
**Electronic fee collection — Evaluation of
on-board and roadside equipment for
conformity to ISO/TS 13141 —**

**Part 1:
Test suite structure and test purposes**

*Perception du télépéage — Évaluation des équipements embarqués et
en bord de route quant à la conformité avec l'ISO/TS 13141 —*

Partie 1: Structure de suite d'essai et buts des essais



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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.

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

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
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An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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

ISO/TS 13140-1 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Road transport and traffic telematics*, in collaboration with Technical Committee ISO/TC 204, *Intelligent transport systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

ISO/TS 13140 consists of the following parts, under the general title *Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to ISO/TS 13141*:

- *Part 1: Test suite structure and test purposes*
- *Part 2: Abstract test suite*

Introduction

ISO/TS 17575 is part of a set of standards that supports interoperability of autonomous EFC-systems. It defines the EFC context data, their charge reports and their use of communication infrastructure.

The set of standards also supports short range communication links in the context of autonomous electronic fee collection (EFC) on-board equipment (OBE) to enable spot checks for the enforcement process. The application interface is defined in ISO/TS 13141:2010.

Within the set of EFC standards this part of ISO/TS 13140 defines the process and tests for conformity evaluation of OBE and roadside equipment (RSE) that comply with the requirements in ISO/TS 13141:2010.

This part of ISO/TS 13140 is intended to

- assess OBU and RSE capabilities,
- assess OBU and RSE behaviour,
- serve as a guide for OBU and RSE conformance evaluation and type approval,
- achieve comparability between the results of the corresponding tests applied in different places at different times, and
- facilitate communications between parties.

This part of ISO/TS 13140 is based on

- ISO/TS 13141:2010,
- the set of dedicated short range communication (DSRC) standards defining the communication stack, and
- ISO 9646.

This part of ISO/TS 13140 is based on using the tree and tabular combined notation (TTCN) that is a standardized language suitable for specification of test cases and steps for assessment of protocol and application behaviour. The TTCN language is also supported by modern automated tools that accelerate software design, implementation and testing.

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Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to ISO/TS 13141 —

Part 1: Test suite structure and test purposes

1 Scope

This part of ISO/TS 13140 specifies the test suite structure (TSS) and test purposes (TP) to evaluate the conformity of on-board units (OBU) and roadside equipment (RSE) to ISO/TS 13141:2010.

It provides a basis for conformance tests for dedicated short range communication (DSRC) equipment (on-board units and roadside units) to enable interoperability between different equipment supplied by different manufacturers.

2 Normative references

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

ISO/TS 13141:2010, *Electronic fee collection — Localisation augmentation communication for autonomous systems*

ISO 14906:2011, *Electronic fee collection — Application interface definition for dedicated short-range communication*

ISO/TS 14907-2:2011, *Road transport and traffic telematics — Electronic fee collection — Test procedures for user and fixed equipment — Part 2: Conformance test for the onboard unit application interface*

EN 15509:2007, *Road transport and traffic telematics — Electronic fee collection — Interoperability application profile for DSRC*

EN 15876-1, *Electronic fee collection — Evaluation of on-board and roadside equipment for conformity to EN 15509 — Part 1: Test suite structure and test purposes*

ETSI TS 102 486-2-2 V1.2.1 (2008-10), *Intelligent transport systems (ITS); Road Transport and Traffic Telematics (RTTT); Test specifications for Dedicated Short Range Communication (DSRC) transmission equipment; Part 2: DSRC application layer; Sub-Part 2: Test Suite Structure and Test Purposes (TSS&TP)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

access credentials

data that is transferred to on-board equipment (OBE), in order to establish the claimed identity of a roadside equipment (RSE) application process entity

[ISO 14906:2011, definition 3.1]

NOTE Access credentials carry information needed to fulfil access conditions in order to perform the operation on the addressed element in the OBE. Access credentials can carry passwords as well as cryptography-based information such as authenticators.

3.2

attribute

application information formed by one or by a sequence of data elements, used for implementation of a transaction

NOTE Adapted from ISO 14906:2011.

3.3

authenticator

data appended to, or a cryptographic transformation of, a data unit that allows a recipient of the data unit to prove the source and/or the integrity of the data unit and protect against forgery

[ISO 14906:2011, definition 3.4]

3.4

channel

information transfer path

[ISO 7498-2:1989, definition 3.3.13]

3.5

component

logical and physical entity composing an on-board equipment, supporting a specific functionality

[ISO 14906:2011, definition 3.6]

3.6

contract

expression of an agreement between two or more parties concerning the use of the road infrastructure

[ISO 14906:2011, definition 3.7]

3.7

cryptography

discipline which embodies principles, means, and methods for the transformation of data in order to hide its information content, prevent its undetected modification and/or prevent its unauthorized use

[ISO 7498-2:1989, definition 3.3.20]

3.8

data group

collection of closely related EFC data attributes which together describe a distinct part of an EFC transaction

[ISO 14906:2011, definition 3.9]

3.9**data integrity**

property that data has not been altered or destroyed in an unauthorized manner

[ISO 7498-2:1989, definition 3.3.21]

3.10**element**

⟨DSRC⟩ directory containing application information in the form of attributes

[ISO 14906:2011, definition 3.11]

3.11**implementation conformance statement**

statement made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities have been implemented

[ISO/TS 14907-2:2011, definition 3.12]

3.12**implementation conformance statement pro forma**

document, in the form of a questionnaire, which when completed for an implementation or system becomes an implementation conformance statement

[ISO/TS 14907-2:2011, definition 3.13]

3.13**implementation extra information for testing**

statement made by the supplier or an implementer of a DUT which contains or references all of the information (in addition to that given in the implementation conformance statement) related to the DUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the DUT

NOTE Adapted from ISO/TS 14907-2:2011.

3.14**implementation extra information for testing pro forma**

document, in the form of a questionnaire, which when completed for a DUT becomes an implementation extra information for testing

NOTE Adapted from ISO/TS 14907-2:2011.

3.15**on-board equipment****OBE**

equipment fitted within or on the outside of a vehicle and used for toll purposes

NOTE The OBE does not need to include payment means.

[ISO 14906:2011, definition 3.13]

3.16**on-board unit****OBU**

minimum component of an on-board equipment, whose functionality always includes at least the support of the DSRC interface

[ISO 14906:2011, definition 3.14]

3.17**roadside equipment****RSE**

equipment located along the road transport network, for the purpose of communication and data exchanges with on-board equipment

[ISO 14906:2011, definition 3.16]

3.18

session

exchange of information and interaction occurring at a specific electronic fee collection station between the roadside equipment and the user/vehicle

[ISO 14906:2011, definition 3.19]

3.19

transaction

whole of the exchange of information between the roadside equipment and the on-board equipment necessary for the completion of an electronic fee collection operation over the dedicated short range communication

[ISO 14906:2011, definition 3.24]

3.20

transaction model

functional model describing the general structure of electronic payment fee collection transactions

[ISO 14906:2011, definition 3.25]

3.21

tester

a combination of equipment and processes which is able to perform conformance tests according to ISO/TS 13140-1

3.22

user

generic term used for the customer of a toll service provider, one liable for toll, the owner of the vehicle, a fleet operator, a driver, etc., depending on the context

[ISO 14906:2011, definition 3.26]

4 Abbreviated terms

AC_CR	Access Credentials
ADU	Application Data Unit
APDU	Application Protocol Data Unit
AP	Application Process
ASN.1	Abstract Syntax Notation One (ISO/IEC 8824-1)
ATS	Abstract Test Suite
BI	Behaviour Invalid (i.e. Invalid Behaviour tests)
B-Kernel	Broadcast Kernel
BST	Beacon Service Table
BV	Behaviour Valid (i.e. Valid Behaviour tests)
cf	Confirm
DLC	Data Link Control
DSRC	Dedicated Short Range Communication

DUT	Device Under Test (ISO/TS 14907-2)
EID	Element IDentifier
EFC	Electronic Fee Collection
EVENT-RT	EVENT-REPORT
ICS	Implementation Conformance Statement
IXIT	Implementation eXtra Information for Testing
LLC	Logical Link Control
MAC	Medium Access Control
PCTR	Proforma Conformance Test Report
TSS	Test Suite Structure
VST	Vehicle Service Table

5 Test suite structure (TSS)

5.1 Structure

The Test Suite Structure (TSS) including its subgroups that are inherited from other specifications is given in Table 1.

Table 1 — Test Suite Structure

Group	Type of DUT	Behaviour
Physical layer	On-Board Unit	Valid Behaviour
		Invalid Behaviour
	Roadside Equipment	Valid Behaviour
		Invalid Behaviour
DLC MAC sublayer	On-Board Unit	Valid Behaviour
		Invalid Behaviour
	Roadside Equipment	Valid Behaviour
		Invalid Behaviour
DLC LLC sublayer	On-Board Unit	Valid Behaviour
		Invalid Behaviour
	Roadside Equipment	Valid Behaviour
		Invalid Behaviour
Application layer	On-Board Unit	Valid Behaviour
		Invalid Behaviour
	Roadside Equipment	Valid Behaviour
		Invalid Behaviour

Physical layer tests are to be performed in a radio wave lab. They will not form part of the ATS.

5.2 Reference to conformance test specifications

Conformance to a profile standard implies conformance to the related base standards; hence, a number of test cases for the LAC application are exactly the same as the conformance test cases for the related base standards. Other test cases are derived from the base standards conformance test cases, by applying some restrictions or choices in e.g. the parameters values, according to what is stated in the profile standard. Finally, specific conformance test cases for the LAC application are identified for statements contained in the LAC application, which have no equivalence in the base standards. These latter cases cover for example the application layer data test purposes. This document takes into account already defined test purposes for conformance to the base standards by referencing them, so that:

- a) For test purposes that are identical to those defined in the base standards conformance test cases (see e.g. [ETSI TS 102 486-2-2] or [EN 15876-1]) a direct reference is reported. For reader's convenience, the title or a verbal description of the referenced test purpose is given, together with the reference.
- b) For test purposes that are **derived** from those defined in the base standards conformance test cases, a direct reference is reported, plus an indication on how the referred test purpose has to be modified for the profile conformance testing.
- c) For test purposes that are **specific to the standard profile**, a complete description is given.

An indication on whether a test purpose is **identical**, **derived**, or **specific** is given in each test purpose.

5.3 Test Purposes (TP)

5.3.1 TP Definition conventions

The TPs are defined following the rules shown in Table 2 below. All Test Purposes are defined in Annex A and Annex B.

Table 2 — TP Definition Rules

TP ID according to the TP naming conventions	Title
	Reference
	TP origin
	Initial condition
	Stimulus and expected behaviour
TP ID	The TP ID is a unique identifier. It shall be specified according to the TP naming conventions defined in the sub-clause below.
Title	Short description of Test Purpose objective.
Reference	The reference should contain the references of the subject to be validated by the actual TP (specification reference, clause, paragraph), or the reference to the standard document defining the TP.
TP origin	Indicates if the TP is identical to a TP defined in another test standard, derived from a TP defined in another test standard, or specific for this standard profile.
Initial condition	The condition defines in which initial state the DUT has to be to apply the actual TP.
Stimulus and expected behaviour	Definition of the events the tester performs, and the events that are expected from the DUT to conform to the base specification.

5.3.2 TP naming conventions

Each TP is given a unique identification. This unique identification is built up to contain the following string of information:

TP/<group>/<dut>/<x>-<nn>

TP : to indicate that it is a Test Purpose;

<group> : which group among those defined in Table 1 – Test Suite Structure does the TP apply to;

<dut> : type of DUT (i.e. OBU or RSE);

X : type of testing (i.e. Valid Behaviour tests – BV, or Invalid Behaviour tests – BI)

<nn> : sequential TP number (01-99)

The naming conventions are as described in Table 3.

Table 3 — TP naming convention

Identifier:

TP/<group>/<dut>/<x>-<nn>

<group>

applicable for OBU/RSE

applicable for OBU/RSE

applicable for OBU/RSE

applicable for OBU

applicable for OBU

applicable for OBU

applicable for RSE

applicable for RSE

<dut> = type of DUT

x = Type of testing

<nn> = sequential
number

PHY

MAC/LLC

AP-BAS

AP-FUN

AP-DAT

AP-SEC

AP-SET

AP-REL

OBU

RSE

BV

BI

(01-99)

Physical layer

MAC/LLC sublayer

Application layer – I Kernel support

Application layer – T Kernel support

Application layer – Data attributes support

Application layer – Security Level 1 support

Application layer - SET-rq PDU test purposes,

Application layer - EVENT-REPORT-rq PDU test purposes

On-Board Unit

Roadside Equipment

Valid Behaviour Tests

Invalid Behaviour Tests

Test Purpose Number

5.4 Conformance test report

The manufacturer of the OBU and RSE, respectively, is responsible for providing a conformance test report.

The manufacturer of the OBU shall complete the proforma conformance test report for on-board units as defined in Annex C.

The manufacturer of the RSE shall complete the proforma conformance test report for roadside equipment as defined in Annex D.

Annex A (normative)

Test purposes for on-board units

A.1 Introduction

This annex contains the Test Purposes (TP) for the conformity evaluation of OBUs to ISO/TS 13141.

A.1.1 Symbols in TP Descriptions

For the application layer test purposes, a special notation and symbol convention is used, as defined in what follows.

Symbols are used in the description of the TPs, with meanings according to Table A.1 below.

Table A.1 — Description of TP Symbols

SYMBOL	DESCRIPTION
XXX.rq ⇒	The Tester sends the XXX.rq PDU to the DUT
⇐ YYY.rs	The DUT sends the YYY.rs PDU to the Tester
A ≡ B	Test Purpose A “is congruent to” Test Purpose B. The notation Test Purpose A ≡ Test Purpose B means that the Test Purpose A is the same as Test Purpose B. If differences in parameters or parameter values have to be applied, these differences are indicated in the text immediately below.
A → B	Object A “is transformed” into Object B. So a notation like “Table X → Table Y” means that, for the scope of the Test Purpose, any reference of Table X should be changed into references to Table Y.
=	Means “assignment”. That is, a notation like “accessCredentials = a value” means that the field accessCredentials is given a value.
∅	Means “empty” or “not set”. So, a notation like “accessCredentials = ∅ → accessCredentials = calculated value”, for a given Test Purpose, means “change all occurrences in which the field accessCredentials has not been assigned to calculation of the value accessCredentials to a given value.

A.2 Physical layer

Per ISO/TS 13141:2010, 5.5.2, all test purposes TP/PHY/OBU/Bx/yy defined in EN 15876-1 are applicable for the conformity evaluation of OBUs to CEN-DSRC based LAC as claimed in ISO/TS 13141:2010, Annex B Clause B.4.4 Table B.8 Item 1.

A.3 MAC & LLC

Per ISO/TS 13141:2010, 5.5.2, all test purposes TP/MAC/OBU/Bx/yy and TP/LLC/OBU/Bx/yy defined in EN 15876-1 are applicable for the conformity evaluation of OBUs to CEN-DSRC based LAC as claimed in ISO/TS 13141:2010, Annex B Clause B.4.4 Table B.8 Item 1.

A.4 Application Layer

A.4.1 Structure of BST and VST

A.4.1.1 BST

The BST general structure, as is transmitted to the OBU, is described in Table A.2.

Table A.2 — BST general structure

			Length	Allowed Values	
T-APDUs			4 bit	'1000' indicating initialisation-request (BST)	
Option Indicator			1 bit (nonmandApplications opt.)	0/1	
rsu	manufacturerid		16 bits	See [ISO 14816]	
	individualid		27 bits	as specified by manufacturer	
Time			32 bits	UNIX real time	
profile			1 bit (Profile ext.)	0 (= no extension)	
			7 bits	See Profile in EN 12834:2003, Annex A and EN13372:2004, chapter 6.3.2	
MandApplications	LACAppl ication	aid	1 bit (mandApplications ext.)	0 (= no extension)	
			7 bits (number of applications)	M	
			1 bit (eid opt.)	0 (= eid not present)	
			1 bit (parameter opt.)	0 (= parameter not present)	
			1 bit (aid ext.)	0 (= no extension)	
			5 bits	21 (= LAC application)	
	Application 2 (not LAC)		1 bit (eid opt.)	0/1	
			1 bit (parameter opt.)	0/1	
		aid	1 bit (aid ext.)	0 (= no extension)	
			5 bits	any (≠ LAC application)	
		eid	1 bit (eid ext.)	0 (= no extension)	
			7 bits	any	
		parameter		See ApplicationContextMark in EN 12834:2003, Annex A	
			...	...	...
	Application M (not LAC)		1 bit (eid opt.)	0/1	
			1 bit (parameter opt.)	0/1	
		aid	1 bit (aid ext.)	0 (= no extension)	
			5 bits	any (≠ LAC application)	
		eid	1 bit (eid ext.)	0 (= no extension)	
			7 bits	any	
		parameter		See ApplicationContextMark in EN 12834:2003, Annex A	
			nonmandAp plications		
				7 bits (number of applications)	N
Application 1 (not EFC)		See “Application 2 (not EFC)” of mandApplications			
...		...			
Application N (not EFC)		See “Application 2 (not EFC)” of mandApplications			
profileList			1 bit (profileList ext.)	0 (= no extension)	
			7 bits (number of profiles)	K	
	Profile 1	1 bit (Profile ext.)	0 (= no extension)		
		7 bits	See Profile in EN 12834:2003, Annex A and EN13372:2004, chapter 6.3.2		
	...		...	...	
	Profile K	1 bit (Profile ext.)	0 (= no extension)		
7 bits		See Profile in EN 12834:2003, Annex A and EN13372:2004, chapter 6.3.2			

A.4.1.2 VST

The VST general structure, as is transmitted by the OBU, is described in Table A.3.

Table A.3 — VST general structure (security level 1)

				Length	Allowed Values				
fill				4 bits	any				
profile				1 bit (Profile ext.)	0 (= no extension)				
				7 bits	See Profile in EN 12834:2003, Annex A				
applications	LAC Application	parameter		1 bit (applications ext.)	0 (= no extension)				
				7 bits (number of applic.)	M				
				1 bit (eid opt.)	1 (= eid present)				
				1 bit (parameter opt.)	1 (= parameter present)				
				aid	1 bit (aid ext.)	0 (= no extension)			
					5 bits	21 (= LAC application)			
				eid	1 bit (eid ext.)	0 (= no extension)			
					7 bits	any (≠ other eid used in this VST)			
						1 bit (Container ext.)	0 (= no extension)		
						7 bits (Container CHOICE)	2 (= OCTET STRING)		
						1 bit (octet string ext.)	0 (= no extension)		
						7 bits (octet string length)	16		
						LAC-ContextMark	Contract	10 bits (CountryCode)	See [ISO 3166-1]
							Provider	14 bits (IssuerIdentifier)	See [ISO 14816]
							TypeOf Contract	16 bits	any
							Context Version	1 bit (contextVersion ext.)	0 (= no extension)
								7 bits	any
								1 bit (Container ext.)	0 (= no extension)
				7 bits (Container CHOICE)	2 (= OCTET STRING)				
				1 bit (octet string ext.)	0 (= no extension)				
				7 bits (octet string length)	2				
				AC_CR-Reference	AC_Master KeyRef			8 bits	any
					AC_CR-Diversifier			8 bits	any
								1 bit (Container ext.)	0 (= no extension)
						7 bits (Container CHOICE)	2 (= OCTET STRING)		
						1 bit (octet string ext.)	0 (= no extension)		
						7 bits (octet string length)	4		
				RndOBE	32 bits	any			
				Application 2			1 bit (eid opt.)	0/1	
							1 bit (parameter opt.)	0/1	
						aid	1 bit (aid ext.)	0 (= no extension)	
							5 bits	See DSRCApplicationEntityID, EN 12834:2003, Annex A	
	eid	1 bit (eid ext.)	0 (= no extension)						
		7 bits	any (≠ other eid used in this VST)						
	parameter		See ApplicationContextMark, EN 12834:2003, Annex A						
	...		1 bit (eid opt.)			0/1			
	Application M					1 bit (parameter opt.)	0/1		
			aid			1 bit (aid ext.)	0 (= no extension)		
						5 bits	See DSRCApplicationEntityID, EN 12834:2003, Annex A		
			eid			1 bit (eid ext.)	0 (= no extension)		
				7 bits	any (≠ other eid used in this VST)				
			parameter		See ApplicationContextMark, EN 12834:2003, Annex A				
	obeConfiguration				1 bit (obeStatus opt.)	0/1			
		equipmentClass			15 bits	any			
manufacturerId			16 bits	any					
obeStatus			16 bits	any					

A.4.2 PDUs parameters

A.4.2.1 Parameters of request PDUs

The following tables:

— Table A.4 — SET-Rq parameters (security level 1)

— Table A.5 — EVENT-REPORT-Rq parameters

describe the valid format of the request APDUs. No other request commands are used by LAC application.

Fill bits always shall be set to zero.

Table A.4 — SET-Rq parameters (security level 1)

	EN 12834:2003, Annex A	ISO 14906:2011, Annex A	EN 15509:2007, C.4.5.5, Table C.16 and ISO/TS 13141
SET-Rq	fill	=	=
	mode		=
	eid		=
	accessCredentials OPTIONAL		mandatory
	attrList		=
	iid OPTIONAL		prohibited

Table A.5 — EVENT-REPORT-Rq parameters

	EN 12834:2003, Annex A	ISO 14906:2011, Annex A	EN 15509:2007, C.4.5.5, Table C.16 and ISO/TS 13141
EVENT-REPORT-Rq	mode	=	false
	eid		0
	eventType		0 (release)
	accessCredentials OPTIONAL		prohibited
	eventParameters OPTIONAL		prohibited
	iid OPTIONAL		prohibited

A.4.2.2 Parameters of response PDUs

The following tables:

— Table A.6 — SET-Rs parameters (security level 1)

describe the valid format of the request APDUs. No other request commands are used by LAC application.

Fill bits always shall be set to zero.

Table A.6 — SET-Rs parameters (security level 1)

	EN 12834:2003, Annex A	ISO 14906:2011, Annex A	EN 15509:2007, C.4.5.5, Table C.16
SET-Rs	fill	=	=
	eid		=
	iid OPTIONAL		prohibited
	ret OPTIONAL		mandatory

A.4.3 Application I-kernel test purposes for On-Board Unit, security level 1

These Test Purposes apply to the security level 1 as claimed in ISO/TS 13141:2010, Annex B Clause B.4.4 Table B.6 Item 1 and to initialisation and termination as claimed in ISO/TS 13141:2010, Annex B Clause B.4.4 Table B.7 Items 1 and 5.

A.4.3.1 Data Structures

For the purpose of this conformance test, the following BSTs described in:

— Table A.7 — BST1 (actual BST used, BV) valid BST

— Table A.8 — BST2 (actual BST used, BI) invalid BST: extraneous parameter (LAC application inserted as non mandatory application)

are transmitted to the DUT. Invalid values are indicated in **boldface**.

Table A.7 — BST1 (actual BST used, BV) valid BST

			Length	Value
Option Indicator			1 bit (nonmandApplications opt.)	0 (= nonmandApplications not present)
RSU	manufacturerid		16 bits	registered value
	individualid		27 bits	any
Time			32 bits	any
profile			1 bit (Profile ext.)	0 (= no extension)
			7 bits	0
MandApp lications			1 bit (mandApplications ext.)	0 (= no extension)
			7 bits (number of applications)	1
	LAC Application		1 bit (eid opt.)	0 (= eid not present)
			1 bit (parameter opt.)	0 (= parameter not present)
		aid	1 bit (aid ext.)	0 (= no extension)
			5 bits	21 (= LAC application)
profileList			1 bit (profileList ext.)	0 (= no extension)
			7 bits (number of profiles)	0 (= list empty)

Table A.8 — BST2 (actual BST used, BI) invalid BST: extraneous parameter (LAC application inserted as non mandatory application)

			Length	Value
Option Indicator			1 bit (nonmandApplications opt.)	1 (= nonmandApplications present)
RSU	manufacturerid		16 bits	registered value
	individualid		27 bits	any
Time			32 bits	any
profile			1 bit (Profile ext.)	0 (= no extension)
			7 bits	0
MandAppli cations			1 bit (mandApplications ext.)	0 (= no extension)
			7 bits (number of applications)	1
	Application #1 (not LAC)		1 bit (eid opt.)	1 (= eid present)
			1 bit (parameter opt.)	0 (= parameter not present)
		aid	1 bit (aid ext.)	0 (= no extension)
			5 bits	≠ 21 (AID that is not supported by the OBU)
		eid	1 bit (eid ext.)	0 (= no extension)
			7 bits	any
nonmandA pplications			1 bit (nonmandApplications ext.)	0 (= no extension)
			7 bits (number of applications)	1
	LAC Application		1 bit (eid opt.)	0 (=eid not present)
			1 bit (parameter opt.)	0 (= parameter not present)
		aid	1 bit (aid ext.)	0 (= no extension)
			5 bits	21 (= LAC application)
profileList			1 bit (profileList ext.)	0 (= no extension)
			7 bits (number of profiles)	0 (= list empty)

A.4.3.2 BV test purposes

Test subgroup objective:

- to test the behaviour of the DUT in relation to:
 - valid BST
 - valid EVENT-REPORT-Rq (Release)
- to test the DUT support of:
 - BeaconId
 - Time
 - Profile
 - Applications
 - LID.

TP/AP-BAS/OBU/BV/01	Receive and manage INITIALISATION.request (BST)
TP Origin	Identical to TP/AL-I/OBU/BV/01 in [ETSI TS 102 486-2-2] Clause 5.4.1
Reference	ISO/TS 13141:2010, 6.1.2
Initial Condition	See TP/AL-I/OBU/BV/01 in [ETSI TS 102 486-2-2] Clause 5.4.1
Stimulus and Expected Behaviour See TP/AL-I/OBU/BV/01 in [ETSI TS 102 486-2-2] Clause 5.4.1	

TP/AP-BAS/OBU/BV/02	Receive and manage EVENTREPORT request (RELEASE) with mode=0
TP Origin	Identical to TP/AL-I/OBU/BV/02 in [ETSI TS 102 486-2-2] Clause 5.4.1
Reference	ISO/TS 13141:2010, 6.1.4
Initial Condition	See TP/AL-I/OBU/BV/02 in [ETSI TS 102 486-2-2] Clause 5.4.1
Stimulus and Expected Behaviour See TP/AL-I/OBU/BV/02 in [ETSI TS 102 486-2-2] Clause 5.4.1	

TP/AP-BAS/OBU/BV/03	Read and manage the BeaconID in the BST
TP Origin	Identical to TP/AL-I/OBU/BV/03 in [ETSI TS 102 486-2-2] Clause 5.4.1
Reference	ISO/TS 13141:2010, 6.1.2
Initial Condition	Identical to TP/AL-I/OBU/BV/03 in [ETSI TS 102 486-2-2] Clause 5.4.1
Stimulus and Expected Behaviour See TP/AL-I/OBU/BV/03 in [ETSI TS 102 486-2-2] Clause 5.4.1	

TP/AP-BAS/OBU/BV/04	Read and manage time of reception of BST in parameter Time in BST
TP Origin	Identical to TP/AL-I/OBU/BV/04 in [ETSI TS 102 486-2-2] Clause 5.4.1
Reference	ISO/TS 13141:2010, 6.1.2
Initial Condition	Identical to TP/AL-I/OBU/BV/04 in [ETSI TS 102 486-2-2] Clause 5.4.1
Stimulus and Expected Behaviour See TP/AL-I/OBU/BV/04 in [ETSI TS 102 486-2-2] Clause 5.4.1	

TP/AP-BAS/OBU/BV/05	Empty Test Purpose, left to keep numbering aligned with [ETSI TS 102 486-2-2]
TP Origin	
Reference	
Initial Condition	
Stimulus and Expected Behaviour	

TP/AP-BAS/OBU/BV/06	Empty Test Purpose, left to keep numbering aligned with [ETSI TS 102 486-2-2]
TP Origin	
Reference	
Initial Condition	
Stimulus and Expected Behaviour	

TP/AP-BAS/OBU/BV/07	Empty Test Purpose, left to keep numbering aligned with [ETSI TS 102 486-2-2]
TP Origin	
Reference	
Initial Condition	
Stimulus and Expected Behaviour	

TP/AP-BAS/OBU/BV/08	Empty Test Purpose, left to keep numbering aligned with [ETSI TS 102 486-2-2]
TP Origin	
Reference	
Initial Condition	
Stimulus and Expected Behaviour	

TP/AP-BAS/OBU/BV/09	Manage profile selection
TP Origin	Identical to TP/AL-I/OBU/BV/09 in [ETSI TS 102 486-2-2] Clause 5.4.1
Reference	ISO/TS 12813:2009, 6.1.2
Initial Condition	See TP/AL-I/OBU/BV/09 in [ETSI TS 102 486-2-2] Clause 5.4.1
Stimulus and Expected Behaviour	
See TP/AL-I/OBU/BV/09 in [ETSI TS 102 486-2-2] Clause 5.4.1	

TP/AP-BAS/OBU/BV/10	Verify that the DUT replies to a BST with a VST		
TP Origin	Specific		
Reference	ISO/TS 13141:2010, 6.1.2		
Initial Condition	DUT not in sleep mode and not yet initialized		
Stimulus and Expected Behaviour			
	Tester		DUT
1	BST1	⇒	
2		⇐	VST
3	Verify length and allowed values of VST (see Table A.3 — VST general structure (security level 1))		
4	IF verification performed in step 3 was not successful THEN TP failed		

A.4.3.3 BI test purposes

Test subgroup objective:

- to check the behaviour of the DUT in response to invalid messages

TP/AP-BAS/OBU/BI/01	Manage profile selection
TP Origin	Identical to TP/AL-I/OBU/BI/01 in [ETSI TS 102 486-2-2] Clause 5.4.2
Reference	ISO/TS 13141:2010, 6.1.2
Initial Condition	See TP/AL-I/OBU/BI/01 in [ETSI TS 102 486-2-2] Clause 5.4.2
Stimulus and Expected Behaviour	
See TP/AL-I/OBU/BI/01 in [ETSI TS 102 486-2-2] Clause 5.4.2	

TP/AP-BAS/OBU/BI/02	Manage applications
TP Origin	Identical to TP/AL-I/OBU/BI/02 in [ETSI TS 102 486-2-2] Clause 5.4.2
Reference	ISO/TS 13141:2010, 6.1.2
Initial Condition	See TP/AL-I/OBU/BI/02 in [ETSI TS 102 486-2-2] Clause 5.4.2
Stimulus and Expected Behaviour	
See TP/AL-I/OBU/BI/02 in [ETSI TS 102 486-2-2] Clause 5.4.2	

TP/AP-BAS/OBU/BI/03	Verify that the DUT handles BST with LAC application marked as non-mandatory application		
TP Origin	Specific		
Reference	ISO/TS 13141:2010, 6.1.2		
Initial Condition	DUT not in sleep mode and not yet initialized		
Stimulus and Expected Behaviour			
	Tester		DUT
1	BST2	⇒	
3	Verify that DUT does not initialize with INITIALISATION-response (VST).		
4	IF verification performed in step 3 was not successful THEN TP failed		

A.4.4 Application T-kernel test purposes for On-Board Unit

These Test Purposes apply to the layer 7 functions related to T-kernel as claimed in ISO/TS 13141:2010, Annex B Clause B.4.4, Table B.7 items 1,2 and 5.

A.4.4.1 BV test purposes

Test subgroup objective:

- to test the behaviour of the DUT in relation to syntactically and contextual correct behaviour of the test system.

TP/AP-FUN/OBU/BV/02	Receive SET.request and manage SET.response with LID=private
TP Origin	Identical to TP/AL-T/OBU/BV/02 in [ETSI TS 102 486-2-2] Clause 5.2.1
Reference	ISO/TS 13141:2010, 6.1.3
Initial Condition	See TP/AL-T/OBU/BV/02 in [ETSI TS 102 486-2-2] Clause 5.2.1
Stimulus and Expected Behaviour	
See TP/AL-T/OBU/BV/02 in [ETSI TS 102 486-2-2] Clause 5.2.1	
NOTE: Request with accessCredentials.	

TP/AP-FUN/OBU/BV/13	Receive and manage non-fragmented APDUs with random PDU number
TP Origin	Identical to TP/AL-T/OBU/BV/13 in [ETSI TS 102 486-2-2] Clause 5.2.1
Reference	ISO/TS 13141:2010, 6.1.3
Initial Condition	See TP/AL-T/OBU/BV/13 in [ETSI TS 102 486-2-2] Clause 5.2.1
Stimulus and Expected Behaviour See TP/AL-T/OBU/BV/13 in [ETSI TS 102 486-2-2] Clause 5.2.1 NOTE: Request with accessCredentials for SET. Test case applicable only for SET.	

TP/AP-FUN/OBU/BV/14	Receive and manage multiplexed APDUs from two different applications
TP Origin	Identical to TP/AL-T/OBU/BV/14 in [ETSI TS 102 486-2-2] Clause 5.2.1
Reference	ISO/TS 13141:2010, 6.1.3
Initial Condition	See TP/AL-T/OBU/BV/14 in [ETSI TS 102 486-2-2] Clause 5.2.1
Stimulus and Expected Behaviour See TP/AL-T/OBU/BV/14 in [ETSI TS 102 486-2-2] Clause 5.2.1 NOTE: Request with accessCredentials for SET. Test case applicable only for SET.	

TP/AP-FUN/OBU/BV/16	Receive and manage concatenated and chained APDUs from a single application
TP Origin	Identical to TP/AL-T/OBU/BV/16 in [ETSI TS 102 486-2-2] Clause 5.2.1
Reference	ISO/TS 13141:2010, 6.1.3
Initial Condition	See TP/AL-T/OBU/BV/16 in [ETSI TS 102 486-2-2] Clause 5.2.1
Stimulus and Expected Behaviour See TP/AL-T/OBU/BV/16 in [ETSI TS 102 486-2-2] Clause 5.2.1 NOTE: Request with accessCredentials for SET. Test case applicable only for SET.	

TP/AP-FUN/OBU/BV/18	Support of DSRC L7 SET
TP Origin	Identical to TC04-A in ISO/TS 14907-2:2011, C.1.4
Reference	ISO/TS 13141:2010, 6.1.3
Initial Condition	See TC04-A in ISO/TS 14907-2:2011, C.1.4
Stimulus and Expected Behaviour See TC04-A in ISO/TS 14907-2:2011, C.1.4 NOTE: Request with accessCredentials	

A.4.4.2 BI test purposes

Test subgroup objective:

- to check the behaviour of the of the DUT in response to invalid stimuli and behaviour from the test tool.

TP/AP-FUN/OBU/BI/02	Receive and manage PDUs to Broadcast kernel with awake but not yet initialised OBU
TP Origin	Identical to TP/AL-T/OBU/BI/02 in [ETSI TS 102 486-2-2] Clause 5.2.2
Reference	ISO/TS 13141:2010, 6.1.2
Initial Condition	See TP/AL-T/OBU/BI/02 in [ETSI TS 102 486-2-2] Clause 5.2.2
Stimulus and Expected Behaviour See TP/AL-T/OBU/BI/02 in [ETSI TS 102 486-2-2] Clause 5.2.2	

TP/AP-FUN/OBU/BI/03	Receive and manage non-fragmented PDUs with wrong fragment counter value with initialised OBU
TP Origin	Identical to TP/AL-T/OBU/BI/03 in [ETSI TS 102 486-2-2] Clause 5.2.2
Reference	ISO/TS 13141:2010, 6.1.3
Initial Condition	See TP/AL-T/OBU/BI/03 in [ETSI TS 102 486-2-2] Clause 5.2.2
Stimulus and Expected Behaviour See TP/AL-T/OBU/BI/03 in [ETSI TS 102 486-2-2] Clause 5.2.2 NOTE: Request with accessCredentials for SET. Test case applicable only for SET.	

TP/AP-FUN/OBU/BI/04	Receive and manage non-fragmented PDUs with wrong fragment counter value with awake but not yet initialised OBU
TP Origin	Identical to TP/AL-T/OBU/BI/04 in [ETSI TS 102 486-2-2] Clause 5.2.2
Reference	ISO/TS 13141:2010, 6.1.2
Initial Condition	See TP/AL-T/OBU/BI/04 in [ETSI TS 102 486-2-2] Clause 5.2.2
Stimulus and Expected Behaviour See TP/AL-T/OBU/BI/04 in [ETSI TS 102 486-2-2] Clause 5.2.2	

TP/AP-FUN/OBU/BI/05	Empty Test Purpose, left to keep numbering aligned with [ETSI TS 102 486-2-2]
TP Origin	
Reference	
Initial Condition	
Stimulus and Expected Behaviour	

TP/AP-FUN/OBU/BI/06	Receive and manage concatenated and chained APDUs from a single application with chaining error
TP Origin	Identical to TP/AL-T/OBU/BI/06 in [ETSI TS 102 486-2-2] Clause 5.2.2
Reference	ISO/TS 13141:2010, 6.1.3
Initial Condition	See TP/AL-T/OBU/BI/06 in [ETSI TS 102 486-2-2] Clause 5.2.2
Stimulus and Expected Behaviour	
See TP/AL-T/OBU/BI/06 in [ETSI TS 102 486-2-2] Clause 5.2.2	
NOTE: Request with accessCredentials for SET. Test case applicable only for SET.	

A.4.5 Application data attributes test purposes, security level 1

These Test Purposes apply to security level 1 as claimed in ISO/TS 13141:2010, Annex B Clause B.4.4 Table B.6 Item 1, SET operation as claimed in ISO/TS 13141 Annex B Clause B.4.4 Table B.7 Item 2 and attributes as claimed in ISO/TS 13141:2010, Annex B Clause B.4.4 Table B.9 Item 1 and ISO/TS 13141:2010, Annex B Clause B.4.4 Table B.10 Items 1-9.

A.4.5.1 Data attributes definition

Table A.9 contains the references to the standard definition of attributes length and allowed values.

Table A.9 — Table 12: Data group definition

Attribute	AttrId	Data element	defined in...
LACData	54	LACOperator	[ISO 14906]
		RSEId	[ISO/TS 13141]
		Latitude	[ISO/TS 12813]
		Longitude	[ISO/TS 12813]
		Altitude	[ISO/TS 13141]
		TollCharger	[ISO/TS 17575-1]
		ChargeObject	[ISO/TS 17575-1]
		DistanceToObject	[ISO/TS 13141]
		LACTime	[ISO 14906]
		MAC1	[ISO/TS 13141]
		MAC2	[ISO/TS 13141]

A.4.5.2 BV test purposes

Test subgroup objective:

- to test the behaviour of the DUT in relation to the support of mandatory attributes (in allowed length and allowed values):
 - LACData
- by means of the syntactically and contextual correct PDUs:
 - SET using both confirmed and non-confirmed mode.
- to test the behaviour of the DUT receiving LACData from different toll contexts.

TP/AP-DAT/OBU/BV/01	Verify that OBU accepts SET.rq on LACData attribute (confirmed mode)																
TP Origin	Specific																
Reference	ISO/TS 13141:2010, 6.1.3 and 7.1																
Initial Condition	OBU initialised and can accept a SET-request																
Stimulus and Expected Behaviour																	
	<table><tr><th></th><th>Tester</th><th></th><th>DUT</th></tr><tr><td>1</td><td>SET.rq = { fill = 0, mode = T, eid = VST. DSRC-eid, accessCredentials = ac₁, attrList = {(‘54’D, v₁)}, iid = ∅ }</td><td>⇒</td><td></td></tr><tr><td>2</td><td></td><td>⇐</td><td>SET.rs = { fill, eid, iid = ∅, returnStatus }</td></tr><tr><td>3</td><td>IF (returnStatus NOT OK) OR (response not received) THEN TP failed</td><td></td><td></td></tr></table>		Tester		DUT	1	SET.rq = { fill = 0, mode = T, eid = VST. DSRC-eid, accessCredentials = ac ₁ , attrList = {(‘54’D, v ₁)}, iid = ∅ }	⇒		2		⇐	SET.rs = { fill, eid, iid = ∅, returnStatus }	3	IF (returnStatus NOT OK) OR (response not received) THEN TP failed		
	Tester		DUT														
1	SET.rq = { fill = 0, mode = T, eid = VST. DSRC-eid, accessCredentials = ac ₁ , attrList = {(‘54’D, v ₁)}, iid = ∅ }	⇒															
2		⇐	SET.rs = { fill, eid, iid = ∅, returnStatus }														
3	IF (returnStatus NOT OK) OR (response not received) THEN TP failed																

TP/AP-DAT/OBU/BV/02	Verify that OBU accepts SET.rq on LACData attribute for multiple toll contexts in separate messages (confirmed mode)		
TP Origin	Specific		
Reference	ISO/TS 13141:2010, 8.3		
Initial Condition	OBU initialised and can accept a SET-request		
Stimulus and Expected Behaviour			
	Tester		DUT
1	SET.rq = { fill = 0, mode = F, eid = VST. DSRC-eid ₁ , accessCredentials = ac ₁ , attrList = {{('54'D, v ₁)}, iid = Ø }	⇒	
2		⇐	SET.rs = { fill, eid, iid = Ø, returnStatus }
3	IF (returnStatus NOT OK) OR (response not received) THEN TP failed		
4	SET.rq = { fill = 0, mode = F, eid = VST. DSRC-eid ₂ , accessCredentials = ac ₂ , attrList = {{('54'D, v ₂)}, iid = Ø }	⇒	
5		⇐	SET.rs = { fill, eid, iid = Ø, returnStatus }
6	IF (returnStatus NOT OK) OR (response not received) THEN TP failed		

TP/AP-DAT/OBU/BV/03	Verify that OBU accepts SET.rq on LACData attribute (non-confirmed mode)		
TP Origin	Specific		
Reference	ISO/TS 13141:2010, 6.1.3 and 7.1		
Initial Condition	OBU initialised and can accept a SET-request		
Stimulus and Expected Behaviour			
	Tester		DUT
1	SET.rq = { fill = 0, mode = F, eid = VST. DSRC-eid, accessCredentials = ac ₁ , attrList = {(‘54’D, v ₁)}, iid = Ø }	⇒	
2	IF (any message from DUT received) OR (LACData not stored correctly in DUT) THEN TP failed NOTE: Condition "LACData not stored correctly in DUT" cannot be tested in black-box configuration, as DUT does not support GET message. This condition shall be tested using other means.		

TP/AP-DAT/OBU/BV/04	Verify that OBU accepts SET.rq on LACData attribute for multiple toll contexts in separate messages (non-confirmed mode)		
TP Origin	Specific		
Reference	ISO/TS 13141:2010, 8.3		
Initial Condition	OBU initialised and can accept a SET-request		
Stimulus and Expected Behaviour			
	Tester		DUT
1	SET.rq = { fill = 0, mode = F, eid = VST. DSRC-eid ₁ , accessCredentials = ac ₁ , attrList = {(‘54’D, v ₁)}, iid = Ø }	⇒	
2	IF (any message from DUT received) OR (LACData not stored correctly in DUT) THEN TP failed NOTE: Condition "LACData not stored correctly in DUT" cannot be tested in black-box configuration, as DUT does not support GET message. This condition shall be tested using other means.		
3	SET.rq = { fill = 0, mode = F, eid = VST. DSRC-eid ₂ , accessCredentials = ac ₂ , attrList = {(‘54’D, v ₂)}, iid = Ø }	⇒	
4	IF (any message from DUT received) OR (LACData not stored correctly in DUT) THEN TP failed NOTE: Condition "LACData not stored correctly in DUT" cannot be tested in black-box configuration, as DUT does not support GET message. This condition shall be tested using other means.		

A.4.5.3 BI test purposes

Test subgroup objective:

- to check the behaviour of the DUT in response to request with invalid accessCredentials:
- to check behaviour of the DUT in response to request with LACData attribute with wrong length.
- to check behaviour of the DUT once Tester tries to read LACData attribute.

TP/AP-DAT/OBU/BI/01	Verify that OBU prevents the update of LACData attribute with invalid access credentials		
TP Origin	Specific		
Reference	ISO/TS 13141:2010, 6.1.3 and 6.2.2		
Initial Condition	OBU initialised and can accept a SET-request		
Stimulus and Expected Behaviour			
	Tester		DUT
1	SET.rq = { fill = 0, mode = T, eid = VST. DSRC-eid, accessCredentials = invalid_ac, attrList = {(‘54’D, v ₁)}, iid = Ø }	⇒	
2		⇐	SET.rs = { fill, eid, iid = Ø, returnStatus }
3	IF (response received) AND (returnStatus != OK) THEN TP passed		

TP/AP-DAT/OBU/BI/02	Verify that OBU prevents getting of LACData attribute by RSE		
TP Origin	Specific		
Reference	ISO/TS 13141:2010, 6.1.3		
Initial Condition	OBU initialised and can receive SET message		
Stimulus and Expected Behaviour			
	Tester		DUT
1	GET.rq = { fill = 0, eid = VST, DSRC-eid, accessCredentials = ac, iid = Ø, attrIdList = { '54'D - - LACData } }	⇒	
2	IF (GET.rs with returnStatus OK received) OR (GET.rs with any values received) THEN TP failed		

Annex B (normative)

Test purposes for roadside equipment

B.1 Introduction

This annex contains the Test Purposes (TP) for the conformity evaluation of RSE to ISO/TS 13141.

B.1.1 TP symbols conventions

For the application layer test purposes, a special notation and symbol convention is used, as defined in what follows.

Symbols are used in the description of the TPs, with meanings according to Table B.1 below.

Table B.1 — Description of TP Symbols

SYMBOL	DESCRIPTION
XXX.rq ⇒	The Tester sends the XXX.rq PDU to the DUT
⇐ YYY.rs	The DUT sends the YYY.rs PDU to the Tester
A ≡ B	Test Purpose A “is congruent to” Test Purpose B. The notation Test Purpose A ≡ Test Purpose B means that the Test Purpose A is the same as Test Purpose B. If differences in parameters or parameter values have to be applied, these differences are indicated in the text immediately below.
A → B	Object A “is transformed” into Object B. So a notation like “Table X → Table Y” means that, for the scope of the Test Purpose, any reference of Table X should be changed into references to Table Y.
=	Means “assignment”. That is, a notation like “accessCredentials = a value” means that the field accessCredentials is given a value.
∅	Means “empty” or “not set”. So, a notation like “accessCredentials = ∅ → accessCredentials = calculated value”, for a given Test Purpose, means “change all occurrences in which the field accessCredentials has not been assigned to calculation of the value accessCredentials to a given value.

In addition, it has to be noted that the sequence of PDUs issued by an RSE is not constrained by ISO/TS 13141. This means that PDUs cannot in general be forced to be generated by the DUT. In order for the test purposes to adequately cover all possibilities, and at the same time avoid the combinatorial explosion, an abbreviated notation has been used. According to the notation, if in a test purpose, a step is indicated as:

n	See Table B.2 — PDU Selector
---	------------------------------

this means that, according to the received PDU, a corresponding test purpose is to be executed, as indicated in Table B.2.

Table B.2 — PDU Selector

n	On arriving	SET.rq	Execute	TP/AP-SET/RSE/...	... BI/x
		EVENT-REPORT.rq		TP/AP-REL/RSE/...	or ...BV/y
		Any other PDU	TP failed		

In order for the Test Purposes to clearly identify and specify the subject of the test, and because of the fact that most Application Protocol Data Unit exchanges can only be tested after other exchanges had been previously successfully performed, the Tester has been modelled as controlling a variable, named **Error**, which indicates if a previously executed Test Purpose had failed. This allows to properly control the sequence of events in a Test Purpose. The variable Error is set by the Tester to either T (True) or F (False), to indicate whether an error occurred or not.

Additionally, as most Application Protocol Data Unit carry the **mode** parameter, which indicates whether a response is expected or not, this mode parameter can be used in some Test Purpose by the Tester in order to decide whether to issue a response or not in the case the Test Purpose passes, so to enable the DUT to continue issuing requests in subsequent Test Purposes.

B.2 Physical Layer

Per ISO/TS 13141:2010, 5.5.2, all test purposes TP/PHY/RSE/Bx/yy defined in EN 15876-1 are applicable for the conformity evaluation of RSE to CEN-DSRC based LAC as claimed in ISO/TS 13141:2010, Annex B Clause B.5.3 Table B.19 Item 1.

B.3 MAC & LLC

Per ISO/TS 13141:2010, 5.5.2, all test purposes TP/MAC/RSE/Bx/yy and TP/LLC/RSE/Bx/yy defined in EN 15876-1, are applicable for the conformity evaluation of RSE to CEN-DSRC based LAC as claimed in ISO/TS 13141:2010, Annex B Clause B.5.3 Table B.19 Item 1.

B.4 Application Layer Test Purposes

B.4.1 Application initialization phase test purposes

These Test Purposes apply to the INITIALISATION as claimed in ISO/TS 13141:2010, Annex B Clause B.5.3 Table B.18 Item 1.

To the purpose of this conformance test, the following VST described in Table B.3 is transmitted to the DUT.

Table B.3 — VST1 (security level 1); valid VST

				Length	Allowed Values		
fill				4 bits	any		
profile				1 bit (Profile ext.)	0 (= no extension)		
				7 bits	See Profile in EN 12834:2003, Annex A		
applications				1 bit (applications ext.)	0 (= no extension)		
				7 bits (number of applic.)	2		
	LAC Application				1 bit (eid opt.)	1 (= eid present)	
					1 bit (parameter opt.)	1 (= parameter present)	
			aid			1 bit (aid ext.)	0 (= no extension)
						5 bits	21 (= LAC application)
		eid			1 bit (eid ext.)	0 (= no extension)	
					7 bits	any	
		parameter	LAC-ContextMark			1 bit (Container ext.)	0 (= no extension)
						7 bits (Container CHOICE)	2 (= OCTET STRING)
						1 bit (octet string ext.)	0 (= no extension)
						7 bits (octet string length)	16
					Contract Provider	10 bits (CountryCode)	See [ISO 3166-1]
					TypeOf Contract	14 bits (IssuerIdentifier)	See [ISO 14816]
						16 bits	any
					Context Version		1 bit (contextVersion ext.)
			7 bits		any		
	AC_CR-Reference		AC_Master KeyRef		8 bits	any	
					AC_CR-Diversifier	8 bits	any
					1 bit (Container ext.)	0 (= no extension)	
				7 bits (Container CHOICE)	2 (= OCTET STRING)		
			1 bit (octet string ext.)	0 (= no extension)			
			7 bits (octet string length)	2			
	Application 2				1 bit (eid opt.)	1 (= eid present)	
					1 bit (parameter opt.)	0 (= parameter not present)	
			aid			1 bit (aid ext.)	0 (= no extension)
						5 bits	≠ 21
		eid			1 bit (eid ext.)	0 (= no extension)	
					7 bits	any (≠ other eid used in this VST)	
					1 bit (obeStatus opt.)	1 (= obeStatus present)	
			equipmentClass		15 bits	any	
			manufacturerId		16 bits	any	
			obeStatus		16 bits	any	

B.4.1.1 BV test purposes

Test subgroup objective:

— to test the behaviour of the DUT in relation to valid VST.

TP/AP-BAS/RSE/BV/01	Verify that DUT supports the BST		
TP Origin	Specific		
Reference	ISO/TS 13141:2010, 6.1.2 and 8.2		
Initial Condition	DUT & Tester are not in initialization or transaction phase		
Stimulus and Expected Behaviour			
	DUT		Tester
1	BST	⇒	
2			Verify length and allowed values of BST (see Table A.2 — BST general structure)
3			IF verification performed in step 2 was not successful THEN TP failed
4		⇐	VST1
5	See Table B.2 — PDU Selector		

B.4.1.2 BI test purposes

Not applicable.

B.4.2 Application SET-rq PDU test purposes

These Test Purposes apply to SET as claimed in ISO/TS 13141:2010, Annex B Clause B.5.3 Table B.19 Item 2 and to the data requirements as claimed in ISO/TS 13141:2010, Annex B Clause B.5.3 Table B.20 Item 1 and ISO/TS 13141:2010, Annex B Clause B.5.3 Table B.20 Items 1-9.

B.4.2.1 BV test purposes

Test subgroup objective:

- to test the DUT support of SET-rq,
- to test the behaviour of DUT in relation to valid SET-rs.

TP/AP-SET/RSE/BV/01		Verify that DUT supports the writing of LACData attribute	
TP Origin		Specific	
Reference		ISO/TS 13141:2010, 6.1.3, 5.3 and 7.1	
Initial Condition		DUT & Tester initialized	
Stimulus and Expected Behaviour			
	DUT		Tester
1	SET.rq = { fill, mode, eid, accessCredentials, attrList, iid = Ø }	⇒	
2			1. Verify length and allowed values of request parameters (see Table A.4 — SET-Rq parameters (security level 1)). 2. Verify that attrList contains data attributes of Table A.9 — Table 12: Data group definition. Note that all data elements from above mentioned table must be present in the request. LACData attribute shall be present in attrList at least once. 3. Verify that LACData consists of valid geographical coordinates (Longitude, Latitude, Altitude) or valid charging object reference (ChargeObject, ChargeObjectID) or both.
3			IF verification performed in step 2 was not successful THEN TP failed
4		⇐	IF mode=T in SET.rq (step 1) THEN SET.rs = { fill=0, eid = VST.DSRC-eid, iid = Ø, returnStatus=0} ENDIF
5	See Table B.2 — PDU Selector		

B.4.2.2 BI test purposes

Not applicable.

B.4.3 Application EVENT-REPORT-rq PDU test purposes

These Test Purposes apply to the EVENT-REPORT as claimed in ISO/TS 13141:2010, Annex B Clause B.5.3 Table B.19 Item 5.

B.4.3.1 BV test purposes

Test subgroup objective:

— to test the DUT support of EVENT-REPORT-rq.

TP/AP-REL/RSE/BV/01	Verify that DUT supports the EVENT-REPORT-rq		
TP Origin	Specific		
Reference	ISO/TS 13141:2010, 6.1.4 and 8.3		
Initial Condition	DUT & Tester initialized		
Stimulus and Expected Behaviour			
	DUT		Tester
1	EVENT-REPORT.rq = { mode, eid, eventType, accessCredentials, eventParameter, iid}	⇒	
2			Verify length and allowed values of request parameters (see Table A.5 — EVENT-REPORT-Rq parameters).
3			IF verification performed in step 2 was not successful THEN TP failed

B.4.3.2 BI test purposes

Not applicable.

Annex C (normative)

PCTR for on-board units

The proforma conformance test report (PCTR) is based on ISO/IEC 9646-6, which can be consulted for any necessary additional information.

C.1 Identification summary

C.1.1 Protocol conformance test report

Table C.1 — Protocol conformance test report

PCTR Number:	
PCTR Date:	
Corresponding SCTR Number:	
Corresponding SCTR Date:	
Test Laboratory Identification:	
Test Laboratory Manager:	
Signature	

C.1.2 DUT identification

Table C.2 — DUT identification

Name:	
Version:	
Protocol specification:	
PICS:	
Previous PCTR if any:	

C.1.3 Testing environment

Table C.3 — Testing environment

PIXIT Number:	
ATS Specification:	
Abstract Test Method:	
Means of Testing identification:	
Date of testing:	
Conformance Log reference(s):	
Retention Date for Log reference(s):	

C.1.4 Limits and reservation

Additional information relevant to the technical contents or further use of the test report, or the rights and obligations of the test laboratory and the client, may be given here. Such information may include restriction on the publication of the report.

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C.1.5 Comments

Additional comments may be given by either the client or the test laboratory on any of the contents of the PCTR, for example, to note disagreement between the two parties.

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C.2 DUT Conformance status

This DUT has or has not been shown by conformance assessment to be non conforming to the specified protocol specification.

Strike the appropriate words in this sentence. If the PICS for this DUT is consistent with the static conformance requirements (as specified in clause C.3 in the present document) and there are no "FAIL" verdicts to be recorded (in clause C.6 in the present document) strike the words "has or", otherwise strike the words "or has not".

C.3 Static conformance summary

The PICS for this DUT is or is not consistent with the static conformance requirements in the specified protocol.

Strike the appropriate words in this sentence.

C.4 Dynamic conformance summary

The test campaign did or did not reveal errors in the DUT.

Strike the appropriate words in this sentence. If there are no "FAIL" verdicts to be recorded (in clause C.6 of the present document) strike the words "did or" otherwise strike the words "or did not".

Summary of the results of groups of test:

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C.5 Static conformance review report

If clause C.3 indicates non-conformance, this clause itemises the mismatches between the PICS and the static conformance requirements of the specified protocol specification.

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