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**Elektronische Gebührenerhebung –
Konformitätsprüfung von Fahrzeuggeräten und straßenseitigen
Einrichtungen mit der EN 15509 –
Teil 1: Prüfreiheitenstruktur und Prüfzweck;
Englische Fassung EN 15876-1:2010+A1:2012**

Electronic fee collection –

Evaluation of on-board and roadside equipment for conformity to EN 15509 –

Part 1: Test suite structure and test purposes;

English version EN 15876-1:2010+A1:2012

Perception de télépéage –

Évaluation de conformité de l'équipement embarqué et de l'équipement au sol à
l'EN 15509 –

Partie 1: Structure des suites de tests et intention des tests;

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DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE

Nationales Vorwort

Dieses Dokument (EN ISO 15876-1:2010+A1:2012) wurde vom Technischen Komitee CEN/TC 278 „Telematik für den Straßen-Verkehr und -Transport“ ausgearbeitet, dessen Sekretariat vom NEN (Niederlande) gehalten wird.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-02-71 GA „Telematik“ des Normenausschusses Automobiltechnik (NAAutomobil).

Das Präsidium des DIN hat mit seinem Beschluss 1/2004 festgelegt, dass von dem in den Regeln der Europäischen Normungsarbeit von CEN/CENELEC verankerten Grundsatz, wonach Europäische Normen in den drei offiziellen Sprachen Deutsch, Englisch und Französisch veröffentlicht werden, in begründeten Ausnahmefällen abgewichen und auf die Deutsche Sprachfassung verzichtet werden kann.

Änderungen

Gegenüber DIN EN 15876-1:2011-10 wurden folgende Änderungen vorgenommen:

- a) Modifizierung von Testabsichten in den Abschnitten A.3.1, A.5.6.4, A.5.7.3, A.5.10.2, A.5.11.3 und A.5.12.3;
- b) Modifizierung von Datenstrukturen im Abschnitt A.5.4.1;
- c) Modifizierung im Abschnitt C.6 bezüglich des Prüfreihenberichts.

Frühere Ausgaben

DIN EN 15876-1: 2011-10

Nationaler Anhang NA (informativ)

Begriffe

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe:

3.1

Zugriffsbeglaubigung

(en: access credentials)

Daten, die an eine fahrzeuginterne Einrichtung (en: on-board equipment, OBE) gesendet werden, um eine von Straßenrand-Einrichtungen geforderte Identität eines Anwendungsprozesses zu identifizieren

[EN ISO 14906:2004]

ANMERKUNG Die Zugriffsbeglaubigungsdaten transportieren Informationen, welche die Zugriffsbedingungen regeln, um entsprechend an die OBE adressierte Operationen durchführen zu können. Diese Zugriffsbeglaubigungsdaten können sowohl Passwörter als auch kryptografische Informationen wie Authentifikatoren enthalten.

3.2

Aktion

(en: action)

Funktion, welche einen in einer Straßenrand-Einrichtung hinterlegten Anwendungsprozess anstößt, um in einer OBE eine spezifische Operation während der Durchführung anzuregen

[EN ISO 14906:2004]

3.3

Attribut

(en: attribute)

Anwendungsinformation, welche aus einem oder mehreren Datenelementen zusammengesetzt wurde und von verschiedenen Transaktionsimplementierungen gehandhabt wird

[EN ISO 14906:2004]

3.4

Authentifikator

(en: authenticator)

Datenanhang oder kryptografische Transformation einer Dateneinheit, welche dem Datenempfänger erlaubt die Integrität des Senders der Dateneinheit zu prüfen und gegen Fälschung zu schützen

[EN ISO 14906:2004]

3.5

Kanal

(en: channel)

Informationsübertragungsweg

[EN ISO 14906:2004]

3.6

Komponente

(en: component)

logische und physikalische Einheit, welche sich zu einer OBE zusammensetzt und eine spezielle Funktionalität unterstützt

[EN ISO 14906:2004]

3.7

Vertrag

(en: contract)

Ausdruck einer Übereinkunft zwischen zwei oder mehreren Verhandlungspartnern zur Nutzung der Straßeninfrastruktur

[EN ISO 14906:2004]

3.8

Kryptografie

(en: cryptography)

Lehre, welche Prinzipien, Mittel und Methoden zur Datentransformation ausdrückt, um Informationsinhalte zu verstecken, damit eine unentdeckte Modifikation und/oder unautorisierte Nutzung vermieden wird

[EN ISO 14906:2004]

3.9

Datengruppe

(en: data group)

Sammlung zusammengehörender EFC-Datenattribute, die zusammen einen eindeutigen Teil einer EFC-Transaktion beschreiben

[EN ISO 14906:2004]

3.10

Datenintegrität

(en: data integrity)

Merkmal, dass Daten nicht in unautorisierter Art und Weise verändert oder zerstört wurden

[EN ISO 14906:2004]

3.11

Element

(en: element)

<DRSC> Verzeichnis, welches Anwendungsinformation in Form von Attributen beinhaltet

[EN ISO 14906:2004]

3.12

Implementierungskonformitätsaussage

(en: implementation conformance statement)

lieferantenbezogene Konformitätsaussage zu einer Implementierung oder einem System bezogen auf eine gegebene Spezifikation, welche den Implementierungsstatus widerspiegelt

[EN ISO 14906:2004]

3.13

Pro-forma-Implementierungskonformitätsaussage

(en: implementation conformance statement proforma)

Dokument in Form eines Fragenkatalogs, welcher bei Erfüllung der Systemimplementierung eine Konformitätsaussage zur Implementierung darstellt

[CEN ISO/TS 14907-2:2006]

3.14**Prüf-Implementierungszusatzinformation**

(en: implementation extra information for testing)

Aussage eines Lieferanten bzw. Umsetzer eines zu prüfenden Systems (en: Device under test, DUT), welche alle Referenzen und Informationen (zusätzlich zur gegebenen Implementierungskonformitätsaussage) bezüglich des DUT beinhaltet, damit in den Prüf-Laboratorien korrespondierende Prüfungen an den DUT durchgeführt werden können

[CEN ISO/TS 14907-2:2006]

3.15**Pro-forma-Prüf-Implementierungszusatzinformation**

(en: implementation extra information for testing proforma)

Dokument in Form eines Fragenkatalogs, der ausgefüllt als Zusatzinformation zur Implementierung der Prüfung des DUT dient

[CEN ISO/TS 14907-2:2006]

3.16**fahrzeuginterne Einrichtung**

(en: on-board equipment)

fahrzeuginterne Einrichtung, die den Informationsaustausch mit der Straßenrand Einrichtung unterstützt, und aus einer fahrzeuginternen Einheit und anderen optionalen Untereinheiten zur Ausführung einer Transaktion besteht

[EN ISO 14906:2004]

3.17**fahrzeuginterne Einheit**

(en: on-board unit)

kleinste Komponente einer fahrzeuginternen Einrichtung, welche mindestens die DSRC-Schnittstelle beinhaltet

[EN ISO 14906:2004]

3.18**Straßenrand-Einrichtung**

(en: roadside equipment)

Einrichtung, die an einer festen Stelle entlang einer Fahrbahn installiert ist, zur Kommunikation und Datenaustausch mit fahrzeuginternen Systemen vorbeifahrender Fahrzeuge

[EN ISO 14906:2004]

3.19**Dienst (elektronische Gebührenerhebung)**

(en: service (EFC))

straßenverkehrsrelevante Einrichtung eines Dienste-Anbieters. Normalerweise eine dem Kunden angebotene, kostenrelevante Infrastruktur

[EN ISO 14906:2004]

3.20**Service Primitive (Kommunikation)**

(en: service primitive (communication))

elementarer Kommunikationsservice, welcher vom Anwendungsprotokoll für den Anwendungsprozess unterstützt wird

[EN ISO 14906:2004]

ANMERKUNG Der Aufruf eines Dienstelementes (en: „Service Primitive“) über einen Anwendungsprozess nimmt indirekt Dienste der unteren Protokollschichten in Anspruch

3.21

Dienste-Anbieter (elektronische Gebührenerhebung)

(en: service provider (EFC))

Anbieter eines gebührenpflichtigen Straßennutzungsdienstes

[EN ISO 14906:2004]

3.22

Sitzung

(en: session)

Informationsaustausch und Interaktion, welche an einer bestimmten EFC-Station zwischen Fahrzeug- und Fahrzeugnutzer auftritt

[EN ISO 14906:2004]

3.23

Transaktion

(en: transaction)

Gesamtheit eines Informationsaustausches zwischen Straßenrand-Einrichtung und fahrzeuginterner Einrichtung zur Durchführung einer EFC-Operation über DRSC

[EN ISO 14906:2004]

3.24

Transaktionsmodell

(en: transaction model)

funktionales Modell, welches die Struktur einer elektronischen Gebührenerhebungstransaktion beschreibt

[EN ISO 14906:2004]

3.25

Prüfgerät

(en: tester)

Kombination von Gerät und Prozessen, mit denen Konformitätsprüfungen nach dieser CEN-Norm durchgeführt werden

3.26

Nutzer

(en: user)

Instanz, welche Transportdienste eines Diensteanbieters gemäß den Vertragsbedingungen nutzt

English Version

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

Perception de télépéage - Évaluation de conformité de
l'équipement embarqué et de l'équipement au sol à
l'EN 15509 - Partie 1: Structure des suites de tests et
intention des tests

Elektronische Gebührenerhebung - Konformitätsprüfung
von Fahrzeuggeräten und straßenseitigen Einrichtungen
mit der EN 15509 - Teil 1: Prüfreiheitenstruktur und
Prüfzweck

This European Standard was approved by CEN on 4 March 2010 and includes Amendment 1 approved by CEN on 4 March 2012.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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Foreword

This document (EN 15876-1:2010+A1:2012) has been prepared by Technical Committee CEN/TC 278 "Road transport and traffic telematics", the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2012, and conflicting national standards shall be withdrawn at the latest by October 2012.

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

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

This document includes Amendment 1, approved by CEN on 2012-03-04.

This document supersedes EN 15876-1:2010.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  .

CEN/TC 278 has produced a set of standards that support interoperable DSRC-EFC-systems e.g. EN ISO 14906 (a "toolbox" for defining EFC-application transaction) and CEN ISO/TS 14907-2 (EFC application interface conformance tests for On Board Units). However, these standards are only of an enabling nature and do not guarantee unambiguous technical interoperability. Therefore EN 15509, *Road transport and traffic telematics — Electronic fee collection — Interoperability application profile for DSRC* was developed to support technical interoperability between EFC-systems.

This standard defines the test suite structure and the test purposes for conformity evaluation of OBUs and RSE designed for compliance with the requirements set up in EN 15509. A test standard for evaluation of conformity of on-board and roadside equipment is a necessary element for coherent, practical and effective appraisal of products' compliance to EN 15509.

This document forms Part 1 of a two-part standard:

- 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*
- EN 15876-2, *Electronic fee collection — Conformity evaluation of on-board and roadside equipment to EN 15509 — Part 2: Abstract test suites*

Together, the two parts of EN 15876 provide the necessary foundation for implementation of the interoperability requirements as stated in EN 15509:

- industry is provided with an easy-to-use toolbox for product assessment;
- operators can easily assess conformity to EN 15509 and reference to the standard in tendering processes;
- authorities and joint undertakings may reference to the test standard when stating interoperability requirements;
- certification organisations are given an effective tool for certification of products.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard contains the Test Suite Structure (TSS) and Test Purposes (TP) to evaluate the conformity of On Board Units (OBU) and Roadside Equipment (RSE) to EN 15509.

The objective of this document is to provide a basis for conformance tests for 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.

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

EN ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes (ISO 3166-1:2006)*

EN ISO 14816, *Road transport and traffic telematics — Automatic vehicle and equipment identification — Numbering and data structure (ISO 14816:2005)*

EN ISO 14906:2004, *Road transport and traffic telematics — Electronic fee collection — Application interface definition for dedicated short-range communication (ISO 14906:2004)*

CEN ISO/TS 14907-2:2006, *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 (ISO/TS 14907-2:2006)*

ETSI EN 300 674-1:2004, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 1: General characteristics and test methods for Road Side Units (RSU) and On-Board Units (OBU)*

ETSI TS 102 486-1-2:2008, *Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Test specifications for Dedicated Short Range Communication (DSRC) transmission equipment; Part 1: DSRC data link layer: medium access and logical link control; Sub-Part 2: Test Suite Structure and Test Purposes (TSS&TP)*

ETSI TS 102 486-2-2:2008, *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

[EN ISO 14906:2004]

NOTE The access credentials data carries information needed to fulfil access conditions in order to perform the operation on the addressed element in the OBE. The access credentials can carry passwords as well as cryptographic based information such as authenticators.

3.2

action

function that an application process resident at the *roadside equipment* can invoke in order to make the *on-board equipment* execute a specific operation during the *transaction*

[EN ISO 14906:2004]

3.3

attribute

application information formed by one or by a sequence of data elements, and is managed by different actions used for implementation of a *transaction*

[EN ISO 14906:2004]

3.4

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

[EN ISO 14906:2004]

3.5

channel

information transfer path

[EN ISO 14906:2004]

3.6

component

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

[EN ISO 14906:2004]

3.7

contract

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

[EN ISO 14906:2004]

3.8

cryptography

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

[EN ISO 14906:2004]

3.9

data group

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

[EN ISO 14906:2004]

3.10

data integrity

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

[EN ISO 14906:2004]

3.11

element

<DSRC> directory containing application information in form of *attributes*

[EN ISO 14906:2004]

3.12

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

[EN ISO 14906:2004]

3.13

implementation conformance statement proforma

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

[CEN ISO/TS 14907-2:2006]

3.14

implementation extra information for testing

statement made by the supplier or an implementor 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

[CEN ISO/TS 14907-2:2006]

3.15

implementation extra information for testing proforma

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

[CEN ISO/TS 14907-2:2006]

3.16

on-board equipment

equipment located within the vehicle and supporting the information exchange with the *roadside equipment*, and which is composed of the *on-board unit* and other sub-units whose presence have to be considered optional for the execution of a *transaction*

[EN ISO 14906:2004]

3.17

on-board unit

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

[EN ISO 14906:2004]

3.18

roadside equipment

equipment located at a fixed position along the road transport network, for the purpose of communication and data exchanges with the *on-board equipment* of passing vehicles

[EN ISO 14906:2004]

3.19

service (EFC)

road transport related facility provided by a *service provider*. Normally a type of infrastructure, the use of which is offered to the *user* for which the *User* may be requested to pay

[EN ISO 14906:2004]

3.20

service primitive (communication)

elementary communication service provided by the Application layer protocol to the application processes

[EN ISO 14906:2004]

NOTE The invocation of a service primitive by an application process implicitly calls upon and uses services offered by the lower protocol layers.

3.21

service provider (EFC)

operator that accepts the user's payment means and in return provides a road-use service to the user

[EN ISO 14906:2004]

3.22

session

exchange of information and interaction occurring at a specific EFC station between the *roadside equipment* and the user/vehicle

[EN ISO 14906:2004]

3.23

transaction

whole of the exchange of information between the *roadside equipment* and the *on-board equipment* necessary for the completion of an EFC operation over the DSRC

[EN ISO 14906:2004]

3.24

transaction model

functional model describing the general structure of Electronic Payment Fee Collection transactions

[EN ISO 14906:2004]

3.25

tester

combination of equipment and processes which is able to perform conformance tests according to this CEN standard

3.26

user

entity that uses transport services provided by the *Service Provider* according to the terms of a *contract*

4 Abbreviations

For the purposes of this document, the following abbreviations apply throughout the document unless otherwise specified.

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 [CEN 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
LPDU	LLC Protocol Data Unit
MAC	Medium Access Control
PCTR	Proforma Conformance Test Report
PICS	Proforma Implementation Conformance Statement
SCTR	System Conformance Test Report
TP	Test Purposes
TSS	Test Suite Structure
VST	Vehicle Service Table

5 Test Suite Structure

5.1 Structure

The table below shows the Test Suite Structure (TSS) including its subgroups defined for the conformance testing.

Table 1 — Test Suite Structure

Group	Type of DUT	Behaviour
Physical layer	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
DLC MAC sublayer	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
DLC LLC sublayer	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application layer – Functions	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application Layer – Data	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application Layer – Security Level 0	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application Layer – Security Level 1	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side Equipment	Valid behaviour
		Invalid behaviour
Application Layer – Transactions	On Board Unit	Valid behaviour
		Invalid behaviour
	Road Side 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 Specifications

Conformance to a profile standard implies conformance to the related base standards; hence, a number of test cases for the profile standard 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 profile standard are identified for statements contained in the profile standard, which have no equivalence in the base standards. These latter cases cover for example the security algorithms and functions that are described in the profile standard. 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 102 486-1-2 or ETSI TS 102 486-2-2) 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

5.3.1 TP Definition Conventions

The TPs are defined following the rules shown in Table 2 below.

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).
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.

Note that the reference field normally points to the clause of the base standard [EN 15509]. As the same standard contains the Protocol Implementation Conformance Statement proforma, where appropriate a reference to the relevant table of the PICS is given either in this field or in the text introducing the group of Test Purposes.

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 — TP Naming Conventions below.

Table 3 — TP Naming Conventions

Identifier: TP/<group>/<dut>/<x>-<nn>		
<group>	PHY	Physical layer
	MAC	MAC sublayer
	LLC	LLC sublayer
	AP-0BAS	Application layer – I Kernel support Security level 0
	AP-0FUN	Application layer – T Kernel support Security level 0
	AP-0DAT	Application layer – Data attributes support Security Level 0
	AP-0SEC	Application layer – Security Level 0 support
	AP-0TRA	Application layer – Transaction support Security level 0
	AP-1BAS	Application layer – I Kernel support Security level 1
	AP-1FUN	Application layer – T Kernel support Security level 1
	AP-1DAT	Application layer – Data attributes support Security Level 1
	AP-1SEC	Application layer – Security Level 1 support
	AP-1TRA	Application layer – Transaction support Security level 1
	AP-0BAS	Application layer – Initialisation phase support Security level 0
	AP-0GET	Application layer - GET-rq PDU test purposes, security level 0
	AP-0SET	Application layer - SET-rq PDU test purposes, security level 0
	AP-0STA	Application layer - GET-STAMPED-rq PDU test purposes, security level 0
	AP-0MMI	Application layer - SET-MMI-rq PDU test purposes security level 0
	AP-0ECH	Application layer - ECHO-rq PDU test purposes, security level 0
	AP-0REL	Application layer - EVENT-REPORT-rq PDU test purposes, security level 0
	AP-1BAS	Application layer - initialization phase test purposes, security level 1
	AP-1GET	Application layer - GET-rq PDU test purposes, security level 1
	AP-1SET	Application layer - SET-rq PDU test purposes, security level 1
	AP-1STA	Application layer - GET-STAMPED-rq PDU test purposes, security level 1
	AP-1MMI	Application layer - SET-MMI-rq PDU test purposes security level 1
	AP-1ECH	Application layer - ECHO-rq PDU test purposes, security level 1
<dut> = type of DUT	OBU	On Board Unit
	RSE	Road Side Equipment
x = Type of testing	BV	Valid Behaviour Tests
	BI	Invalid Behaviour Tests
<nn> = sequential number (01-99)		Test Purpose Number

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 [EN 15509].

A.2 Physical Layer

A.2.1 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/PHY/OBU/BV/01	Dynamic range – sensitivity
TP Origin	Identical to [ETSI EN 300 674-1], Clause 10.1.1
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI EN 300 674-1], Clause 8.
Stimulus and Expected Behaviour	
See [ETSI EN 300 674-1], Clause 10.1.1	

TP/PHY/OBU/BV/02	Dynamic range – upper power limit for communication
TP Origin	Identical to [ETSI EN 300 674-1], Clause 10.1.2
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI EN 300 674-1], Clause 8.
Stimulus and Expected Behaviour	
See [ETSI EN 300 674-1], Clause 10.1.2	

TP/PHY/OBU/BV/03	Cut-off power level
TP Origin	Identical to [ETSI EN 300 674-1], Clause 10.2
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI EN 300 674-1], Clause 8.
Stimulus and Expected Behaviour	
See [ETSI EN 300 674-1], Clause 10.2	

TP/PHY/OBU/BV/04	Conversion gain
TP Origin	Identical to [ETSI EN 300 674-1], Clause 10.3
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI EN 300 674-1], Clause 8.
Stimulus and Expected Behaviour	
See [ETSI EN 300 674-1], Clause 10.3	

TP/PHY/OBU/BV/05	Maximum equivalent isotropically radiated power
TP Origin	Identical to [ETSI EN 300 674-1], Clause 10.4
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI EN 300 674-1], Clause 8.
Stimulus and Expected Behaviour	
See [ETSI EN 300 674-1], Clause 10.4	

TP/PHY/OBU/BV/06	Frequency error
TP Origin	Identical to [ETSI EN 300 674-1], Clause 10.5
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI EN 300 674-1], Clause 8.
Stimulus and Expected Behaviour	
See [ETSI EN 300 674-1], Clause 10.5	

TP/PHY/OBU/BV/07	Transmitter spectrum mask
TP Origin	Identical to [ETSI EN 300 674-1], Clause 10.6
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI EN 300 674-1], Clause 8.
Stimulus and Expected Behaviour	
See [ETSI EN 300 674-1], Clause 10.6	

TP/PHY/OBU/BV/08	Transmitter unwanted emissions
TP Origin	Identical to [ETSI EN 300 674-1], Clause 10.7
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI EN 300 674-1], Clause 8.
Stimulus and Expected Behaviour	
See [ETSI EN 300 674-1], Clause 10.7	

TP/PHY/OBU/BV/09	Receiver spurious emissions
TP Origin	Identical to [ETSI EN 300 674-1], Clause 10.8
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI EN 300 674-1], Clause 8.
Stimulus and Expected Behaviour	
See [ETSI EN 300 674-1], Clause 10.8	

A.2.2 BI Test Purposes

BI test purposes group do not apply for Layer 1.

A.3 MAC

A.3.1 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/MAC/OBU/BV/01	Receive downlink frames – maximum length
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/01
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/01
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/01	

TP/MAC/OBU/BV/02	Receive downlink frames within T1
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/02
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/02
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/02	

TP/MAC/OBU/BV/03	Timing constraints for public uplink windows
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/03
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/03
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/03	

TP/MAC/OBU/BV/04	Receive downlink frames within T2
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/04
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/04
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/04	

TP/MAC/OBU/BV/05	Timing constraints for private uplink windows
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/05
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/05
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/05	

TP/MAC/OBU/BV/06	S-bit and L-bit in MAC control field
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/06
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/06
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/06	

TP/MAC/OBU/BV/07	Manage S-bit state variable
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/07
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/07
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/07	

TP/MAC/OBU/BV/08	Random selection of N5 public uplink windows
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/08
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/08
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BV/08	

A1 deleted text **A1**

A.3.2 BI Test Purposes

Test subgroup objective:

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

TP/MAC/OBU/BI/01	Manage double-bit errors in the LID, MAC control and LPDU fields
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/01
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/01
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/01	

TP/MAC/OBU/BI/02	Detect and manage double-bit errors in the FCS field
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/02
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/02
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/02	

TP/MAC/OBU/BI/03	Detect and manage a block of 15 bit errors
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/03
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/03
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/03	

TP/MAC/OBU/BI/04	Detect and manage the abort sequence in the LPDU field
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/04
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/04
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/04	

TP/MAC/OBU/BI/05	Detect and manage the abort sequence at the end of a downlink frame
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/05
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/05
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/05	

TP/MAC/OBU/BI/06	Detect and manage a too long downlink frame according to N2
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/06
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/06
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/06	

TP/MAC/OBU/BI/07	Detect and manage wrong format of LID
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/07
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/07
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/07	

TP/MAC/OBU/BI/08	Detect and manage missing MAC control field
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/08
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/08
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/08	

TP/MAC/OBU/BI/09	Detect and manage wrong A-bit in MAC control field in broadcast frame
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/09
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/09
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/09	

TP/MAC/OBU/BI/10	Detect and manage wrong D-bit in MAC control field in broadcast frame
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/10
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/10
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/10	

TP/MAC/OBU/BI/11	Detect and manage wrong D-bit in MAC control field in private frame
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/11
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/11
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/11	

TP/MAC/OBU/BI/12	Detect and manage wrong L-bit in MAC control field in broadcast frame
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/12
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/12
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/12	

TP/MAC/OBU/BI/13	Detect and manage wrong L-bit in MAC control field in private frame
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/13
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/13
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/13	

TP/MAC/OBU/BI/14	Detect and manage wrong C/R-bit in MAC control field of a PrWa frame
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/14
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/14
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/14	

TP/MAC/OBU/BI/15	Detect and manage a wrong MAC control field
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/15
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/15
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/15	

TP/MAC/OBU/BI/16	Detect and manage blocked signals
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/16
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/16
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/16	

TP/MAC/OBU/BI/17	Detect and manage blocked end flag
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/17
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/17
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/17	

TP/MAC/OBU/BI/18	Detect and manage blocked start flag
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/18
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/18
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/18	

TP/MAC/OBU/BI/19	Detect and manage broadcast LID where expecting private LID
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/19
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/19
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/19	

TP/MAC/OBU/BI/20	Detect and manage multicast LID where expecting private LID
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/20
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/20
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/20	

TP/MAC/OBU/BI/21	Detect and manage wrong A-bit in MAC control field in private frame
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/21
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/21
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/21	

TP/MAC/OBU/BI/22	Manage wrong A-bit in MAC control field in private downlink frame with ACn
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/22
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/22
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/22	

TP/MAC/OBU/BI/23	Detect and manage wrong private LID
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/23
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/23
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/23	

TP/MAC/OBU/BI/24	Verify that the OBU can manage retransmission of PrWRq
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/24
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/24
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/MAC/OBU/BI/24	

A.4 LLC

A.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/LLC/OBU/BV/01	Exchange UI commands
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/01
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/01
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/01	

TP/LLC/OBU/BV/02	Manage ACn data transmission
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/02
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/02
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/02	

TP/LLC/OBU/BV/03	Manage ACn data exchange
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/03
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/03
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/03	

TP/LLC/OBU/BV/04	Empty Test Purpose, left to keep numbering aligned with [ETSI TS 102 486-1-2]
TP Origin	
Reference	
Initial condition	
Stimulus and Expected Behaviour	

TP/LLC/OBU/BV/05	Manage data response Procedure I
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/05
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/05
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BV/05	

A.4.2 BI Test Purposes

Test subgroup objective:

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

TP/LLC/OBU/BI/01	Detect and manage corrupted LLC control field when expecting UI command
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/01
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/01
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/01	

TP/LLC/OBU/BI/02	Detect and manage invalid LPDU with fractional number of octets in length
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/02
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/02
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/02	

TP/LLC/OBU/BI/03	Detect and manage corrupted LLC control field when expecting ACn command
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/03
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/03
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/03	

TP/LLC/OBU/BI/04	Detect and manage LPDU containing acknowledged connectionless LLC command control field when LID is multicast or broadcast
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/04
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/04
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/04	

TP/LLC/OBU/BI/05	Detect and manage invalid LPDU with fractional number of octets in length
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/05
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/05
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/05	

TP/LLC/OBU/BI/06	Detect and manage an invalid ACn command with P=1 and no LSDU.
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/06
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/06
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/06	

TP/LLC/OBU/BI/07	Detect and manage duplicate ACn commands
TP Origin	Identical to [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/07
Reference	[EN 15509] Clause 5.1.2
Initial condition	See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/07
Stimulus and Expected Behaviour	
See [ETSI TS 102 486-1-2] TP/LLC/OBU/BI/07	

A.5 Application Layer

A.5.1 Introduction and general 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 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.5.2 Structure of BST and VST

A.5.2.1 BST

The BST general structure, as is *transmitted* to the OBU, is described in Table A.2 — BST, General Structure, below.

Table A.2 — BST, General Structure

			Length	Allowed Values
T-APDUs			4 bit	'1000' indicating initialisation-request (BST)
			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] Annex A
mandApplications			1 bit (mandApplications ext.)	0 (= no extension)
			7 bits (number of applications)	M
	EFC 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	1 (= electronic-fee-collection)
	Application 2 (not EFC)		1 bit (eid opt.)	0/1
			1 bit (parameter opt.)	0/1
		aid	1 bit (aid ext.)	0 (= no extension)
			5 bits	See DSRCAApplicationEntityID in [EN 12834] Annex A
		eid	1 bit (eid ext.)	0 (= no extension)
			7 bits	any
		parameter		See ApplicationContextMark in [EN 12834] Annex A
	...		...	...
	Application M (not EFC)		1 bit (eid opt.)	0/1
			1 bit (parameter opt.)	0/1
		aid	1 bit (aid ext.)	0 (= no extension)
			5 bits	See DSRCAApplicationEntityID in [EN 12834] Annex A
		eid	1 bit (eid extension)	0 (= no extension)
			7 bits	any
		parameter		See ApplicationContextMark in [EN 12834] Annex A
nonmandAp plications			1 bit (mandApplications ext.)	0 (= no extension)
			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] Annex A
	...		...	...
	Profile K		1 bit (Profile ext.)	0 (= no extension)
			7 bits	See Profile in [EN 12834] Annex A

A.5.2.2 VST

The VST general structure, as is *transmitted* by the OBU, is described in Table A.3 — VST, General Structure and Table A.4 — VST, General Structure (security level 1) below.

Table A.3 — VST, General Structure

					Length	Allowed Values	
T-APDUs					4 bits	'1001' indicating initialisation-response (VST)	
fill					4 bits	'0000'	
profile					1 bit (Profile ext.)	0 (= no extension)	
					7 bits	See Profile in [EN 12834] Annex A	
applications					1 bit (applications ext.)	0 (= no extension)	
					7 bits (number of applic.)	M	
	EFC 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	1 (= electronic-fee-collection)	
		eid	1 bit (eid ext.)	0 (= no extension)			
			7 bits	any (≠ other eid used in this VST)			
		parameter	EFC-ContextMark	contract Provider	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)	6	
					10 bits (CountryCode)	See ISO 3166-1	
					14 bits (IssuerIdentifier)	See ISO 14816	
					typeOf Contract	16 bits	any
					context Version	1 bit (contextVersion ext.)	0 (= no extension)
						7 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] Annex A			
	eid		1 bit (eid ext.)	0 (= no extension)			
			7 bits	any (≠ other eid used in this VST)			
	parameter	See ApplicationContextMark, [EN 12834] Annex A					
	⋮	...					
	Application M			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] Annex A			
		eid	1 bit (eid extension)	0 (= no extension)			
			7 bits	any (≠ other eid used in this VST)			
parameter		See ApplicationContextMark, [EN 12834] Annex A					
obeConfiguration					1 bit (obeStatus opt.)	0/1	
	equipmentClass				15 bits	any	
	manufacturerID				16 bits	any	
	obeStatus				16 bits	valid status	

Table A.4 — 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] Annex A	
applications	EFC Application			1 bit (applications ext.)	0 (= no extension)	
				7 bits (number of applic.)	M	
				aid	1 bit (eid opt.)	1 (= eid present)
					1 bit (parameter opt.)	1 (= parameter present)
		eid	1 bit (aid ext.)		0 (= no extension)	
			5 bits		1 (= electronic-fee-collection)	
			parameter	1 bit (eid ext.)	0 (= no extension)	
				7 bits	any (≠ other eid used in this VST)	
		EFC-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	
				10 bits (CountryCode)	See EN ISO 3166-1	
				14 bits (IssuerIdentifier)	See EN ISO 14816	
				16 bits	any	
				1 bit (contextVersion ext.)	0 (= no extension)	
		AC_CR_R eference		contract Provider	7 bits	any
				typeOf Contract	16 bits	any
				context Version	1 bit (contextVersion ext.)	0 (= no extension)
					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_Mas terKeyRef		8 bits	any
		AC_CR_Dive rsifier	8 bits		any	
		RndOBE	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		
		Application 2			32 bits	any
					1 bit (eid opt.)	0/1
					1 bit (parameter opt.)	0/1
					1 bit (aid ext.)	0 (= no extension)
			aid	5 bits	See DSRCApplicationEntityID, [EN 12834] Annex A	
				1 bit (eid ext.)	0 (= no extension)	
			eid	7 bits	any (≠ other eid used in this VST)	
				parameter	See ApplicationContextMark, [EN 12834] Annex A	
		..	...		...	
		Application M			1 bit (eid opt.)	0/1
					1 bit (parameter opt.)	0/1
					1 bit (aid ext.)	0 (= no extension)
					5 bits	See DSRCApplicationEntityID, [EN 12834] Annex A
			aid	1 bit (eid extension)	0 (= no extension)	
7 bits				any (≠ other eid used in this VST)		
eid			See ApplicationContextMark, [EN 12834] Annex A			
			parameter			
obeConfiguration				1 bit (obeStatus opt.)	0/1	
	equipmentClass		15 bits	any		
	manufacturerID		16 bits	any		
	obeStatus		16 bits	any		

A.5.3 PDUs Parameters

A.5.3.1 Parameters of request PDUs (security level 0)

The following tables:

- Table A.5 — GET-Rq parameters (security level 0);
- Table A.6 — SET-Rq parameters (security level 0);
- Table A.7 — ACTION-Rq parameters (security level 0)

describe the valid format of the request APDUs for the security level 0.

Table A.5 — GET-Rq parameters (security level 0)

	[EN 12834] Annex A	[EN 15509] Clause C.4.5.5 Table C.16
GET-Rq	fill	=
	eid	
	accessCredentials OPTIONAL	prohibited
	iid OPTIONAL	
	attributeldList OPTIONAL	mandatory

Table A.6 — SET-Rq parameters (security level 0)

	[EN 12834] Annex A	[EN 15509] Clause C.4.5.5 Table C.18
SET-Rq	fill	=
	mode	
	eid	
	accessCredentials OPTIONAL	prohibited
	attrList	=
	iid OPTIONAL	prohibited

Table A.7 — ACTION-Rq parameters (security level 0)

	[EN 12834] Annex A	[EN 15509] Clause C.4.5.5 Table C.20
ACTION-Rq	mode	=
	eid	
	actionType	
	accessCredentials OPTIONAL	prohibited
	actionParameter OPTIONAL	mandatory
	iid OPTIONAL	prohibited

Table A.8 — EVENT-REPORT-Rq parameters (security level 0)

	[EN 12834] Annex A	[EN 15509] Clause C.4.5.5 Table C.22
EVENT-REPORT-Rq	mode	=
	eid	
	eventType	
	accessCredentials OPTIONAL	prohibited
	eventParameter OPTIONAL	
	iid OPTIONAL	

A.5.3.2 Parameters of request PDUs (security level 1)

The following tables:

- Table A.9 — GET-Rq parameters (security level 1);
- Table A.10 — SET-Rq parameters (security level 1);
- Table A.11 — ACTION-Rq parameters (security level 1);
- Table A.12 — EVENT-REPORT-Rq parameters (security level 1)

describe the valid format of the request APDUs for the security level 1.

Table A.9 — GET-Rq parameters (security level 1)

	[EN 12834] Annex A	[EN 15509] Clause C.4.5.5 Table C.16
GET-Rq	fill	=
	eid	
	accessCredentials OPTIONAL	mandatory
	iid OPTIONAL	prohibited
	attributeldList OPTIONAL	mandatory

Table A.10 — SET-Rq parameters (security level 1)

	[EN 12834] Annex A	[EN 15509] Clause C.4.5.5 Table C.18
SET-Rq	fill	=
	mode	
	eid	
	accessCredentials OPTIONAL	mandatory
	attrList	=
	iid OPTIONAL	prohibited

Table A.11 — ACTION-Rq parameters (security level 1)

	[EN 12834] Annex A	[EN 15509] Clause C.4.5.5 Table C.20
ACTION-Rq	mode	=
	eid	
	actionType	
	accessCredentials OPTIONAL	mandatory
	actionParameter OPTIONAL	
	iid OPTIONAL	prohibited

Table A.12 — EVENT-REPORT-Rq parameters (security level 1)

	[EN 12834] Annex A	[EN 15509] Clause C.4.5.5 Table C.22
EVENT-REPORT-Rq	mode	=
	eid	
	eventType	
	accessCredentials OPTIONAL	prohibited
	eventParameter OPTIONAL	
	iid OPTIONAL	

A.5.3.3 Parameters of response PDUs

The following tables:

- Table A.13 — GET-Rs parameters;
- Table A.14 — SET-Rs parameters;
- Table A.15 — ACTION-Rs parameters

describe the valid format of the response APDUs.

Table A.13 — GET-Rs parameters

	[EN 12834] Annex A	[EN 15509] Clause C.4.5.5 Table C.17
GET-Rs	fill	=
	eid	
	iid OPTIONAL	prohibited
	attributelist OPTIONAL	mandatory
	ret OPTIONAL	