

INTERNATIONAL  
STANDARD

ISO  
14229-8

First edition  
2020-02

---

---

**Road vehicles — Unified diagnostic  
services (UDS) —**

**Part 8:  
UDS on Clock eXtension Peripheral  
Interface (UDSonCXPI)**

*Véhicules routiers — Services de diagnostic unifiés (SDU) —  
Partie 8: Partie 8: SDU sur l'interface périphérique d'extension  
d'horloge (UDSonCXPI)*



Reference number  
ISO 14229-8:2020(E)

© ISO 2020



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
<b>Foreword</b>	<b>v</b>
<b>Introduction</b>	<b>vi</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>1</b>
<b>4 Abbreviated terms</b>	<b>2</b>
<b>5 Conventions</b>	<b>2</b>
<b>6 SIP – Service interface parameters</b>	<b>2</b>
6.1 SIP – General	2
6.2 SIP — Data type definitions	2
6.3 SIP — A_Mtype, message type	3
6.4 SIP — A_TAtype, target address type	3
6.5 SIP — A_TA, target address	3
6.6 SIP — A_SA, source address	3
6.7 SIP — A_Length, length of A_PDU	4
6.8 SIP — A_Data, protocol data unit	4
6.9 SIP — A_SCT, sequence count	4
6.10 SIP — A_Result, result	4
6.11 SIP — ev_wakeup_ind, event wake-up indication (optional)	4
6.12 SIP — cmd_wakeup_req, command wake-up request	5
6.13 SIP — NMInfo, network management information	5
<b>7 APP – Application</b>	<b>5</b>
7.1 APP – General	5
7.2 APP – Definition of diagnostic classes	6
7.2.1 APP – Overview	6
7.2.2 APP – Diagnostic class I	6
7.2.3 APP – Diagnostic class II	6
7.2.4 APP – Diagnostic class III	6
7.3 APP – CXPI master node requirements – Master node fault management, sensor reading, I/O control	7
7.4 APP – CXPI slave node requirements	7
7.4.1 APP – General	7
7.4.2 APP – Error indications	7
7.5 APP – CXPI measurement and control data diagnostics	7
7.5.1 APP – Master handling of slave failure status measurement and control data	7
7.5.2 APP – Slave node current failure status support	7
7.6 APP – Network management (optional)	8
7.7 APP – CXPI master node gateway application	8
7.7.1 APP – General	8
7.7.2 APP – CXPI master gateway number of subnets	8
7.7.3 APP – CXPI master gateway address routing table	8
7.7.4 APP – CXPI master gateway all nodes request message handling	9
7.7.5 APP – Round trip of all node addressing with functional NAD	9
7.7.6 APP – Round trip of all node addressing with node-specific NADs	10
<b>8 AL – Application layer</b>	<b>11</b>
8.1 AL – Client to CXPI slave node(s) communication	11
8.2 AL – Overview of UDSONCXPI services and applicability to diagnostic classes	11
8.3 AL – CommunicationControl (28 <sub>16</sub> ) service	12
8.4 AL – UDSONCXPI services	13
8.4.1 AL – Supported functions	13
8.4.2 AL – Master node receive buffer length	14

8.4.3	AL – Message length is exceeded .....	14
8.5	AL – Protocol .....	14
8.6	AL – Timing .....	14
8.6.1	AL – General .....	14
8.6.2	AL – Timing parameter values .....	14
8.6.3	AL – Server timing performance requirements .....	14
8.6.4	AL – SuppressPosRspMsgIndicationBit .....	15
8.7	AL – Response pending .....	15
8.8	AL – CXPI slave node configuration services .....	16
8.8.1	AL – CXPI node configuration .....	16
8.8.2	AL – Slave node model .....	16
8.8.3	AL – WriteDataByIdentifier – AssignNodeAddress .....	20
8.8.4	AL – WriteDataByIdentifier – NodeDataDump .....	22
8.8.5	AL – ReadDataByIdentifier – NodeProductIdentification .....	23
8.8.6	AL – ReadDataByIdentifier – NodeSerialNumberIdentification .....	24
8.8.7	AL – ReadDataByIdentifier – NodeConfigurationFileAvailability .....	25
8.8.8	AL – WriteDataByIdentifier – SaveConfiguration .....	27
8.8.9	AL – WriteDataByIdentifier – AssignFrameIdentifierRange .....	28
<b>9</b>	<b>PL – Presentation layer .....</b>	<b>29</b>
<b>10</b>	<b>SL – Session layer .....</b>	<b>29</b>
10.1	SL – General .....	29
10.2	SL – A_Data and T_Data service interface parameter mapping .....	29
<b>11</b>	<b>TL – Transport layer .....</b>	<b>30</b>
11.1	TL – Service primitive interface adaptation – General information .....	30
11.2	TL – CXPI transport layer interface adaptation .....	30
11.2.1	TL – Mapping of session layer to transport layer service primitives .....	30
11.2.2	TL – Mapping of T_Data service primitive interface parameters .....	30
<b>12</b>	<b>NL – Network layer .....</b>	<b>31</b>
12.1	NL – Service primitive interface adaptation .....	31
12.1.1	NL – General information .....	31
12.1.2	NL – CXPI network layer interface adaptation .....	31
12.2	NL – CXPI master node .....	32
12.2.1	NL – Network layer .....	32
12.2.2	NL – Dynamic NAD assignment .....	32
12.2.3	NL – NodeIdentificationNumber .....	32
12.3	NL – Master message routing .....	32
12.3.1	NL – General .....	32
12.3.2	NL – Diagnostic request message routing .....	33
12.3.3	NL – Diagnostic response message routing .....	33
12.3.4	NL – Master node transport protocol support .....	33
12.4	NL – CXPI slave node .....	33
12.4.1	NL – General .....	33
12.4.2	NL – Node configuration handling .....	33
12.4.3	NL – Slave node diagnostic class II .....	34
12.4.4	NL – Slave node diagnostic class II – Fixed node address .....	34
12.4.5	NL – Slave node diagnostic class II – Ignore NAD 7E <sub>16</sub> as broadcast .....	34
12.4.6	NL – Slave diagnostic class III – Network layer .....	34
12.4.7	NL – Slave diagnostic class III – Fixed node address .....	34
12.4.8	NL – Slave diagnostic class III – Accept NAD 7E <sub>16</sub> as broadcast .....	34
<b>13</b>	<b>DLL – Data link layer .....</b>	<b>34</b>
<b>Annex A (normative) DID parameter definitions .....</b>		<b>35</b>
<b>Annex B (informative) Guideline for P2<sub>CAN_Client</sub> setting .....</b>		<b>36</b>
<b>Bibliography .....</b>		<b>43</b>

## 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](http://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](http://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](http://www.iso.org/iso/foreword.html).

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

A list of all parts in the ISO 14229 series can be found on the ISO website.

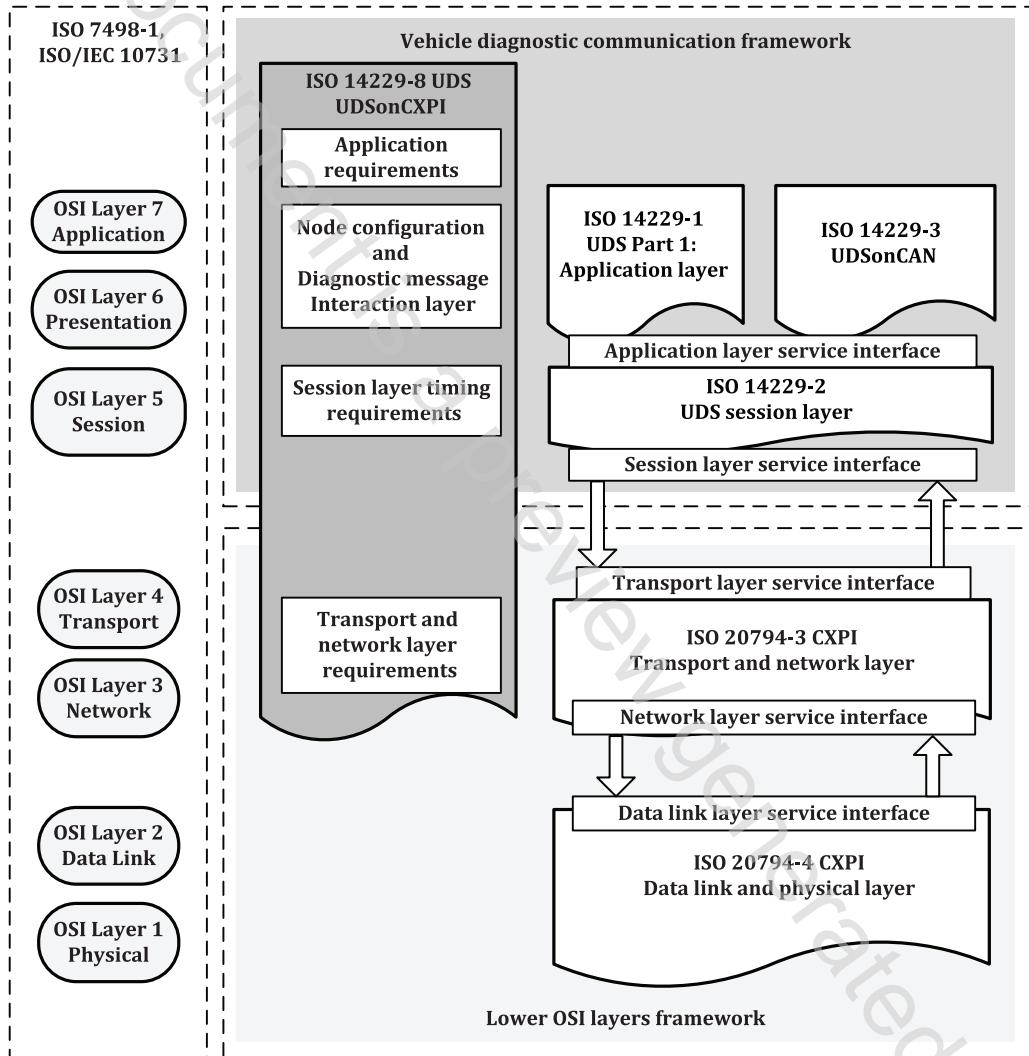
Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

This document has been created in order to enable the implementation of unified diagnostic services, as specified in ISO 14229-1, on the clock extension peripheral interface (CXPI) networks (UDSonCXPI).

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.

[Figure 1](#) illustrates the document references from ISO 14229-1, ISO 14229-2 and ISO 20794 (all parts). This document uses only a subset of the diagnostic services defined in ISO 14229-1 (see [Table 2](#)).



**Figure 1 — UDSONCXPI documents reference according to OSI model**

# Road vehicles — Unified diagnostic services (UDS) —

## Part 8: UDS on Clock eXtension Peripheral Interface (UDSonCXPI)

### 1 Scope

This document specifies the implementation of a common set of unified diagnostic services (UDS) on clock extension peripheral interface networks in road vehicles. The UDSonCXPI diagnostics defines methods to implement diagnostic data transfer between a client and the CXPI slave nodes via the CXPI master node.

This document specifies support of three different diagnostic classes for CXPI slave nodes.

This document references ISO 14229-1 and ISO 14229-2 and specifies implementation requirements of the UDSonCXPI communication protocol for mainly HMI (Human Machine Interface), but not limited to, electric/electronic systems of road vehicles. UDSonCXPI defines how to implement the diagnostic data transfer between a client and CXPI slave nodes via CXPI master node.

NOTE UDSonCXPI does not specify any requirement for the in-vehicle CXPI bus architecture.

This document refers to information contained in ISO 14229-1, ISO 14229-2 and ISO 20794 (all parts).

This document does not include any redundant information of the above-mentioned documents.

It focuses on

- additional requirements specific to the implementation of UDSonCXPI network, and
- specific restrictions in the implementation of UDSonCXPI network.

### 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 7498-1, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model*

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 20794 (all parts), *Road vehicles — Clock extension peripheral interface (CXPI)*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14229-1, ISO 14229-2, ISO 20794 (all parts), ISO/IEC 7498-1 apply.