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AMENDMENT 1
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Road vehicles — Diagnostic communication over Internet Protocol (DoIP) —

Part 2:
Transport protocol and network layer services
AMENDMENT 1

Véhicules routiers — Communication de diagnostic au travers du protocole internet (DoIP) —

Partie 2: Protocole de transport et services de la couche réseau

AMENDEMENT 1

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

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Road vehicles — Diagnostic communication over Internet Protocol (DoIP) —

Part 2:
Transport protocol and network layer services

AMENDMENT 1

6.2.5

Replace description with this text.

For a secured TCP connection, the TLS dedicated TCP_DATA port is used. As for the unsecured DoIP session case, the first step in order to initiate a secure TLS connection between the client DoIP entity and the DoIP entity, is to open a TLS socket (destination port is TLS TCP_DATA). This is done prior to any message exchange. Therefore, a DoIP entity provides the resources to handle the incoming communication request (e.g. socket resources). The DoIP entity provides sufficient resources to handle the specified number of concurrently supported DoIP sessions secured with TLS (<k>) (see [DoIP-159]). If more than <k> connection attempts arrive at the same time, it is possible that no more resources are available and the <k + 1st> connection attempt is refused (because there are no longer any sockets in the listening state because of DoIP protocol handling).

A vehicle manufacturer may choose to implement k+1 TLS data sockets, where the additional socket is used to reject a routing activation with routing activation response code 01_{16}.

If a k+1 TLS data socket is not implemented, no DoIP routing activation response code 01_{16} can be responded when all k concurrently supported DoIP sessions are already in use. In this case, the additional connection will be rejected on the TCP level already.

7.7, Table 12

Replace Table 12 with this table.

Table 12 — DoIP timing and communication parameters

Timing parameter	Description	Client	Server
$t_{A\_DoIP\_Ctrl}$	This timeout specifies the time that the client DoIP entity waits for a response to a previously sent UDP message. This includes the time to wait and collect multiple responses to a previous broadcast (UDP only).	Minimum timeout: 2 s	Recommended ECU Performance Response time: 1 600 ms
$t_{A\_DoIP\_Routing\_Activation}$	This timeout specifies the time that the client DoIP entity waits for a response to a previously sent routing activation request on a TCP_DATA socket.	Minimum timeout: 2 s	Recommended ECU Performance Response time: 1 600 ms

Table 12 *(continued)*

Timing parameter	Description	Client	Server
$t_{A\_DoIP\_Announce\_Wait}$	This timing parameter specifies the initial time that a DoIP entity waits until it responds to a vehicle identification request and the time that a DoIP entity waits until it transmits a vehicle announcement message after a valid IP address is configured. The value of this timing parameter shall be determined randomly between the minimum and the maximum value.	N/A	Random time: 0 to 500 ms
$t_{A\_DoIP\_Announce\_Interval}$	This timing parameter specifies the time between the vehicle announcement messages that are sent by the DoIP entities after a valid IP address has been configured.	N/A	Delay time: 500 ms
$t_{A\_DoIP\_Announce\_Num}$	This parameter specifies the number of vehicle-announcement messages, which are sent by the DoIP entity, after the configuration of a valid IP address.	N/A	Repetition: 3 times
$t_{A\_DoIP\_Diagnostic\_Message}$	This is the time between receipt of the last byte of a DoIP diagnostic message and the transmission of the confirmation ACK or NACK. After the timeout has elapsed, the request or the response shall be considered lost and the request may be repeated.	Minimum timeout: 2 s	ECU performance response time: 50 ms
$t_{T\_TCP\_General\_Inactivity}$	This timeout specifies the time of inactivity on a TCP_DATA socket (no data received or sent) before it is closed by the DoIP entity.	N/A	Timeout: 300 s
$t_{T\_TCP\_Initial\_Inactivity}$	This timeout specifies the time of inactivity directly after a TCP_DATA socket is established. After the specified time without routing activation, the TCP_DATA socket is closed by the DoIP entity.	N/A	Timeout: 2 s
$t_{T\_TCP\_Alive\_Check}$	This timeout specifies the time that a DoIP entity waits for an alive check response after having written an alive check request on the TCP_DATA socket. Thus, the timer elapses if the underlying TCP stack is unable to deliver the alive check request message.	Client performance time: 300 ms	Timeout: 500 ms
$t_{A\_Processing\_Time}$	This timeout is defined as the time between transmission from the client DoIP entity of DoIP messages that require no response message but may need some time to be processed. Thus, the client DoIP entity shall wait for at least A_Processing_Time before sending another request to the same DoIP entity.	Timeout: 2 s	N/A
$t_{A\_Vehicle\_Discovery\_Timer}$	This is a per vehicle offboard sided timer. This timer specifies the time a vehicle can take to perform the VIN/GID synchronization between all DoIP entities. The vehicle discovery timer may only be started when a vehicle announcement/ vehicle identification response message containing a VIN/GID sync status code "incomplete" (10_{16}) and a valid VIN or GID is received by the client DoIP entity.	Timeout: 5 s	N/A

9.2, Table 16

Replace Table 16 with this table.

Table 16 — Generic DoIP header structure

Item	Pos.	Len.	Description	Values
Protocol version	0	1	Identifies the protocol version of DoIP packets.	00_{16}: reserved 01_{16}: ISO/DIS 13400-2:2010 02_{16}: ISO 13400-2:2012 03_{16}: ISO 13400-2:2019 04_{16}: ISO 13400-2:2019/Amd1 05_{16} to FE_{16}: reserved by this document FF_{16}: default value for vehicle identification request messages
Inverse protocol version	1	1	Contains the bit-wise inverse value of the protocol version, which is used in conjunction with the DoIP protocol version as a protocol verification pattern to ensure that a correctly formatted DoIP message is received.	Equals the <Protocol_Version> XOR FF_{16} (e.g. FE_{16} for protocol version 01_{16}).
Payload type (GH_PT)	2	2	Contains information about how to interpret the data following the generic DoIP header (e.g. gateway command, diagnostic message, etc.).	See Table 17 for a complete list of currently specified payload type values.
Payload length (GH_PL)	4	4	Contains the length of the DoIP message payload in bytes (i.e. excluding the generic DoIP header bytes). Some payload types do not require any additional parameters (payload length is 0), some require a fixed DoIP message length while others allow for dynamic length DoIP messages.	0 to 4 294 967 295 bytes
Payload type specific message content	8	...	The payload type specific message content starts here. This implies that, for example, byte position 0 of the payload type-specific part of the message means byte position 8 in the context of the overall DoIP message.	—

9.2, Table 17

Replace Table 17 with this table.

Table 17 — Overview of DoIP application layer payload types

Payload type value	Payload type name	See	Support DoIP GW	Support DoIP nodes	Port and protocol
0000_{16}	Generic DoIP header negative acknowledge	9.3	M	M	UDP_DISCOVERY UDP_TEST_EQUIPMENT_REQUEST TCP_DATA
0001_{16}	Vehicle identification request message	7.4	M	M	UDP_DISCOVERY

Table 17 *(continued)*

Payload type		See	Support DoIP		Port and protocol
value	name		GW	nodes	
0002_{16}	Vehicle identification request message with EID	7.4	O	O	UDP_DISCOVERY
0003_{16}	Vehicle identification request message with VIN	7.4	M	M	UDP_DISCOVERY
0004_{16}	Vehicle announcement message/ vehicle identification response message	7.4	M	M	UDP_DISCOVERY UDP_TEST_EQUIPMENT_REQUEST
0005_{16}	Routing activation request	12.5	M	M	TCP_DATA
0006_{16}	Routing activation response	12.5	M	M	TCP_DATA
0007_{16}	Alive check request	9.6	M	M	TCP_DATA
0008_{16}	Alive check response	9.6	M	M	TCP_DATA
0009_{16} to 4000_{16}	reserved by this document				
4001_{16}	DoIP entity status request	7.6	O	O	UDP_DISCOVERY
4002_{16}	DoIP entity status response	7.6	O	O	UDP_TEST_EQUIPMENT_REQUEST
4003_{16}	Diagnostic power mode information request	7.5	M	M	UDP_DISCOVERY
4004_{16}	Diagnostic power mode information response	7.5	M	M	UDP_TEST_EQUIPMENT_REQUEST
4005_{16} to 8000_{16}	reserved by this document				
8001_{16}	Diagnostic message	9.5	M	M	TCP_DATA
8002_{16}	Diagnostic message positive acknowledgement	9.5	M	M	TCP_DATA
8003_{16}	Diagnostic message negative acknowledgement	9.5	M	M	TCP_DATA
8004_{16}	Periodic diagnostic message	9.7	O	O	TCP_DATA
8005_{16} to $8FFF_{16}$	reserved by this document				
9000_{16} to $9FFF_{16}$	see 11.4				
$A000_{16}$ to $EFFF_{16}$	reserved by this document				
$F000_{16}$ to $FFFF_{16}$	Reserved for manufacturer-specific use	—	O	O	—

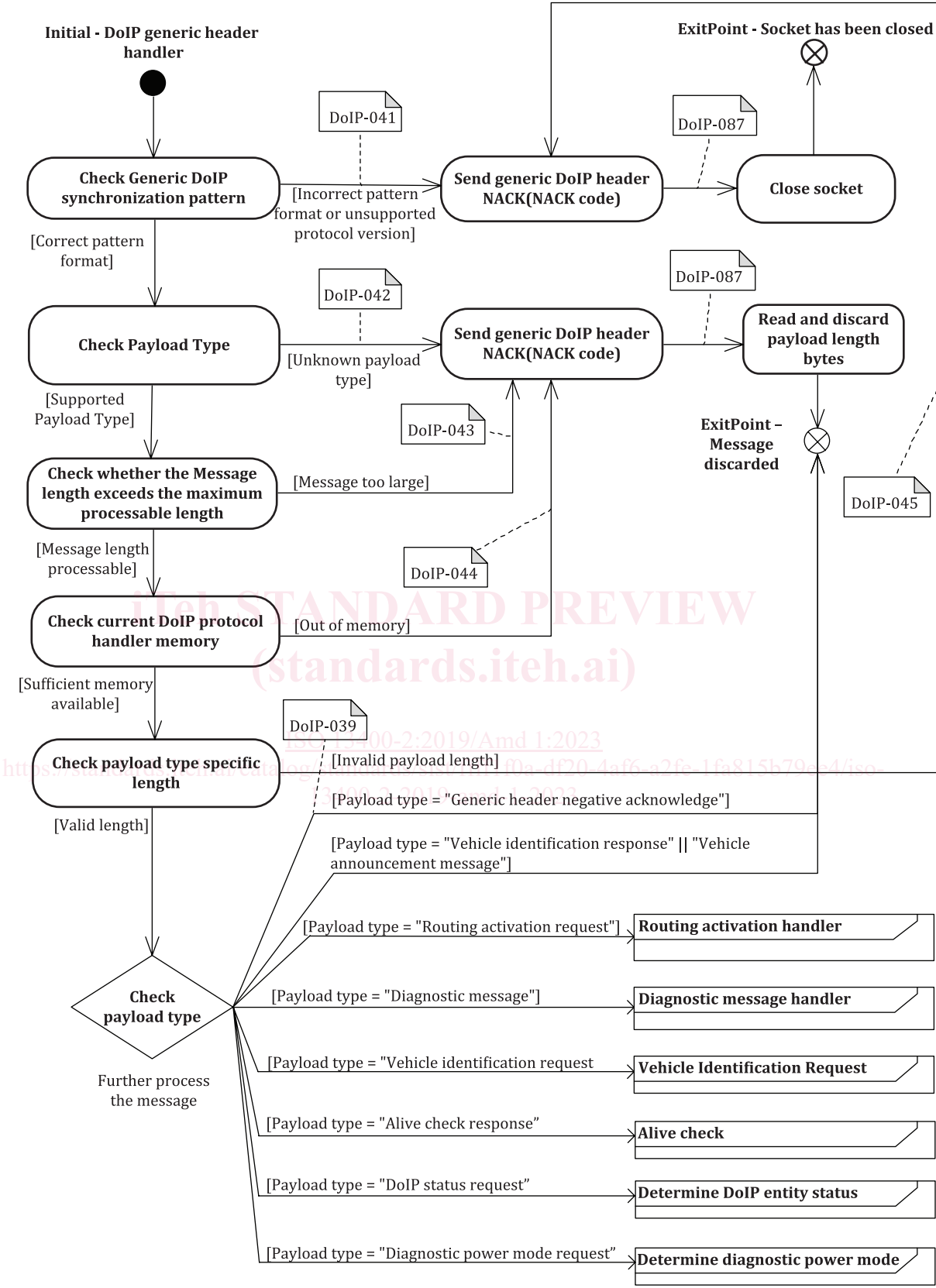*9.2, Figure 16*

Replace Figure 16 with this figure.

Figure 16 — DoIP generic header handler

9.2

Replace REQ 7.DoIP-041 AL with the following.

REQ	7.DoIP-041 AL – DoIP entity does not match generic DoIP header structure
Each DoIP entity shall send a generic DoIP header negative acknowledge message with NACK code set to 00_{16} if the protocol version or inverse protocol version (synchronization pattern) does not match the format specified in Table 16 or if the protocol version is not supported by the DOIP entity.	

9.4, NOTE 1

Replace NOTE 1 with the following:

NOTE 1 Table 20 shows the IPv6 variant. For IPv4, Limited Broadcast is used instead of Multicast.

9.5, title

Replace "AL diagnostic message and diagnostic message acknowledgement" with "AL – Payload type definition and acknowledgement".

9.5, first paragraph

Replace with the following:

This subclause specifies the message format that allows for the optional transmission of internal transport layer status service primitive information to a DoIP client. This transport layer status message covers the standard transport layer services primitives useful to the DoIP client including T_Data.confirm, T_DataSOM.indication, and T_Data.indication. If this payload type is utilized, a DoIP client has the ability to determine when a gatewayed message has completed transmission on the target network (or aborted due to an error), when a segmented response has started on the target network, and when a segmented response has aborted due to an error on the target network. DoIP clients are not required to process this payload type if supported by a DoIP entity. If a DoIP client does support processing this payload type, it may implement substantially faster timeouts depending upon the details of the target network.

9.5

Replace REQ 7.DoIP-064 AL with the following:

REQ	7.DoIP-064 AL – DoIP entity status message structure
Each DoIP entity shall support the status message structure as specified in Table 21 for incoming (i.e. requests) and outgoing (i.e. responses) diagnostic messages.	

9.7

Add the following new subclause.

9.7 AL – Periodic response message

This subclause specifies the periodic response message structure of the DoIP message that is used. The periodic response messages are utilized by the `TCP_DATA` socket handler.

REQ	7.DoIP-189 AL – DoIP periodic response message structure
For DoIP entities that use payload type 8004_{16}, each DoIP entity shall support the periodic response message structure as specified in Table 31.	

Insert new Tables 29-31.

Table 29 — Payload type periodic response message structure

Item	Pos.	Len.	Description	Values	Cvt
Protocol version	0	1	see Table 16	see Table 16	M
Inverse protocol version	1	1	see Table 16	see Table 16	M
Payload type (GH_PT)	2	2	see Table 16	see Table 16	M
Payload length (GH_PL)	4	4	see Table 16	see Table 16	M
Source address (SA)	8	2	Contains the logical address of the sender of a diagnostic message (e.g. the client DoIP entity address).	see Table 13	M
Target address (TA)	10	2	Contains the logical address of the receiver of a diagnostic message (e.g. a specific server DoIP entity on the vehicle's networks).	see Table 13	M
User data 1 to 9	12	9	Contains the actual timestamp of the user data 12 to 12 + k.	See Table 30	M
User data 10	21	2	Contains the periodic response payload length	0002_{16} to $FFFF_{16}$	M
User data 12	23	1	Contains the periodicDataIdentifier	00_{16} to FF_{16}	M
User data 13 to user data (12 + k)	24	k	Contains the dataRecord[] = [] data#1 : data#k]	 00_{16} to $FF16$: 00_{16} to FF_{16}	M
:	:	:		:	:
User data t to t + 8	t	9	Contains the actual timestamp of the user data t to t + k.	See Table 30	C[a]
User data t + 9	t + 9	2	Contains the periodic response payload length	$(p + 1)$ 0002_{16} to $FFFF_{16}$	C[a]
User data t + 11	t + 11	1	Contains the periodicDataIdentifier	00_{16} to FF_{16}	C[a]
User data t + 12 to user data (t + 11+p)	t + 12	p	Contains the dataRecord[] = [] data#1 : data#p]	 00_{16} to FF_{16} : 00_{16} to FF_{16}	C[a]
[a] Present, if more periodic responses are available to be reported from the same source address.					

Table 30 — Timestamp format definition

Item	Pos.	Len.	Description	Type	Values	Cvt
Time base status	1	1	Synchronization state of the ECU's local time base with the vehicle's global time base.	see Table 31	see Table 31	M