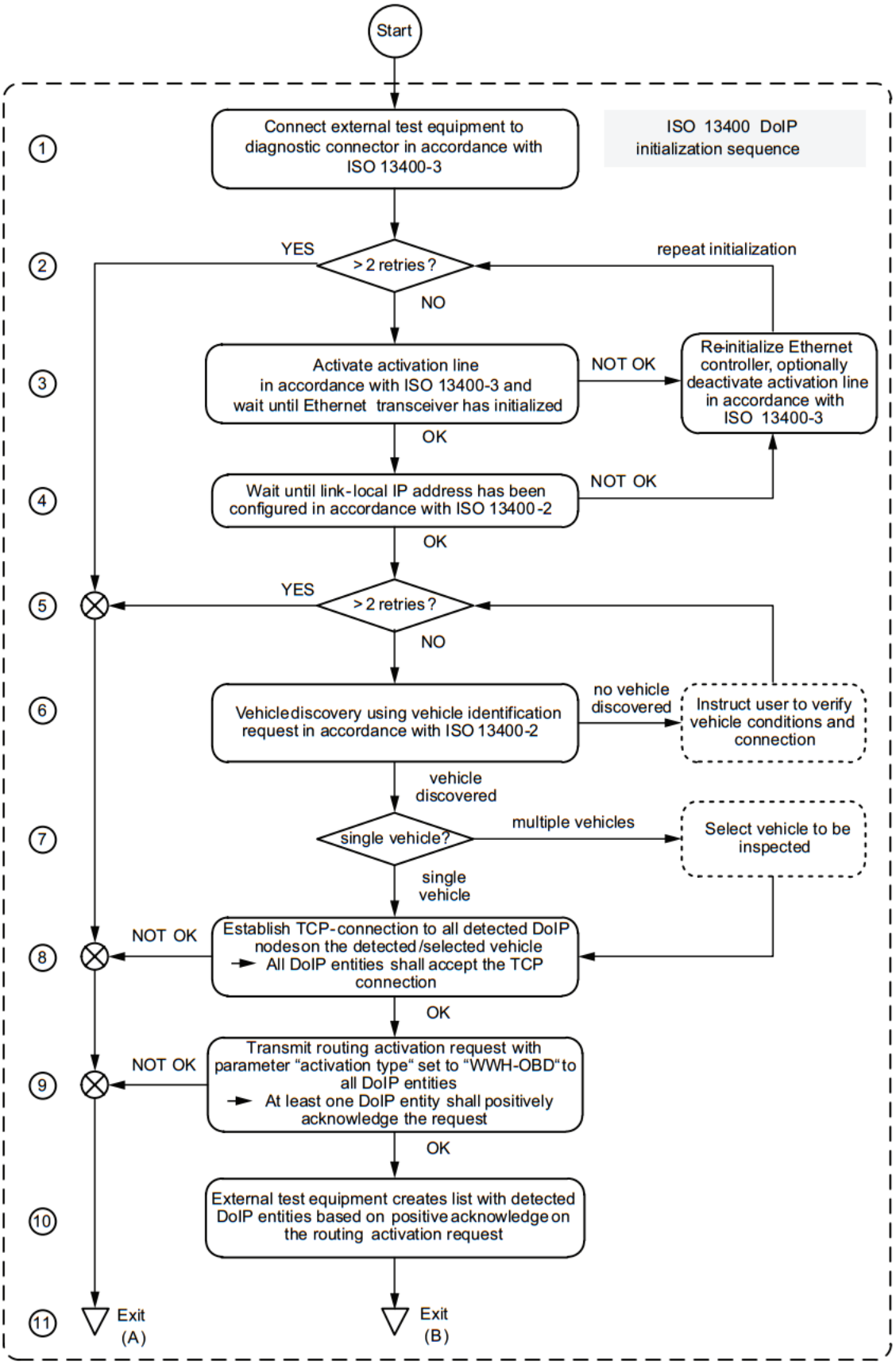
— A WWH-OBD-compliant vehicle shall support either IPv4 or IPv6 as specified in ISO 13400-2.
WWH-OBD 符合标准的车辆应支持 ISO 13400-2 中规定的 IPv4 或 IPv6。

See ISO 14229-2 for network scenario examples. 有关网络方案示例, 请参见 ISO 14229-2。

8.2 Initialization sequence 初始化序列

When connecting the external test equipment to the vehicle’s diagnostic connector, which implements the future Ethernet-based high-speed data link connector, the initialization sequence shall be implemented as specified in Figure 3.

当将外部测试设备连接到车辆的诊断连接器时, 它实现了未来基于以太网的高速数据链路连接器, 则初始化序列应按照图3中的指定执行。



Key

1 Connect the external test equipment to the vehicle's diagnostic connector.
将外部测试设备连接到车辆的诊断连接器。

2 The external test equipment checks if more than two re-initializations have been performed. If not (see *NO*), continue with step 3. If yes (see *YES*), continue with step 11, Exit (A).
外部测试设备检查是否执行了两次以上的重新初始化。如果没有 (请参见否), 请继续执行步骤3。如果是 (请参见 "是"), 请继续执行步骤 11, 退出 (A)。

3 Upon connection of the external test equipment to the vehicle, the Ethernet activation line defined in ISO 13400-3 shall be activated. After activation of the activation line, the external test equipment shall wait until its Ethernet port is active (i.e. Ethernet transceiver detects link).

当外部测试设备连接到车辆时, 应激活 ISO 13400-3 中定义的以太网激活线。激活线激活后, 外部测试设备应等到其以太网端口处于活动状态 (即以太网收发器检测到链接)。
If, one second after enabling the activation line, the Ethernet controller still has not detected an active Ethernet link (see *NOT OK*), a reset (*re-initialize*) of the Ethernet transceiver may be performed. The external test equipment may reset (*re-initialize*) its Ethernet controller and repeat the initialization. However, depending on the implemented activation line strategy (hardwired or soft activation), the external test equipment shall optionally keep the activation line enabled or deactivate the activation line. The external test equipment shall retry establishing an Ethernet connection for as long as power is detected on the battery supply voltage pins of the diagnostic connector, and it should instruct the user to verify the correct connection of the diagnostic connector.
如果在启用激活线路一秒钟后, 以太网控制器仍未检测到活动以太网链接 (请参阅 "不确定"), 则可以执行以太网收发器的重置 (重新初始化)。外部测试设备可以重置 (重新初始化) 其以太网控制器并重复初始化。但是, 根据已实现的激活线策略 (硬质或软激活), 外部测试设备应选择保持激活线启用或停用激活线。在诊断连接器的电池电源电压针脚上检测到电源时, 外部测试设备应重试建立以太网连接, 并应指示用户验证诊断连接器的正确连接。
Continue with step 4 (see *OK*) if, within one second of enabling the activation line, the Ethernet controller has detected an active Ethernet link.
继续执行步骤 4 (请参见 "确定") 如果在启用激活线的一秒钟内, 以太网控制器检测到一个活动的以太网链接。

4 The external test equipment shall perform the link-local IP address assignment as specified in ISO 13400-2.
If the link-local IP address assignment is not successful (see *NOT OK*), then branch back to step 3 and reset (*re-initialize*) the Ethernet controller.

外部测试设备应执行 ISO 13400-2 中指定的链路本地 IP 地址分配。如果链接本地 IP 地址分配不成功 (请参阅 "不确定"), 则分支回步骤3并重置 (重新初始化) 以太网控制器。
If the link-local IP address assignment is successful (see *OK*), then continue with step 5.
如果链接本地 IP 地址分配成功 (请参阅 "确定"), 则继续执行步骤5。

5 The external test equipment checks whether more than two vehicle identification requests have been performed. If not (see *NO*), continue with step 6. If yes (see *YES*), continue with step 11, Exit (A).
外部测试设备检查是否已执行了两个以上的车辆识别请求。如果没有 (请参见否), 请继续执行步骤6。如果是 (请参见 "是"), 请继续执行步骤 11, 退出 (A)。

6 The external test equipment performs the vehicle discovery in accordance with ISO 13400-2, using the vehicle identification request. If no vehicle is discovered, the external test equipment shall additionally instruct the user to verify that all pre-conditions are met (e.g. connection, ignition key turned to on, etc.), then branch to step 5.
If at least one vehicle is discovered, branch to step 7.
外部测试设备根据 ISO 13400-2 进行车辆发现, 使用车辆识别请求。如果没有发现车辆, 外部测试设备应另外指示用户验证是否满足所有预条件 (如连接, 点火钥匙打开, 等等), 然后分支到步骤5。
如果发现至少一辆车辆, 则分支到步骤7。

NOTE The above sequence assumes that the vehicle's WWH-OBD-compliant ECUs (including DoIP entities) are powered and are ready to send and receive messages (e.g. usually in the "ignition on" state).
注意 上面的顺序假定车辆的 WWH 符合标准的 ECUs (包括 DoIP 实体) 是通电的, 并且准备发送和接收消息 (例如, 通常在 "点火时" 状态)。

7 The external test equipment checks whether a single vehicle or multiple vehicles have been discovered.
If more than one vehicle has been discovered (see *multiple vehicles*) the external test equipment shall display a selection in order for the user to select the vehicle intended for inspection. If a selection is performed, branch to step 8.
If only one vehicle has been discovered (see *single vehicle*), then branch to step 8.
外部测试设备检查是否发现了一辆或多辆车辆。
如果发现不止一辆车辆 (见多辆车), 外部测试设备应显示选择, 以便用户选择要检查的车辆。见果执行了选择, 则分支到步骤8
如果只有一辆车被发现 (见单车), 然后分支到步骤8。

IMPORTANT — If more than one vehicle is detected, this is an indication that the external test equipment is operating in a networked connection scenario (see ISO 13400-2) and therefore message timing delays might occur. The external test equipment shall ask the user to select the vehicle to be inspected from a list of detected vehicles and shall continue with communication but shall use extended timeouts determined on the basis of the network architecture (which is outside the scope of this part of ISO 27145).

重要-如果检测到多个车辆, 这表明外部测试设备正在网络连接方案中运行 (请参阅 ISO 13400-2), 因此可能会出现消息定时延迟。外部测试设备应要求用户从检测到的车辆列表中选择要检查的车辆, 并应继续进行通信, 但应使用根据网络结构确定的延长超时 (超出范围ISO 27145 的这一部分)。

8 The external test equipment shall establish transmission control protocol data (TCP_data) connections to all detected DoIP entities of the selected vehicle, as specified in ISO 13400-2. All detected DoIP entities shall accept the TCP_data connection. If at least one of the DoIP entities rejects the TCP_data connection attempt, the external test equipment shall inform the user (not shown in this figure) and branch to step 11, Exit (A) (ISO 27145-4: Not ISO 13400-2

compliant).

外部测试设备应根据 ISO 13400-2 的规定, 建立与所选车辆的所有检测到的 DoIP 实体的传输控制协议数据 (TCP_data) 连接。所有检测到的 DoIP 实体均应接受 TCP_data 连接。如果至少有一个 DoIP 实体拒绝 TCP_data 连接尝试, 外部测试设备应通知用户 (不显示在此图中) 和分支到步骤 11, 退出 (A) (iso 27145-4: 不符合 iso 13400-2)。

If all detected DoIP entities accept the TCP_data connection (see *OK*), then continue with step 9.

Some DoIP entities might either indicate that generally they do not support WWH-OBD responses or that no WWH-OBD-compliant ECUs are connected to the DoIP gateway. In some cases, DoIP entities might indicate that confirmation (see ISO 13400-2 for further details) is required to activate routing. This shall not be considered as a rejection. In general, for WWH-OBD communication, no authentication will be required by the DoIP entities.

如果所有检测到的 DoIP 实体接受 TCP_data 连接 (请参见 OK), 则继续执行步骤9。

某些 DoIP 实体可能表明它们通常不支持 WWH 的响应, 或者没有与 DoIP 网关连接 WWH 符合标准的 ECUs。在某些情况下, DoIP 实体可能表示启用路由需要确认 (请参阅 ISO 13400-2 以了解详细信息)。这不应视为拒绝。一般而言, 对于 WWH 通信, DoIP 实体不需要任何身份验证。

9 After having established TCP_data connections to all DoIP entities, the external test equipment shall activate routing on all established TCP_data connections, as specified in ISO 13400-2, using the routing activation request with the parameter “activation type” set to “WWH-OBD”. The requirements specified in ISO 13400-2 relating to the initial inactivity timer shall be met.

At least one DoIP entity shall respond positively to the routing activation request (see *OK*), in which case, branch to step 10.

If no DoIP entity responds positively to the routing activation request (see *NOT OK*), branch to step 11, Exit (A) (ISO 27145-4: Not ISO 13400-2 compliant).

在建立了与所有 DoIP 实体的 TCP_data 连接后, 外部测试设备应在 ISO 13400-2 中指定的所有已建立的 TCP_data 连接上激活路由, 方法是使用带有参数 "激活的路由激活请求"类型 "设置为" WWH "。ISO 13400-2 中规定的与初始非活动定时器有关的要求应予满足。

至少有一个 DoIP 实体应积极响应路由激活请求 (请参见 OK), 在这种情况下, 分支到步骤10。

如果没有 DoIP 实体对路由激活请求作出积极响应 (见不确定), 分支到步骤 11, 退出 (A) (iso 27145-4: 不符合 iso 13400-2)。

10 The external test equipment shall create a list with detected DoIP entities based on positive acknowledgement of the routing activation request. Continue to step 11.

外部测试设备应根据对路由激活请求的肯定确认, 创建一个检测到 DoIP 实体的列表。继续步骤11。

11 Exit (A): The vehicle is not compliant with this part of ISO 27145 or ISO 13400-2.

Exit (B): The external test equipment has detected DoIP entities and proceeds with the WWH-OBD protocol validation. Perform the ISO 27145-3 response validation as specified in Figure 4.

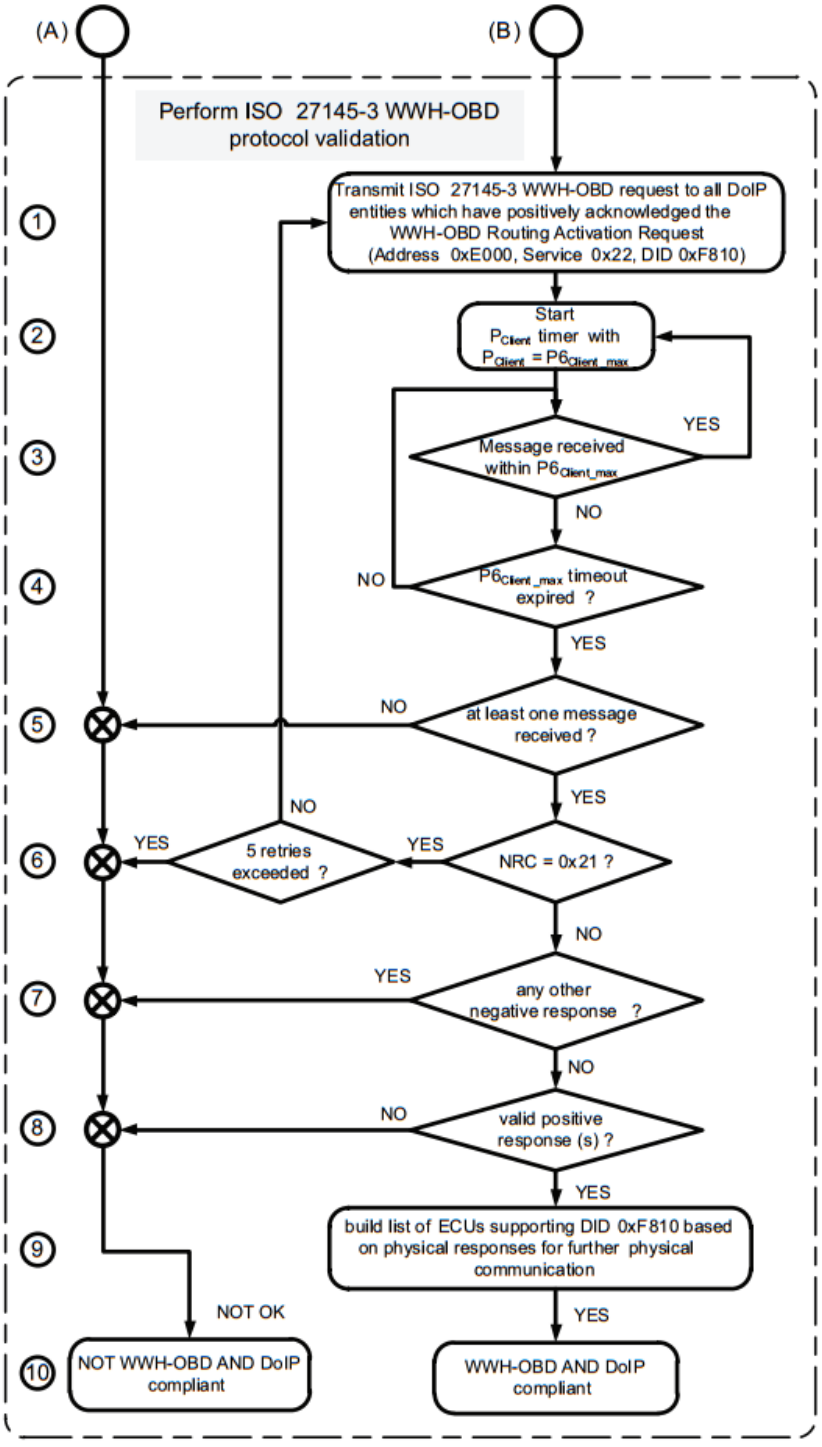
出口 (A): 车辆不符合ISO 27145 或ISO 13400-2 的这一部分。

出口 (B): 外部测试设备检测到了 DoIP 实体, 并进行了 WWH 协议验证。执行图4中指定的 ISO 27145-3 响应验证。

Figure 3 — ISO 13400 DoIP initialization sequence

8.3 ISO 27145-3 WWH-OBD protocol validation sequence协议验证序列

Once the ISO 13400 DoIP initialization sequence is successfully completed, the ISO 27145-3 WWH-OBD protocol validation sequence shall be implemented as specified in Figure 4. 一旦ISO 13400 DoIP 初始化序列成功完成,ISO 27145-3 WWH 的协议验证序列应按照图4中的指定执行。



Key

(A) Branch to step 10 (not WWH-OBD AND DoIP compliant). 分支到步骤 10 (不是 WWH-OBD和 DoIP 兼容)。

(B) Branch to step 1. 分支到步骤1

1 The external test equipment shall transmit the ISO 27145-3 WWH-OBD request (Service 0x22, DID 0xF810 “protocol identification”) to all DoIP entities which have positively acknowledged the routing activation request (see Figure 3, step 10). The external text equipment shall use the functional logical address 0xE000 as specified in ISO 13400-2 (WWH-OBD). After completion, branch to step 2. 外部测试设备应将 ISO 27145-3 WWH 请求 (服务 0x22, 0xF810 "协议标识") 传送给所有已积极确认路由激活请求的 DoIP 实体 (见图 3, 步骤 10)。外部文本设备应使用 ISO 13400-2 (WWH) 中指定的功能逻辑地址0xE000。完成后, 分支到步骤2。

2 The external test equipment shall start the P_{Client} timer with $P_{Client} = P6_{Client\_max}$ (see ISO 14229-2).
外部测试设备应启动P_{Client} 定时器以 $P_{Client} = P6_{Client\_max}$ (见 ISO 14229-2)。

3 The external test equipment shall check if any response message(s) have been received within $P6_{Client}$.
If yes (see *YES*), then branch to step 2.
If no (see *NO*), then branch to step 4.
外部测试设备应检查是否在$P6_{Client}$ 中收到了任何响应消息。
如果是 (请参见YES), 则分支到步骤2。
如果没有 (请参阅 NO), 则分支到步骤4。

4 The external test equipment shall check whether the P_{Client} timer has expired ($\geq P6_{Client\_max}$).
If no (see *NO*), then branch to step 3.
If yes (see *YES*) then branch to step 5.
外部测试设备应检查 PClient 定时器是否已过期 ($\geq P6_{Client\_max}$)。
如果没有 (请参阅 NO), 则分支到步骤3。
如果是 (见 YES), 则分支到步骤5。

5 The external test equipment shall check if at least one message has been received.
If no (see *NO*), this ECU is not WWH-OBD-compliant. Branch to step 10 (Not WWH-OBD AND DoIP compliant).
If yes (see *YES*), then branch to step 6.
外部测试设备应检查是否至少收到一条消息。
如果没有 (见NO), 这个 ECU 是不符合 WWH-OBD 的。分支到步骤 10 (不兼容 WWH-OBD 和 DoIP)。
如果是 (见 YES), 则分支到步骤6。

6 The external test equipment evaluates the response messages and checks for a negative response message including NRC = 0x21 “busyRepeatRequest”.
If NRC = 0x21 (see *YES*), then check whether five re-transmissions of the request message have been exceeded.
If no (see *NO*), branch to step 1 after a delay of 200 ms.
If yes (see *YES*), this ECU is not WWH-OBD compliant. Branch to step 10 (not WWH-OBD AND DoIP compliant).
If NRC ≠ 0x21 (see *NO*), then branch to step 7.
外部测试设备评估响应消息并检查负面响应消息
包括 NRC = 0x21 "繁忙的重复请求"。
如果 NRC = 0x21 (见 YES), 请检查是否超过了请求消息的五次传输。
如果没有 （见NO），则在延迟200毫秒后, 分支到步骤1。
如果是 (见YES), 这个 ECU 是不符合 WWH-OBD。分支到步骤 10 (不兼容 WWH-OBD 和 DoIP)。
如果 NRC ≠ 0x21 (见 NO), 则分支到步骤7。

7 The external test equipment evaluates the response messages and checks for any other negative response messages not including NRC = 0x21 “busyRepeatRequest”.
If yes (see *YES*), this ECU is not WWH-OBD compliant. Branch to step 10 (not WWH-OBD AND DoIP compliant).
If no (see *NO*) then branch to step 8.
外部测试设备评估响应消息并检查任何其他负面响应
不包括NRC = 0x21 "繁忙的重复请求" 的消息。
如果是 (见YES), 这个 ECU 是不 WWH-OBD 符合。分支到步骤 10 (不兼容WWH-OBD 和 DoIP)。
如果没有 (见NO), 则分支到步骤8。

8 The external test equipment evaluates the response messages and checks for a valid positive response message(s).
If no (see *NO*), this ECU is not WWH-OBD-compliant. Branch to step 10 (Not WWH-OBD AND DoIP compliant).
If yes (see *YES*), branch to step 9.
外部测试设备评估响应消息并检查有效的正反馈消息。
如果没有 (见NO), 这个 ECU 是不符合 WWH-OBD。分支到步骤 10 (不兼容 WWH-OBD 和 DoIP)。
如果是 (参见YES), 则分支到步骤9。

9 The external test equipment shall create a list of ECUs supporting DID 0xF810 with the data set to 0x01 = ISO 27145-4. Then branch to step 10 (WWH-OBD AND DoIP compliant).
外部测试设备应创建 一个ECUs 支持的列表DID 0xF810 与数据集0x01 = ISO 27145-4。然后分支到步骤 10 (WWH-OBD和 DoIP)。

10 Either the vehicle is not WWH-OBD AND DoIP compliant or it is WWH-OBD AND DoIP compliant.
这辆车要么不符合WWH-OBD和DoIP，要么同时符合WWH-OBD和DoIP

Figure 4 — ISO 27145-3 WWH-OBD protocol validation

8.4 Application layer — DoIP 应用层DoIP

8.4.1 General

All application-specific requirements for data content and formatting shall be supported as defined in ISO 27145-2 and ISO 27145-3.
对于数据内容和格式的所有特定于应用程序的要求, 应按照ISO 27145-2 和ISO 27145-3 中的定义予以支持。

8.4.2 Diagnostic protocol communication types诊断协议通信类型

The following diagnostic protocol communication types shall be supported for the diagnostic protocol implementation for WWH-OBD on DoIP: 对于在DoIP上WWH-OBD的诊断协议实现, 应支持以下诊断协议通信类型:

a) functional communication; 功能通信
b) physical communication.物理通信

The following WWH-OBD communication types on DoIP shall be supported by the WWH-OBD-compliant servers/ECUs (for details, see ISO 14229-2):
在DoIP,符合WWH-OBD的控制器/ECUs应该支持支持以下WWH-OBD通信类型(详细，参见ISO 14229-2)

— physical communication during defaultSession; 默认会话期间的物理通信
— physical communication during defaultSession with enhanced response timing;增强响应时间的默认会话的物理通信
— functional communication during defaultSession;默认会话期间的功能通信
— functional communication during defaultSession with enhanced response timing;增强响应时间的默认会话的功能通信

The specific requirements of the WWH-OBD communication types for the individual services are defined in ISO 27145-3. 在 ISO 27145-3 中定义了单个服务的 WWH-OBD通信类型的特定要求。

8.4.3 Maximum number of WWH-OBD servers/ECUs WWH-OBD控制器/ECUs的最大数量

The maximum number of WWH-OBD-compliant servers/ECUs is limited by the address range definitions in ISO 13400-2. WWH-OBD符合标准的控制器/ECUs 的最大数量受 ISO 13400-2 中地址范围定义的限制。

8.4.4 Diagnostic protocol timing parameters 诊断协议定时参数

The application layer timing parameter values for the default diagnostic session shall be in accordance with ISO 27145-3. 默认诊断会话的应用层计时参数值应符合 ISO 27145-3。

For all diagnostic services specified in ISO 27145-3, the possibility of the server requesting an enhanced response-timing window via a negative response message, including an NRC 0x78 (requestCorrectlyReceived-ResponsePending), shall be supported if specified for the diagnostic service in ISO 14229-1. 对于 ISO 27145-3 中指定的所有诊断服务, 应支持服务器通过负面响应消息 (包括 NRC 0x78 (请求正确接收-响应待定) 请求增强的响应时间窗口的可能性, 如果为 ISO 14229-1 中的诊断服务指定。

8.4.5 External test equipment logical addresses外部测试逻辑地址

External test equipment implementing the use cases defined in ISO 27145-1 shall use a logical address as specified in ISO 13400-2 for the external legislated diagnostic test equipment when requesting WWH-OBD data from a WWH-OBD-compliant vehicle. 在请求 WWH-OBS 符合标准的车辆上的数据时, 执行ISO 27145-1 中定义的用例的外部测试设备应使用ISO13400-2 中指定的逻辑地址作为外部立法诊断测试设备。

8.4.6 Server/ECU logical addressing 控制器/ECU逻辑地址

A WWH-OBD-compliant vehicle shall use a unique logical address for each WWH-OBD-compliant server/ECU, as specified in ISO 13400-2. WWH-OBD符合标准的车辆应对每个WWH-OBD符合标准的控制器/ECU 使用唯一的逻辑地址, 如 ISO 13400-2 所述。

From the external test equipment point of view, each server/ECU in a WWH-OBD-compliant vehicle shall 从外部测试设备的角度来看, 每台服务器/ECU 的 WWH-OBD符合标准的车辆应：

— support a single 16 bit logical address as defined in ISO 13400-2 for physically addressed request and response messages, and 支持 ISO 13400-2 中为物理寻址的请求和响应消息定义的单个16位逻辑地址, 并
— receive and process the functional 16 bit WWH-OBD functional group address as specified in ISO 13400-2 for functionally addressed request messages. 接收并处理 ISO 13400-2 中指定的功能16位 WWH-OBD 功能组地址, 用于功能寻址的请求消息。

8.5 Presentation layer 表示层

All presentation-layer-specific requirements for data content and formatting shall be supported as defined in ISO 27145-2. 所有表示层特定的数据内容和格式要求应按 ISO 27145-2 中的定义支持。

8.6 Session layer 会话层

All WWH-OBD communication shall take place during the default diagnostic session; therefore, no session layer timing handling is required for WWH-OBD communication. See ISO 14229-2 for further details on session layer requirements.
在默认的诊断会话期间, 所有 WWH-OBD 通信都应进行;因此, WWH-OBD 通信不需要会话层定时处理。有关会话层要求的详细信息, 请参阅 ISO 14229-2。

There shall always be exactly one diagnostic session active in a WWH-OBD-related server/ECU. A WWH-OBD-related server/ECU shall always start the default diagnostic session when powered up. If no other diagnostic session is started, then the default diagnostic session shall run as long as the WWH-OBD-related server/ECU is powered.
在与 WWHOBD 相关的服务器/ECU 中, 始终只有一个诊断会话处于活动状态。WWHOBD 相关的服务器/ECU 在通电时始终应启动默认的诊断会话。如果未启动其他诊断会话, 则只要 WWHOBD 相关的服务器/ECU 已通电, 则默认诊断会话将运行。

A WWH-OBD-related server/ECU shall be capable of providing all diagnostic functionality defined for WWH-OBD in the default diagnostic session and under normal operating conditions.
WWH-OBD 相关的控制器/ECU 应能够提供在默认诊断会话和正常操作条件下为 WWH-OBD 确定的所有诊断功能。

NOTE If in multi-tester environments (e.g. additional on-vehicle monitoring unit) a different session is active while external test equipment transmits requests, then the default diagnostic session need only be entered if the WWH-OBD communication requirements (including application requirements) cannot be fulfilled in the currently active non-default session.

注意：如果在多测试环境中 (如额外的车载监控单元), 当外部测试设备传输请求时, 不同的会话处于活动状态, 则只有在 WWH-OBD 通信要求时才输入默认诊断会话。(包括应用程序要求) 无法在当前活动的非默认会话中实现。

There shall be no need to send any diagnostic service to the WWH-OBD-related server/ECU in order to keep the default diagnostic session active.
不需要向与 WWH-OBD相关的控制器/ECU 发送任何诊断服务, 以保持默认的诊断会话处于活动状态。

8.7 Transport layer 传输层

8.7.1 General information

All transport-layer-specific requirements shall be supported as specified in ISO 13400-2. This part of ISO 27145 makes use of the session layer T_PDU service primitives defined in ISO 14229-2 for the transmission and reception of diagnostic messages. Subclauses 8.7.2 and 8.7.3 define the mapping of the data-link-independent T_PDUs onto the data-link-specific network layer protocol data units (DoIP_PDU) as defined in this part of ISO 27145.
所有运输层特定要求应按 ISO 13400-2 的规定予以支持。ISO 27145 的这一部分使用了ISO 14229-2 中定义的会话层 T_PDU 服务基元来传输和接收诊断消息。第8.7.2 和8.7.3 定义了数据链路无关的 T_PDUs 映射到数据链路特定的网络层协议数据单元 (DoIP_PDU), 这是 ISO 27145 的这一部分所定义的。

NOTE The transport/network layer services are used to perform the application layer and diagnostic session management timing. 注意: 传输/网络层服务用于执行应用程序层和诊断会话管理时间。

8.7.2 Mapping of data-link-independent service primitives onto the Internet Protocol data-link-dependent service primitives
将数据链路无关的服务基元映射到 Internet 协议数据链路相关服务基元

Table 4 defines the mapping of T_PDU service primitives onto DoIP_PDU service primitives.
表4定义了 T_PDU 服务基元到 DoIP_PDU 服务基元的映射。

Table 4 — 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_DataSOM.indication	—
T_Data.confirm	DoIP_Data.confirm
T_Data.request	DoIP_Data.request

8.7.3 Mapping of T_PDU onto DoIP_PDU for message transmission
T_PDU 到 DoIP_PDU 的消息传输映射

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 5 onto the parameters of the network layer protocol data unit for the transmission of a message in the client/server.
为请求传输诊断服务请求/响应而定义的应用层协议数据单元的参数按照表5映射到网络层协议数据单元的参数, 用于传输一个客户端/服务器中的消息。

Table 5 — Mapping of T_PDU parameter onto DoIP_PDU parameter

T_PDU parameter (data-link-independent according to ISO 14229-2)	**DoIP_PDU parameter** (DoIP data-link-dependent according to ISO 13400-2)
T_Mtype	—
T_SA	DoIP_SA
T_TA	DoIP_TA
T_TAtype	DoIP_TAtype
T_AE	—
T_Data [ ]	<MessageData>
T_Length	<Length>
T_Result	<DoIP_Result>

The address mapping between the network layer and the OSI higher layers is not necessarily an exact copy of the address values as encoded on the data link layer and therefore depends on the implementation concept.

网络层和 OSI 较高层之间的地址映射不一定是数据链路层上编码的地址值的确切副本, 因此取决于实现概念。

The mapping and the values for emissions-related WWH-OBD are defined in ISO 13400-2.
在 ISO 13400-2 中定义了与排放相关的 WWH-OBD 的映射和值。

8.8 Network layer 网络层

The network layer of the external test equipment and the legislated OBD/WWH-OBD-compliant vehicle server(s)/ECU(s) — from the external test equipment point of view — shall be in accordance with ISO 13400-2.
外部测试设备的网络层和立法的与 WWH-OBD 兼容的车辆控制器/ECU--从外部测试设备的角度来看--应符合 ISO 13400-2。

A vehicle compliant with ISO 27145 shall only respond to ISO 27145-3 requests from external test equipment if the external test equipment uses the assigned functional address as specified for the WWH-OBD GTR-defined functional system group, e.g. 0x33 for an emissions-related functional system group. If the external test equipment uses other server/ECU addresses, it may request messages as defined by that protocol.

符合ISO 27145 标准的车辆, 如果外部测试设备使用为 WWH-OBD GTR 定义的功能系统组指定的功能地址, 则只应对来自外部测试设备的ISO 27145-3 请求, 例如0x33与排放相关的功能系统组。如果外部测试设备使用其他控制器/ECU 地址, 它可能会请求该协议定义的消息。

8.9 Data link layer 数据链路层

For WWH-OBD purposes, the data link layer shall be in accordance with ISO 13400-3.

跟怒WWH-OBD的要求，数据链路层应该符合ISO 13400-3的要求。

8.10 Physical layer 物理层

The physical layer and physical signalling of the external test equipment and the servers/ECUs shall be in accordance with ISO 13400-3.

外部测试设备和控制器/ECUs 的物理层和物理信号应符合 ISO 13400-3

8.11 Diagnostic connector 诊断连接器

The diagnostic connector provides the connection between the external test equipment and the WWH-OBD-compliant vehicle.

诊断连接器提供外部测试设备与 WWH-OBD 符合标准的车辆之间的连接。

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ICS 43.040.10; 43.180

Price based on 17 pages