
**Road vehicles — Interchange of digital
information on electrical connections
between towing and towed vehicles —**

**Part 4:
Diagnostic communication**

*Véhicules routiers — Échange d'informations numériques sur
les connexions électriques entre véhicules tracteurs et véhicules
tractés —*
Partie 4: Communication de diagnostic

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

This third edition cancels and replaces the second edition (ISO 11992-4:2014), which has been technically revised.

The main changes are as follows:

- introduction of requirement structure with numbering and name;
- introduction of application requirements;
- introduction of OSI layers related requirements;
- clarification on gateway network address translation (deleted subnet addressing subclause).

A list of all parts in the ISO 11992 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 11992 series specifies the interchange of digital information between road vehicles with a maximum authorised total mass greater than 3 500 kg, and towed vehicles, including communication between towed vehicles in terms of parameters and requirements of the lower OSI layers (physical and data link layer) of the electrical connection used to connect the electrical and electronic systems.

This document is structured according to the Open Systems Interconnection (OSI) Basic Reference Model, in accordance with ISO/IEC 7498-1 and ISO/IEC 10731, which structures communication systems into seven layers. When mapped on this model, the application layer protocol and data link layer framework requirements specified/referenced in the ISO 11992 series are structured according to [Figure 1](#).

[Figure 1](#) illustrates a simplified communication framework:

- vehicle normal communication framework,
- vehicle diagnostic communication framework,
- vehicle-specific use case framework, and
- vehicle lower-layers framework.

The vehicle normal communication framework is composed of ISO 11992-2 and ISO 11992-3.

The vehicle diagnostic communication framework is composed of ISO 14229-1, ISO 14229-2, ISO 14229-3 and this document.

The vehicle-specific use case framework is composed of this document, ISO 22901-1 or vehicle manufacturer-specific diagnostic data definition.

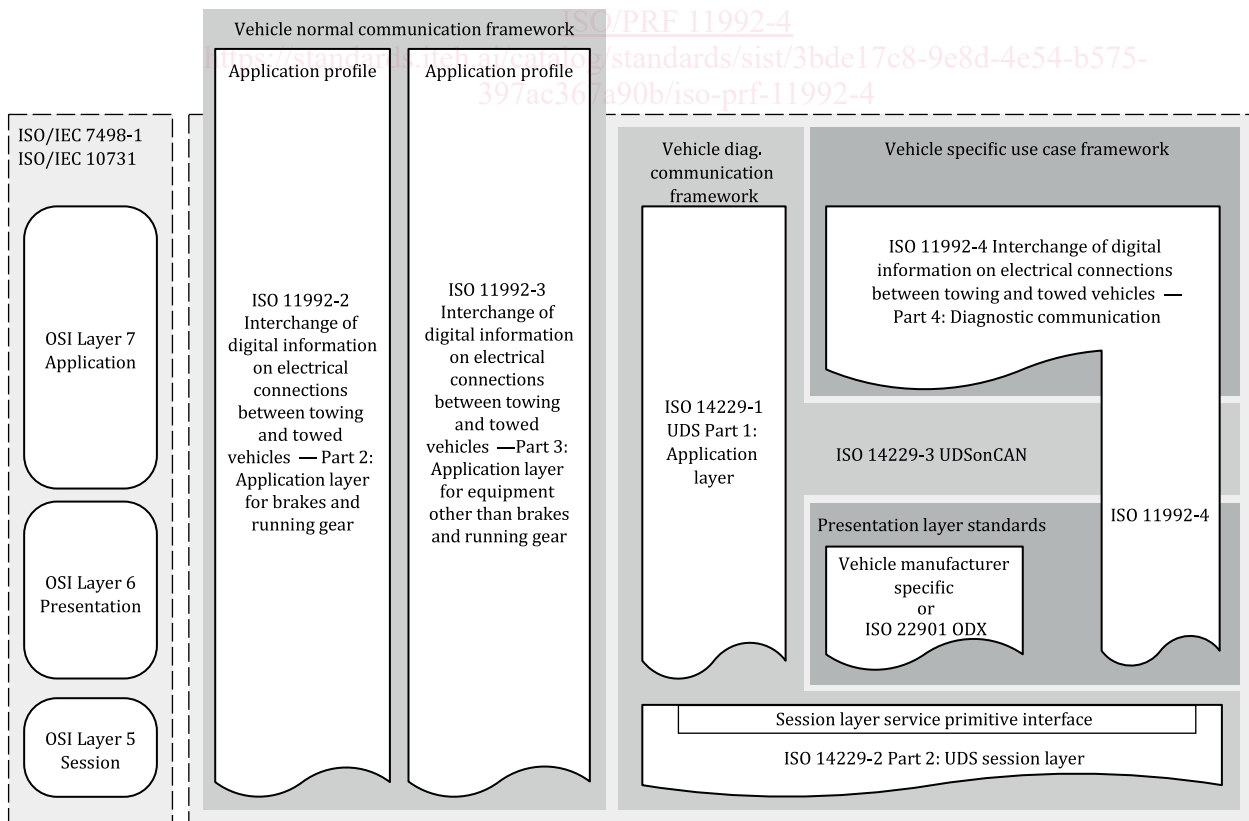


Figure 1 — ISO documents reference according to the OSI model

Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles —

Part 4: Diagnostic communication

1 Scope

This document specifies diagnostic application requirements and OSI-layer related communication profiles to ensure the interchange of digital information between towing and towed vehicles with a maximum authorized total mass greater than 3 500 kg.

The conformance and interoperability test plans are not part of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11992-1, *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles — Part 1: Physical and data-link layers*

ISO 11992-2:—,¹⁾ *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles — Part 2: Application layer for brakes and running gear*

ISO 11992-3:2021, *Road vehicles — Interchange of digital information on electrical connections between towing and towed vehicles — Part 3: Application layer for equipment other than brakes and running gear*

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

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

ISO 14229-3, *Road vehicles — Unified diagnostic services (UDS) — Part 3: Unified diagnostic services on CAN implementation (UDSonCAN)*

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

ISO 15765-5, *Road vehicles — Diagnostic communication over Controller Area Network (DoCAN) — Part 5: Specification for an in-vehicle network connected to the diagnostic link connector*

SAE J1939-21, *Data Link Layer*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11992-1, ISO 14229-1, ISO 14229-2, ISO 14229-3 and the following apply.

1) Fourth edition under preparation. Stage at the time of publication: ISO/FDIS 11992-2:2023.

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

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

3.1 mandatory

M
keyword indicating an item that is required to be implemented as defined in this document to claim compliance with this document

[SOURCE: ISO/IEC 14776-113:2002, 3.3.3, modified — The word “standard” has been replaced by “document”.]

4 Symbols and abbreviated terms

4.1 Symbols

- empty table cell or feature undefined

4.2 Abbreviated terms

CEFF	classical extended frame format
ComProfile	communication profile
Cvt	convention
DA	destination address (see SAE J1939-21)
DP	data page (see SAE J1939-21)
ECU	electronic control unit
EDP	extended data page (see SAE J1939-21)
GW	gateway
M	mandatory
NAT	network address translation
P	priority (see SAE J1939-21)
PDU	protocol data unit
PF	PDU format (see SAE J1939-21)
PGN	parameter group number (see SAE J1939-21)
PS	PDU specific: destination address or group extension (see SAE J1939-21)
USDT	unacknowledged segmented data transfer
VIN	vehicle identification number

5 Conventions

This document is based on the conventions used in ISO 14229-1 and the underlying OSI Service Conventions (ISO/IEC 10731) as they apply for diagnostic services.

These conventions specify the interactions between the service user and the service provider. The information is passed between the service user and the service provider by the service primitives, which can convey parameters.

6 Vehicle network architecture

Figure 2 shows a possible road train configuration.

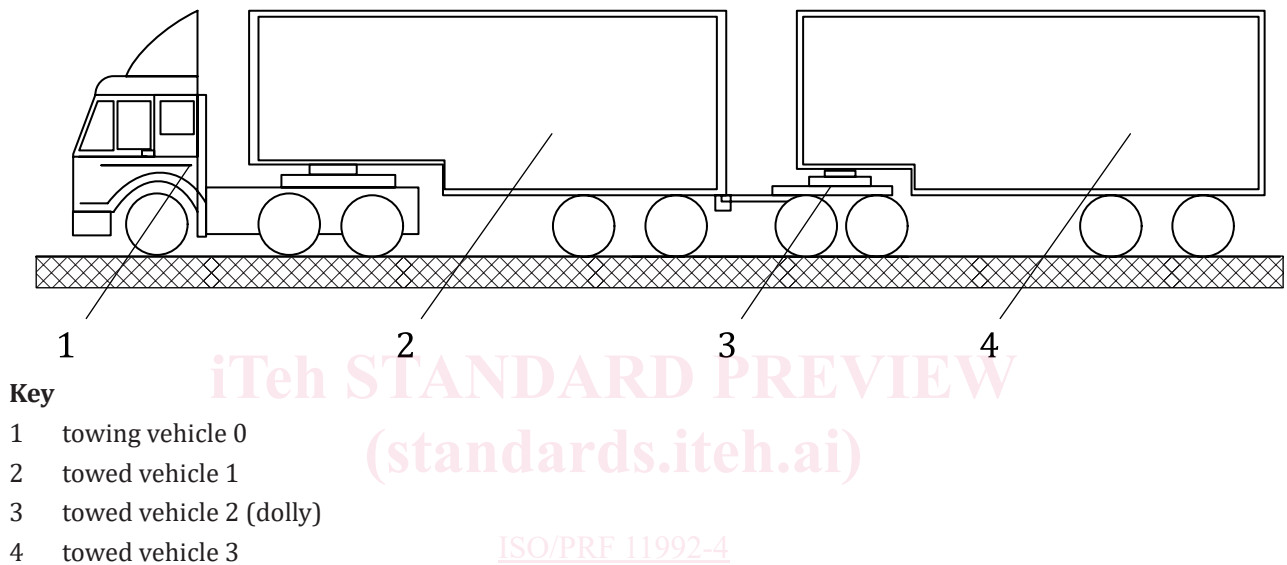
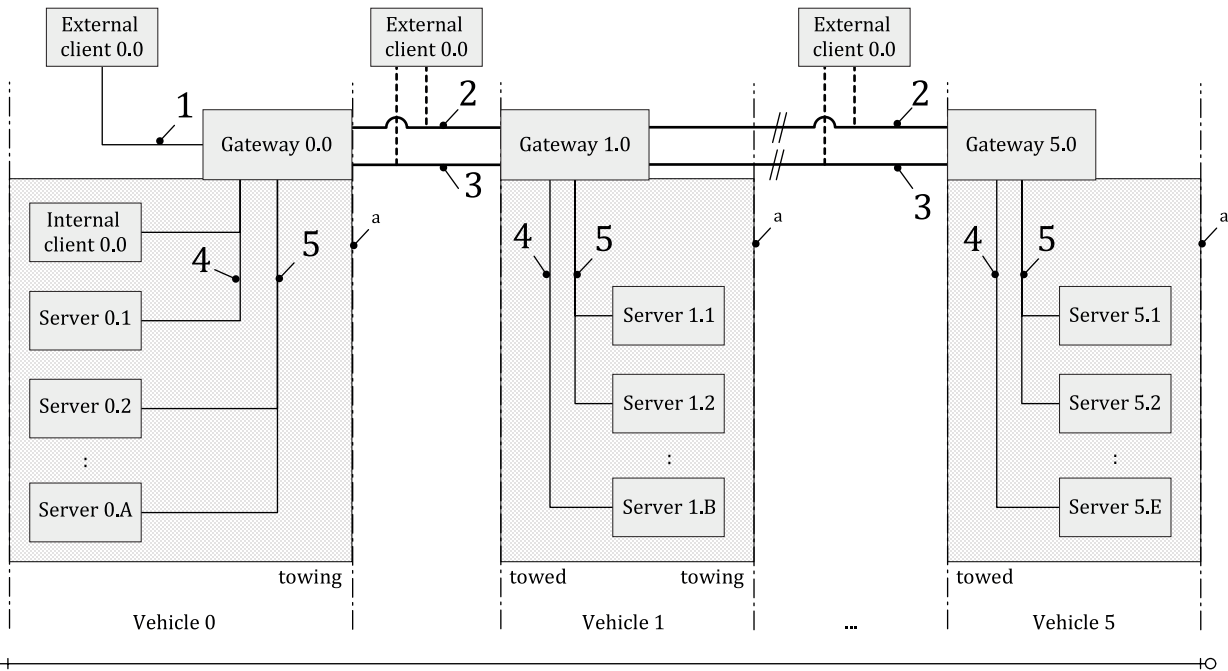


Figure 2 — Example of a possible road train configuration

Figure 3 shows the vehicle network architecture. The external client 0.0 (external test equipment) connects to the vehicle's diagnostic connector.

The gateway 0.0 of vehicle 0 connects the in-vehicle network(s) (Figure 3, key a), which is (are) comprised of, e.g. network(s) Figure 3, keys 4 and 5 with an internal client 0.0 and servers (0.1 to 0.A). It also connects vehicle 0 to the gateway 1.0 of vehicle 1 with a logical communication link Figure 3, key 2 based on ISO 11992-2 and Figure 3, key 3 based on ISO 11992-3.

Gateway 1.0 of vehicle 1 connects the in-vehicle network(s) (Figure 3, key a), which is (are) comprised of, e.g. network(s) Figure 3, keys 4 and 5 with servers (1.1 to 1.B). It also connects vehicle 1 to the gateway 2.0 (3.0, 4.0, 5.0) of vehicle 2 (3, 4, 5) with a logical communication link Figure 3, key 2 based on ISO 11992-2 and Figure 3, key 3 based on ISO 11992-3.



Key

- 1 external diagnostic connection: ISO 11898 CAN, ISO 13400 Ethernet
- 2 ISO 11992-2 messages on ISO 11992-1 communication link
- 3 ISO 11992-3 messages on ISO 11992-1 communication link
- 4 ISO 11992-2 messages on ISO 11992-1 communication link
- 5 ISO 11992-3 messages on ISO 11992-1 communication link
- a In-vehicle network(s): e.g. ISO 11992-2, ISO 11992-3, the ISO 17987 series, the ISO 20794 series, ISO/IEC/IEEE 8802.3, discrete connection.

Figure 3 — Logical vehicle network architecture

The diagnostic communication addressing scheme is initiated from the client (external or internal) to one (physical: point to point addressing) or multiple (functional: one to many addressing) servers.

There is no mechanism specified in this document to synchronise multiple clients.

7 Non OSI-layer-related technical requirements overview

Tables 1 and 2 provide an overview about non OSI-layer-related technical requirements and associated requirement numbers.

Table 1 — Abstract service primitive interface-related technical requirements overview

ASP#.REQ#	Technical requirement title
0	Abstract service primitive interface (ASP) definition
0.1	ASP – A_Data.req, A_Data.ind, and A_Data.conf service primitive interface
0.2	ASP – Abstract service primitive interface parameters
0.3	ASP – Applicable A_Data service interface parameters
0.4	ASP – Data type definitions
0.5	ASP – Mtype, message type
0.6	ASP – TAtype, target address type
0.7	ASP – AE, address extension

Table 1 (continued)

ASP#.REQ#	Technical requirement title
0.8	ASP – TA, target address
0.9	ASP – SA, source address
0.10	ASP – Length, length of PDU
0.11	ASP – PDU, protocol data unit
0.12	ASP – Result, result

Table 2 — Application-related technical requirements overview

APP#.REQ#	Technical requirement title
8	Application
8.1	APP – Data identifier (DID) definition
8.2	APP – DTC field definition
8.3	APP – DTC functional unit definition
8.4	APP – Negative response code (NRC)
8.5	APP – Communication profile (ComProfile)

8 Abstract service primitive interface (ASP) definition

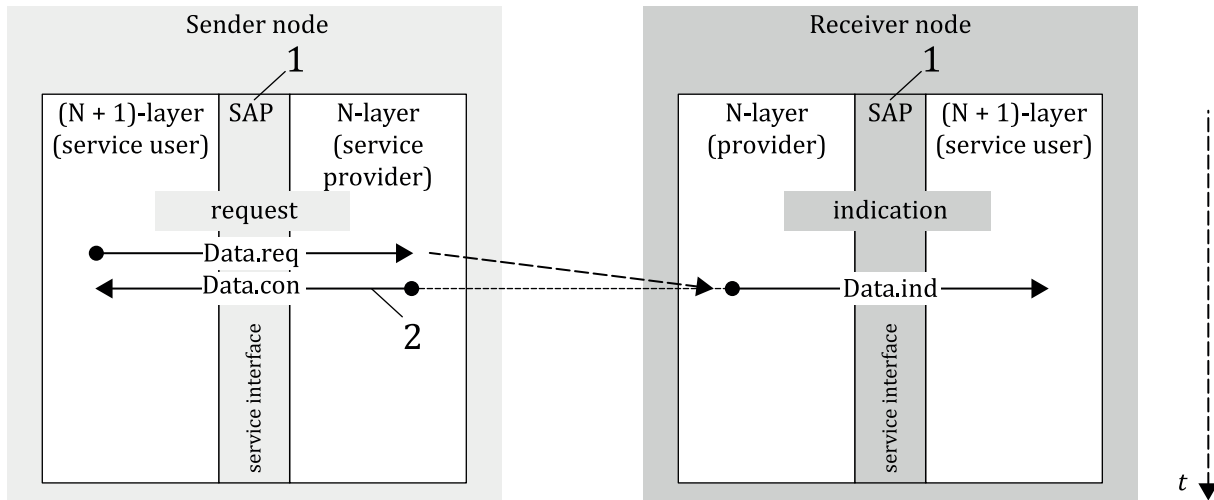
8.1 ASP – A_Data.req, A_Data.ind, and A_Data.conf service primitive interface

The definitions in this document follow the abstract service primitive interface definition in the ISO 14229-1 specification.

REQ	0.1 ASP – A_Data.req, A_Data.ind, and A_Data.conf service primitive interface
	The <code>A_Data.req</code> , <code>A_Data.ind</code> , and <code>A_Data.conf</code> abstract service primitive interface shall be implemented as specified in ISO 14229-1.

The service interface defines the service and parameter mapping to the application and the lower OSI layers.

[Figure 4](#) shows the `A_Data.req` (request), `A_Data.ind` (indication) and `A_Data.conf` (confirmation) service interface.



Key

- t* time
- 1 service access point
- 2 read back from N-layer service provider

Figure 4 — A_Data.req, A_Data.ind, and A_Data.conf service interface

8.2 ASP – Service interface parameters
(standards.iteh.ai)

8.2.1 General

The abstract service primitive interface parameters are used by the management of the OSI-layers.

REQ	0.2 ASP – ISO 14229-1 service interface parameters
The service primitive interface parameters shall be implemented as specified in ISO 14229-1.	

REQ	0.3 ASP – Applicable A_Data service interface parameters
The A_Data abstract service primitives shall use the service primitive parameters as specified in Table 3 .	

Table 3 — A_Data abstract service primitive parameters

ASP parameter	.req	.ind	.conf	Description
A_Mtype	X	X	—	message type [RDiagMixAddr]: remote diagnostics mixed addressing
A_AI[TAtype]	X	X	X	target address type [functional, physical]
A_AI[SA]	X	X	X	source address
A_AI[TA]	X	X	X	target address
A_AI[AE]	X	X	X	address extension
A_Length	X	X	—	length of PDU
A_Data	X	X	—	A_PDU data
A_Result	—	X	X	result of service primitive interface execution