BS ISO 22901-2:2011

BSI Standards Publication

Road vehicles — Open diagnostic data exchange (ODX)

Part 2: Emissions-related diagnostic data

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee AUE/16, Electrical and electronic equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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INTERNATIONAL STANDARD

ISO 22901-2

First edition
2011-07-01

Road vehicles — Open diagnostic data exchange (ODX) —

Part 2: Emissions-related diagnostic data

Véhicules routiers — Échange de données de diagnostic ouvert (ODX) —

Partie 2: Données de diagnostic relatives aux émissions

Reference number
ISO 22901-2:2011(E)

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Foreword

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

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

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

ISO 22901-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 22901 consists of the following parts, under the general title *Road vehicles — Open diagnostic data exchange (ODX)*:

— *Part 1: Data model specification*

— *Part 2: Emissions-related diagnostic data*

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Introduction

This International Standard has been established in order to define the data format for transferring standardized emissions-related diagnostic data of the vehicle's OBD system between system supplier, vehicle manufacturer and service dealerships and diagnostic tools of different vendors.

The standardized information is contained in the following standards:

— Diagnostic protocol information:

  — ISO 9141-2:1994, *Road vehicles — Diagnostic systems — Part 2: CARB requirements for interchange of digital information,*

  — ISO 9141-2:1994/Amd.1:1996, *Road vehicles — Diagnostic systems — Part 2: CARB requirements for interchange of digital information — Amendment 1*,

  — ISO 14230-4:2000, *Road vehicles — Diagnostic systems — Keyword Protocol 2000 — Part 4: Requirements for emissions-related systems*,

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

  — SAE J1850, *Class B Data Communications Network Interface*

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

— Emissions-related OBD data:

  — ISO 15031-4, *Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics — Part 4: External test equipment*,

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

  — ISO 15031-6, *Road vehicles — Communication between vehicle and external test equipment for emissions-related diagnostics — Part 6: Diagnostic trouble code definitions,*

  — SAE J1979-DA, *Digital Annex of E/E Diagnostic Test Modes*,

  — SAE J2012-DA, *Digital Annex of Diagnostic Trouble Code Definition*;

— OBD Conformance test cases:

  — SAE J1699-3, *OBD II Compliance Test Cases*.

The automotive industry mostly utilizes an informal description to document diagnostic data stream information of vehicle ECUs. Each user, who desires to use the ECU diagnostic data stream documentation to setup development tools or service diagnostic test equipment, has a requirement for a manual transformation of this documentation into a format readable by these tools. This effort will no longer be required if the diagnostic data stream information is provided in ODX format and if those tools support the ODX format.

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Road vehicles — Open diagnostic data exchange (ODX) —

Part 2:
Emissions-related diagnostic data

1 Scope

This part of ISO 22901 is intended to ensure that diagnostic data stream information is available to diagnostic tool application manufacturers to simplify the support of the aftermarket automotive service industry. The ODX modelled diagnostic data are compatible with the software requirements of the Modular Vehicle Communication Interface (MVCI) (ISO 22900-2 and ISO 22900-3). The ODX modelled diagnostic data can enable an MVCI device to communicate with the vehicle [ECU(s)] and interpret the diagnostic data contained in the messages exchanged between the external test equipment and the ECU(s). For ODX-compliant external test equipment, no software programming is necessary to convert diagnostic data into technician-readable information for display by the external test equipment.

This part of ISO 22901 contains emissions-related OBD data examples described in ODX. The data examples derive from ISO 15031 (all parts).

EXAMPLES Diagnostic trouble codes, data parameters, identification data and communication parameters.

The emissions-related OBD ODX modelled diagnostic data describe

— the protocol specification from diagnostic communication of emissions-related ECUs;

— the communication parameters for the emissions-related OBD protocols and data link layers and for emissions-related ECU software;

— the related vehicle interface description (connectors and pin-out);

— the functional description of diagnostic capabilities of a network of ECUs.

This part of ISO 22901 is based on emissions-related diagnostic data derived and formatted according to the ISO 15765-4 DoCAN protocol. The definitions and XML representation is exemplary for all other protocols that are referenced in ISO 15031-5.

2 Normative references

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

ISO 15031 (all parts), *Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics*

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

ISO 22901-1, *Road vehicles — Open diagnostic data exchange (ODX) — Part 1: Data model specification*

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3 Terms and definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22901-1 apply.

3.2 Abbreviated terms

MVCI Modular Vehicle Communication Interface

ODX-RT Open Diagnostic data eXchange — Run-Time format

4 Conventions

This part of ISO 22901 is based on the conventions discussed in the OSI Service Conventions (ISO/IEC 10731[11]) as they apply for diagnostic services.

5 ODX data in the ECU life cycle

Figure 1 shows the usage of ODX in the ECU life cycle. Engineering, manufacturing, and service specify that communication protocol and data should be implemented in the ECU. This information is documented in a structured format utilizing the XML standard and by an appropriate ODX authoring tool. There is potential to generate ECU software from the ODX file. Furthermore, the same ODX file is used to set up the diagnostic engineering tools to verify proper communication with the ECU and to perform functional verification and compliance testing. Once all quality goals are met, the ODX file may be released to a diagnostic database. Diagnostic information is now available to manufacturing, service, OEM franchised dealers and aftermarket service outlets via Intranet and Internet.

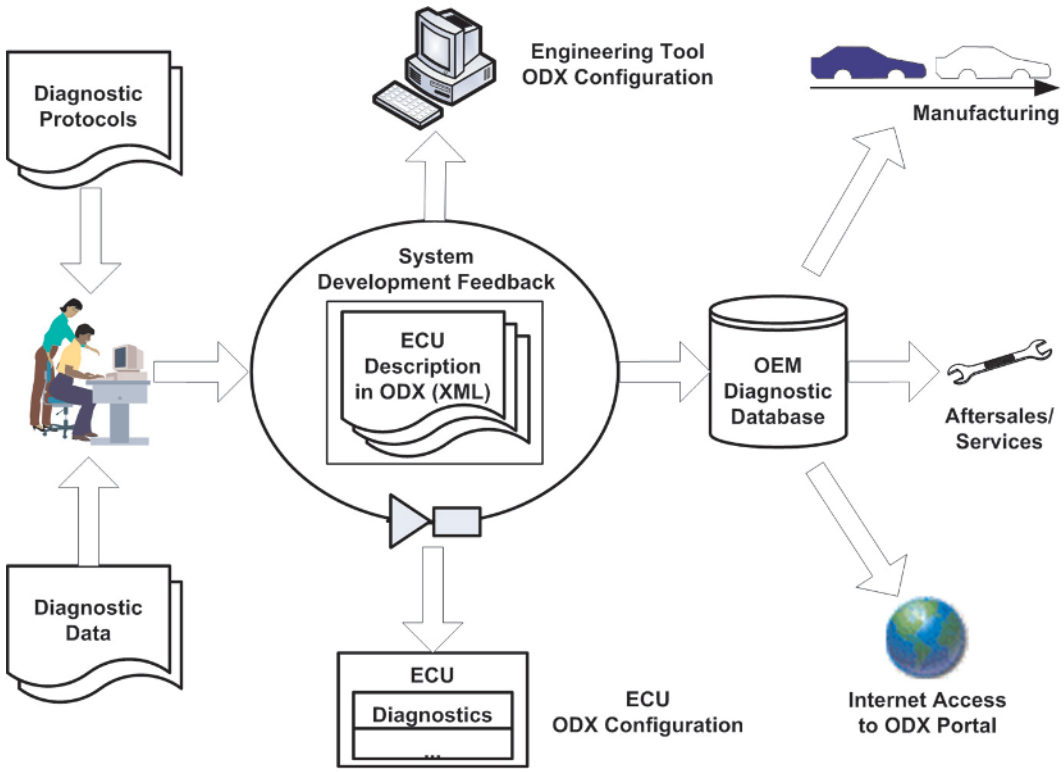

Figure 1 — Usage of ODX data in the ECU life cycle

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The objective of this specification is to ensure that diagnostic data from any vehicle manufacturer is independent of the testing hardware and protocol software supplied by any test equipment manufacturer.

6 Emissions-related OBD ODX use cases

6.1 Use case 1 — OBD Scan Tool based on a Modular VCI architecture and ODX

This use case describes the usage of an OBD scan tool in accordance with ISO 15031-4 / SAE J1978 and implemented according to the Modular VCI specification (see ISO 22900, parts 1, 2 and 3) and ODX (see ISO 22901-1).

The benefits of an emissions-related OBD scan tool that is based on the Modular VCI and ODX standard are the following:

— no software programming to support the implementation of

  — new diagnostic trouble codes (see ISO 15031-6 / SAE J2012-DA),

  — new PIDs, Test IDs, Monitor IDs, Info Type IDs, and Scaling IDs (see ISO 15031-5 / SAE J1979-DA);

— OBD scan tool applications in accordance with ISO 15031-4 are developed only once and are not impacted by modifications / changes in the definition of emissions-related OBD data and formats;

— separation of application, communication logic and data items.

NOTE The Modular VCI software architecture supports the emissions-related OBD scan tool requirements as well as enhanced diagnostic protocols, data streams and applications.

Figure 2 illustrates external test equipment connected to the vehicle's diagnostic connector. The OBD scan tool's software architecture is compliant to the Modular VCI specifications. The diagnostic kernel is the key software component of the Modular VCI system. It implements the D-PDU API (see ISO 22900-2), the D-Server API (see ISO 22900-3) and the interface to the ODX derived runtime data.

The OBD scan tool application depends on standardized names or naming conventions as defined by this part of ISO 22901. These names are defined in the emissions-related ODX data and utilized by the OBD scan tool application to address logical links, services, and emission-related data. Using the standardized names and structures from this part of ISO 22901, the interface to implement the scan tool application against is clearly defined. This is indicated by the dashed line in Figure 2.

The D-PDU API is a software component of the tool supplier's Modular VCI protocol module. It connects the diagnostic kernel with any Modular VCI compatible vehicle communication interface.

The D-Server API of the diagnostic kernel provides a standardized interface to the OBD scan tool applications. These applications shall be in accordance with ISO 15031-4, which implements the standardized data and messages of ISO 15031-5 and ISO 15031-6.

The emissions-related ODX runtime data format is tool supplier specific. The runtime format is not contained in the ODX standard (see ISO 22901-1). Based on the use cases supported by the diagnostic tool, the content and structure of the ODX runtime data format and content may differ. However, for emissions-related OBD the OBD scan tool applications and ODX runtime data shall support the full scope of ISO 15031 (all parts) and the respective SAE J documents.

All emissions-related OBD data as specified in ISO 15031-5 and SAE J1979-DA, ISO 15031-6 and SAE J2012-DA shall be authored according to the requirements established in this part of ISO 22901.

This use case requires the unique and complete definition of all elements necessary for any OBD scan tool application compliant to ISO 22900.

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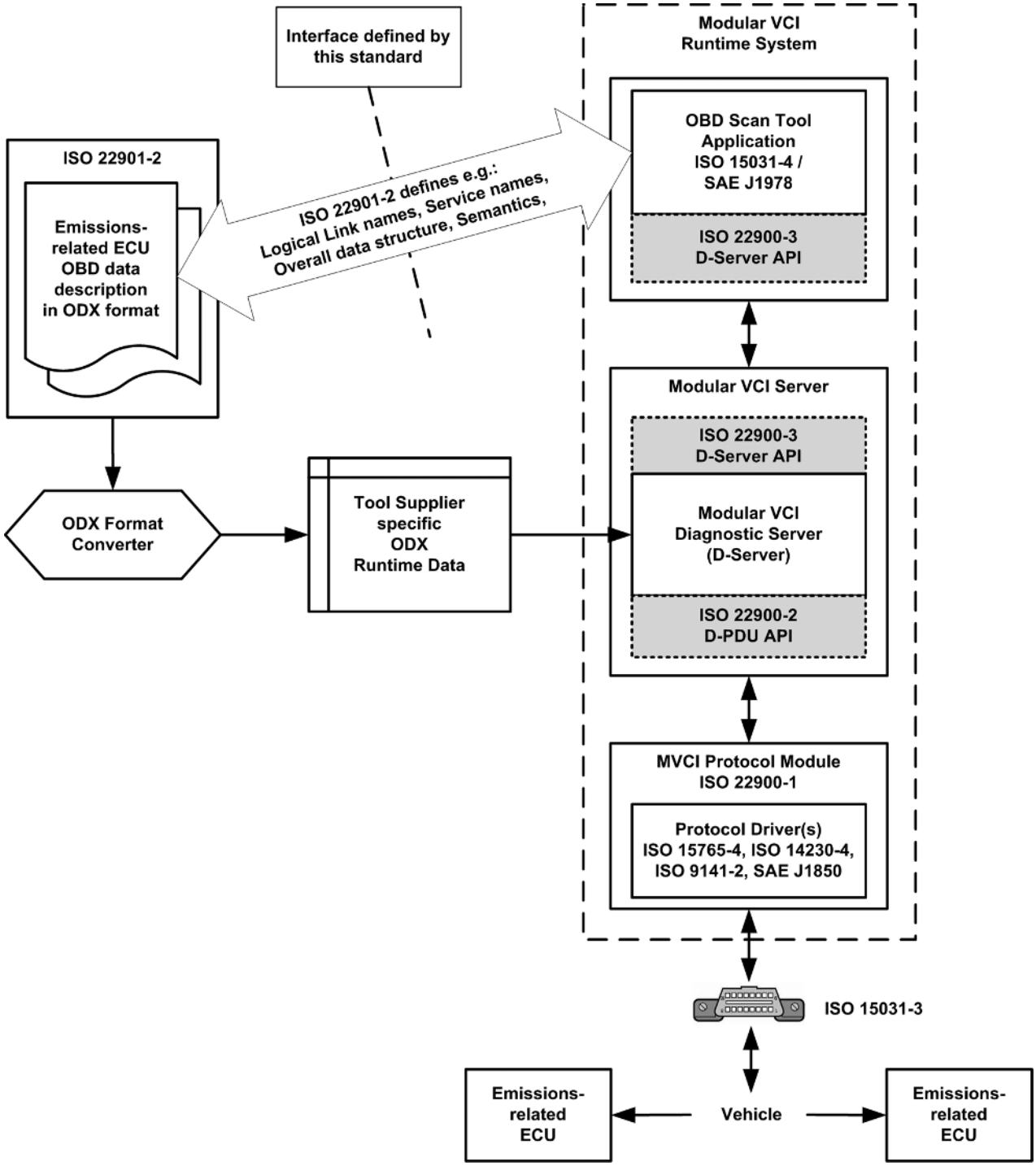

Figure 2 — OBD scan tool based on Modular VCI architecture and ODX

6.2 Use case 2 — Conversion of emissions-related OBD data to ODX format

This use case describes the conversion of emissions-related OBD data into the ODX format in order to provide various applications of external test equipment with emissions-related OBD data in an ODX-RT (runtime) format.

It is assumed that the external test equipment is based on ISO 22900.

The emissions-related OBD data files derive from the Registration Authority installation for ISO 15031.

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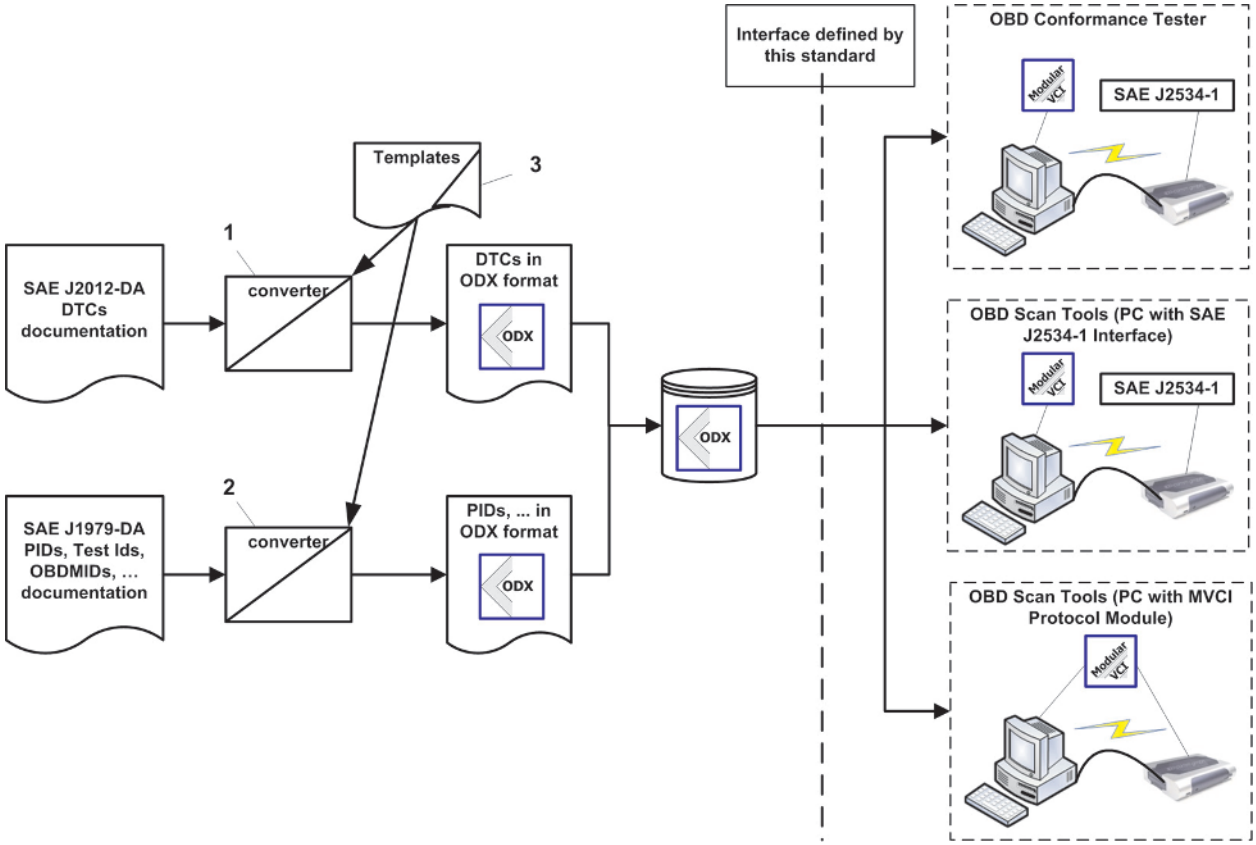
The applicable emissions-related OBD data files are

— SAE J1979-DA,

— SAE J2012-DA.

Figure 3 illustrates the process to be followed in order to convert SAE J2012-DA, and SAE J1979-DA data file information (i.e. Excel or equivalent format) into a standardized ODX format[1],[2] which enrich the emissions-related OBD data with template[3] information. The dotted line depicts the interface that this part of ISO 22901 defines. ODX data providers can deliver ODX data in the format defined here, while tester and scan tool developers can create their tools in accordance with this part of ISO 22901. Thus, both parties can work independently and their products will work together.

How far the converter processes can be automated depends solely on the concrete format of the digital annex. This part of ISO 22901 defines the target format of these processes.



Key

1 SAE J2012-DA DTC converter into ODX format

2 SAE J1979-DA PIDs, OBDMIDs, ... converter into ODX format

3 ODX converter templates to determine standardized ODX parts i.e. PROTOCOLS, COMPARAMS, ... and ODX usage as defined by this part of ISO 22901

Figure 3 — Emissions-related OBD data converter to ODX-RT format

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The benefits of implementing this use case are

— the setup/update of an ISO 22900 Modular VCI based OBD test equipment utilizing a SAE J2534-1 compliant vehicle communication interface or an MVCI compliant Protocol Module with emissions-related OBD data (ODX-RT format) that derive from a conversion of the applicable SAE Digital Annexes;

— the setup/update of an ISO 22900 Modular VCI based OBD conformance tester with emissions-related OBD data (ODX-RT format) that implements the test cases as specified in SAE J1699-3.

7 Emissions-related OBD ODX application examples

7.1 OBD conformance tester according to SAE J1699-3

This application example describes the implementation of an OBD conformance tester in accordance with SAE J1699-3 and based on the Modular VCI software architecture. The base architecture as shown in use case 1 applies. The major difference between the emissions-related OBD scan tool and the OBD conformance tester is implemented in the test applications. While the emissions-related OBD scan tool is in accordance with ISO 15031-4, the OBD conformance tester is in accordance with SAE J1699-3. This specification describes very specific test cases in order to achieve vehicle emissions-related system compliance. These test cases have been introduced and referenced by legislation in order to reduce emissions-related diagnostic software implementation deviations in the ECUs from ISO 15031 (all parts) and the respective SAE J documents.

The benefits of an OBD conformance tester based on the Modular VCI and ODX standard are

— no software programming to support the implementation of

  — new diagnostic trouble codes (see ISO 15031-6 / SAE J2012-DA),

  — new PIDs, Test IDs, Monitor IDs, Info Type IDs and Scaling IDs (see ISO 15031-5 / SAE J1979-DA);

— conformance test applications implement the test logic but not the data items (derive from emissions-related ODX runtime);

— clear separation of application and communication logic as well as from all data items.

Figure 4 is based on the architecture as shown in use case 1.

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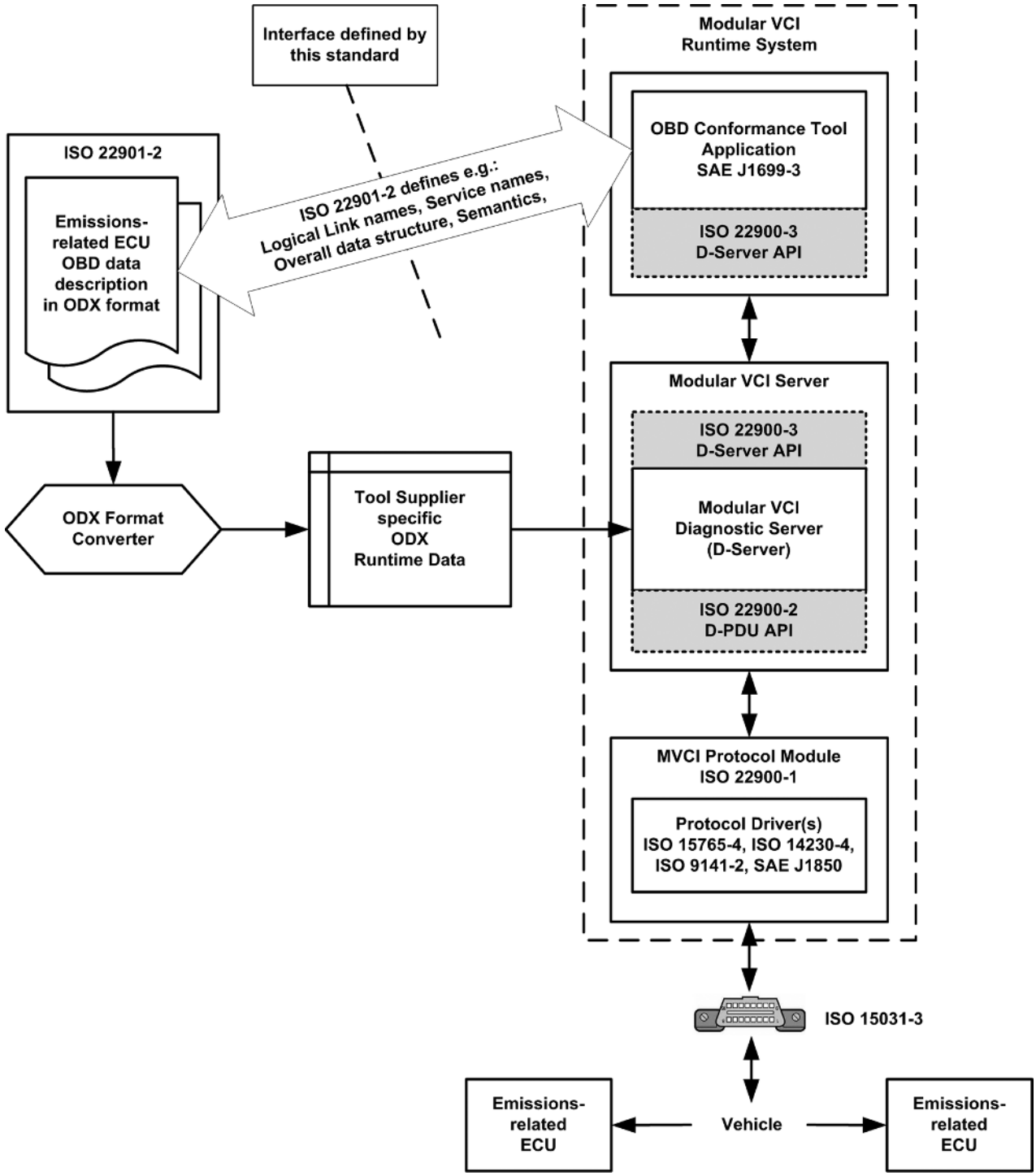

Figure 4 — ODX emissions OBD Modular VCI based OBD conformance tester

7.2 Usage of ODX as a configuration for standardized ECU software

This application example describes how to drive the implementation of the emissions-related OBD diagnostic software module of the ECU by the OBD ODX data. This may be done either by using the OBD ODX data as configuration for a generic diagnostic software module or by utilizing a software generation process, which is controlled by the OBD ODX configuration data.

Once the OBD behaviour of an ECU is defined in ODX format, this file can be used to configure a standardized software part in the ECU.

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The benefits of implementing this use case are that

— it is necessary to test standardized ECU software modules only once;

— standardized ECU software modules can be reused in different projects;

— ECU behaviour fits exactly to the behaviour described in the ODX file (because the software as well as the documentation are derived from the same data source).

Figure 5 depicts an example of an ECU diagnostic software module and configuration data derived from ODX.

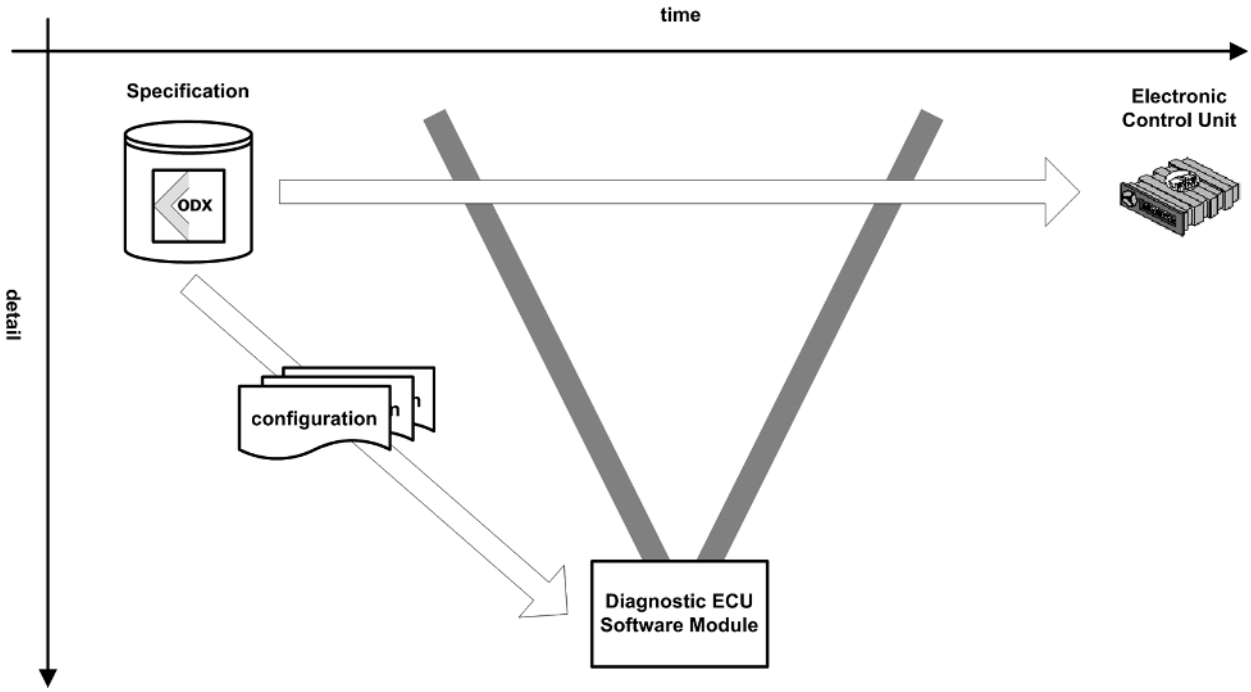

Figure 5 — Example of an ECU diagnostic software module and configuration data derived from ODX

7.3 Usage of ODX checker rules for ECU development

This application example describes the usage of ODX checker rules, which represent a subset of the SAE J1699-3 test cases.

For ODX, adaptable checkers exist. These allow to check for ODX compliance and may be extended with individual checker rules. With these, OBD compliance may be checked before the ECU is implemented, only if the emissions-related OBD ODX data follow the requirements of this part of ISO 22901.

EXAMPLE When specifying the behaviour of an individual ECU in ODX, the support of Infotype 0x0A (ECU-name) for model year 2010 and later can be checked before the ECU code is implemented.

The benefits of implementing this application example are:

— early check for errors (before ECU is implemented in the vehicle);

— checker rules may be provided by a third party and made available to interested users.

Figure 6 depicts an emissions-related OBD compliance test during ECU specification phase.

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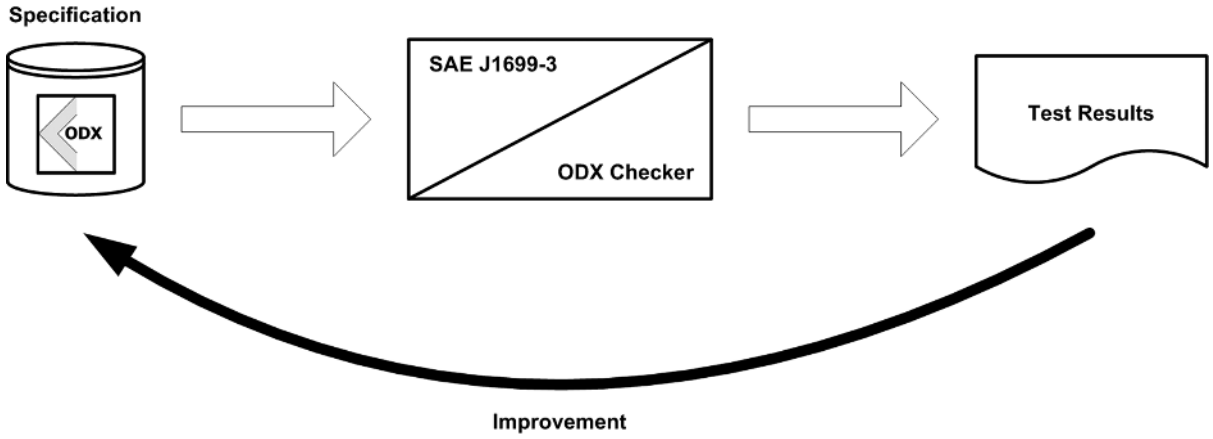

Figure 6 — Emissions-related OBD compliance test during ECU specification phase

8 Specification release version information

8.1 Specification release version location

The release version of the ODX standard can be obtained from every ODX file instance. It is contained in the MODEL-VERSION attribute.

```
<ODX MODEL-VERSION="2.2.0">
```

8.2 Specification release version

The specification release version of this document is: 2.2.0

9 OBD authoring in ODX

9.1 ODX layering

9.1.1 Relationship between ODX layers

Figure 7 illustrates the partitioning of the emissions-related OBD protocols and their associated ComParamSpec from the ECU-Shared-Data and Functional Groups 1 and 2. The Vehicle-Info specifies the Logical Links to the Protocols and Functional Groups. The light and dotted parts are user extensions that can be integrated, if protocols other than ISO 15765-4 are to be supported.

This part of ISO 22901 covers only the ISO 15765-4 DoCAN case. If other physical layers are modelled in ODX as well, the naming as defined in this part of ISO 22901 are to be used.

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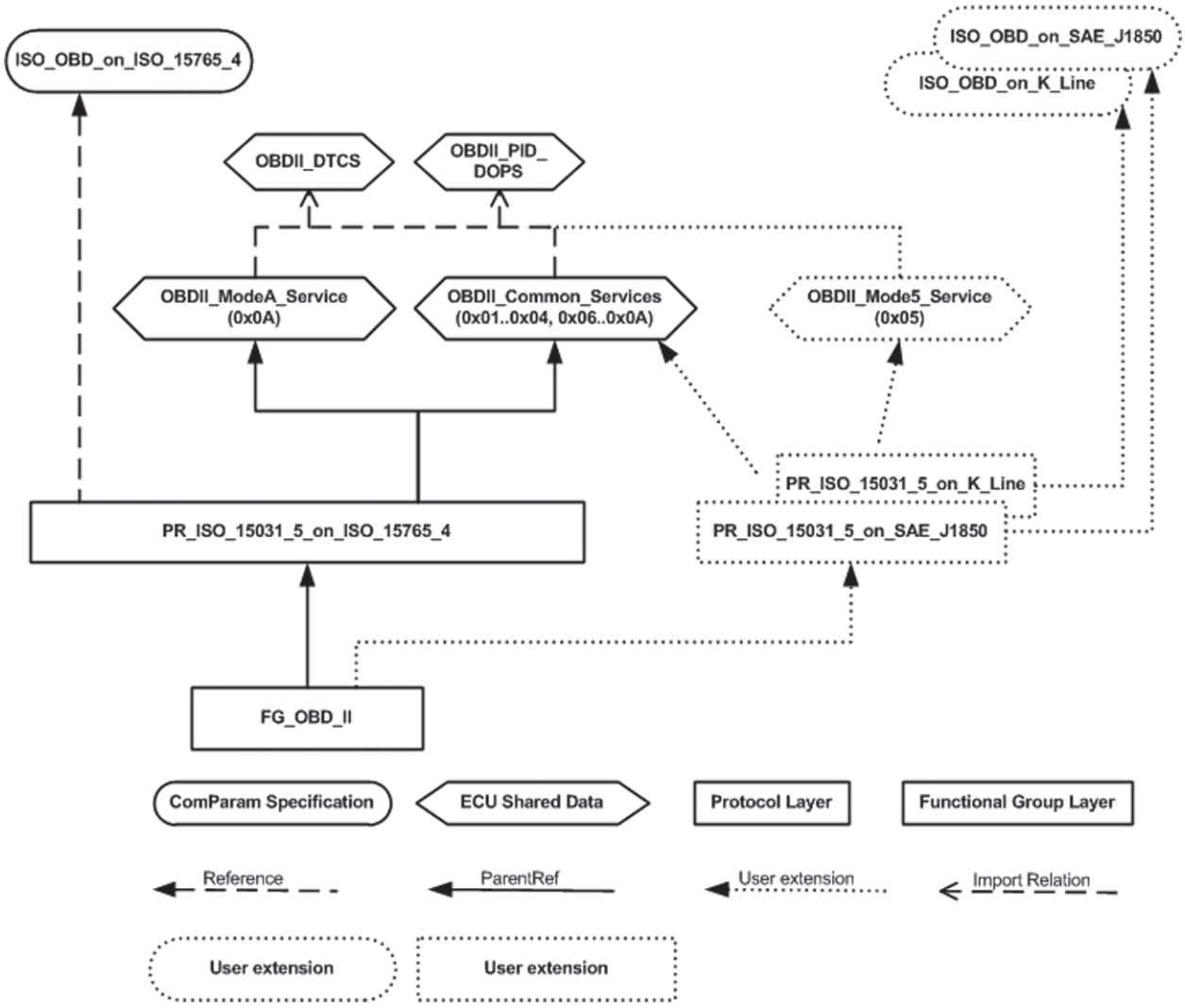

Figure 7 — ComParam-Specs for emissions-related OBD protocols and data

Each DIAG-LAYER should reside in a DIAG-LAYER-CONTAINER of its own.

9.1.2 Authoring of Functional Groups

Functional Groups specify data for a group of emissions-related ECUs, i.e. Engine Control Module and Transmission Control Module which contain all required information to enable the Modular VCI compliant emissions-related OBD test equipment to perform functional communication.

A Functional Group named “FG_OBD_II” specifies the data relevant to the OBD message protocol for all of the available and supported physical link layers (ISO_OBD_on_ISO_15765_4 and also ISO_OBD_on_SAE_J1850, ISO_OBD_on_K_Line, if present). The ComParamSpec as defined by ISO 22900-2 specifies the protocol specific message framing, message timing and message addressing information. For SAE J1993-73, this part of ISO 22901 defines only the name for the protocol layer.

9.1.3 Authoring of emissions-related protocols

The PROTOCOL class in ODX is used to capture communication data like message layout, parameters in diagnostic requests and responses, conversion information to convert from coded values to physical values and vice versa.

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For emission-related data, three ODX protocol layers named “PR_ISO_15031_5_on_ISO_15765_4”, “PR_ISO_15031_5_on_SAE_J1850” and “PR_ISO_15031_5_on_K_Line” are defined. “PR_ISO_15031_5_on_ISO_15765_4” is covered by this part of ISO 22901. They capture the physical layer and transport layer specific protocol information.

EXAMPLE Name tags of protocol PR_ISO_15031_5_on_ISO_15765_4

```
<PROTOCOL ID="ID_PR_ISO_15031_5_on_ISO_15765_4">
  <SHORT-NAME>PR_ISO_15031_5_on_ISO_15765_4</SHORT-NAME>
  <LONG-NAME>ISO OBD on CAN</LONG-NAME>
  <COMPARAM-SPEC-REF DOCREF="ISO_OBD_on_ISO_15765_4" DOCTYPE="COMPARAM-SPEC" ID-
   REF="ID_ISO_OBD_on_ISO_15765_4"/>
</PROTOCOL>
```

Table 1 defines SHORT-NAME and LONG-NAME of the OBD protocols.

Table 1 — Definition of SHORT-NAME and LONG-NAME of OBD protocols

SHORT-NAME	LONG-NAME
PR_ISO_15031_5_on_ISO_15765_4	ISO OBD on CAN
PR_ISO_15031_5_on_SAE_J1850	ISO OBD on J1850 VPW and J1850 PWM
PR_ISO_15031_5_on_K_Line	ISO OBD on 9141-2 K-Line and KWP2000 K-Line

In order to identify and group OBD services effectively, all OBD Services are members of the Functional Class “OBD.PROTOCOL.OBDonCAN.FUNCT-CLASS.emissionRelatedDiagnosticServices”.

EXAMPLE FUNCT-CLASSS

```
<FUNCT-CLASSS>
  <FUNCT-CLASS ID="OBD.PROTOCOL.OBDonCAN.FUNCT-CLASS.emissionRelatedDiagnosticServices">
  <SHORT-NAME>ISO_15031_5</SHORT-NAME>
  <LONG-NAME>ISO 15031-5</LONG-NAME>
  </FUNCT-CLASS>
</FUNCT-CLASSS>
```

9.1.4 Authoring of emissions-related ECU-SHARED-DATA

Several named ECU-SHARED-DATA ODX containers capture OBDII relevant services as well as parameter encoding and decoding information.

“OBDII_DOPS” hold the encoding and decoding description of a response and request parameter as well as units and dimension specifications.

“OBDII_Common_Services” holds OBDII services definitions for modes 0x01-0x04, 0x06-0x09.

“OBDII_ModeA_Service” holds OBDII services definitions for mode 0x0A. Mode 0x0A service is separated out because it is not used for OBD other than on CAN.

“OBDII_Mode5_Service” holds OBDII service definitions for mode 0x05. Mode 0x05 service is separated out because it is not used for OBD on CAN.

EXAMPLE Ecu-Shared-Data

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```
<ECU-SHARED-DATA>
  <SHORT-NAME>OBDII_DOPS</SHORT-NAME>
  <LONG-NAME>DTCS for the OBD protocol</LONG-NAME>
  <DIAG-DATA-DICTIONARY-SPEC>
    <DTC-DOPS>
      <DTC-DOP ID="DIAG-LAYER-CONTAINER.OBDTemplate.DTC-DOP.J2012DTC">
        <SHORT-NAME>J2012DTC</SHORT-NAME>
        <LONG-NAME>J2012DTC</LONG-NAME>
        <DIAG-CODED-TYPE BASE-DATA-TYPE="A_UINT32" xsi:type="STANDARD-LENGTH-TYPE">
          <BIT-LENGTH>16</BIT-LENGTH>
        </DIAG-CODED-TYPE>
        <PHYSICAL-TYPE BASE-DATA-TYPE="A_UINT32" DISPLAY-RADIX="HEX"/>
        <COMPU-METHOD>
          <CATEGORY>IDENTICAL</CATEGORY>
        </COMPU-METHOD>
        <DTCS>
          <DTC ID="ID_OBD.DTC-DOP.J2012DTC.DTC.P0000">
            <SHORT-NAME>P0000</SHORT-NAME>
            <TROUBLE-CODE>0</TROUBLE-CODE>
            <TEXT>ISO/SAE reserved - Use Not Allowed</TEXT>
          </DTC>
                    …
        </DTCS>
      </DTC-DOP>
    </DTC-DOPS>
   …
  </DIAG-DATA-DICTIONARY-SPEC>
</ECU-SHARED-DATA>
```

9.1.5 Authoring of VEHICLE-INFO

The VEHICLE-INFO-SPECIFICATION “VI_OBDII” specifies the logical links to be supported by the Modular VCI (see ISO 22900).

All OBDII logical links refer to Functional Group “FG_OBD_II”. However, for different physical layers, the respective predefined protocol of 9.1.3 is referenced.

There shall be three Logical Links defined, named “LL_OBD_on_ISO_15765_4”, “LL_OBD_on_SAE_J1850” and “LL_OBD_on_K_Line”:

a) LL_OBD_on_ISO_15765_4 references FG_OBD_II and PR_OBD_on_ISO_15765_4;

b) LL_OBD_on_SAE_J1850 references FG_OBD_II and PR_OBD_on_SAE_J1850;

c) LL_OBD_on_K_Line references FG_OBD_II and PR_OBD_on_K_Line.

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This technique ensures that selecting a logical link is sufficient to establish ECU communication using the correct protocol, communication parameters and services.

IMPORTANT — OBD communication initialization is specified in ISO 22900-2.

9.2 Service implementation in ODX

9.2.1 General

ISO 22901-1 provides at least two alternatives to author diagnostic data:

a) dedicated diagnostic service related data authoring, i.e. the same data (PIDS, INFOTYPES, ...) are used by all emissions-related OBD protocols and authored for each protocol redundantly;

b) diagnostic service independent related data authoring, also called “table based authoring”, i.e. the same data (PIDS, INFOTYPES, ...), are used by all emissions-related OBD protocols but authored only once and referenced by each protocol.

IMPORTANT — Emissions-related OBD data as specified in ISO 15031-5, ISO 15031-6 / SAE J1979 and SAE J1979-DA (Digital Annex) shall be authored according to b).

9.2.2 OBD Services authoring

9.2.2.1 ODX IDs of OBD services

The ID of the OBD services shall be generated by the following rule: <Layer-ID>.DS_SHORT-NAME

```
<DIAG-SERVICE
    ID="ES_OBDIICommonServices.DS_Service01RequestCurrentPowertrainDiagnosticDataPID13">
    <SHORT-NAME>Service01RequestCurrentPowertrainDiagnosticDataPID13</SHORT-NAME>
    <LONG-NAME>Service 0x01 - Request current powertrain diagnostic data (PID 0x13)</LONG-
NAME>
    …
</DIAG-SERVICE>
```

9.2.2.2 ODX DESCription of OBD services

The text of the ISO 15031-5 “Functional description” subclause of the particular OBD service shall be used.

9.2.2.3 ODX LONG-NAMEs of OBD services

The LONG-NAME of the DIAG-SERVICE shall use the complete wording of the service description in the headlines of ISO 15031-5. This document distinguishes between services for ISO 9141-2, ISO 14230-4, SAE J1850 and services for ISO 15765-4, but the descriptions of the headlines are the same as the services in both cases; this circumstance has to be considered in the LONG-NAME or later on in the description of the services itself. Request and POS-/NEG-RESPONSES have to be kept in mind in this case.

Table 2 defines the LONG-NAMEs for OBD services regarding ISO 15765-4.

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Table 2 — LONG-NAMEs for OBD services regarding ISO 15765-4

Headline used in ISO 15031-5 and ISO 15765-4	LONG-NAME
Service 0x01 – Request current powertrain diagnostic data	Service 0x01 – Request current powertrain diagnostic data
Service 0x02 – Request powertrain freeze frame data	Service 0x02 – Request powertrain freeze frame data
Service 0x03 – Request emission-related diagnostic trouble codes	Service 0x03 – Request emission-related diagnostic trouble codes
Service 0x04 – Clear/reset emission-related diagnostic information	Service 0x04 – Clear/reset emission-related diagnostic information
Service 0x05 – Request oxygen sensor monitoring test results	Service 0x05 – Request oxygen sensor monitoring test results
Service 0x06 – Request on-board monitoring test results for specific monitored systems	Service 0x06 – Request on-board monitoring test results for specific monitored systems
Service 0x07 – Request emission-related diagnostic trouble codes detected during current or last completed driving cycle	Service 0x07 – Request emission-related diagnostic trouble codes detected during current or last completed driving cycle
Service 0x08 – Request control of on-board system, test or component	Service 0x08 – Request control of on-board system, test or component
Service 0x09 – Request vehicle information	Service 0x09 – Request vehicle information
Service 0x0A – Request emissions-related diagnostic trouble codes with permanent status	Service 0x0A – Request emissions-related diagnostic trouble codes with permanent status

It is necessary to consider the following exceptions. With service 0x01, the behaviour for PID 0x13 and PID 0x1D shall be distinguished. Therefore, it is necessary to define two services for service 0x01. The LONG-NAME of both services are extended by the marker (PID 0x13) and (PID 0x1D), respectively.

Table 3 defines the LONG-NAMEs for OBD service 0x01 distinguishing PID 0x13 and PID 0x1D.

Table 3 — LONG-NAMEs for OBD service 0x01 distinguishing PID 0x13 and PID 0x1D

Headline used in ISO 15031-5 and ISO 15765-4	LONG-NAME
Service 0x01 – Request current powertrain diagnostic data	Service 0x01 – Request current powertrain diagnostic data (PID 0x13)
Service 0x01 – Request current powertrain diagnostic data	Service 0x01 – Request current powertrain diagnostic data (PID 0x1D)

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9.2.2.4 ODX SHORT-NAMEs of OBD services

Table 4 defines the SHORT-NAMEs for OBD services regarding ISO 15765-4.

Table 4 — SHORT-NAMEs for OBD services regarding ISO 15765-4

LONG-NAME	SHORT-NAME
Service 0x01 – Request current powertrain diagnostic data	Service01RequestCurrentPowertrainDiagnosticData
Service 0x02 – Request powertrain freeze frame data	Service02RequestPowertrainFreezeFrameData
Service 0x03 – Request emissions-related diagnostic trouble codes	Service03RequestEmissionRelatedDiagnosticTroubleCodes
Service 0x04 – Clear/reset emissions-related diagnostic information	Service04ClearResetEmissionRelatedDiagnosticInformation
Service 0x05 – Request oxygen sensor monitoring test results	Service05RequestOxygenSensorMonitoringTestResults
Service 0x06 – Request on-board monitoring test results for specific monitored systems	Service06RequestOnBoardMonitoringTestResults ForSpecificMonitoredSystems
Service 0x07 – Request emissions-related diagnostic trouble codes detected during current or last completed driving cycle	Service07RequestEmissionRelatedDiagnosticTroubleCodesDetectedDuringCurrentOrLastCompletedDrivingCycle
Service 0x08 – Request control of on-board system, test or component	Service08RequestControlOfOnBoardSystemTestOrComponent
Service 0x09 – Request vehicle information	Service09RequestVehicleInformation
Service 0x0A – Request emissions-related diagnostic trouble codes with permanent status	Service0ARequestEmissionRelatedDiagnosticTroubleCodes WithPermanentStatus

IMPORTANT — The addressing method shall be FUNCTIONAL.

Table 5 defines two different service 0x01 LONG-NAME and SHORT-NAME because the interpretation of the respective response impacts the interpretation of, for example, PID 0x1B.

Table 5 — SHORT-NAMEs for OBD service 0x01 distinguishing PID 0x13 and PID 0x1D

LONG-NAME	SHORT-NAME
Service 0x01 – Request current powertrain diagnostic data (PID 0x13)	Service01RequestCurrentPowertrainDiagnosticDataPID13
Service 0x01 – Request current powertrain diagnostic data (PID 0x1D)	Service01RequestCurrentPowertrainDiagnosticDataPID1D

9.2.3 ODX request implementation

9.2.3.1 ODX IDs of requests

For the ID of an OBD request the prefix REQ_ shall be combined with the SHORT-NAME of the request.

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9.2.3.2 LONG-NAMEs and SHORT-NAMEs of requests

The LONG-NAME of the request shall be the same as the LONG-NAME of the DIAG-SERVICE that the request belongs to. The SHORT-NAME of the request shall be the same as the SHORT-NAME of the DIAG-SERVICE that the request belongs to.

Table 6 defines the LONG-NAMEs and SHORT-NAMEs of requests.

Table 6 — LONG-NAMEs and SHORT-NAMEs of requests

LONG-NAME of request	SHORT-NAME of request
Service 0x01 – Request current powertrain diagnostic data	Service01RequestCurrentPowertrainDiagnosticData
Service 0x02 – Request powertrain freeze frame data	Service02RequestPowertrainFreezeFrameData
Service 0x03 – Request emission-related diagnostic trouble codes	Service03RequestEmissionRelatedDiagnosticTroubleCodes
Service 0x04 – Clear/reset emission-related diagnostic information	Service04ClearResetEmissionRelatedDiagnosticInformation
Service 0x05 – Request oxygen sensor monitoring test results	Service05RequestOxygenSensorMonitoringTestResults
Service 0x06 – Request on-board monitoring test results for specific monitored systems	Service06RequestOnBoardMonitoringTestResultsForSpecific MonitoredSystems
Service 0x07 – Request emission-related diagnostic trouble codes detected during current or last completed driving cycle	Service07RequestEmissionRelatedDiagnosticTroubleCodes DetectedDuringCurrentOrLastCompletedDrivingCycle
Service 0x08 – Request control of on-board system, test or component	Service08RequestControlOfOnBoardSystemTestOr Component
Service 0x09 – Request vehicle information	Service09RequestVehicleInformation
Service 0x0A – Request emissions-related diagnostic trouble codes with permanent status	Service0ARequestEmissionRelatedDiagnosticTroubleCodes WithPermanentStatus

9.2.4 ODX POS-RESPONSE implementation

9.2.4.1 ODX IDs of POS-RESPONSES

For the ID of an OBD POS-RESPONSE the prefix PRE_ shall be combined with the SHORT-NAME of the POS-RESPONSE.

9.2.4.2 LONG-NAMEs of POS-RESPONSES

The LONG-NAME of the POS-RESPONSE shall be the same as the LONG-NAME of the DIAG-SERVICE that the POS-RESPONSE belongs to.

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9.2.4.3 SHORT-NAMEs of POS-RESPONSES

The SHORT-NAME of the POS-RESPONSE shall be the same as the SHORT-NAME of the DIAG-SERVICE that the POS-RESPONSE belongs to.

Table 7 defines the LONG-NAMEs and SHORT-NAMEs of POS-RESPONSES.

Table 7 — LONG-NAMEs and SHORT-NAMEs of POS-RESPONSES

LONG-NAME of POS-RESPONSE	SHORT-NAME of POS-RESPONSE
Service 0x01 – Request current powertrain diagnostic data	Service01RequestCurrentPowertrainDiagnosticData
Service 0x02 – Request powertrain freeze frame data	Service02RequestPowertrainFreezeFrameData
Service 0x03 – Request emission-related diagnostic trouble codes	Service03RequestEmissionRelatedDiagnosticTroubleCodes
Service 0x04 – Clear/reset emission-related diagnostic information	Service04ClearResetEmissionRelatedDiagnosticInformation
Service 0x05 – Request oxygen sensor monitoring test results	Service05RequestOxygenSensorMonitoringTestResults
Service 0x06 – Request on-board monitoring test results for specific monitored systems	Service06RequestOnBoardMonitoringTestResultsForSpecificMonitoredSystems
Service 0x07 – Request emission-related diagnostic trouble codes detected during current or last completed driving cycle	Service07RequestEmissionRelatedDiagnosticTroubleCodesDetectedDuringCurrentOrLastCompletedDrivingCycle
Service 0x08 – Request control of on-board system, test or component	Service08RequestControlOfOnBoardSystemTestOrComponent
Service 0x09 – Request vehicle information	Service09RequestVehicleInformation
Service 0x0A – Request emissions-related diagnostic trouble codes with permanent status	Service0ARequestEmissionRelatedDiagnosticTroubleCodesWithPermanentStatus

9.2.5 ODX NEG-RESPONSE implementation

A GLOBAL-NEG-RESPONSE in the ECU-SHARED-DATA “OBDII_Common_Services” defines the negative responses according to ISO 15031-5 for OBD communication based on ISO 15765-4, SAE J1850. The ID of the GLOBAL-NEG-RESPONSE is “GNR_OBDIIServicesNegativeResponse”. Its LONG-NAME is “OBDII Services – Negative Response”. Its SHORT-NAME is “OBDIIServicesNegativeResponse”.

No DIAG-SERVICE specific NEG-RESPONSEs are used for the OBD Modes 0x01-0x0A.

9.3 ODX PARAMs implementation

As a general rule, the ODX names of a parameter shall be derived from the “Description” of the parameter as specified in ISO 15031-5. The LONG-NAME shall be copied from the description in ISO 15031-5. The SHORT-NAME shall be generated by removing all characters from the LONG-NAME disallowed by the ODX specification.

In case a parameter in ISO 15031-5 has no description or when the description is not favourable for a specific parameter, the naming convention shall be as detailed in this part of ISO 22901.

The second parameter at the POS-RESPONSE shall describe the PID of the request. This shall be done with the use of MATCHING-REQUEST-PARAM. The LONG-NAME of this parameter is “Matching PID”. The SHORT-NAME shall be MatchingParameterID.

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9.3.1 Service IDs (SID)

9.3.1.1 LONG-NAMEs and SHORT-NAMEs of request SIDs

The general rule shall be applied, however, the words “request SID” shall be appended to the LONG-NAME of the SID parameter. The SHORT-NAME is then derived from the LONG-NAME as described in the general rule.

Table 8 defines the LONG-NAMEs and SHORT-NAMEs of PARAMs of the request SID.

Table 8 — LONG-NAMEs and SHORT-NAMEs of PARAMs of the request SID

Request SID	LONG-NAME of PARAM	SHORT-NAME of PARAM
Service 0x01	Request current powertrain diagnostic data request SID	RequestCurrentPowertrainDiagnosticDataRequestSID
Service 0x02	Request powertrain freeze frame data request SID	RequestPowertrainFreezeFrameDataRequestSID
Service 0x03	Request emission-related diagnostic trouble codes request SID	RequestEmissionRelatedDiagnosticTroubleCodesRequestSID
Service 0x04	Clear/reset emission-related diagnostic information request SID	ClearResetEmissionRelatedDiagnosticInformationRequestSID
Service 0x05	Request oxygen sensor monitoring test results request SID	RequestOxygenSensorMonitoringTestResultsRequestSID
Service 0x06	Request on-board monitoring test results for specific monitored systems request SID	RequestOnBoardMonitoringTestResults ForSpecificMonitoredSystemsRequestSID
Service 0x07	Request emission-related diagnostic trouble codes detected during current or last completed driving cycle request SID	RequestEmissionRelatedDiagnosticTroubleCodesDetected DuringCurrentOrLastCompletedDrivingCycleRequestSID
Service 0x08	Request control of on-board system, test or component request SID	RequestControlOfOnBoardSystemTestOrComponent RequestSID
Service 0x09	Request vehicle information request SID	RequestVehicleInformationRequestSID
Service 0x0A	Request emissions-related diagnostic trouble codes with permanent status request SID	RequestEmissionsRelatedDiagnosticTroubleCodesWithPerman entStatusRequestSID

The request SID parameters shall be of type CODED-CONST defined as DIAG-CODED-TYPE, i.e. an 8 bit unsigned integer value. The SEMANTIC of the parameter shall be “SERVICE-ID”.

9.3.1.2 LONG-NAMEs and SHORT-NAMEs of response SIDs

The general rule shall be applied, however, the words “response SID” shall be appended to the LONG-NAME of the SID parameter. The SHORT-NAME is then derived from the LONG-NAME as described in the general rule.

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