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

**Part 2:
Application layer for brakes and
running gear**

*Véhicules routiers — Échange d'informations numériques sur
les connexions électriques entre véhicules tracteurs et véhicules
tractés —*

*Partie 2: Couche d'application pour les équipements de freinage et les
organes de roulement*



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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 fourth edition cancels and replaces the third edition (ISO 11992-2:2014), which has been technically revised.

The main changes are as follows:

- introduced requirements structure;
- added new parameter specifications;
- added new message definitions;
- updated all figures.

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 standard 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 this document and ISO 11992-3.

The vehicle diagnostic communication framework is composed of ISO 14229-1, ISO 14229-2, ISO 14229-3 and ISO 11992-4.

The vehicle-specific use case framework is composed of ISO 11992-4, ISO 22901-1 or vehicle manufacturer-specific diagnostic data definition.

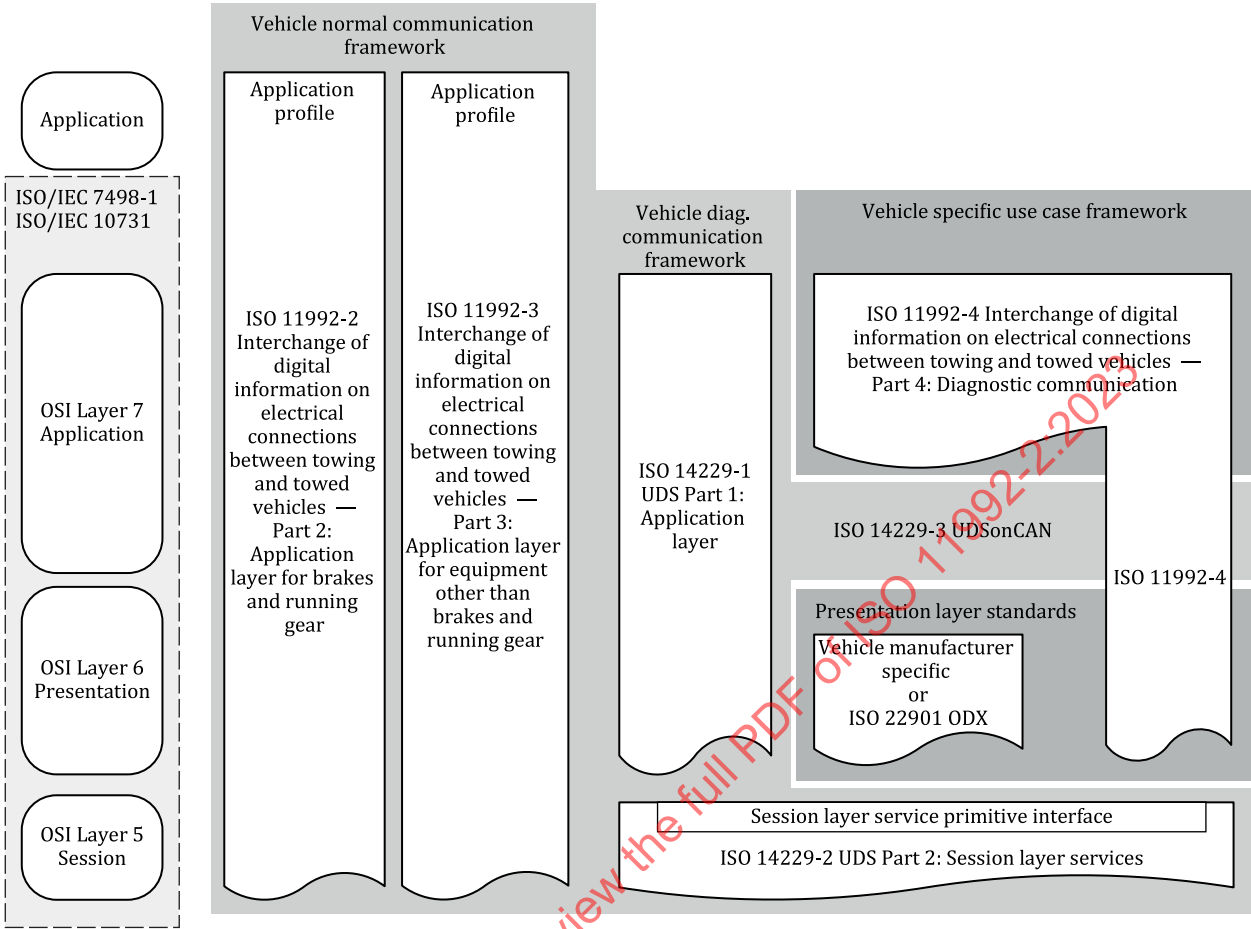


Figure 1 — Referenced documents according to the OSI model

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

Part 2: Application layer for brakes and running gear

1 Scope

This document specifies the SAE J1939-based application layer, the payload of messages, and parameter groups for electronically controlled braking systems, including anti-lock braking systems (ABS), vehicle dynamics control systems (VDC), and running gears equipment, to ensure the interchange of digital information between road vehicles with a maximum authorized total mass greater than 3 500 kg and their towed vehicles, including communication between towed vehicles.

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 3779, *Road vehicles — Vehicle identification number (VIN) — Content and structure*

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 11992-3:2021, *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 80000-1, *Quantities and units — Part 1: General*

SAE J1939-21, *Recommended Practice for a Serial Control and Communications Vehicle Network — Data Link Layer*

SAE J1939-71, *Recommended Practice for a Serial Control and Communications Vehicle Network — Vehicle Application Layer*

SAE J1939-DA, *Recommended Practice for a Serial Control and Communications Vehicle Network — J1939 Digital Annex*

3 Terms and definitions

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

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

ABS

anti-lock braking system

control function, which automatically modulates the pressure producing the braking forces at the wheels to limit the degree of wheel slip, or a system that provides an anti-lock braking function

3.2

ASR

anti-spin regulation

control function, which automatically modulates the engine torque or the pressure producing the braking forces at the wheels to limit the degree of wheel spin, or a system that provides an anti-spin control

3.3

axle group

assembly of two or more consecutive axles considered together in determining their combined load effect

3.4

centre-axle towed vehicle

towed vehicle (3.19) equipped with a rigid towing device, and in which the axle(s) is (are) positioned close to the centre of gravity of the vehicle

3.5

converter towed vehicle

dolly unit that couples to a *semi towed vehicle* (3.18) with a *fifth-wheel coupling* (3.8) and thereby “converts” the semi towed vehicle to a *full towed vehicle* (3.9)

3.6

EBS

electronic braking system

braking system in, which control is generated and processed as an electrical signal in the control transmission

3.7

ECU

electronic control unit

electronic item consisting of a combination of basic parts, subassemblies, and assemblies packaged together as a physically independent entity

3.8

fifth-wheel coupling

link between a *towing vehicle* (3.22) and a *towed vehicle* (3.19), designed for towing a *semi towed vehicle* (3.18)

3.9

full towed vehicle

towed vehicle (3.19) equipped with a towing device, which can move vertically (in relation to the towed vehicle), and in which the axle(s) is (are) positioned farther from the centre of gravity of the vehicle

3.10

gateway

unit connecting different networks or parts of one network and performing any necessary protocol translation

3.11

link towed vehicle

towed vehicle (3.19) with a *fifth-wheel coupling* (3.8), designed for towing a *semi towed vehicle* (3.18)

3.12**network segment**

part of a network that is within the domain of a single link layer

3.13**node**

device capable of sending or receiving data whose identification will be unambiguous for authentication purposes

3.14**RGE**

running rear equipment

equipment of a vehicle, including steering, suspension, and tyres

3.15**road train**

combination of *towing vehicle* (3.22) and *towed vehicles* (3.19) connected via a communication link

3.16**road train session number**

randomised number that is used to identify a set of vehicles that are connected via a communication link with their *ECUs* (3.7) powered up

3.17**ROP**

roll-over prevention

roll-over protection

control function to prevent roll-over situations of a vehicle

Note 1 to entry: ROP is part of a *VDC* (3.23) function

3.18**semi towed vehicle**

towed vehicle (3.19), which is designed to be coupled to a semi towed vehicle towing vehicle and to impose a substantial part of its total weight on the *towing vehicle* (3.22)

3.19**towed vehicle**

non-power-driven road vehicle, which, on account of its design and appointments, is used to transport persons or goods and is intended to be towed by a motor vehicle

3.20**towing full towed vehicle**

towed vehicle (3.19) equipped with a towing device, which can move vertically (in relation to the towed vehicle), and in which the axle(s) is (are) positioned less close to the centre of gravity of the vehicle that is capable of towing another vehicle

3.21**towing semi towed vehicle**

towed vehicle (3.19), which is designed to be coupled to a semi towed vehicle towing vehicle and to impose a substantial part of its total weight on the *towing vehicle* (3.22) that is capable of towing another vehicle

3.22**towing vehicle**

motor vehicle or non-power-driven vehicle, which tows a succeeding vehicle

3.23

VDC

vehicle dynamic control

control function as part of the braking system that reacts to stabilize the vehicle during dynamic manoeuvres

Note 1 to entry: VDC has the possible sub-functions *ROP* (3.18) and *YC* (3.25).

3.24

wheel base

horizontal distance between the centres of the front *axle group* (3.3) and rear *axle group*

3.25

YC

yaw control

control function to reduce an unwanted lateral movement of a vehicle

Note 1 to entry: Yaw control is part of a *VDC* (3.23) function.

4 Symbols and abbreviated terms

4.1 Symbols

$p_{\text{axle number}}$ position number of axle

— empty table cell or feature undefined

4.2 Abbreviated terms

ABS anti-lock braking system

AI address information

ASR anti-spin regulation

Cvt convention

CAN controller area network

DA destination address

DLC data length code

DP data page

EDP extended data page

GE group extension

LSb least significant bit

LSB least significant byte

MSb most significant bit

MSB most significant byte

Msg message

P	priority
PDU	protocol data unit
PF	PDU format
PG	parameter group
PGN	parameter group number
PS	PDU specific
ROP	roll-over prevention/protection
SA	source address
TA	target address
TOS	type of service
UTC	universal time coordinate
VDC	vehicle dynamic control
XBR	external brake request
YC	yaw control

5 Conventions

This document is based on OSI service conventions as specified in ISO/IEC 10731.

6 APP – Parameter specification

6.1 General definitions

Parameter ranges are of 1-byte, 2-byte, and 4-byte in size. Discrete and control request parameters are coded as 2-bit values.

REQ	8.1 APP – Parameter specification – General definitions
Interpretation of suspect parameter values shall be followed according to SAE J1939-71, unless otherwise specified in this document.	

The data parameter attributes are composed of data length, resolution, offset, data range, operating range and type.

The type of data parameters is either control request or measured status.

- Control request data specifies a command requesting an action to be performed by the receiving node. Examples of control request-type data are “service brake demand value” and “ride height request”.
- Measured status data conveys the current value of a parameter as measured or observed by the transmitting node to determine the condition of the defined parameter. Examples of measured-type data are “wheel-based vehicle speed” and “lift axle 1 position”. A measured-type parameter can indicate the condition of the defined parameter, even if no measurement has been taken. For example, the measured-type parameter can indicate that a solenoid has been activated, even if no measurement has been taken to ensure the solenoid accomplished its function.

[Table 1](#) defines the parameter attributes.

Table 1 — Attribute definition

Attribute	Definition
data length	required number of bits/bytes of the parameter
resolution	weight of a bit in physical unit
offset	value of the binary value 0 (zero) in physical unit
data range	physical range of data that the parameter is able to hold
operating range	physical range of data that can be used
type	type of data, for example, measured or control request

6.2 APP – Identification parameter specification

6.2.1 APP – Axle/wheel identification

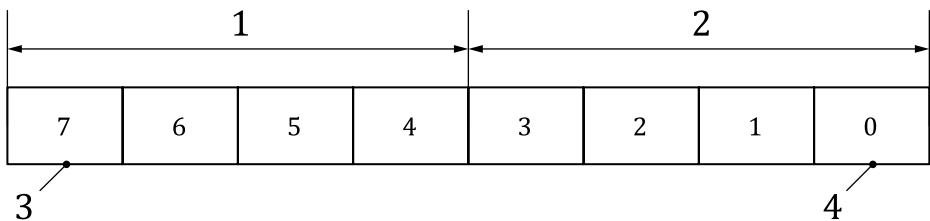
This parameter indicates the identification number of the tyre or wheel. The identification number specifies the tyre or wheel position on each axle and the number of axles starting from the front of the respective towed vehicle (see [Figure 3](#)).

REQ	8.2 APP – Identification parameter specification – APP – Axle/wheel identification
Table 2 specifies the parameter attributes. The axle/wheel identification shall only be used as complementary information in conjunction with all axle, wheel, or wheel-end related information in the PG's message and shall be ignored, if those parameters are not supported. The identification number "0" shall be used, if the position of the axle, wheel, or wheel-end cannot be identified.	

Table 2 — Axle/wheel identification attributes

Attribute	Value
Data length	2 x 4 bit (enumeration)
Data range	bit 1 to bit 4: 0 ₁₆ : wheel position undefined 1 ₁₆ to F ₁₆ : wheel position 1 to 15 bit 5 to bit 8: 0 ₁₆ : axle position undefined 1 ₁₆ to F ₁₆ : axle position 1 to 15
Type	measured

[Figure 2](#) specifies the parameter structure of axle and wheel/tyre position.

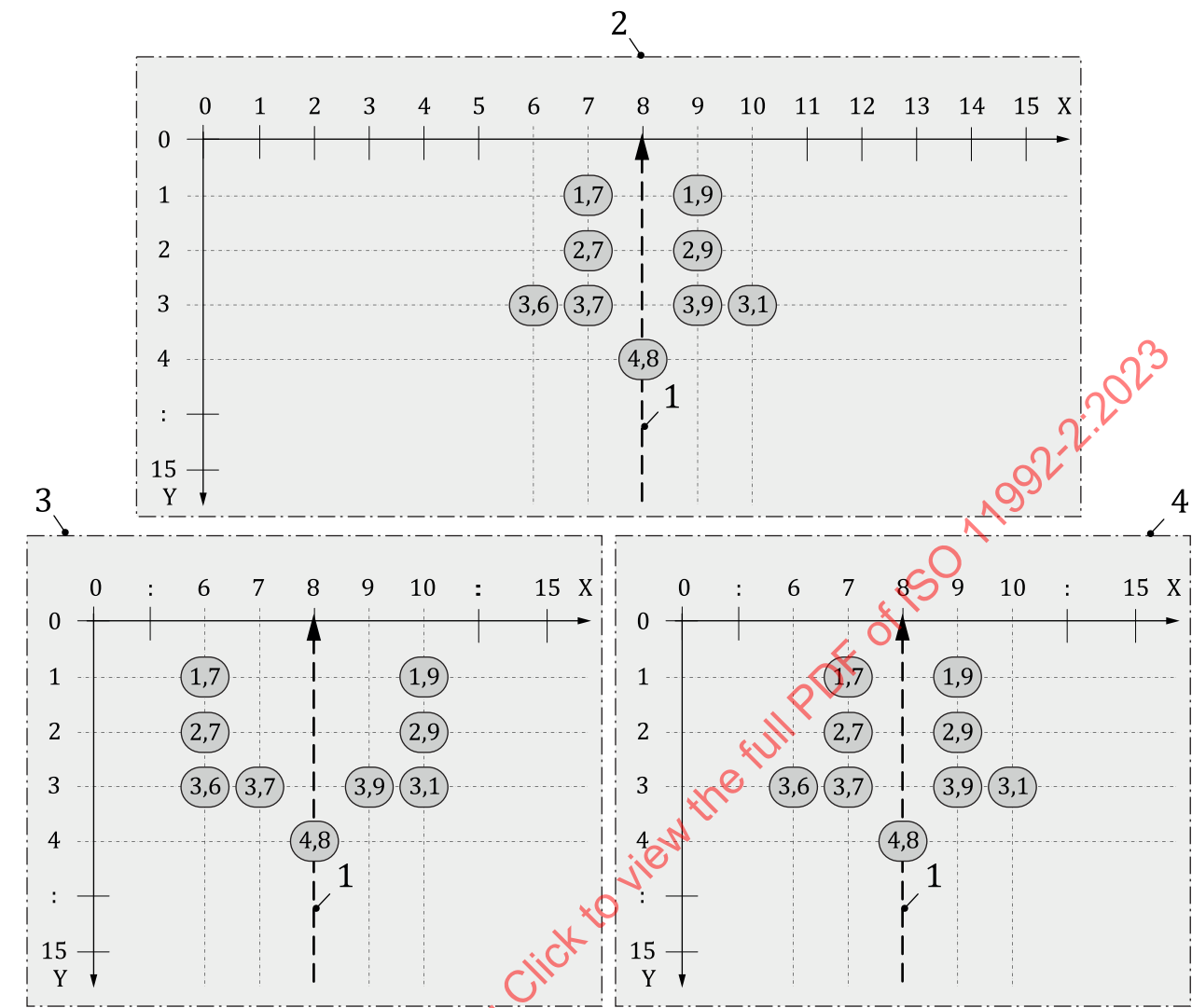


- Key**
- 1 axle position
 - 2 wheel position
 - 3 most significant bit (MSb)
 - 4 least significant bit (LSb)

Figure 2 — Parameter structure of axle and wheel/tyre position

REQ	8.3 APP – Identification parameter specification – Axle/wheel identification assignment rules
The following assignment rules apply.	
—	The axle/wheel identification shall be assigned sequentially from the vehicle's centre line, starting from “9” incrementing on the right side and from “7” decrementing on the left side, in the normal direction of travel. “8” is used for the one wheel on the centre line as illustrated in Figure 3 .
—	It is assumed that each wheel rim has one and only one tyre.
—	In situations when the number of wheels on each wheel-end cannot be identified, or the wheel-end alone is to be identified, the parameters shall be identified using the default wheel position 7 left and 9 right in the normal direction of travel.
—	In cases when the wheel definition is shared, within the same PG, with another parameter or parameters, the wheel-end can be specified as a wheel position 1 to 7 on the left-hand side or 9 to 15 on the right-hand side, as required by the other parameter or parameters.
—	In situations when more than 15 axles are present on the vehicle, the first 15 axles shall be identified using this procedure; the additional axles shall then be identified with the axle identification “0” together with the respective wheel identification.

NOTE Due to the parameter definition, there is an ambiguity between “parameter not supported” (255) and wheel = 15 and axle = 15. As the identification number serves only as complementary information for other parameters, the value of 255 identifies only a valid position, if those parameters are supported.



- Key**
- Y axle
 - 1 vehicle's centre line; arrow indicates driving direction
 - 2 logical view as specified in [Figure 2](#)
 - 3 physical view 1
 - 4 physical view 2

Figure 3 — Axle and wheel/tyre position

6.2.2 APP – Identification data index

This parameter indicates the index to an array of identification data as defined by the parameter “identification data indexed content” (see [6.2.3](#)) and is used without that context.

REQ	8.4 APP – Identification parameter specification – Identification data index
The identification data index attributes shall follow the specification in Table 3 .	

Table 3 — Identification data index attributes

Attribute	Value
data length	1 byte

Table 3 (continued)

Attribute	Value
resolution	1 per bit
offset	0
data range	0 to 250 (enumeration as given in Table 5 , column "Index")
operating range	0 to 250 (enumeration as given in Table 5 , column "Index")
type	measured

6.2.3 APP – Identification data indexed content

This parameter indicates an array of identification data that is indexed by the parameter "identification data indexed content" and is used without that context.

REQ	8.5 APP – Identification parameter specification – Identification data indexed content
The identification data indexed content shall follow the specification in Table 4 and the vehicle identification number parameter attributes shall follow ISO 3779 as specified in Table 5 .	

Table 4 — Identification data indexed content attributes

Attribute	Value
data length	1 byte
resolution	1 per bit
offset	0
data range	0 to 250
operating range	0 to 250
type	measured

Table 5 — Identification data indexed content specification

Index	Attribute	Value
0 to 16	parameter	VIN
	content	vehicle identification number as specified in ISO 3779 (encoded as a string)
	resolution	as specified in ISO 3779
	data range	as specified in ISO 3779
17	parameter	truck drive system control support
	content	indicates if the towing vehicle supports the control of a drive system or retarder installed on the towed vehicle
	resolution	1
	data range	0 to 250
	operating range	0: no drive system control support by truck 1: truck supports only negative torque to control drive systems in the towed vehicle 2: truck supports only positive torque to control drive systems in the towed vehicle 3: truck supports negative and positive torque to control drive systems in the towed vehicle 4 to 249: reserved by document 250: unknown control support

Table 5 (continued)

Index	Attribute	Value
18 to 25	parameter	road train session number (optional) The road train session number can be used to identify a set of vehicles that forms part of a wireless network or to help with remote analysis of data collected from the vehicles using telematics. The road train session number is changed, for example, on each ignition cycle, and shall (if implemented) have entropy, so that it can be used as a method of uniquely identifying a set of vehicles.
	content	randomised 8 byte binary value
	resolution	not applicable
	data range	0000 0000 0000 0000 ₁₆ to FFFF FFFF FFFF FFFF ₁₆
	operating range	0000 0000 0000 0000 ₁₆ to FFFF FFFF FFFF FFFF ₁₆
26 to 250	reserved by document	

6.3 APP – Braking systems parameter specification

6.3.1 APP – Park brake demand relative pressure

This parameter requests the brake pressure for the parking brake as a percentage of the maximum pressure.

REQ	8.6 APP – Braking systems parameter specification – Park brake demand relative pressure
	Table 6 specifies the parameter attributes.

Table 6 — Park brake demand relative pressure attributes<Tbl_large_>

Attribute	Value
data length	1 byte
resolution	0,4 % per bit
offset	0 %
data range	0 % to 100 %
operating range	0 % to 100 %
type	control request

6.3.2 APP – Service brake demand pressure

This parameter requests the brake pressure value of the service brake.

REQ	8.7 APP – Braking systems parameter specification – Service brake demand pressure
	Table 7 specifies the parameter attributes.

Table 7 — Service brake demand pressure attributes

Attribute	Value
data length	2 byte
resolution	5/256 kPa per bit
offset	0 kPa
data range	0 kPa to 1 255 kPa
operating range	0 kPa to 1 255 kPa

Table 7 (continued)

Attribute	Value
type	control request

6.3.3 APP – Vehicle service brake status

This parameter indicates the current status of the vehicle's service brake by observing the brake pressure.

REQ	8.8 APP – Braking systems parameter specification – Vehicle service brake status
	Table 8 specifies the parameter attributes.

Table 8 — Vehicle service brake status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle service brake passive 01 ₂ : vehicle service brake active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.4 APP – Braking system wheel-based vehicle speed

This parameter indicates the absolute value of the actual speed of the vehicle (for example, positive values for forward and backward speeds) calculated as the average of the wheel speeds of one axle influenced by slip and filtered by a frequency range of 5 Hz to 20 Hz.

REQ	8.9 APP – Braking systems parameter specification – Braking system wheel-based vehicle speed
	Table 9 specifies the parameter attributes.

Table 9 — Braking system wheel-based vehicle speed attributes

Attribute	Value
data length	2 byte
resolution	1/256 km/h per bit
offset	0 km/h
data range	0 km/h to 250 km/h
operating range	0 km/h to 250 km/h
type	measured

6.3.5 APP – Vehicle retarder control status

This parameter indicates the current status in all cases the retarder functionality is applied by the driver's demand or by other systems (e.g. brakes).

REQ	8.10 APP – Braking systems parameter specification – Vehicle retarder control status
	Table 10 specifies the parameter attributes.

Table 10 — Vehicle retarder control status attributes

Attribute	Value
data length	2 bit

Table 10 (continued)

Attribute	Value
data range	00 ₂ : retarder passive 01 ₂ : retarder active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

NOTE “Applied” means that the retarder starts to increase its torque and decelerates the vehicle.

6.3.6 APP – Retarder demand relative torque

This parameter requests the torque of the retarder as a percentage of the retarder wheel torque reference.

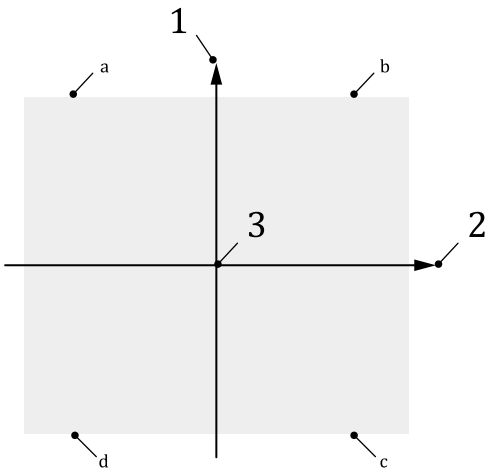
REQ	8.11 APP – Braking systems parameter specification – Retarder demand relative torque
Table 11 specifies the parameter attributes.	

Table 11 — Retarder demand relative torque attributes

Attribute	Value
data length	1 byte
resolution	1 % per bit
offset	-125 %
data range	-125 % to +125 %
operating range	-125 % to +125 %
type	control request

In the definition of powertrain speed/torque, the retarder torque reaction is a deceleration specified by a negative signed parameter.

[Figure 4](#) defines the retarder torque in relation to vehicle velocity.



- Key**
- 1 y-axis: retarder % torque
 - 2 x-axis: vehicle velocity km/h in forward driving direction
 - 3 0 km/h at 0 % torque
 - a Decelerating.
 - b Accelerating.
 - c Decelerating.
 - d Accelerating.

Figure 4 — Retarder torque in relation to vehicle velocity

EXAMPLE Given a retarder demand relative torque = 75 % × the wheel torque reference of the retarder calculation steps are the following.

a) First step: V_{RDV} (variable of retarder demand value)

$$V_{RDC} = \frac{V_{RDV} - V_{RDV_Offset}}{V_{RDV_Resolution}} = \frac{-75 - (-125)}{\frac{1}{\text{bit}}} = 50 \tag{1}$$

b) Second step: V_{ART} [measured actual retarder torque (ART)]

$$V_{RDC} = \frac{V_{ART} - V_{ART_Offset}}{V_{ART_Resolution}} = 50 \tag{2}$$

where

$$\begin{aligned} V_{ART} &= V_{RDC} \times V_{RDC_Resolution} + V_{RDC_Offset} ; \\ V_{ART} &= 50 \times 1 \% + (-125 \%) ; \\ V_{ART} &= -75 \% . \end{aligned}$$

6.3.7 APP – Retarder wheel torque reference

This parameter indicates the 100 % reference value for all the specified indicated retarder wheel torque reference. It is specified only once and does not change if a different retarder torque map becomes valid.

REQ	8.12 APP – Braking systems parameter specification – Retarder wheel torque reference
Table 12 specifies the parameter attributes.	

Table 12 — Retarder wheel torque reference attributes

Attribute	Value
data length	2 byte
resolution	1 Nm per bit
offset	0 Nm
data range	0 Nm to 64 255 Nm
operating range	0 Nm to 64 255 Nm
type	measured

6.3.8 APP – Retarder relative peak torque

This parameter indicates the actual torque of the retarder as a percentage of the retarder wheel torque reference.

REQ	8.13 APP – Braking systems parameter specification – Retarder relative peak torque
Table 13 specifies the parameter attributes.	

Table 13 — Retarder relative peak torque attributes

Attribute	Value
data length	1 byte
resolution	1 % per bit
offset	-125 %
data range	-125 % to +125 %
operating range	-125 % to +125 %
type	measured

6.3.9 APP – Retarder actual maximum positive torque

This parameter indicates the actual maximum available positive torque that the retarder can deliver as a percentage of the retarder wheel torque reference.

REQ	8.14 APP – Braking systems parameter specification – Retarder actual maximum positive torque
Table 14 specifies the parameter attributes.	

Table 14 — Retarder actual maximum positive torque attributes

Attribute	Value
data length	1 byte
resolution	1 % per bit
offset	-125 %
data range	-125 % to +125 %
operating range	0 % to +125 %
type	measured

6.3.10 APP – Retarder actual maximum negative torque

This parameter indicates the actual maximum available negative torque that the retarder can deliver as a percentage of the retarder wheel torque reference.

REQ	8.15 APP – Braking systems parameter specification – Retarder actual maximum negative torque
Table 15 specifies the parameter attributes.	

Table 15 — Retarder actual maximum negative torque attributes

Attribute	Value
data length	1 byte
resolution	1 % per bit
offset	–125 %
data range	–125 % to +125 %
operating range	–125 % to 0 %
type	measured

6.3.11 APP – Axle load sum

This parameter indicates the sum of the static vertical loads of the vehicle axles.

REQ	8.16 APP – Braking systems parameter specification – Axle load sum
Table 16 specifies the parameter attributes.	

Table 16 — Axle load sum attributes

Attribute	Value
data length	2 byte
resolution	2 kg per bit
offset	0 kg
data range	0 kg to 128 510 kg
operating range	0 kg to 128 510 kg
type	measured

6.3.12 APP – Pneumatic supply pressure

This parameter indicates the actual pneumatic supply pressure of the reservoir of the braking system.

REQ	8.17 APP – Braking systems parameter specification – Pneumatic supply pressure
Table 17 specifies the parameter attributes.	

Table 17 — Pneumatic supply pressure attributes

Attribute	Value
data length	1 byte
resolution	5 kPa per bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.3.13 APP – Brake lining

This parameter indicates the actual relative value of the brake lining of a specific brake. High values indicate new linings, small values indicate worn linings.

REQ	8.18 APP – Braking systems parameter specification – Brake lining
-----	--

Table 18 specifies the parameter attributes.
--

Table 18 — Brake lining attributes

Attribute	Value
data length	1 byte
resolution	0,4 % per bit
offset	0 %
data range	0 % to 100 %
operating range	0 % to 100 %
type	measured

6.3.14 APP – Brake temperature

This parameter indicates the actual temperature of a specific brake.

REQ	8.19 APP – Braking systems parameter specification – Brake temperature
-----	---

Table 19 specifies the parameter attributes.
--

Table 19 — Brake temperature attributes

Attribute	Value
data length	1 byte
resolution	10 °C per bit
offset	0 °C
data range	0 °C to 2 500 °C
operating range	0 °C to 2 500 °C
type	measured

6.3.15 APP – Tyre pressure

This parameter indicates the actual tyre pressure of a specific wheel without any corrections.

REQ	8.20 APP – Braking systems parameter specification – Tyre pressure
-----	---

Table 20 specifies the parameter attributes.
--

Table 20 — Tyre pressure attributes

Attribute	Value
data length	1 byte
resolution	10 kPa per bit
offset	0 kPa
data range	0 kPa to 2 500 kPa
operating range	0 kPa to 2 500 kPa
type	measured

6.3.16 APP – Automatic towed vehicle braking status

This parameter indicates the current status of the automatic towed vehicle braking. This function is active when the pneumatic supply is insufficient or not connected. This parameter should be used for driver information.

REQ	8.21 APP – Braking systems parameter specification – Automatic towed vehicle braking status
Table 21 specifies the parameter attributes.	

Table 21 — Automatic towed vehicle braking status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : automatic vehicle braking inactive 01 ₂ : automatic vehicle braking active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

NOTE The brake pressure in the towed vehicle can be suppressed under certain conditions in case of an automatic braking. This parameter reflects the following conditions:

- 00₂: the pneumatic supply is insufficient or not connected, the brake pressure is suppressed (not applied to the brakes);
- 01₂: the pneumatic supply is insufficient or not connected, the brake pressure is not suppressed, and for example, the towed vehicle brakes are applied;
- 11₂: the pneumatic supply is sufficient and connected, the automatic braking function is not available.

6.3.17 APP – Vehicle ABS status

This parameter indicates the current status of the anti-lock braking function or system. The parameter is set active when the ABS starts to modulate the wheel brake pressure and is reset to passive when all wheels are in stable condition for a certain time period. The parameter can also be set active when driven wheels are in high slip (e.g. caused by the retarder).

In the case of at least one-wheel speed error, the error indicator for the parameter has priority.

REQ	8.22 APP – Braking systems parameter specification – Vehicle ABS status
Table 22 specifies the parameter attributes.	

Table 22 — Vehicle ABS status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle ABS passive 01 ₂ : vehicle ABS active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

NOTE Active does not mean “installed” or “enabled”, but indicates an actual ABS situation.

6.3.18 APP – Vehicle electrical supply status

This parameter indicates, if the current status of the supply voltage is sufficient or insufficient for a proper braking function. This also includes overvoltage conditions.

REQ	8.23 APP – Braking systems parameter specification – Vehicle electrical supply status
Table 23 specifies the parameter attributes.	

Table 23 — Vehicle electrical supply status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : electrical supply insufficient 01 ₂ : electrical supply sufficient 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.19 APP – Vehicle pneumatic supply status

This parameter indicates if the current status of the pneumatic supply pressure of the reservoir of the braking system is insufficient or sufficient for a proper braking function.

REQ	8.24 APP – Braking systems parameter specification – Vehicle pneumatic supply status
Table 24 specifies the parameter attributes.	

Table 24 — Vehicle pneumatic supply status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle pneumatic supply insufficient 01 ₂ : vehicle pneumatic supply sufficient 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.20 APP – Spring brake installation status

This parameter indicates if the vehicle is equipped with one or more axles fitted with spring brakes.

REQ	8.25 APP – Braking systems parameter specification – Spring brake installation status
Table 25 specifies the parameter attributes.	

Table 25 — Spring brake installation status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle without spring brakes 01 ₂ : vehicle with spring brakes 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.21 APP – Electrical load proportional function installation status

This parameter indicates if the vehicle is equipped with an electrical load proportional function.

REQ	8.26 APP – Braking systems parameter specification – Electrical load proportional function installation status
Table 26 specifies the parameter attributes.	

Table 26 — Electrical load proportional function installation status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle without electrical load proportional function 01 ₂ : vehicle with electrical load proportional function 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.22 APP – Load proportional function installation status

This parameter indicates if the vehicle is equipped with a load proportional function.

REQ	8.27 APP – Braking systems parameter specification – Load proportional function installation status
Table 27 specifies the parameter attributes.	

Table 27 — Load proportional function installation status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle without load proportional function 01 ₂ : vehicle with load proportional function 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.23 APP – ABS off-road request

This parameter requests the operating mode for the ABS off-road function. This parameter is independent of the current ABS control situation.

REQ	8.28 APP – Braking systems parameter specification – ABS off-road request
Table 28 specifies the parameter attributes.	

Table 28 — ABS off-road request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : ABS off-road request off 01 ₂ : ABS off-road request on 10 ₂ : error indicator 11 ₂ : not available or not installed
type	status

6.3.24 APP – ASR brake control status

This parameter indicates the current status of the ASR brake control function. ASR active indicates that the ASR function actually controls the wheel brake pressure at one or more wheels of the driven axles and does not indicate “installed” or “enabled”.

REQ	8.29 APP – Braking systems parameter specification – ASR brake control status
Table 29 specifies the parameter attributes.	

Table 29 — ASR brake control status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : ASR brake control passive 01 ₂ : ASR brake control active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.25 APP – ASR engine control status

This parameter indicates the current status of the ASR engine control function. ASR active indicates that the ASR function tries to control the engine torque and does not indicate “installed” or “enabled”. This status is independent of other control commands influencing the engine torque (e.g. transmission control requests), which can have higher priority.

REQ	8.30 APP – Braking systems parameter specification – ASR engine control status
Table 30 specifies the parameter attributes.	

Table 30 — ASR engine control status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : ASR engine control passive 01 ₂ : ASR engine control active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.26 APP – Pneumatic control line status

This parameter indicates that the towing vehicle has a pneumatic control line for the towed vehicle service braking system.

REQ	8.31 APP – Braking systems parameter specification – Pneumatic control line status
Table 31 specifies the parameter attributes.	

Table 31 — Pneumatic control line status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle without pneumatic control line 01 ₂ : vehicle with pneumatic control line 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.27 APP – Two electrical circuits brake demand status

This parameter indicates that the service brake demand value, which is sent by the towing vehicle, can be generated by one or two independent electrical braking circuits.

REQ	8.32 APP – Braking systems parameter specification – Two electrical circuits brake demand status
Table 32 specifies the parameter attributes.	

Table 32 — Two electrical circuits brake demand status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : one electrical braking circuit available 01 ₂ : two electrical braking circuits available 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.28 APP – Tyre pressure status

This parameter indicates the current status of the tyre pressure. An insufficient tyre pressure is indicated, if the pressure is outside of a pressure range recommended by the tyre or vehicle manufacturer, to ensure an optimized operation with regard to the fuel consumption of the vehicle and life time of the tyre.

REQ	8.33 APP – Braking systems parameter specification – Tyre pressure status
Table 33 specifies the parameter attributes.	

Table 33 — Tyre pressure status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : tyre pressure insufficient 01 ₂ : tyre pressure sufficient 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.29 APP – Brake lining status

This parameter indicates the current status of the brake linings. An insufficient brake lining status is indicated if the linings are worn out.

REQ	8.34 APP – Braking systems parameter specification – Brake lining status
Table 34 specifies the parameter attributes.	

Table 34 — Brake lining status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : brake linings insufficient 01 ₂ : brake linings sufficient 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.30 APP – Brake temperature status

This parameter indicates the current status of the temperature of the brakes. A brake temperature out of range value is indicated if the brake temperature is higher than a specific level for proper operation.

REQ	8.35 APP – Braking systems parameter specification – Brake temperature status
	Table 35 specifies the parameter attributes.

Table 35 — Brake temperature status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : brake temperature out of range 01 ₂ : brake temperature inside normal range 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.31 APP – Brake light switch

This parameter indicates that the brake pedal is currently being pressed.

REQ	8.36 APP – Braking systems parameter specification – Brake light switch
	Table 36 specifies the parameter attributes.

Table 36 — Brake light switch attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : brake light switch off 01 ₂ : brake light switch on 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.32 APP – Vehicle type

This parameter indicates if a vehicle is a converter towed vehicle or a towing or towed vehicle.

REQ	8.37 APP – Braking systems parameter specification – Vehicle type
	Table 37 specifies the parameter attributes.

Table 37 — Vehicle type attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : towing or towed vehicle 01 ₂ : converter towed vehicle axle 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

NOTE This parameter definition is redundant to the definitions given in the parameter “geometric data indexed content” (see [6.3.49](#)) and is kept for backward compatibility.

6.3.33 APP – Red warning signal request

This parameter requests the towing vehicle to activate the red warning signal, which indicates certain specified failures within the braking equipment of the towed vehicle.

REQ	8.38 APP – Braking systems parameter specification – Red warning signal request
	Table 38 specifies the parameter attributes.

Table 38 — Red warning signal request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : red warning signal off 01 ₂ : red warning signal on 10 ₂ : reserved 11 ₂ : not available or not installed
type	control request

6.3.34 APP – Amber warning signal request

This parameter requests the towing vehicle to activate the amber warning signal, which indicates certain specified events within the braking equipment of the towed vehicle. A flashing warning signal is used to signal fault conditions that are related to non-braking systems, e.g. auxiliary equipment. It is not used to signal braking system-relevant faults or status.

REQ	8.39 APP – Braking systems parameter specification – Amber warning signal request
	Table 39 specifies the parameter attributes.

Table 39 — Amber warning signal request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : amber warning signal off 01 ₂ : amber warning signal on 10 ₂ : amber warning signal flashing 11 ₂ : not available or not installed
type	control request

The amber warning signal request is regarded as providing the same information as the yellow warning signal, activated by the towed vehicle on pin five of the electric connector conforming to the ISO 7638 series.

Implementation of a flashing signal is left open to the vehicle integrator of the vehicle. A frequency of about 1 Hz to 1,5 Hz should be used.

6.3.35 APP – Electrical supply of non-braking systems status

This parameter indicates the current status of the supply voltage of non-braking systems.

REQ	8.40 APP – Braking systems parameter specification – Electrical supply of non-braking systems status
	Table 40 specifies the parameter attributes.

Table 40 — Electrical supply of non-braking systems status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : supply of non-braking systems off 01 ₂ : supply of non-braking systems on 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.36 APP – Loading ramp approach assistance status

This parameter indicates whether the loading ramp approach assistance is activated. The loading ramp approach assistance measures the distance to the loading ramp while reversing and applies the vehicle brakes accordingly.

REQ	8.41 APP – Braking systems parameter specification – Loading ramp approach assistance status
	Table 41 specifies the parameter attributes.

Table 41 — Loading ramp approach assistance status

Attribute	Value
data length	2 bit
data range	00 ₂ : loading ramp approach assistance not active 01 ₂ : loading ramp approach assistance active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.37 APP – VDC active

This parameter indicates the current status of the VDC function. Active means that VDC actually controls the engine torque or the wheel brake pressure at one or more wheels and does not mean “installed” or “enabled”. The parameter “VDC active” is only set to active when a vehicle stability function event occurs where the intent is to impact on vehicle stability. Interventions by the vehicle stability function in any process designed to determine the physical characteristics of the vehicle are not considered to be “VDC active” events.

REQ	8.42 APP – Braking systems parameter specification – VDC active
	Table 42 specifies the parameter attributes.

Table 42 — VDC active attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : VDC passive 01 ₂ : VDC active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

The parameter VDC active is communicated between directly coupled vehicles.

6.3.38 APP – Road curvature

This parameter indicates the estimated value for the current road curvature. Positive values are used for left-hand curves.

REQ	8.43 APP – Braking systems parameter specification – Road curvature
	Table 43 specifies the parameter attributes.

Table 43 — Road curvature attributes

Attribute	Value
data length	2 byte
resolution	1/128 km ⁻¹ per bit
offset	–250 km ⁻¹
data range	–250 km ⁻¹ to 250 km ⁻¹
operating range	–250 km ⁻¹ to 250 km ⁻¹
type	measured

6.3.39 APP – Wheel speed difference main axle

This parameter indicates the difference between the wheel speed on the right side and on the left side of the main axle, calculated as specified in [Formula \(3\)](#) and filtered by a frequency range of 5 Hz to 20 Hz.

$$V_{\text{Wheel_Speed_Diff}} = V_{\text{Wheel_Speed_Right}} - V_{\text{Wheel_Speed_Left}} \quad (3)$$

where

$V_{\text{Wheel_Speed_Diff}}$ is the wheel speed difference main axle;

$V_{\text{Wheel_Speed_Right}}$ is the wheel speed right wheel;

$V_{\text{Wheel_Speed_Left}}$ is the wheel speed left wheel.

REQ	8.44 APP – Braking systems parameter specification – Wheel speed difference main axle
	Table 44 specifies the parameter attributes.

Table 44 — Wheel speed difference main axle attributes

Attribute	Value
data length	2 byte
resolution	1/256 km/h per bit
offset	–125 km/h
data range	–125 km/h to 125 km/h
operating range	–125 km/h to 125 km/h
type	measured

6.3.40 APP – Supply line braking

This parameter requests the activation of the brake system by means of venting the pneumatic supply line.

REQ	8.45 APP – Braking systems parameter specification – Supply line braking
Table 45 specifies the parameter attributes.	

Table 45 — Supply line braking attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : supply line braking not requested 01 ₂ : supply line braking requested 10 ₂ : reserved 11 ₂ : not available or not installed
type	control request

6.3.41 APP – Spring brake status

This parameter indicates the current status of the vehicle spring brake(s).

REQ	8.46 APP – Braking systems parameter specification – Spring brake status
Table 46 specifies the parameter attributes.	

Table 46 — Spring brake status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : spring brake is released (is not braking the vehicle) 01 ₂ : spring brake is engaged (is braking the vehicle) 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.42 APP – Relative brake demand for front or left vehicle side

This parameter requests the percentage of the service brake demand value, which is applied to the steering axle wheels or to the wheels on the left-hand side of the vehicle. If brake force distribution is supported, full towed vehicles support axle-wise distribution and semi towed vehicles support side-wise distribution.

REQ	8.47 APP – Braking systems parameter specification – Relative brake demand for front or left vehicle side
Table 47 specifies the parameter attributes.	

Table 47 — Relative brake demand for front or left vehicle side attributes

Attribute	Value
data length	1 byte
resolution	0,4 % per bit
offset	0 %
data range	0 % to 100 %
operating range	0 % to 100 %
type	control request

6.3.43 APP – Relative brake demand for rear or right vehicle side

This parameter requests the percentage of the service brake demand value, which is applied to the wheels of the rear axle(s) or to the wheels on the right-hand side of the vehicle. If brake force distribution is supported, full towed vehicles support axle-wise distribution and semi towed vehicles support side-wise distribution.

REQ	8.48 APP – Braking systems parameter specification – Relative brake demand for rear or right vehicle side
Table 48 specifies the parameter attributes.	

Table 48 — Relative brake demand for rear or right vehicle side attributes

Attribute	Value
data length	1 byte
resolution	0,4 % per bit
offset	0 %
data range	0 % to 100 %
operating range	0 % to 100 %
type	control request

6.3.44 APP – Support of side- or axle-wise brake force distribution

This parameter indicates whether the functionality of an axle- or side-wise brake force distribution is enabled. If brake force distribution is supported, full towed vehicles support axle-wise distribution and semi towed vehicle support side-wise distribution.

REQ	8.49 APP – Braking systems parameter specification – Support of side- or axle-wise brake force distribution
Table 49 specifies the parameter attributes.	

Table 49 — Support of side- or axle-wise brake force distribution attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : side- or axle-wise brake force distribution disabled 01 ₂ : side- or axle-wise brake force distribution enabled 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.45 APP – Lateral acceleration

This parameter indicates the actual lateral acceleration of the vehicle. A positive lateral acceleration value is used when the vehicle is accelerated to the left.

REQ	8.50 APP – Braking systems parameter specification – Lateral acceleration
Table 50 specifies the parameter attributes.	

Table 50 — Lateral acceleration attributes

Attribute	Value
data length	1 byte
resolution	1/10 m/s ² per bit

Table 50 (continued)

Attribute	Value
offset	-12,5 m/s ²
data range	-12,5 m/s ² to 12,5 m/s ²
operating range	-12,5 m/s ² to 12,5 m/s ²
type	measured

6.3.46 APP – Stop lamps request

This parameter requests the towed vehicle to illuminate the stop lamps.

REQ	8.51 APP – Braking systems parameter specification – Stop lamps request
	Table 51 specifies the parameter attributes.

Table 51 — Stop lamps request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : stop lamps illumination not request 01 ₂ : stop lamps illumination requested 10 ₂ : reserved 11 ₂ : not available or not installed
type	control request

6.3.47 APP – Braking via electric control line support

This parameter indicates whether the vehicle supports braking via the electrical control or not.

REQ	8.52 APP – Braking systems parameter specification – Braking via electric control line support
	Table 52 specifies the parameter attributes.

Table 52 — Braking via electrical control line support attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : braking via electrical control line not supported 01 ₂ : braking via electrical control line supported 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.48 APP – Geometric data index

This parameter is used as an index to an array of geometric data as defined by the parameter geometric data indexed content (see [6.3.49](#)) and is not used without that context.

REQ	8.53 APP – Braking systems parameter specification – Geometric data index
	Table 53 specifies the parameter attributes.

Table 53 — Geometric data index attributes

Attribute	Value
data length	1 byte

Table 53 (continued)

Attribute	Value
data range	enumeration as specified in Table 54 , column index
type	measured

6.3.49 APP – Geometric data indexed content

This parameter is interpreted as an array of geometric data indexed by the parameter geometric data index ([6.3.48](#)).

REQ	8.54 APP – Braking systems parameter specification – Geometric data indexed content
Vehicle geometrical data and keys shall be in accordance with the definitions in Annex A . The parameter attributes shall be in accordance with the specification in Table 54 .	

Table 54 — Geometric data indexed content attributes

Attribute	Value
data length	1 byte
data range	as specified in Table 55
type	measured

Table 55 — Content geometric data indexed content attributes

Index	Attribute	Value
0	parameter	extended vehicle type
	content	indicates the type of the vehicle
	resolution	enumeration
	offset	0
	data range	0 to 250
	operating range	0: semi towed vehicle 1: centre-axle towed vehicle 2: full towed vehicle 3: converter towed vehicle 4: link towed vehicle 5: towing semi towed vehicle 6: towing centre-axle towed vehicle 7: towing full towed vehicle 8 to 249: reserved by document 250: unknown vehicle type
1	parameter	d_{ca} (see Table A.1)
	content	distance between the coupling point and the middle of the first axle
	resolution	0,1 m per bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 25,0 m
2	parameter	w_{track_width} (see Table A.1)
	content	width between the centre of the wheels at the same axle
	resolution	0,01 m per bit
	offset	0 m to 2,50 m
	data range	0 m to 2,50 m
	operating range	0 m to 2,50 m

Table 55 (continued)

Index	Attribute	Value
3	parameter	$n_{\text{axle_count}}$ (axle count)
	content	total number of axles
	resolution	1 count per bit
	offset	0
	data range	0 to 250
	operating range	1 to 250
4	parameter	$n_{\text{front_axle_count}}$ (front axle count)
	content	total number of axles attached to the drawbar
	resolution	1 count per bit
	offset	0
	data range	0 to 250
	operating range	0 to 250, 0 indicates “no front axle”
5	parameter	$n_{\text{lift_axle_count}}$ (lift axle count)
	content	total number of liftable axles
	resolution	1 count per bit
	offset	0
	data range	0 to 250
	operating range	0 to 250, 0 indicates “no liftable axle”
6 to 10	parameter	$n_{\text{lift_axle_position}}$ (lift axle position of lift axle Data Index (6 to 10) – 5)
	content	axle position number of lift axle 1 to 5, with axle counting from the front to the rear and starting with 1
	resolution	1 count per bit
	offset	0
	data range	0 to 250
	operating range	0 to 250, 0 indicates “no liftable axle”
11 to 29	parameter	$d_{\text{axle_number}}$ (distance to the next axle (wheel base))
	content	wheel base of axle number to axle number+1, with axle number (Data Index -10) = 1 to 19 counting from the front to the rear
	resolution	0,1 m per bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 25,0 m
30	parameter	d_{cc} (see Table A.1)
	content	distance between the first and the second coupling point
	resolution	0,1 m per bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 25,0 m
31	parameter	l_{tot} (see Table A.1)
	content	total length of vehicle
	resolution	0,1 m per bit
	offset	0 m
	data range	0 m to 25,0 m
	operating range	0 m to 25,0 m

Table 55 (continued)

Index	Attribute	Value
32	parameter	h_1 (see Table A.1 and Figure A.1 to Figure A.5)
	content	nominal coupling height over ground for the first coupling point h_1
	resolution	0,02 m per bit
	offset	0 m
	data range	0 m to 5,00 m
	operating range	0 m to 5,00 m
33	parameter	h_2 (see Table A.1 and Figure A.1 to Figure A.5)
	content	nominal coupling height over ground for the second coupling point h_2 for an unloaded vehicle; this data is dynamic and indicates the current coupling point height
	resolution	0,02 m per bit
	offset	0 m
	data range	0 m to 5,00 m
	operating range	0 m to 5,00 m
34	parameter	h_3 (see Table A.1)
	content	height over ground for the floor inside the vehicle at the rear end of the floor
	resolution	0,02 m per bit
	offset	0 m
	data range	0 m to 5,00 m
	operating range	0 m to 5,00 m
35	parameter	h_4 (see Table A.1)
	content	height over ground for the floor inside the vehicle at the front end of the floor
	resolution	0,02 m per bit
	offset	0 m
	data range	0 m to 5,00 m
	operating range	0 m to 5,00 m
36	parameter	h_5 (see Table A.1)
	content	total height over ground at the front of the vehicle
	resolution	0,02 m per bit
	offset	0 m
	data range	0 m to 5,00 m
	operating range	0 m to 5,00 m
37	parameter	h_6 (see Table A.1)
	content	height from the bottom most point of the chassis to the top most point of the vehicle at the front of the vehicle
	resolution	0,02 m per bit
	offset	0 m
	data range	0 m to 5,00 m
	operating range	0 m to 5,00 m

Table 55 (continued)

Index	Attribute	Value
38	parameter	h_7 (see Table A.1)
	content	total height over ground of the vehicle at the rear of the vehicle, this refers to the rear end of the cargo put directly on the vehicle; this data is dynamic and indicates the current rear total height
	resolution	0,02 m per bit
	offset	0 m
	data range	0 m to 5,00 m
	operating range	0 m to 5,00 m
39	parameter	dynamic tyre radius
	content	dynamic tyre radius of the vehicle; for a vehicle equipped with a retarder or drive system the tyre radius refers to the wheels physically connected to the retarder/drive system
	resolution	0,01 m per bit
	offset	0 m
	data range	0 m to 2,50 m
	operating range	0 m to 2,50 m
40	parameter	towed vehicle drive system capabilities
	content	indicates the torque capabilities of a drive system or retarder installed on the vehicle
	resolution	enumeration
	offset	0
	data range	0 to 250
	operating range	0: no drive system installed in the vehicle 1: drive system installed with only negative torque capabilities 2: drive system installed with only positive torque capabilities 3: drive system installed with both positive and negative torque capabilities 4 to 249: reserved by document 250: unknown torque capabilities
41 to 250	parameter	reserved by document

NOTE Information about “normal towed vehicle” or “converter towed vehicle” is also available with the parameter “vehicle type” (see 6.3.32) and is supported for backward compatibility.

6.3.50 APP – Brake cylinder pressure first axle, left wheel

This parameter indicates the actual pressure of the wheel-brake actuator at the left wheel of the first axle. In the case of a full towed vehicle, first axle means the steering axle.

REQ	8.55 APP – Braking systems parameter specification – Brake cylinder pressure first axle, left wheel
Table 56 specifies the parameter attributes.	

Table 56 — Brake cylinder pressure first axle, left wheel attributes

Attribute	Value
data length	1 byte
resolution	5 kPa per bit

Table 56 (continued)

Attribute	Value
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.3.51 APP – Brake cylinder pressure first axle, right wheel

This parameter indicates the actual pressure of the wheel-brake actuator at the right wheel of the first axle. In the case of a full towed vehicle, first axle means the steering axle.

REQ	8.56 APP – Braking systems parameter specification – Brake cylinder pressure first axle, right wheel
Table 57 specifies the parameter attributes.	

Table 57 — Brake cylinder pressure first axle, right wheel attributes

Attribute	Value
data length	1 byte
resolution	5 kPa per bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.3.52 APP – Brake cylinder pressure second axle, left wheel

This parameter indicates the actual pressure of the wheel-brake actuator at the left wheel of the second axle.

REQ	8.57 APP – Braking systems parameter specification – Brake cylinder pressure second axle, left wheel
Table 58 specifies the parameter attributes.	

Table 58 — Brake cylinder pressure second axle, left wheel attributes

Attribute	Value
data length	1 byte
resolution	5 kPa per bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.3.53 APP – Brake cylinder pressure second axle, right wheel

This parameter indicates the actual pressure of the wheel-brake actuator at the right wheel of the second axle.

REQ	8.58 APP – Braking systems parameter specification – Brake cylinder pressure second axle, right wheel
Table 59 specifies the parameter attributes.	

Table 59 — Brake cylinder pressure second axle, right wheel attributes

Attribute	Value
data length	1 byte
resolution	5 kPa per bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.3.54 APP – Brake cylinder pressure third axle, left wheel

This parameter indicates the actual pressure of the wheel-brake actuator at the left wheel of the third axle.

REQ	8.59 APP – Braking systems parameter specification – Brake cylinder pressure third axle, left wheel
Table 60 specifies the parameter attributes.	

Table 60 — Brake cylinder pressure third axle, left wheel attributes

Attribute	Value
data length	1 byte
resolution	5 kPa per bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.3.55 APP – Brake cylinder pressure third axle, right wheel

This parameter indicates the actual pressure of the wheel-brake actuator at the right wheel of the third axle.

REQ	8.60 APP – Braking systems parameter specification – Brake cylinder pressure third axle, right wheel
Table 61 specifies the parameter attributes.	

Table 61 — Brake cylinder pressure third axle, right wheel attributes

Attribute	Value
data length	1 byte
resolution	5 kPa per bit
offset	0 kPa
data range	0 kPa to 1 250 kPa
operating range	0 kPa to 1 250 kPa
type	measured

6.3.56 APP – Wheel speed first axle, left wheel

This parameter indicates the unbalanced and unfiltered speed of the left wheel on the first axle. The definition of axle positions is as follows.

- In the case of a full towed vehicle, the first axle is the steering axle.
- In the case of a semi towed vehicle, the first non-lifting axle equipped with the wheel speed measuring sensors is used. Both sensors are on the same axle.

REQ	8.61 APP – Braking systems parameter specification – Wheel speed first axle, left wheel
	Table 62 specifies the parameter attributes.

Table 62 — Wheel speed first axle, left wheel attributes

Attribute	Value
data length	2 byte
resolution	1/256 km/h per bit
offset	0 km/h
data range	0 km/h to 250 km/h
operating range	0 km/h to 250 km/h
type	measured

6.3.57 APP – Wheel speed first axle, right wheel

This parameter indicates the unbalanced and unfiltered speed of the right wheel on the first axle. The definition of axle positions is as follows.

- In the case of a full towed vehicle, the first axle is the steering axle.
- In the case of a semi towed vehicle, the first non-lifting axle equipped with wheel speed measuring sensors is used. Both sensors are on the same axle.

REQ	8.62 APP – Braking systems parameter specification – Wheel speed first axle, right wheel
	Table 63 specifies the parameter attributes.

Table 63 — Wheel speed first axle, right wheel attributes

Attribute	Value
data length	2 byte
resolution	1/256 km/h per bit
offset	0 km/h
data range	0 km/h to 250 km/h
operating range	0 km/h to 250 km/h
type	measured

6.3.58 APP – ROP system status

This parameter indicates whether the ROP system is currently enabled or disabled.

REQ	8.63 APP – Braking systems parameter specification – ROP system status
	Table 64 specifies the parameter attributes.

Table 64 — ROP system status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : ROP system disabled 01 ₂ : ROP system enabled 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.59 APP – YC system status

This parameter indicates whether the YC system is currently enabled or disabled.

REQ	8.64 APP – Braking systems parameter specification – YC system status
	Table 65 specifies the parameter attributes.

Table 65 — YC system status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : YC system disabled 01 ₂ : YC system enabled 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.60 APP – Towed vehicle ROP system request

This parameter requests to enable or disable the towed vehicle ROP system.

REQ	8.65 APP – Braking systems parameter specification – Towed vehicle ROP system request
	Table 66 specifies the parameter attributes.

Table 66 — Towed vehicle ROP system request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : disable towed vehicle ROP system 01 ₂ : enable towed vehicle ROP system 10 ₂ : reserved 11 ₂ : not available or not installed
type	control request

6.3.61 APP – Towed vehicle YC system request

This parameter requests to enable or disable the towed vehicle YC system.

REQ	8.66 APP – Braking systems parameter specification – Towed vehicle YC system request
	Table 67 specifies the parameter attributes.

Table 67 — Towed vehicle YC system request attributes

Attribute	Value
data length	2 bit

Table 67 (continued)

Attribute	Value
data range	00 ₂ : disable towed vehicle YC system 01 ₂ : enable towed vehicle YC system 10 ₂ : reserved 11 ₂ : not available or not installed
type	control request

6.3.62 APP – Vehicle combination ABS status

This parameter indicates the current status of the anti-lock braking function or system including the status of additional towed vehicles. The parameter is set active if there is an ABS-related fault condition detected at the local vehicle or any of the towed vehicles and also considers the status of the towed vehicle detection specified in 6.3.63.

REQ	8.67 APP – Braking systems parameter specification – Vehicle combination ABS status
Table 68 specifies the parameter attributes.	

Table 68 — Vehicle combination ABS status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no ABS-related fault condition detected up to the end of the vehicle combination (for example, all ABS systems from this to the last towed vehicle are fully operational) 01 ₂ : ABS-related fault condition detected in the vehicle combination (for example, either in this or in one of the following towed vehicles or a following towed vehicle without ABS detected) 10 ₂ : ABS status unclear (for example, no ABS fault set but one of the following towed vehicles does not have a towed vehicle detection therefore, there should be an undetected additional towed vehicle) 11 ₂ : not available or not installed
type	measured

6.3.63 APP – Towed vehicle detection status

This parameter is provided by any towed vehicle and indicates:

- if that vehicle is able to detect an additional towed vehicle (towed vehicle detection support);
- if an additional towed vehicle is detected (parameter “vehicle status”); and
- which type of brake system is detected in that vehicle (parameter “brake system type”).

REQ	8.68 APP – Braking systems parameter specification – Towed vehicle detection status
Table 69 specifies the parameter attributes.	

Table 69 — Towed vehicle detection status attributes

Attribute	Value
data length	4 bit

Table 69 (continued)

Attribute	Value
data range	0000 ₂ : no brake system detected 0001 ₂ to 0100 ₂ : ABS detected 0101 ₂ to 0110 ₂ : EBS detected 0111 ₂ : reserved by document 1000 ₂ : no brake system detected 1001 ₂ to 1101 ₂ : reserved by document 1110 ₂ : error indicator: towed vehicle detection not possible 1111 ₂ : not available or not installed: no towed vehicle detection installed
type	measured

6.3.64 APP – Reverse gear status

This parameter indicates if the reverse gear at the gearshift box of the vehicle is engaged or not.

REQ	8.69 APP – Braking systems parameter specification – Reverse gear status
Table 70 specifies the parameter attributes.	

Table 70 — Reverse gear status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : reverse gear not engaged 01 ₂ : reverse gear engaged 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.3.65 APP – External brake request status

This parameter indicates if a brake request neither from EBS nor from VDC/ROP/YC is currently active.

REQ	8.70 APP – Braking systems parameter specification – External brake request status
Table 71 specifies the parameter attributes.	

Table 71 — External brake request status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no external brake request active 01 ₂ : external brake request active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

NOTE The in-vehicle network of the towing vehicle can use the similar XBR PG as specified in J1939DA.

6.3.66 APP – Emergency braking status

This parameter indicates, if there is an active emergency braking request at the vehicle.

REQ	8.71 APP – Braking systems parameter specification – Emergency braking status
Table 72 specifies the parameter attributes.	

Table 72 — Emergency braking status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no emergency braking active 01 ₂ : emergency braking active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4 APP – Running gear equipment parameter specification

6.4.1 APP – Driven axle load

This parameter indicates the current static vertical load on the driven axle of a vehicle. In case the vehicle is equipped with more than one driven axle, the value of the axle with the highest vertical load is transmitted.

REQ	8.72 APP – Running gear equipment parameter specification – Driven axle load
	Table 73 specifies the parameter attributes.

Table 73 — Driven axle load attributes

Attribute	Value
data length	2 byte
resolution	2 kg per bit
offset	0 kg
data range	0 kg to 128 510 kg
operating range	0 kg to 128 510 kg
type	measured

6.4.2 APP – Nominal vehicle body level, front axle

This parameter indicates the current nominal vehicle body height. In cases when controlled by “level change request, front axle” (see [6.4.8](#)), this value represents the current vehicle body height at the front axle referred to ground level.

REQ	8.73 APP – Running gear equipment parameter specification – Nominal vehicle body level, front axle
	Table 74 specifies the parameter attributes.

Table 74 — Nominal vehicle body level, front axle attributes

Attribute	Value
data length	2 byte
resolution	1 mm per bit
offset	0 mm
data range	0 mm to 64 255 mm
operating range	0 mm to 64 255 mm
type	measured

6.4.3 APP – Nominal vehicle body level, rear axle

This parameter indicates the current nominal vehicle body height. In cases when controlled by “level change request, rear axle” (see 6.4.9), this value represents the current vehicle body height at the rear axle referred to ground level.

REQ	8.74 APP – Running gear equipment parameter specification – Nominal vehicle body level, rear axle
Table 75 specifies the parameter attributes.	

Table 75 — Nominal vehicle body level, rear axle attributes

Attribute	Value
data length	2 byte
resolution	1 mm per bit
offset	0 mm
data range	0 mm to 64 255 mm
operating range	0 mm to 64 255 mm
type	measured

6.4.4 APP – Relative vehicle body level, front axle

This parameter indicates the current nominal vehicle body height. In cases when controlled by “level change request, front axle” (see 6.4.8), this value represents the current vehicle body height at the front axle referred to the ride height normal level 1.

REQ	8.75 APP – Running gear equipment parameter specification – Relative vehicle body level, front axle
Table 76 specifies the parameter attributes.	

Table 76 — Relative vehicle body level, front axle attributes

Attribute	Value
data length	2 byte
resolution	1 mm per bit
offset	–32 000 mm
data range	–32 000 mm to 32 255 mm
operating range	–32 000 mm to 32 255 mm
type	measured

6.4.5 APP – Relative vehicle body level, rear axle

This parameter indicates the current nominal vehicle body height. In cases when controlled by “level change request, rear axle” (see 6.4.9), this value represents the current vehicle body height at the rear axle referred to ride height normal level 1.

REQ	8.76 APP – Running gear equipment parameter specification – Relative vehicle body level, rear axle
Table 77 specifies the parameter attributes.	

Table 77 — Relative vehicle body level, rear axle attributes

Attribute	Value
data length	2 byte

Table 77 (continued)

Attribute	Value
resolution	1 mm per bit
offset	–32 000 mm
data range	–32 000 mm to 32 255 mm
operating range	–32 000 mm to 32 255 mm
type	measured

6.4.6 APP – Level control request

This parameter requests to enable or disable the automatic level control.

REQ	8.77 APP – Running gear equipment parameter specification – Level control request
	Table 78 specifies the parameter attributes.

Table 78 — Level control request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : level control disabled 01 ₂ : level control enabled 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.7 APP – Level control status

This parameter indicates the current status of the level control function.

REQ	8.78 APP – Running gear equipment parameter specification – Level control status
	Table 79 specifies the parameter attributes.

Table 79 — Level control status attributes

Attribute	Value
data length	2-bit
data range	00 ₂ : level control disabled 01 ₂ : level control enabled 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.8 APP – Level change request, front axle

This parameter requests to control the body height for the front axle lifting (up)/lowering (down). This value of the parameter is sent as long as the lifting/lowering procedure lasts.

REQ	8.79 APP – Running gear equipment parameter specification – Level change request, front axle
	Table 80 specifies the parameter attributes.

Table 80 — Level change request, front axle attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle body up (lifting) 01 ₂ : vehicle body down (lowering) 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.9 APP – Level change request, rear axle

This parameter requests to control the body height for the rear axle lifting (up)/lowering (down). This value of the parameter is sent as long as the lifting/lowering procedure lasts.

REQ	8.80 APP – Running gear equipment parameter specification – Level change request, rear axle
Table 81 specifies the parameter attributes.	

Table 81 — Level change request, rear axle attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle body up (lifting) 01 ₂ : vehicle body down (lowering) 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.10 APP – Level change status, front axle

This parameter indicates the current status of the level change of the body height at the front axle due to any external control request.

REQ	8.81 APP – Running gear equipment parameter specification – Level change status, front axle
Table 82 specifies the parameter attributes.	

Table 82 — Level change status, front axle attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle body lifting/lowering not active 01 ₂ : vehicle body lifting/lowering active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	Measured

6.4.11 APP – Level change status, rear axle

This parameter indicates the current status of the level change of the body height at the rear axle due to any external control request.

REQ	8.82 APP – Running gear equipment parameter specification – Level change status, rear axle
Table 83 specifies the parameter attributes.	

Table 83 — Level change status, rear axle attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle body lifting/lowering not active 01 ₂ : vehicle body lifting/lowering active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.12 APP – Lift axle 1 position request

This parameter requests to control the position of the lift axle 1 or the load condition of the first tag axle. Numbering of lift axles starts from the front axle position.

A command to control the lift axle position/tag axle load condition is sent in five successive messages followed by messages with lift axle position request set to take no action. Less than five messages are allowed if the receiver acknowledges via lift axle 1 position (see [6.4.17](#)).

REQ	8.83 APP – Running gear equipment parameter specification – Lift axle 1 position request
	Table 84 specifies the parameter attributes.

Table 84 — Lift axle 1 position request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle laden 01 ₂ : lift axle position up/tag axle unladen 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.13 APP – Lift axle 2 position request

This parameter requests to control the position of the lift axle 2 or the load condition of the second tag axle. The numbering of the lift axles starts from the front axle position.

A command to control the lift axle position/tag axle load condition is sent in five successive messages followed by messages with lift axle position request set to take no action. Less than five messages are allowed if the receiver acknowledges via lift axle 2 position (see [6.4.18](#)).

REQ	8.84 APP – Running gear equipment parameter specification – Lift axle 2 position request
	Table 85 specifies the parameter attributes.

Table 85 — Lift axle 2 position request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle laden 01 ₂ : lift axle position up/tag axle unladen 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.14 APP – Lift axle 3 position request

This parameter requests to control the position of the lift axle 3 or the load condition of the third tag axle. The numbering of the lift axles starts from the front axle position.

A command to control the lift axle position/tag axle load condition is sent in five successive messages followed by messages with lift axle position request set to take no action. Less than five messages are allowed if the receiver acknowledges via lift axle 3 position (see 6.4.19).

REQ	8.85 APP – Running gear equipment parameter specification – Lift axle 3 position request
Table 86 specifies the parameter attributes.	

Table 86 — Lift axle 3 position request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle laden 01 ₂ : lift axle position up/tag axle unladen 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.15 APP – Lift axle 4 position request

This parameter requests to control the position of the lift axle 4 or the load condition of the fourth tag axle. The numbering of the lift axles starts from the front axle position.

A command to control the lift axle position/tag axle load condition is sent in five successive messages followed by messages with lift axle position request set to take no action. Less than five messages are allowed if the receiver acknowledges via lift axle 4 position (see 6.4.20).

REQ	8.86 APP – Running gear equipment parameter specification – Lift axle 4 position request
Table 87 specifies the parameter attributes.	

Table 87 — Lift axle 4 position request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle laden 01 ₂ : lift axle position up/tag axle unladen 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.16 APP – Lift axle 5 position request

This parameter requests to control the position of the lift axle 5 or the load condition of the fifth tag axle. The numbering of the lift axles starts from the front axle position.

A command to control the lift axle position/tag axle load condition is sent in five successive messages followed by messages with lift axle position request set to take no action. Less than five messages are allowed if the receiver acknowledges via lift axle 5 position (see 6.4.21).

REQ	8.87 APP – Running gear equipment parameter specification – Lift axle 5 position request
Table 88 specifies the parameter attributes.	

Table 88 — Lift axle 5 position request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle laden 01 ₂ : lift axle position up/tag axle unladen 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.17 APP – Lift axle 1 position

This parameter indicates the position of the lift axle 1 or the load condition of the first tag axle. The numbering of the lift axles starts from the front axle position.

REQ	8.88 APP – Running gear equipment parameter specification – Lift axle 1 position
	Table 89 specifies the parameter attributes.

Table 89 — Lift axle 1 position attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle 01 ₂ : lift axle position up/tag axle 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.18 APP – Lift axle 2 position

This parameter indicates the position of the lift axle 2 or the load condition of the second tag axle. The numbering of the lift axles starts from the front axle position.

REQ	8.89 APP – Running gear equipment parameter specification – Lift axle 2 position
	Table 90 specifies the parameter attributes.

Table 90 — Lift axle 2 position attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle 01 ₂ : lift axle position up/tag axle 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.19 APP – Lift axle 3 position

This parameter indicates the position of the lift axle 3 or the load condition of the third tag axle. The numbering of the lift axles starts from the front axle position.

REQ	8.90 APP – Running gear equipment parameter specification – Lift axle 3 position
	Table 91 specifies the parameter attributes.

Table 91 — Lift axle 3 position attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle 01 ₂ : lift axle position up/tag axle 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.20 APP – Lift axle 4 position

This parameter indicates the position of the lift axle 4 or the load condition of the fourth tag axle. The numbering of lift axles starts from the front axle position.

REQ	8.91 APP – Running gear equipment parameter specification – Lift axle 4 position
Table 92 specifies the parameter attributes.	

Table 92 — Lift axle 4 position attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle 01 ₂ : lift axle position up/tag axle 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.21 APP – Lift axle 5 position

This parameter indicates the position of the lift axle 5 or the load condition of the fifth tag axle. The numbering of the lift axles starts from the front axle position.

REQ	8.92 APP – Running gear equipment parameter specification – Lift axle 5 position
Table 93 specifies the parameter attributes.	

Table 93 — Lift axle 5 position attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : lift axle position down/tag axle 01 ₂ : lift axle position up/tag axle 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.22 APP – Steering axle locking request

This parameter requests to lock the steering axle.

A command to lock or unlock the steering axle is sent in five successive messages followed by messages with steering axle locking request set to take no action. Less than five messages are allowed if the receiver acknowledges via steering axle locking (see [6.4.23](#)).

REQ	8.93 APP – Running gear equipment parameter specification – Steering axle locking request
Table 94 specifies the parameter attributes.	

Table 94 — Steering axle locking request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : unlock steering axle 01 ₂ : lock steering axle 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.23 APP – Steering axle locking status

This parameter indicates the current steering axle locking status.

REQ	8.94 APP – Running gear equipment parameter specification – Steering axle locking status
Table 95 specifies the parameter attributes.	

Table 95 — Steering axle locking status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : steering axle unlocked 01 ₂ : steering axle locked 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.24 APP – Traction help (load transfer) request

This parameter requests to control the lift axle position or tag axle load condition to transfer more load on the driven axle of the vehicle.

A request to switch the traction help on or off is sent in five successive messages followed by messages with traction help request set to take no action. Less than five messages are allowed if the receiver acknowledges through traction help (see [6.4.25](#)).

REQ	8.95 APP – Running gear equipment parameter specification – Traction help (load transfer) request
Table 96 specifies the parameter attributes.	

Table 96 — Traction help (load transfer) request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : traction help not requested 01 ₂ : traction help requested 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.25 APP – Traction help (load transfer) status

This parameter indicates the current status of the traction help function.

REQ	8.96 APP – Running gear equipment parameter specification – Traction help (load transfer) status
Table 97 specifies the parameter attributes.	

Table 97 — Traction help (load transfer) status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : traction help (load transfer) inactive 01 ₂ : traction help (load transfer) active 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.26 APP – Ride height request

This parameter requests to activate a normal ride body height. The normal levels 1 and 2 are towed vehicle-specific body heights.

A request to activate a normal level is sent in five successive messages followed by messages with ride height request set to take no action. Less than five messages are allowed if the receiver already acknowledges through levelling control system, ride height level (see [6.4.27](#)).

REQ	8.97 APP – Running gear equipment parameter specification – Ride height request
Table 98 specifies the parameter attributes.	

Table 98 — Ride high request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : normal level 1 requested 01 ₂ : normal level 2 requested 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.27 APP – Ride height level

This parameter indicates the current body height position status of the vehicle as a response to the ride height request.

REQ	8.98 APP – Running gear equipment parameter specification – Ride height level
Table 99 specifies the parameter attributes.	

Table 99 — Ride height level attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle body not at requested normal level 01 ₂ : vehicle body at requested normal level 10 ₂ : error indicator 11 ₂ : not available or not installed

Table 99 (continued)

Attribute	Value
type	measured

6.4.28 APP – Normal level

This parameter indicates the current state of the body height normal positions independent of a specific level request. In the case when there is no corresponding body height position, the value not available is transmitted.

REQ	8.99 APP – Running gear equipment parameter specification – Normal level
	Table 100 specifies the parameter attributes.

Table 100 — Normal level status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle body height at normal level 1 01 ₂ : vehicle body height at normal level 2 10 ₂ : error indicator 11 ₂ : not available, unknown body height level
type	measured

6.4.29 APP – Ramp level request

This parameter requests to control the body height to a level programmed and memorized in the levelling control system.

A request to activate one ramp level is sent in five successive messages followed by messages with ramp level request set to take no action. Less than five messages are allowed if the receiver acknowledges through ramp level (see [6.4.30](#)).

REQ	8.100 APP – Running gear equipment parameter specification – Ramp level request
	Table 101 specifies the parameter attributes.

Table 101 — Ramp level request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : ramp level 1 requested 01 ₂ : ramp level 2 requested 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.30 APP – Ramp level

This parameter indicates the current status of the body height as a response to the “ramp level request” (see [6.4.29](#)).

REQ	8.101 APP – Running gear equipment parameter specification – Ramp level
	Table 102 specifies the parameter attributes.

Table 102 — Ramp level status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle body not at the requested ramp level 01 ₂ : vehicle body at the requested ramp level 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.31 APP – Ramp level position

This parameter indicates the current state of the body height ramp level positions independent of a specific level request. In cases when there is no corresponding body height position, the value not available is transmitted.

REQ	8.102 APP – Running gear equipment parameter specification – Ramp level position
	Table 103 specifies the parameter attributes.

Table 103 — Ramp level status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle body height at ramp level 1 01 ₂ : vehicle body height at ramp level 2 10 ₂ : error indicator 11 ₂ : not available, unknown body height level
type	measured

6.4.32 APP – Ramp level storage request

This parameter requests to store the current body height as the newly programmed and memorized ramp levels 1 or 2 in the levelling control system.

A request to store a ramp level is sent in five successive messages followed by messages with ramp level storage request set to take no action. Less than five messages are allowed if the receiver acknowledges through ramp level storage (see [6.4.33](#)).

REQ	8.103 APP – Running gear equipment parameter specification – Ramp level storage request
	Table 104 specifies the parameter attributes.

Table 104 — Ramp level storage request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : store ramp level 1 request 01 ₂ : store ramp level 2 request 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.33 APP – Ramp level storage status

This parameter indicates the current status of the ramp level storage in the levelling control system as a response to the ramp level storage request.

REQ	8.104 APP – Running gear equipment parameter specification – Ramp level storage status
Table 105 specifies the parameter attributes.	

Table 105 — Ramp level storage status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no new ramp level stored 01 ₂ : new ramp level stored 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.34 APP – Stop level change request

This parameter requests to immediately stop any change of the actual body height level.

This request is sent until the receiver acknowledges via stop acknowledge (see [6.4.35](#)).

REQ	8.105 APP – Running gear equipment parameter specification – Stop level change request
Table 106 specifies the parameter attributes.	

Table 106 — Stop level change request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no stop request 01 ₂ : stop requested 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.4.35 APP – Stop level change request acknowledge

This parameter indicates the current status of the levelling control system as a response to the stop level change request.

REQ	8.106 APP – Running gear equipment parameter specification – Stop level change request acknowledge
Table 107 specifies the parameter attributes.	

Table 107 — Stop level change request acknowledge attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no stop request 01 ₂ : stop request accepted 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.4.36 APP – Parking and towed vehicle air pressure

This parameter indicates the current pneumatic pressure on the circuit or reservoir for the parking brake and the towed vehicle supply.

REQ	8.107 APP – Running gear equipment parameter specification – Parking and towed vehicle air pressure
Table 108 specifies the parameter attributes.	

Table 108 — Parking and towed vehicle air pressure attributes

Attribute	Value
data length	1 byte
resolution	8 kPa per bit
offset	0 kPa
data range	0 kPa to 2 000 kPa
operating range	0 kPa to 2 000 kPa
type	measured

6.4.37 APP – Auxiliary equipment supply pressure

This parameter indicates the current pneumatic pressure in the auxiliary equipment supply circuit.

REQ	8.108 APP – Running gear equipment parameter specification – Auxiliary equipment supply pressure
Table 109 specifies the parameter attributes.	

Table 109 — Auxiliary equipment supply pressure attributes

Attribute	Value
data length	1 byte
resolution	8 kPa per bit
offset	0 kPa
data range	0 kPa to 2 000 kPa
operating range	0 kPa to 2 000 kPa
type	measured

6.4.38 APP – Tyre pressure threshold detection

This parameter indicates the pressure level of one specific tyre. This parameter is used in conjunction with the tyre/wheel identification. The levels specified in [Table 110](#) represent the different pressure conditions of the tyre as specified in [Table 111](#).

REQ	8.109 APP – Running gear equipment parameter specification – Tyre pressure threshold detection
Table 110 specifies the parameter attributes.	

Table 110 — Tyre pressure threshold detection status attributes

Attribute	Value
data length	3 bit
data range	000 ₂ : extreme over pressure 001 ₂ : over pressure 010 ₂ : no warning pressure 011 ₂ : under pressure 100 ₂ : extreme under pressure 101 ₂ : not defined 110 ₂ : error indicator 111 ₂ : not available

Table 110 (continued)

Attribute	Value
type	measured

Table 111 — Pressure conditions of the tyre

Value	Description
extreme over pressure	The tyre pressure is at a level where the safety of the vehicle can be jeopardized.
over pressure	The tyre pressure is higher than the pressure specified by the vehicle or tyre manufacturer.
no warning pressure	The tyre pressure is within the thresholds specified by the vehicle or tyre manufacturer.
under pressure	The tyre pressure is lower than the pressure specified by the vehicle or tyre manufacturer.
extreme under pressure	The tyre pressure is at a level in which the safety of the vehicle can be jeopardized.

6.4.39 APP – Air leakage detection

This parameter indicates the current air leakage (pressure loss) of a tyre. This parameter is used in conjunction with the tyre/wheel identification.

REQ	8.110 APP – Running gear equipment parameter specification – Air leakage detection
	Table 112 specifies the parameter attributes.

Table 112 — Air leakage detection attributes

Attribute	Value
data length	2 byte
resolution	0,1 Pa/s per bit
offset	0 Pa/s
data range	0 Pa/s to 6 425,5 Pa/s
operating range	0 Pa/s to 6 425,5 Pa/s
type	measured

6.4.40 APP – Tyre temperature

This parameter indicates the current temperature of a tyre. This parameter is used in conjunction with the tyre/wheel identification.

REQ	8.111 APP – Running gear equipment parameter specification – Tyre temperature
	Table 113 specifies the parameter attributes.

Table 113 — Tyre temperature attributes

Attribute	Value
data length	2 byte
resolution	0,031 25 °C per bit
offset	–273 °C
data range	–273 °C to 1 735 °C
operating range	–273 °C to 1 735 °C
type	measured

6.4.41 APP – Tyre module power supply status

This parameter indicates the current status of the power supply of the tyre module. It indicates whether it is sufficient to achieve the specified performance of the module. This parameter is used in conjunction with the tyre/wheel identification.

REQ	8.112 APP – Running gear equipment parameter specification – Tyre module power supply status
Table 114 specifies the parameter attributes.	

Table 114 — Tyre module power supply status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : insufficient power supply 01 ₂ : sufficient power supply 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.5 APP – Axle load parameter specification

6.5.1 APP – Axle load

This parameter indicates the static vertical load of a vehicle axle identified by a tyre/wheel identification parameter (see [6.2.1](#)).

REQ	8.113 APP – Running gear equipment parameter specification – Axle load
Table 115 specifies the parameter attributes.	

Table 115 — Axle load attributes

Attribute	Value
data length	2 byte
resolution	0,5 kg per bit
offset	0 kg
data range	0 kg to 32 127,5 kg
operating range	0 kg to 32 127,5 kg
type	measured

6.5.2 APP – Axle load calibration data storage request

This parameter requests to store the following axle load calibration data in the ECU:

- the supplied externally measured axle load;
- the internally measured axle load of the axle identified by the tyre/wheel identification;
- the current date.

There are two types of axle load calibration requests.

- For the first type of calibration (00₂), the external axle loads are provided and stored one axle at a time.

- For the second type of calibration (01₂), the towed vehicle is put on a scale for complete vehicles in a sequence where the entire towed vehicle is put on a scale on the first request, all axles except the first axle on the second request, and so on until the last request with only the last axle of the towed vehicle on a scale. In this type of calibration, the tyre/wheel identification is used to identify, which axle that is being calibrated indicates the first axle on a scale, and it is assumed that all the following axles are also on a scale. When an entire sequence is performed, the towed vehicle can calculate the calibration data for each individual axle and store this data just like the first type of calibration.

A request to store the axle load calibration data is acknowledged by axle load calibration data storage (see 6.5.3).

REQ	8.114 APP – Running gear equipment parameter specification – Axle load calibration data storage request
Table 116 specifies the parameter attributes.	

Table 116 — Axle load calibration data storage request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : store axle load calibration data using the individual axle scale 01 ₂ : store axle load calibration data using the vehicle scale sequence 10 ₂ : error indicator 11 ₂ : not available or not installed: take no action
type	control request

6.5.3 APP – Axle load calibration data storage status

This parameter indicates the storage status of a new axle load calibration data in the ECU. Each successful axle load calibration data storage request is acknowledged with a new axle load calibration data stored even though the actual data storage can be postponed until a complete axle calibration sequence is performed.

REQ	8.115 APP – Running gear equipment parameter specification – Axle load calibration data storage status
Table 117 specifies the parameter attributes.	

Table 117 — Axle load calibration data storage status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no new axle load calibration data storage request 01 ₂ : new axle load calibration data stored 10 ₂ : calibration aborted due to timeout or error 11 ₂ : not available or not installed
type	measured

6.5.4 APP – Axle load measured by external scale

This parameter indicates the static vertical load, measured by an external scale at the time of the axle load calibration, of one or several vehicle axles identified by the tyre/wheel identification and axle load calibration data storage request.

- If the axle load calibration data storage request is “Store axle load calibration data using individual axle scale”, this parameter indicates the static vertical load of the vehicle axle identified by the tyre/wheel identification measured by an external scale at the time of the axle load calibration.

- If the axle load calibration data storage request is “Store axle load calibration data using vehicle scale sequence”, this parameter indicates the total static vertical load of the vehicle axles starting from the vehicle axle identified by the tyre/wheel identification and all the following vehicle axles until the last vehicle axle measured by an external scale at the time of the axle load calibration.

REQ	8.116 APP – Running gear equipment parameter specification – Axle load measured by external scale
Table 118 specifies the parameter attributes.	

Table 118 — Axle load measured by external scale attributes

Attribute	Value
data length	2 byte
resolution	1 kg per bit
offset	0 kg
data range	0 kg to 64 255 kg
operating range	0 kg to 64 255 kg
type	measured

6.5.5 APP – Axle load measured by towed vehicle

This parameter indicates the static vertical load, measured by the towed vehicle at the time of the axle load calibration, of one or several vehicle axles identified by the tyre/wheel identification and axle load calibration data storage request.

REQ	8.117 APP – Running gear equipment parameter specification – Axle load measured by towed vehicle
Table 119 specifies the parameter attributes.	

Table 119 — Axle load measured by towed vehicle attributes

Attribute	Value
data length	2 byte
resolution	1 kg per bit
offset	0 kg
data range	0 kg to 64 255 kg
operating range	0 kg to 64 255 kg
type	measured

6.5.6 APP – Axle load calibration data load level

This parameter indicates the load case the calibration data belongs to. Each axle can be calibrated at one out of the three levels: heavy, medium and light load.

REQ	8.118 APP – Running gear equipment parameter specification – Axle load calibration data load level
Table 120 specifies the parameter attributes.	

Table 120 — Axle load calibration data load level attributes

Attribute	Value
data length	2 bit

Table 120 (continued)

Attribute	Value
data range	00 ₂ : axle load calibration data for low load 01 ₂ : axle load calibration data for heavy load 10 ₂ : axle load calibration data for medium load 11 ₂ : not available or not installed
type	measured

6.5.7 APP – Axle load calibration type

This parameter indicates the type of calibration used. The towed vehicle can choose whether to use or not to use the stored calibration data when calculating the axle load.

- Normally, the towed vehicle does not use the stored calibration data and any external application that wants the calibrated axle loads uses the stored calibration data to calculate the calibrated axle loads.
- If the towed vehicle chooses to include the stored calibration data when calculating the axle loads, any external application does not use the stored calibration data again.

REQ	8.119 APP – Running gear equipment parameter specification – Axle load calibration type
Table 121 specifies the parameter attributes.	

Table 121 — Axle load calibration type attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : stored calibration data used for axle load output 01 ₂ : stored calibration data not used for axle load output 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.5.8 APP – Maximum driven axle load

This parameter indicates the maximum allowed static vertical load on the driven axle of a vehicle. In case of the vehicle is equipped with more than one driven axle the value of the axle with the highest vertical load is transmitted.

REQ	8.120 APP – Running gear equipment parameter specification – Maximum driven axle load
Table 122 specifies the parameter attributes.	

Table 122 — Maximum driven axle load attributes

Attribute	Value
data length	2 byte
resolution	2 kg per bit
offset	0 kg
data range	0 kg to 128 510 kg
operating range	0 kg to 128 510 kg
type	measured

6.6 Ride height parameter specification

6.6.1 APP – Extended ride height and ramp level storage

This parameter indicates whether the towed vehicle supports the storage of four extra drive heights and four extra ramp levels.

REQ	8.121 APP – Running gear equipment parameter specification – Extended ride height and ramp level storage
Table 123 specifies the parameter attributes.	

Table 123 — Extended ride height and ramp level storage attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : extended ride height and ramp level storage supported (ride height can be stored in all three sets) 01 ₂ : extended ride height and ramp level storage supported (ride height can only be stored in the two extended sets) 10 ₂ : error indicator 11 ₂ : not available or not installed
type	measured

6.6.2 APP – Ride height and ramp level set request

This parameter requests a set of stored ride heights and ramp levels to use in combination with the ride height request, ride height storage request, ramp level request, and ramp level storage request. If extended ride height and ramp level storage are not supported, the default set is used independent of the value of this signal.

REQ	8.122 APP – Running gear equipment parameter specification – Ride height and ramp level set request
Table 124 specifies the parameter attributes.	

Table 124 — Ride height and ramp level set request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : use the extended set 1 of the stored ride heights and ramp levels 01 ₂ : use the extended set 2 of the stored ride heights and ramp levels 10 ₂ : reserved 11 ₂ : use the default set of the stored ride heights and ramp levels
type	control request

6.6.3 APP – Ride height storage request

This parameter requests to store the actual body height level as new programmed and memorized ride height 1 or 2 in the requested ride height set in the ECU. A request to store a ride height is sent in five successive messages followed by messages with ride height storage request set to take no action. Less than five messages are allowed if the receiver acknowledges through ride height level storage.

REQ	8.123 APP – Running gear equipment parameter specification – Ride height storage request
Table 125 specifies the parameter attributes.	

Table 125 — Ride height storage request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : store ride height 1 01 ₂ : store ride height 2 10 ₂ : reserved 11 ₂ : not available or not installed: take no action
type	control request

6.6.4 APP – Ride height storage

This parameter indicates the current status of the ride high storage in the levelling control system as a response to the ride high storage request.

REQ	8.124 APP – Running gear equipment parameter specification – Ride height storage
	Table 126 specifies the parameter attributes.

Table 126 — Ride height storage attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no new ride height storage request 01 ₂ : new ride height stored 10 ₂ : error indicator: ride height cannot be stored in the requested set 11 ₂ : not available or not installed
type	measured

6.6.5 APP – Neutral gear request

This parameter requests to reduce the engine torque to idle and open the clutch/switch to neutral gear. For low speeds the towing vehicle should even apply its own brakes to stop the vehicle.

This parameter indicates the towing vehicle to reduce its engine torque to idle and open the clutch/switch to neutral gear. For low speeds the towing vehicle should even apply its own brakes to stop the vehicle.

REQ	8.125 APP – Running gear equipment parameter specification – Neutral gear request
	Table 127 specifies the parameter attributes. Operating condition: speed <10 km/h during reversing.

Table 127 — Neutral gear request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no neutral gear request 01 ₂ : neutral gear request 10 ₂ : error indicator 11 ₂ : not available or not installed
type	control request

6.6.6 APP – Rear obstacle distance

This parameter indicates the current status of the rear obstacle distance and provides a visual and/or audible warning when approaching an obstacle during reversing.

REQ	8.126 APP – Running gear equipment parameter specification – Rear obstacle distance
This parameter shall indicate the rear obstacle distance as part of the GPM22 message as specified in ISO 11992-3:2021, 6.2.4. Operating condition: speed <10 km/h during reversing.	

6.6.7 APP – Immobilizer status

This parameter indicates the current status of the immobilizer. If an immobilizer function is active in the towed vehicle, this is indicated to the towing vehicle to show the driver the status in the towing vehicle dashboard.

REQ	8.127 APP – Running gear equipment parameter specification – Immobilizer status
Table 128 specifies the parameter attributes.	

Table 128 — Immobilizer status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : immobilizer passive, but installed 01 ₂ : immobilizer active 10 ₂ : error indicator: failure 11 ₂ : not available or not installed
type	measured

6.6.8 APP – Fifth wheel load

This parameter indicates the fifth wheel load of a vehicle.

The fifth wheel load is calculated according to [Formula \(4\)](#).

$$L_{\text{Fifth_Wheel}} = L_{\text{Driven_Axle}} \times l_{\text{Distance}} \quad (4)$$

where

$L_{\text{Fifth_Wheel}}$ is the load of the fifth wheel;

$L_{\text{Driven_Axle}}$ is the load of the driven axle;

l_{Distance} is the distance between the front axle and fifth wheel.

REQ	8.128 APP – Running gear equipment parameter specification – Fifth wheel load
Table 129 specifies the parameter attributes.	

Table 129 — Fifth wheel load attributes

Attribute	Value
data length	2 byte
resolution	2 kg per bit
offset	0 kg
data range	0 kg to 128 510 kg
operating range	0 kg to 128 510 kg
type	measured

6.6.9 APP – Ambient air temperature

This parameter indicates the ambient air temperature.

REQ	8.129 APP – Running gear equipment parameter specification – Ambient air temperature
The ambient air temperature attributes are specified in SAE J1939-DA (SPN 171).	

6.6.10 APP – Parking brake status

This parameter indicates the current status of the parking brake. The purpose of this signal is to indicate to the towed vehicle that the parking brake in the towing vehicle is applied.

REQ	8.130 APP – Running gear equipment parameter specification – Parking brake status
Table 130 specifies the parameter attributes.	

Table 130 — Parking brake status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : Parking brake passive 01 ₂ : Parking brake active 10 ₂ : error indicator: failure 11 ₂ : not available or not installed
type	measured

6.6.11 APP – Neutral gear status

This parameter indicates the current status of the neutral gear. The purpose of this signal is to indicate to the towed vehicle that the neutral gear in the towing vehicle is applied for reverse monitoring systems with automated braking.

REQ	8.131 APP – Running gear equipment parameter specification – Neutral gear status
Table 131 specifies the parameter attributes.	

Table 131 — Neutral gear status attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : Neutral gear not engaged 01 ₂ : Neutral gear engaged 10 ₂ : error indicator: failure 11 ₂ : not available or not installed
type	measured

6.7 APP – Software update parameter specification

6.7.1 APP – Vehicle software update request

This parameter is used to indicate in the towing vehicle with the driver's dashboard the towed vehicle software update request.

This parameter is used in combination with the vehicle software update request acknowledgement parameter (see [6.7.2](#)) that is sent from the towing vehicle with the driver's dashboard to the towed vehicle.

REQ	8.132 APP – Software update parameter specification – Vehicle software update request
Table 132 specifies the parameter attributes.	

Table 132 — Vehicle software update request attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : no vehicle software update request 01 ₂ : vehicle software update request 10 ₂ : error indicator 11 ₂ : not available or not installed: take no action
type	control request

6.7.2 APP – Vehicle software update request acknowledgement

This parameter is used in combination with the vehicle software update request (see 6.7.1) parameter that is sent from the towed vehicle(s) to the towing vehicle.

REQ	8.133 APP – Software update parameter specification – Vehicle software update request acknowledgement
The software update request and acknowledge interaction between towing and towed vehicles shall be in accordance with the definitions in Annex B. The parameter attributes shall be in accordance with the specification in Table 133.	

Table 133 — Vehicle software update request acknowledged attributes

Attribute	Value
data length	2 bit
data range	00 ₂ : vehicle software update request not acknowledged 01 ₂ : vehicle software update request acknowledged 10 ₂ : error indicator: towed vehicle software update refused 11 ₂ : not available or not installed
type	measured

7 APP – PG specification

7.1 APP – Overview of PGs

The first number stands for the transmission direction,

- '1' for the transmission from the towing to the towed vehicle and
- '2' for the transmission from the towed to the towing vehicle.

The second number is an index number starting with '1'.

REQ	8.134 APP – Overview of PGs – Standard initialisation message
The standard initialisation message, which is used for the dynamic address assignment, is one of the PDU 1 type messages, which shall be sent from the towing vehicle to the towed vehicle with the smallest nominal transmission rate.	

REQ	8.135 APP – Overview of PGs – Continuously sent standard initialisation message
The standard initialisation message shall be sent continuously as well as one of the PDU 1 type messages, which shall be sent from a towed vehicle to its predecessor with the smallest nominal transmission rate.	

[Annex C](#) gives an overview of all messages and their flow.

The messages transmitted on the interface are distinguished by their unique identifier. The nominal transmission rates are specified for messages with particular identifiers. For example, if there are three towed vehicles, the towing vehicle sends one RGE11 message (PDU 1 type) to the first towed vehicle, one to the second and one to the third, each with a nominal transmission rate of 100 ms.

The repetition time of PDU 2 type messages is independent of the number of towed vehicles.

REQ	8.136 APP – Overview of PGs – Optimal brake control
The messages EBS11 and EBS21 shall be transmitted only between two directly coupled vehicles for optimal brake control between these two units.	

Since EBS21 also contains information that is relevant to the towing vehicle (warning information to the driver), this information is also mapped into the message EBS22.

[Table 134](#) and [Table 135](#) show an overview of PDU 1 and PDU 2.

Table 134 — Overview of the PDU 1

Acronym	Nominal transmission rate	P	EDP	DP	PF	PS (GE)	PGN	Remark
EBS11	10 ms	3 ₁₆	0 ₁₆	0 ₁₆	2 ₁₆	DA	000200 ₁₆	—
EBS21	10 ms	3 ₁₆	0 ₁₆	0 ₁₆	3 ₁₆	DA	000300 ₁₆	—
RGE11	100 ms	6 ₁₆	0 ₁₆	0 ₁₆	E4 ₁₆	DA	00E400 ₁₆	—
RGE12	1 000 ms	6 ₁₆	0 ₁₆	0 ₁₆	8A ₁₆	DA	008A00 ₁₆	—
RGE21	100 ms	6 ₁₆	0 ₁₆	0 ₁₆	E5 ₁₆	DA	00E500 ₁₆	—
RGE24	1 000 ms	6 ₁₆	0 ₁₆	0 ₁₆	89 ₁₆	DA	008900 ₁₆	—

Table 135 — Overview of the PDU 2

Acronym	Nominal transmission rate	P	EDP	DP	PF	PS (GE)	PGN	Remark
EBS12	100 ms	6 ₁₆	0 ₁₆	0 ₁₆	FE ₁₆	C9 ₁₆	00FEC9 ₁₆	—
EBS22	100 ms	6 ₁₆	0 ₁₆	0 ₁₆	FE ₁₆	C4 ₁₆	00FEC4 ₁₆	—
EBS23	100 ms	6 ₁₆	0 ₁₆	0 ₁₆	FE ₁₆	C6 ₁₆	00FEC6 ₁₆	—
EBS24	1 000 ms	6 ₁₆	0 ₁₆	0 ₁₆	FD ₁₆	9A ₁₆	00FD9A ₁₆	—
EBS25	100 ms	6 ₁₆	0 ₁₆	0 ₁₆	F0 ₁₆	20 ₁₆	00F020 ₁₆	—
EBS26	10 ms	6 ₁₆	0 ₁₆	0 ₁₆	F0 ₁₆	1F ₁₆	00F01F ₁₆	—
RGE22	100 ms	6 ₁₆	0 ₁₆	0 ₁₆	FE ₁₆	5C ₁₆	00FE5C ₁₆	—
RGE23	1 000 ms	6 ₁₆	0 ₁₆	0 ₁₆	FE ₁₆	5E ₁₆	00FE5E ₁₆	—
TD11	1 000 ms	6 ₁₆	0 ₁₆	0 ₁₆	FE ₁₆	E6 ₁₆	00FEE6 ₁₆	—

REQ	8.137 APP – Overview of PGs – PG attribute and message definition
For each PG, the attribute and message definitions given in Table 136 and Table 137 shall apply.	

Table 136 — PG attribute definition

Attribute	Definition
nominal transmission rate	nominal time and tolerance between two subsequently transmitted messages
data length	number of bytes of the message
default priority	value of the parameter P specified in SAE J1939-21
extended data page	value of the parameter EDP specified in SAE J1939-21
data page	value of the parameter DP specified in SAE J1939-21
PDU format	value of the parameter PF specified in SAE J1939-21
PDU specific	value of the parameter PS specified in SAE J1939-21
PGN	value of the parameter PG specified in SAE J1939-21

Table 137 — PG message definition

Column title	Definition
byte pos	byte offset of the specified parameter starting with '1' (one) for the first byte
bit pos	bit offset of the specified parameter starting with '1' (one) for the LSb
parameter	name of the parameter as specified in 6.1
reference	reference to the subsection number of the specified parameter

7.2 APP – Message transmission in case of multiple towed vehicles

If more than one towed vehicle is connected to the towing vehicle, the number of messages per second needs to be reduced to meet the requirements of the physical data interfaces concerning bus load. In this case, the following restrictions apply.

REQ	8.138 APP – Overview of PGs – Multiple towed vehicles – Nominal transmission rate
All messages shall be sent with the nominal transmission rate as specified in this document.	

REQ	8.139 APP – Overview of PGs – Multiple towed vehicles – EBS26
The message EBS26 shall only be sent in the case of one towed vehicle. If more than one towed vehicle is present, the message EBS26 shall not be sent at all by any towed vehicle.	

7.3 APP – Towing vehicle

7.3.1 APP – General specification

The general requirements specify details of the messages for use on the electrical connection between towing and towed vehicles.

A message is described by a short form of the function (e.g. GPM for General Purpose Message) and two numbers. The first number of the message indicates the direction (towing to towed vehicle) and is always '1'. The second number is the message number.

The allowed attribute values attributes and mapping description are specified in detail in SAE J1939-21.

REQ	8.140 APP – Towing vehicle – Undefined bits
All undefined bits shall be transmitted with a value of "1". All undefined bits shall be treated as "don't care" (either masked out or ignored).	

REQ	8.141 APP – Towing vehicle – Coupled vehicle messages
The messages GPM11 and GPM21 shall be transmitted only between two coupled vehicles.	

REQ	8.142 APP – Towing vehicle – Message direction
All towing vehicle messages shall be transmitted in the direction from towing to towed vehicle.	

REQ	8.143 APP – Towing vehicle – Single message transmission rate tolerance
The single message transmission rate of a towing vehicle message shall meet the nominal transmission rate with a tolerance of $\pm 30\%$ as specified in Table 134 and Table 135 .	

REQ	8.144 APP – Towing vehicle – Average transmission rate tolerance
The average transmission rate within 5 min of a towed vehicle message shall meet the nominal transmission rate with a tolerance of $\pm 10\%$ as specified in Table 134 and Table 135 .	

7.3.2 APP – General PGs, transmitted from the towing to the towed vehicle

7.3.2.1 APP – Time/Date message #1/1 (TD11)

REQ	8.145 APP – Towing vehicle – TD11
If this message is supported, it shall be implemented as specified in SAE J1939-DA: PG TD (Time/Date) with PGN FEE6 ₁₆ .	

7.3.3 APP – Electronic brake system PGs, transmitted from the towing to the towed vehicle

7.3.3.1 APP – Electronic brake system #1/1 (EBS11)

With this PG, the relevant information for the electronic brake system function is sent from the towing vehicle to the towed vehicle.

REQ	8.146 APP – Towing vehicle – EBS11
This message shall be supported and shall be implemented as specified in Table 138 and Table 139 .	

Table 138 — SP mapping of EBS11

Attribute	Value
transmission repetition time	10 ms $\pm$ 1 ms
data length	8 byte
extended data page	0
data page	0
PDU format	2 (PDU 1)
PDU specific	DA (address of the successor)
default priority	3

Table 139 — EBS11 message definition

Byte pos	Bit pos	Parameter	Reference
1	1 to 2	vehicle ABS status	6.3.17
	3 to 4	vehicle retarder control status	6.3.5
	5 to 6	ASR brake control status	6.3.24
	7 to 8	ASR engine control status	6.3.25
2	1 to 2	brake light switch	6.3.31
	3 to 4	vehicle type	6.3.32
	5 to 6	VDC active	6.3.37
	7 to 8	parking brake status	6.6.10
3 to 4	—	service brake demand pressure	6.3.2
5	—	park brake demand relative pressure	6.3.1
6	—	retarder demand relative torque	6.3.5
7	—	relative brake demand for front or left vehicle side	6.3.42
8	—	relative brake demand for rear or right vehicle side	6.3.43

7.3.3.2 APP – Electronic brake system #1/2 (EBS12)

With this PG, the relevant information for the electronic brake system function is sent from the towing vehicle to the towed vehicle.

REQ	8.147 APP – Towing vehicle – EBS12
If this message is supported, it shall be implemented as specified in Table 140 and Table 141 .	

Table 140 — SP mapping of EBS12

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 201
default priority	6

Table 141 — EBS12 message definition

Byte pos	Bit pos	Parameter	Reference
1	1 to 2	vehicle retarder control status	6.3.5
	3 to 4	ROP system status	6.3.58
	5 to 6	YC system status	6.3.59
	7 to 8	vehicle software update acknowledge	6.7.2
2	1 to 2	towed vehicle ROP system request	6.3.60
	3 to 4	towed vehicle YC system request	6.3.61
	5 to 6	reverse gear status	6.3.64
	7 to 8	emergency braking status	6.3.66

Table 141 (continued)

Byte pos	Bit pos	Parameter	Reference
3	1 to 2	two electrical circuits brake demand status	6.3.27
	3 to 4	ABS off-road request	6.3.23
	5 to 6	pneumatic control line status	6.3.26
	7 to 8	load proportional function installation status	6.3.22
4	—	neutral gear status	6.6.11
5 to 6	—	road curvature	6.3.38
7 to 8	—	braking system wheel-based vehicle speed	6.3.3

7.3.3.3 APP – Electronic brake system #1/2 (EBS13)

With this PG, the relevant information for the electronic brake system function is sent from the towing vehicle to the towed vehicle. With respect to busload, the message EBS13 is only sent in the case of maximal two towed vehicles. If more than two towed vehicles are present, the message EBS13 is not sent at all by any towing vehicle.

REQ	8.148 APP – Towing vehicle – EBS13
If this message is supported, it shall be implemented as specified in Table 142 and Table 143 .	

Table 142 — SP mapping of EBS13

Attribute	Value
transmission repetition time	10 ms ± 1 ms
data length	8 byte
extended data page	0
data page	0
PDU format	4 (PDU1)
PDU specific	DA (address of the successor)
default priority	3

Table 143 — EBS13 message definition

Byte pos	Bit pos	Parameter	Reference
1	—	message cyclic redundancy check	ISO 11992-3:2021, 5.100
2	1 to 4	sequence counter	ISO 11992-3:2021, 5.101
	5 to 8	reserved by document	—
3	—	retarder demand relative torque	6.3.5
4 to 5	—	service brake demand pressure	6.3.2
6 to 8	—	reserved by document	—

7.3.4 APP – Running gear equipment PGs, transmitted from the towing to the towed vehicle

7.3.4.1 APP – Running gear equipment #1/1 (RGE11)

With this PG, the relevant information for the running gear equipment system function is sent from the towing vehicle to the towed vehicle. It can be sent to each towed vehicle individually and/or to the global destination address (all towed vehicles). If the global destination address is used, the PGs are only sent to the successor vehicles.

A request to enable or to disable the level control is sent in five successive messages followed by messages with level control request set to take no action. Less than five messages are allowed if the receiver acknowledges through level control (see 6.4.7).

REQ	8.149 APP – Towing vehicle – RGE11
If this message is supported, it shall be implemented as specified in Table 144 and Table 145 .	

Table 144 — SP mapping of RGE11

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	228 (PDU1)
PDU specific	DA (address of the towed vehicle)
default priority	6

Table 145 — RGE11 message definition

Byte pos	Bit pos	Parameter	Reference
1	1 to 2	ride height request	6.4.26
	3 to 4	level change request, front axle	6.4.8
	5 to 6	level change request, rear axle	6.4.9
	7 to 8	traction help (load transfer) request	6.4.24
2	1 to 2	lift axle 1 position request	6.4.12
	3 to 4	lift axle 2 position request	6.4.13
	5 to 6	steering axle locking request	6.4.22
	7 to 8	ramp level request	6.4.29
3	1 to 2	level control request	6.4.6
	3 to 4	ramp level storage request	6.4.32
	5 to 6	stop level change request	6.4.34
	7 to 8	ride height storage request	6.6.3
4 to 5	—	driven axle load	6.4.1
6	—	parking and towed vehicle air pressure	6.4.36
7	—	auxiliary equipment supply pressure	6.4.37
8	1 to 2	lift axle 3 position request	6.4.14
	3 to 4	lift axle 4 position request	6.4.15
	5 to 6	lift axle 5 position request	6.4.16
	7 to 8	ride height and ramp level set request	6.6.2

7.3.4.2 APP – Running gear equipment #1/2 (RGE12)

With this PG, the relevant information for the running gear equipment system function is sent from the towing vehicle to the towed vehicle.

REQ	8.150 APP – Towing vehicle – RGE12
If this message is supported, it shall be implemented as specified in Table 146 and Table 147 .	

Table 146 — SP mapping of RGE12

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	138 (PDU1)
PDU specific	DA (address of the towed vehicle)
default priority	6

Table 147 — RGE12 message definition

Byte pos	Bit pos	Parameter	Reference
1	1 to 2	axle load calibration data storage request	6.5.2
	3 to 8	reserved by document	—
2	—	tyre/wheel identification	6.2.1
3 to 4	—	axle load measured by external scale	6.5.4
5	—	identification data index	6.2.2
6	—	identification data content	6.2.3
7	1 to 2	lift axle 1 position	6.4.17
	3 to 4	lift axle 2 position	6.4.18
	5 to 8	reserved by document	—
8	—	reserved by document	—

It is recommended that RGE12 should be transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values is assumed on the receiver side.

7.3.4.3 APP – Running gear equipment #1/3 (RGE13)

With this PG, the relevant information for the running gear equipment system function is sent from the towing vehicle to the towed vehicle. If more than one towed vehicle is present, the message RGE13 is sent by some towed vehicles.

REQ	8.151 APP – Towing vehicle – RGE13
If this message is supported, it shall be implemented as specified in Table 148 and Table 149 .	

Table 148 — SP mapping of RGE13

Attribute	Value
transmission repetition time	1 000 ms ± 100 ms
data length	8 byte
extended data page	0
data page	0
PDU format	6 (PDU1)
PDU specific	DA (address of the successor vehicle)
default priority	6

Table 149 — RGE13 message definition

Byte pos	Bit pos	Parameter	Reference
1 to 2	—	maximum driven axle load	6.5.8
3 to 4	—	fifth wheel load	6.6.8
5 to 6	—	ambient air temperature	6.6.9
7 to 8	—	reserved by document	—

7.4 APP – Towed vehicle

7.4.1 APP – General PGs, transmitted from the towed to the towing vehicle

There are currently no PGs defined within this group.

7.4.2 APP – Electronic brake system PGs, transmitted from the towed to the towing vehicle

7.4.2.1 APP – Electronic brake system #2/1 (EBS21)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle.

REQ	8.152 APP – Towed vehicle – EBS21
If this message is supported, it shall be implemented as specified in Table 150 and Table 151 .	

Table 150 — SP mapping of EBS21

Attribute	Value
transmission repetition time	10 ms ± 1 ms
data length	8 byte
extended data page	0
data page	0
PDU format	3 (PDU1)
PDU specific	DA (address of the predecessor)
default priority	3

Table 151 — EBS21 message definition

Byte pos	Bit pos	Parameter	Reference
1	1 to 2	vehicle ABS status	6.3.17
	3 to 4	vehicle retarder control status	6.3.5
	5 to 6	vehicle service brake status	6.3.3
	7 to 8	automatic towed vehicle braking status	6.3.16
2	1 to 2	VDC active	6.3.37
	3 to 4	support of side or axle wise brake force distribution	6.3.44
	5 to 6	Immobilizer status	6.6.7
	7 to 8	reserved by document	—
3 to 4	—	braking system wheel-based vehicle speed	6.3.3
5	—	retarder relative peak torque	6.3.8
6 to 7	—	wheel speed difference main axle	6.3.39
8	—	lateral acceleration	6.3.45

7.4.2.2 APP – Electronic brake system #2/2 (EBS22)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle.

REQ	8.153 APP – Towed vehicle – EBS22
If this message is supported, it shall be implemented as specified in Table 152 and Table 153 .	

Table 152 — SP mapping of EBS22

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 196
default priority	6

Table 153 — EBS22 message definition

Byte pos	Bit pos	Parameter	Reference
1	1 to 2	vehicle ABS status	6.3.17
	3 to 4	vehicle retarder control status	6.3.5
	5 to 6	vehicle service brake status	6.3.3
	7 to 8	automatic towed vehicle braking status	6.3.16
2	1 to 2	vehicle electrical supply status	6.3.18
	3 to 4	red warning signal request	6.3.33
	5 to 6	amber warning signal request	6.3.34
	7 to 8	electrical supply of non-braking systems status	6.3.35
3	1 to 2	spring brake installation status	6.3.20
	3 to 4	electrical load proportional function installation status	6.3.21
	5 to 6	vehicle type	6.3.32
	7 to 8	spring brake status	6.3.41
4	1 to 2	loading ramp approach assistance status	6.3.36
	3 to 4	supply line braking	6.3.40
	5 to 6	stop lamps request	6.3.46
	7 to 8	braking via electric control line support	6.3.47
5 to 6	—	axle load sum	6.3.9
7 to 8	—	retarder wheel torque reference	6.3.5

7.4.2.3 APP – Electronic brake system #2/3 (EBS23)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle. All tyre-related parameters at the data bytes 1, 5, 6, and 7 are interpreted in conjunction with the corresponding tyre/wheel identification given in bytes 2, 3, and 4. The tyre/wheel identification is only interpreted when the corresponding parameter is supported and has no relevance, if the corresponding parameter is not supported.

It is recommended that this PG is transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values is assumed on the receiver side.

REQ	8.154 APP – Towed vehicle – EBS23
If this message is supported, it shall be implemented as specified in Table 154 and Table 155 .	

Table 154 — SP mapping of EBS23

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 198
default priority	6

Table 155 — EBS23 message definition

Byte pos	Bit pos	Parameter	Reference
1	1 to 2	tyre pressure status	6.3.28
	3 to 4	brake lining status	6.3.29
	5 to 6	brake temperature status	6.3.30
	7 to 8	vehicle pneumatic supply status	6.3.19
2	—	tyre/wheel identification (for tyre pressure and tyre pressure status)	6.2.1
3	—	tyre/wheel identification (for brake lining and brake lining status)	6.2.1
4	—	tyre/wheel identification (for brake temperature and brake temperature status)	6.2.1
5	—	tyre pressure	6.3.15
6	—	brake lining	6.3.13
7	—	brake temperature	6.3.14
8	—	pneumatic supply pressure	6.3.12

7.4.2.4 APP – Electronic brake system #2/4 (EBS24)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle. The parameter “geometric data index” serves as an index to an array of data transmitted in the parameter “geometric data indexed content” and is continuously cycled through all supported values, but no specific order of index values is assumed on the receiver side.

REQ	8.155 APP – Towed vehicle – EBS24
If this message is supported, it shall be implemented as specified in Table 156 and Table 157 .	

Table 156 — SP mapping of EBS24

Attribute	Value
transmission repetition time	1 000 ms ± 100 ms
data length	8 byte
extended data page	0
data page	0
PDU format	253 (PDU2)
PDU specific	GE = 154
default priority	6

Table 157 — EBS24 message definition

Byte pos	Bit pos	Parameter	Reference
1	—	geometric data index	6.3.48
2	—	geometric data indexed content	6.3.49
3	1 to 4	towed vehicle detection status	6.3.63
	5 to 6	vehicle combination ABS status	6.3.62
	7 to 8	reserved by document	—
4	1 to 2	vehicle software update request	6.7.1
	3 to 4	reserved by document	—
	5 to 8	reserved by document	—
5 to 8	—	reserved by document	—

7.4.2.5 APP – Electronic brake system #2/5 (EBS25)

With this PG, relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle.

REQ	8.156 APP – Towed vehicle – APP – Electronic brake system #2/5 (EBS25)
If this message is supported, it shall be implemented as specified in Table 158 and Table 159 .	

Table 158 — SP mapping of EBS25

Attribute	Value
transmission repetition time	100 ms ± 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 173
default priority	6

Table 159 — EBS25 message definition

Byte pos	Bit pos	Parameter	Reference
1	—	brake cylinder pressure first axle, left wheel	6.3.50
2	—	brake cylinder pressure first axle, right wheel	6.3.51
3	—	brake cylinder pressure second axle, left wheel	6.3.52
4	—	brake cylinder pressure second axle, right wheel	6.3.53
5	—	brake cylinder pressure third axle, left wheel	6.3.54
6	—	brake cylinder pressure third axle, right wheel	6.3.55
7	1 to 2	ROP system status	6.3.58
	3 to 4	YC system status	6.3.59
	5 to 6	external brake request status	6.3.65
	7 to 8	Neutral gear request	6.6.5
8	—	rear obstacle distance	6.6.6

7.4.2.6 APP – Electronic brake system #2/6 (EBS26)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle. If supported, this PG is sent by the first towed vehicle. It is not sent by any towed vehicle, if the road train consists of multiple towed vehicles.

REQ	8.157 APP – Towed vehicle – APP – Electronic brake system #2/6 (EBS26)
If this message is supported, it shall be implemented as specified in Table 160 and Table 161 .	

Table 160 — SP mapping of EBS26

Attribute	Value
transmission repetition time	10 ms ± 1 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 110
default priority	3

Table 161 — EBS26 message definition

Byte pos	Bit pos	Parameter	Reference
1 to 2	—	wheel speed first axle, left wheel	6.3.56
3 to 4	—	wheel speed first axle, right wheel	6.3.57
5 to 8	—	reserved by document	—

7.4.2.7 APP – Electronic brake system #2/7 (EBS27)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle. With respect to busload, the message EBS27 is only sent in the case of maximal two towed vehicles. If more than two towed vehicles are present, the message EBS27 is not sent at all by any towed vehicle.

REQ	8.158 APP – Towed vehicle – APP – Electronic brake system #2/7 (EBS27)
If this message is supported, it shall be implemented as specified in Table 162 and Table 163 .	

Table 162 — SP mapping of EBS27

Attribute	Value
transmission repetition time	10 ms ± 1 ms
data length	8 byte
extended data page	0
data page	0
PDU format	244 (PDU2)
PDU specific	GE = 64
default priority	3

Table 163 — EBS27 message definition

Byte pos	Bit pos	Parameter	Reference
1	—	message cyclic redundancy check	ISO 11992-3:2021, 5.100

Table 163 (continued)

Byte pos	Bit pos	Parameter	Reference
2	1 to 4	sequence counter	ISO 11992-3:2021, 5.101
	5 to 8	reserved by document	—
3	—	retarder relative peak torque	6.3.8
4	—	retarder actual maximum positive torque	6.3.9
5	—	retarder actual maximum negative torque	6.3.10
6 to 8	—	reserved by document	—

7.4.2.8 APP – Electronic brake system #2/8 (EBS28)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle. With respect to busload, the message EBS28 is only sent in the case of maximum two towed vehicles. If more than two towed vehicles are present, the message EBS28 is not sent at all by any towed vehicle.

REQ	8.159 APP – Towed vehicle – APP – Electronic brake system #2/8 (EBS28)
If this message is supported, it shall be implemented as specified in Table 164 and Table 165 .	

Table 164 — SP mapping of EBS28

Attribute	Value
transmission repetition time	1 000 ms ± 100 ms
data length	8 byte
extended data page	0
data page	0
PDU format	244 (PDU2)
PDU specific	GE = 66
default priority	6

Table 165 — EBS28 message definition

Byte pos	Bit pos	Parameter	Reference
1	—	message cyclic redundancy check	ISO 11992-3:2021, 5.100
2	1 to 4	sequence counter	ISO 11992-3:2021, 5.101
	5 to 8	reserved by document	—
3 to 4	—	retarder wheel torque reference	6.3.5
5 to 8	—	reserved by document	—

7.4.3 APP – Running gear equipment PGs, transmitted from towed to towing vehicle

7.4.3.1 APP – Running gear equipment #2/1 (RGE21)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle.

REQ	8.160 APP – Towed vehicle – APP – Running gear equipment #2/1 (RGE21)
If this message is supported, it shall be implemented as specified in Table 166 and Table 167 .	

Table 166 — SP mapping of RGE21

Attribute	Value
transmission repetition time	100 ms $\pm$ 10 ms
data length	8 byte
extended data page	0
data page	0
PDU format	229 (PDU1)
PDU specific	DA (address of the towing vehicle)
default priority	6

Table 167 — RGE21 message definition

Byte pos	Bit pos	Parameter	Reference
1	1 to 2	ride height level	6.4.27
	3 to 4	level control status	6.4.7
	5 to 6	traction help (load transfer) status	6.4.25
	7 to 8	ramp level position	6.4.31
2	1 to 2	lift axle 1 position	6.4.17
	3 to 4	lift axle 2 position	6.4.18
	5 to 6	steering axle locking status	6.4.23
	7 to 8	reserved by document	—
3	1 to 2	ride height storage	6.6.4
	3 to 4	ramp level storage status	6.4.33
	5 to 6	level change status, front axle	6.4.10
	7 to 8	level change status, rear axle	6.4.11
4	1 to 2	stop level change acknowledge	6.4.35
	3 to 4	normal level	6.4.28
	5 to 6	ramp level	6.4.30
	7 to 8	extended ride height and ramp level storage	6.5.8
5 to 6	—	nominal vehicle body level, front axle	6.4.2
7 to 8	—	nominal vehicle body level, rear axle	6.4.3

7.4.3.2 APP – Running gear equipment #2/2 (RGE22)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle. All tyres-related parameters are interpreted in conjunction with the corresponding tyre/wheel identification. The tyre/wheel identification is only interpreted, if the corresponding parameter is supported.

REQ	8.161 APP – Towed vehicle – APP – Running gear equipment #2/2 (RGE22)
If this message is supported, it shall be implemented as specified in Table 168 and Table 169 .	

Table 168 — SP mapping of RGE22

Attribute	Value
transmission repetition time	100 ms $\pm$ 10 ms
data length	8 byte
extended data page	0
data page	0

Table 168 (continued)

Attribute	Value
PDU format	254 (PDU2)
PDU specific	GE = 92
default priority	6

Table 169 — RGE22 message definition

Byte pos	Bit pos	Parameter	Reference
1 to 2	—	relative vehicle body level, front axle	6.4.4
3 to 4	—	relative vehicle body level, rear axle	6.4.5
5	—	tyre/wheel identification for the parameter “axle load”	6.2.1
6 to 7	—	axle load	6.5
8	—	reserved by document	—

The RGE22 parameter group should be transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values is assumed on the receiver side.

7.4.3.3 APP – Running gear equipment #2/3 (RGE23)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle. If supported, this PG is sent by the towed vehicle(s). All tyres-related parameters are interpreted in conjunction with the corresponding tyre/wheel identification. The tyre/wheel identification is only interpreted when the corresponding parameter is supported. It is recommended that this PG is transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values is assumed on the receiver side.

REQ	8.162 APP – Towed vehicle – APP – Running gear equipment #2/3 (RGE23)
If this message is supported, it shall be implemented as specified in Table 170 and Table 171 .	

Table 170 — SP mapping of RGE23

Attribute	Value
transmission repetition time	1 000 ms ± 100 ms
data length	8 byte
extended data page	0
data page	0
PDU format	254 (PDU2)
PDU specific	GE = 94
default priority	6

Table 171 — RGE23 message definition

Byte pos	Bit pos	Parameter	Reference
1	—	tyre/wheel identification	6.2.1
2 to 3	—	tyre temperature	6.4.40
4 to 5	—	air leakage detection	6.4.39
6	1 to 3	tyre pressure threshold detection	6.4.38
	4 to 5	tyre module power supply status	6.4.41
	6 to 8	reserved by document	—

Table 171 (continued)

Byte pos	Bit pos	Parameter	Reference
7	—	identification data index	6.2.2
8	—	identification data indexed content	6.2.3

7.4.3.4 APP – Running gear equipment #2/4 (RGE24)

With this PG, the relevant information for the electronic brake system function is sent from the towed vehicle to the towing vehicle. If supported, this PG is sent by the towed vehicle(s) to the towing vehicle. All tyres-related parameters are interpreted in conjunction with the corresponding tyre/wheel identification. The tyre/wheel identification is only interpreted when the corresponding parameter is supported. It is recommended that this PG is transmitted cyclically with the tyre/wheel identification parameters alternating for all tyres, but no specific order of identification values is assumed on the receiver side.

REQ	8.163 APP – Towed vehicle – APP – Running gear equipment #2/4 (RGE24)
If this message is supported, it shall be implemented as specified in Table 172 and Table 173 .	

Table 172 — SP mapping of RGE24

Attribute	Value
transmission repetition time	1 000 ms ± 100 ms
data length	8 byte
extended data page	0
data page	0
PDU format	137 (PDU1)
PDU specific	DA (address of the towing vehicle)
default priority	6

Table 173 — RGE24 message definition

Byte pos	Bit pos	Parameter	Reference
1	—	tyre/wheel identification	6.2.1
2 to 3	—	axle load measured by towed vehicle	6.5.5
4 to 5	—	axle load measured by external scale	6.5.4
6	1 to 2	axle load calibration data load level	6.5.6
	3 to 4	axle load calibration type	6.5.7
	5 to 6	axle load calibration data storage	6.5.3
	7 to 8	reserved by document	—
7	—	year	SAE J1939DA
8	—	month	SAE J1939DA

8 APP – Address assignment

8.1 APP – General requirements

To minimize bus loading on the towing/towed vehicle interface, appropriate messages are specified. These messages can be filtered by a device (node) on each vehicle that also provide address assignment and electrical isolation from the in-vehicle sub-network.

REQ	8.164 APP – Address assignment – Combination of new and old towing and towed vehicles
The nodes on the network shall be capable of addressing any towed vehicle, including dollies. The towing vehicle operator can disconnect and connect towed vehicles at any time and in any order and the nodes on the network shall adjust and respond accordingly.	

The system requirements specify the network system behaviour.

8.2 APP – Road train configuration

A road train consists of one towing vehicle and one or more towed vehicles. Dolly axles within the road train are treated as additional towed vehicles (see [Figure 5](#)).

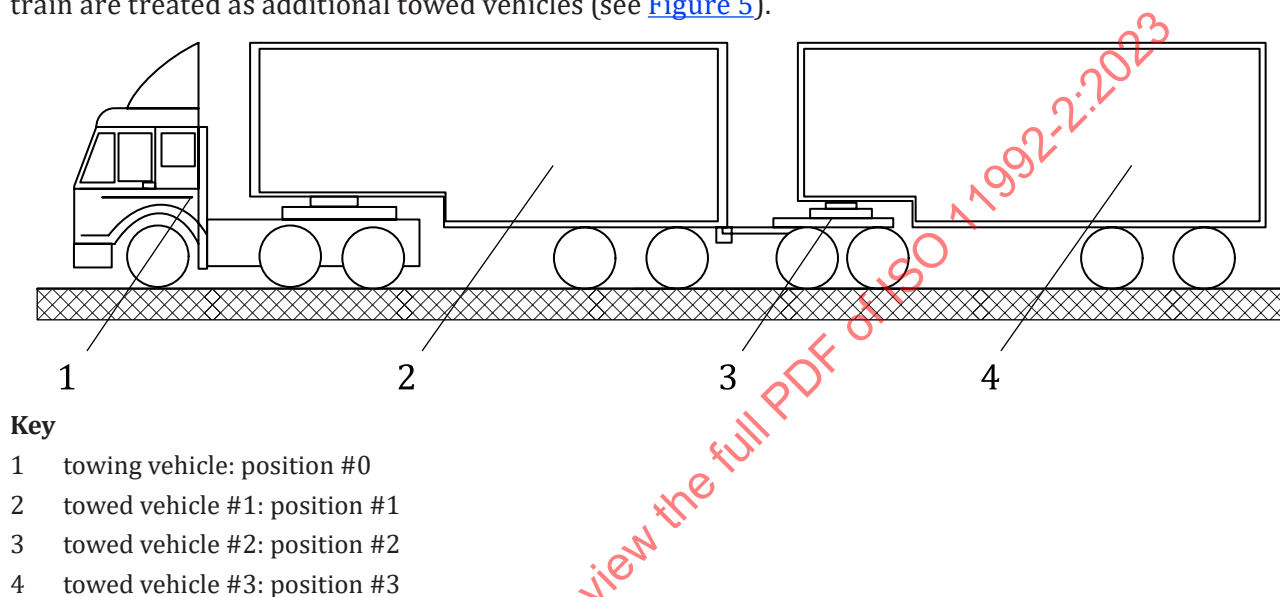


Figure 5 — Example of possible road train configuration

8.3 APP – Address assignment method of a towing and towed vehicle

The towing vehicle is the towing vehicle of towed vehicle #1, towed vehicle #1 is the towing vehicle of towed vehicle #2, and so on.

REQ	8.165 APP – Address assignment – Address of towing vehicle
The address of the towing vehicle shall be fixed to EB_{16} (see Table 174).	

REQ	8.166 APP – Address assignment – Assignment of address of towed vehicle
The address assignment method of a towing and towed vehicle shall comply with Table 174 .	

Table 174 — Towing vehicle/towed vehicle addresses

Name	Address	Predecessor	Successor
Towing vehicle (position #0)	20_{16}	Not applicable	Towed vehicle position #1
Towed vehicle position #1	$C8_{16}$	Towing vehicle position #0	Towed vehicle position #2
Towed vehicle position #2	$C0_{16}$	Towed vehicle position #1	Towed vehicle position #3
Towed vehicle position #3	$B8_{16}$	Towed vehicle position #2	Towed vehicle position #4
Towed vehicle position #4	$B0_{16}$	Towed vehicle position #3	Towed vehicle position #5
Towed vehicle position #5	$A8_{16}$	Towed vehicle position #4	Not applicable

Table 174 (continued)

Name	Address	Predecessor	Successor
Global destination address	FF ₁₆	Not applicable	Not applicable

The address assignment method is used by the towed vehicle node to communicate and to identify its presence to its predecessor after power-up.

REQ	8.167 APP – Address assignment – Initialisation message (EBS11)
EBS11 shall be used as the general initialization message for the address assignment at the receiving vehicle's node.	

REQ	8.168 APP – Address assignment – Logical separation of network segments and any IVNs
Each node at a vehicle shall provide logical separation between the network segments and any in-vehicle networks, and act as a gateway to forward the messages.	

Any combination of new and old towing and towed vehicles is allowed. Multiple towed vehicles can be connected in any combination.

REQ	8.169 APP – Address assignment – Network addressing
The nodes on the network shall be capable of addressing any towed vehicle, including dollies. The towing vehicle operator can disconnect and connect towed vehicles at any time and in any order, and the nodes on the network shall adjust and respond accordingly.	

8.4 APP – Vehicle node capabilities

REQ	8.170 APP – Address assignment – Vehicle node capabilities
A towed vehicle node shall:	
— identify its predecessor by the SA of the initialisation message (GPM11),	
— assign its SA based on the predecessor's address (see Figure 6), and	
— identify potential receiver(s) by the DA and by the message type.	

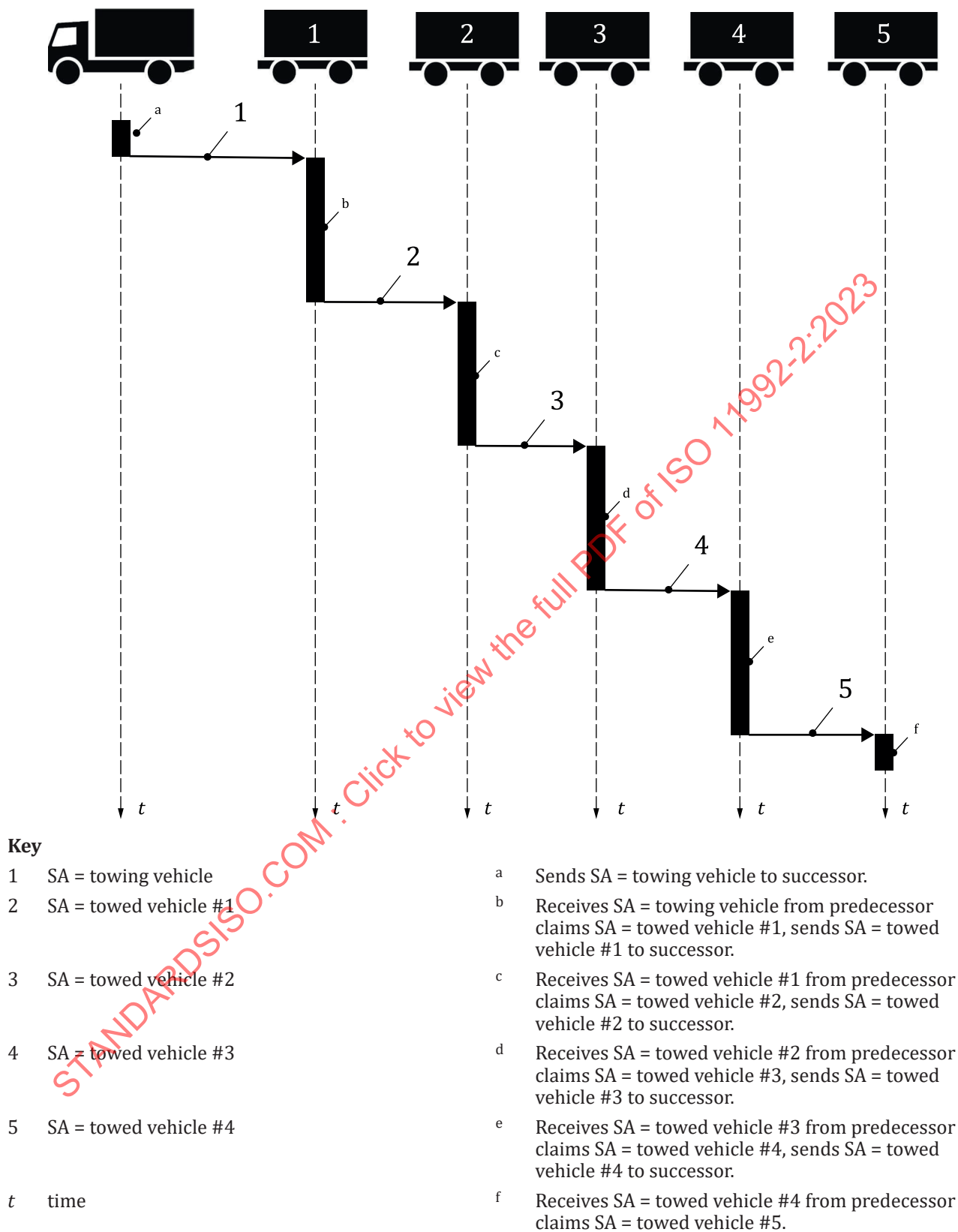


Figure 6 — Source address assignment procedure