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Entwurf

Einsprüche bis 2017-04-03
Vorgesehen als Ersatz für
DIN CEN ISO/TS 16407-1
(DIN SPEC 70669):2012-01

**Elektronische Gebührenerhebung –
Konformitätsbeurteilung von Geräten nach ISO/TS 17575-1 –
Teil 1: Struktur und Zweck des Prüfprogrammes (ISO/DIS 16407-1:2017);
Englische Fassung prEN ISO 16407-1:2017**

Electronic fee collection –
Evaluation of equipment for conformity to ISO/TS 17575-1 –
Part 1: Test suite structure and test purposes (ISO/DIS 16407-1:2017);
English version prEN ISO 16407-1:2017

Perception du télépéage –
Évaluation de la conformité de l'équipement à l'ISO/TS 17575-1 –
Partie 1: Structure de la suite d'essais et objectifs des essais (ISO/DIS 16407-1:2017);
Version anglaise prEN ISO 16407-1:2017

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2017-02-03 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses Entwurfs besonders zu vereinbaren.

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Gesamtumfang 131 Seiten

DIN-Normenausschuss Automobiltechnik (NAAutomobil)
DKE Deutsche Kommission Elektrotechnik Elektronik Informationstechnik in DIN und VDE

Nationales Vorwort

Dieses Dokument (prEN ISO 16407-1:2017) wurde vom Technischen Komitee CEN/TC 278 „Intelligente Verkehrssysteme“, dessen Sekretariat vom NEN (Niederlande) gehalten wird, in Zusammenarbeit mit dem Technischen Komitee ISO/TC204 „Intelligent transport systems“ ausgearbeitet.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-02-71 GA „Intelligente Verkehrssysteme“ des Normenausschusses Automobiltechnik.

Der Entwurf ist derzeit zur parallelen Umfrage vorgelegt.

Dieser Teil der Norm ist Teil einer kompletten Reihe von Normen die sich mit der Sicherstellung von Interoperabilität autonomer elektronischer Gebührenerhebungssysteme beschäftigt. Sie schließen Innerhalb dieser Normenreihe legt diese Norm Prüfungen zur Konformitätsevaluierung von Front- und Backends fest, die den Anforderungen der ISO 17575-1 entsprechen.

Potentielle Anwender dieser Normenreihe sind Hersteller von fahrzeuginternen Einrichtungen zur elektronischen Gebührenerhebung. Die Anwendung dieser Norm garantiert dem Anwender interoperables Verhalten bei Systemen unterschiedlicher Hersteller.

Änderungen

Gegenüber DIN CEN ISO/TS 16407-1 (DIN SPEC 70669):2012-01 wurden folgende Änderungen vorgenommen:

- a) Umwandlung in eine Norm;
- b) Ergänzungen, die Änderungen in den zugrunde liegenden Grundnormen, besonders der DIN EN ISO 17575, berücksichtigen;
- c) Änderungen in den Datenelemente der DIN EN ISO 17575-1:2016 und DIN EN ISO 17575-3:2016 wurden berücksichtigt;
- d) Folgende neue Prüfzwecke wurden ergänzt
 - Festlegung von Protokollversionen,
 - Beglaubigte Datenelemente.
- e) Begriffe wurden überarbeitet;
- f) Editorische und formale Fehler wurden behoben;
- g) Prüfzwecke zu Kommunikationsdiensten und Regeln zu Inhaltsdaten, die nicht mehr Teil der DIN EN ISO 17575-1:2016 sind, wurden gelöscht.

Nationaler Anhang NA (informativ)

Literaturhinweise

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe:

3.1

Gebietsabrechnung

(en: area charging)

Abrechnung basierend auf einer Straßennutzung innerhalb eines vorgegebenen Gebiets

[QUELLE: ISO 17575-1:2016, 3.1]

3.2

Attribut

(en: attribute)

adressierbares Datenpaket, welches aus einem einzelnen Datenelement oder strukturierten Sequenzen von Datenelementen besteht

[QUELLE: ISO 17575-1:2016, 3.2]

3.3

Authentifikator

(en: authenticator)

Daten, wenn möglich verschlüsselt, die zur Authentifizierung verwendet werden

[QUELLE: EN 15509:2014, 3.3]

3.4

Back End

Teil eines Backoffice-Systems, welches mit einem oder mehreren Front End verbunden sind

[QUELLE: ISO 17575-1:2016, 3.4]

3.5

Abrechnungsobjekt

(en: charge object)

geografisches- oder straßenbezogenes Objekt zur abrechnungsbezogenen Nutzung

[QUELLE: ISO 17575-1:2016, 3.5]

3.6

Abrechnungsbericht

(en: charge report)

Informationen, die für das Front End hervorgebrachte Straßennutzungs- und Zusatzinformationen beinhalten

[QUELLE: ISO 17575-1:2016, 3.6]

3.7

Absperrung

(en: cordon)

Grenzlinie in einem Gebiet

[QUELLE: ISO 17575-1:2016, 3.7]

3.8

Absperrabrechnung

(en: cordon charging)

Abrechnung zur Überquerung einer Absperrung

[QUELLE: ISO 17575-1:2016, 3.8]

3.9

Datenelement

(en: data element)

kodierte Information, welche selbst aus weiteren Basis-Informationsstrukturen bestehen kann

[QUELLE: ISO 17575-1:2016, 3.9]

3.10

Datenmenge

(en: data set)

logische Menge von *Datenelementen* (3.9) mit semantischem Bezug

[QUELLE: ISO 17575-1:2016, 3.10]

3.11

Front End

Teil eines Mautsystems bestehend aus einer *On-board Ausrüstung* (OBE, 3.13) und möglicherweise einem *Vertreter* (3.14) mit dem Straßenmautinformationen und Benutzungsdaten gesammelt, verarbeitet und an das *Back End* (3.4) übermittelt werden

[QUELLE: ISO/TS 19299:2015, 3.17]

Anmerkung 1 zum Begriff: Das Front End umfasst die *On-board Ausrüstung* (OBE, 3.13) und möglicherweise einem *Vertreter* (3.14).

3.12

Layout

(en: layout)

technische Beschreibung zur Position eines Mautobjekts und dessen Grenzen

[QUELLE: ISO 17575-3:2016, 3.12]

3.13

On-Board Ausrüstung

OBE

(en: on-board equipment)

alle notwendigen Ausrüstungen innerhalb Fahrzeuges, um notwendige Funktionen zur elektronischen Gebührenerhebung (en: EFC) und Kommunikationsdienste durchzuführen

3.14

Vertreter

(en: proxy)

optionale Einheit des *Front Ends* (3.11) welches mit externen Einrichtungen kommuniziert und Daten in ein abgestimmtes Format überführt und an das *Back End* (3.4) übermittelt

[QUELLE: ISO 17575-1:2016, 3.13]

3.15

Straßensektionsmaut

(en: road section tolling)

Mautprinzip, bei dem die Gebühr anfällt, wenn ein vordefinierter Straßenabschnitt benutzt wird

[QUELLE: ISO 17575-1:2016, 3.14]

3.16

Maut

(en: toll)

Abrechnung, Steuer, oder Verpflichtungsabgabe in Verbindung einer Fahrzeugbenutzung innerhalb eines *Mautgebietes* (3.20)

[QUELLE: ISO/TS 19299:2015, 3.42]

Anmerkung 1 zum Begriff: Diese Definition ist die Verallgemeinerung des klassischen Begriffs der Maut als eine Gebühr, eine Steuer, oder eine Abgabe zur Erlaubnis eine Schranke zu passieren, oder eine Straße oder Brücke (usw.) zu passieren. Der Begriff beinhaltet ebenfalls Gebühren bezogen auf eine (administrative) Verpflichtung, z. B. eine Steuer oder Abgabe.

3.17

Mautbereich

(en: tolled area)

geografischer Bereich, in dem *Maut* (3.16) zur Nutzung von Fahrzeugen verlangt wird

[QUELLE: ISO 17575-3:2016, 3.17]

3.18

Maut Kontext

(en: toll context)

Logischer Blick auf ein Mautschema, welcher Anhand von *Attributen* (3.2) und Funktionen eines Basiselements definiert ist und aus einem einzelnen Basismautprinzip, der räumlichen Verteilung eines *Abrechnungsobjektes* (3.5) und dem einzelnen Verhalten des betroffenen *Front Ends* (3.11) besteht

[QUELLE: ISO 17575-1:2016, 3.17]

3.19

Maut Kontextdaten

(en: toll context data)

Information welche vom verantwortlichen Mauterheber festgelegt wird und notwendig ist, um die *Maut* (3.16) zur Nutzung eines Fahrzeugs in einem bestimmten *Maut Kontext* (3.18) festzusetzen und um die Mauttransaktion abzuschließen

[QUELLE: ISO 12855:2015, 3.15]

3.20

Mautgebiet

(en: toll domain)

Bereich oder Teil eines Straßennetzwerks in der ein bestimmtes *Mautregimes* (3.21) angewendet wird

[QUELLE: ISO 17573:2010, 3.18]

3.21

Mautregime

(en: toll regime)

Menge von Regeln, einschließlich Betreiberregeln, welche die Erhebung von *Maut* (3.16) in einem *Mautgebiet* (3.20) regeln

[QUELLE: ISO 17573:2010, 3.20]

3.22

Mautübersicht

(en: toll scheme)

organisatorischer Blick auf ein *Mautregime* (3.21), welcher die Akteure sowie deren Beziehungen beinhaltet

[QUELLE: ISO 17575-3:2016, 3.22]

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC204.

This edition of ISO 16407-1 cancels and replaces ISO/TS 16407-1:2011, which has been technically revised. The following changes have been made:

- conversion from a Technical Specification to an International Standard,
- amendments to reflect changes to the underlying base standards, especially ISO 17575,
- major changes regarding,
 - data element changes introduced by ISO 17575-1:2016 and ISO 17575-3:2016
 - new test purposes related:
 - protocol version handling,
 - authenticated data elements,
 - removed test purposes related to:
 - rules with respect to charging which are not anymore required by ISO 17575-1:2016.

- revised terms and definitions,
- editorial and formal corrections as well as changes to improve readability.

Introduction

This document, ISO 16407-1, is part of a set of standards that supports interoperability of autonomous EFC-systems. Autonomous systems use satellite positioning, often combined with additional sensor technologies such as gyroscopes, odometers, and accelerometers, to localise the vehicle and to find its position on a map containing the charged geographic objects, such as charged roads or charged areas. From the charged objects, the vehicle characteristics, the time of day and other data that are relevant for describing road use, the tariff and ultimately the road usage fee is determined.

Autonomous on-board equipment (OBE) operates without relying on dedicated road-side infrastructure by employing wide-area technologies such as Global Navigation Satellite Systems (GNSS) and Cellular Communications Networks (CN). Therefore, autonomous systems may also be referred to as GNSS/CN systems.

Within the suite of EFC standards this document defines tests for conformity evaluation of Front End and Back End that comply with the requirements towards the charging specified in ISO 17575-1.

ISO 16407-1 is based on

- ISO 17575-1, and
- the ISO 9646 family of standards on conformance test methodology.

- Entwurf -

Electronic fee collection — Evaluation of equipment for conformity to ISO 17575-1 — Part 1: Test suite structure and test purposes

1 Scope

The scope of ISO 16407 standards is to provide a suite of tests in order to assess the Front End and Back End behaviours compliancy towards the requirements listed in ISO 17575-1. This document contains the definition of such tests in the form of Test Purposes, listing the required initial conditions, references and individual steps in a structured textual manner.

Test Purposes defined in this document are reflecting the structural and semantical requirements stated in ISO 17575-1:2016:

- Presence / Absence of particular data elements,
- Semantics related to various data elements:
 - Data Group General (see ISO 17575-1:2016, clause 7.3)
 - Data Group Security (see ISO 17575-1:2016, clause 7.4)
 - Data Group Contract (see ISO 17575-1:2016, clause 7.5)
 - Data Group Usage (see ISO 17575-1:2016, clause 7.6)
 - Data Group Account (see ISO 17575-1:2016, clause 7.7)
 - Data Group Versioning (see ISO 17575-1:2016, clause 7.8)

With regards to the individual data sets and EFC attributes defined in ISO 17575-1:2016, the Test Purposes have been organised into the test suite groups, designated for the Front End and Back End respectively.

Besides the Test Purposes, this document also provides proforma conformance test reports templates for both the Front End and Back End Test Purposes.

For more information regarding the requirements against which the conformance is evaluated in this document, please refer to ISO 17575-1:2016.

Testing of the following behaviours and functionalities is outside of the scope of this part of ISO 16407:

- dynamic behaviour, i.e. sequence of messages and triggering events that must be exchanged/happen to fulfil certain charging scenarios;
- profiles and business logic built on top of particular pricing schemas;

- As ISO 17575-1:2016 does not specify any invalid behaviour of Front End and Back End, BI test purposes are not applicable for any test purpose group.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 9646-6:1994, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 6: Protocol profile test specification*

ISO 17575-1:2016, *Electronic fee collection— Application interface definition for autonomous systems— Part 1: Charging*

3 Terms and definitions

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

3.1 area charging

charging based on road usage within a given area

[SOURCE: ISO 17575-1:2016, 3.1]

3.2 attribute

addressable package of data consisting of a single data element or structured sequences of data elements

[SOURCE: ISO 17575-1:2016, 3.2]

3.3 authenticator

data, possibly encrypted, that is used for authentication

[EN 15509:2014, definition 3.3]

3.4 Back End

part of a back office system interfacing to one or more Front Ends

[SOURCE: ISO 17575-1:2016, 3.4]

3.5 charge object

geographic or road related object for the use of which a charge is applied

[SOURCE: ISO 17575-1:2016, 3.5]

3.6

charge report

information containing road usage and related information originated at the Front End

[SOURCE: ISO 17575-1:2016, 3.6]

3.7

cordon

border line of an area

[SOURCE: ISO 17575-1:2016, 3.7]

3.8

cordon charging

charging for the crossing of a cordon

[SOURCE: ISO 17575-1:2016, 3.8]

3.9

data element

coded information, which might itself consist of lower level information structures

[SOURCE: ISO 17575-1:2016, 3.9]

3.10

data set

logical set of *data elements* (3.9) with a semantic relation

[SOURCE: ISO 17575-3:2016, 3.10]

3.11

Front End

part of a tolling system consisting of an *OBE* (3.13) and possibly a *proxy* (3.14) where road tolling information and usage data are collected and processed for delivery to the *Back End* (3.4)

[SOURCE: ISO/TS 19299:2015, 3.17]

NOTE The Front End comprises the on-board equipment (3.13) and an optional proxy (3.14).

3.12

layout

technical description of the location of tolled objects including their borders

[SOURCE: ISO 17575-3:2016, 3.12]

3.13

on-board equipment

OBE

all required equipment on-board a vehicle for performing required EFC functions and communication services

3.14

proxy

optional part of a *Front End* (3.11) that communicates with external equipment and processes the data received into an agreed format to be delivered to the *Back End* (3.4)

[SOURCE: ISO 17575-1:2016, 3.13]

3.15

road section charging

tolling principle where the fee is due if predefined sections of roads are used

[SOURCE: ISO 17575-1:2016, 3.14]

3.16

toll

charge, tax or duty levied in connection to using a vehicle in a *toll domain* (3.20)

[SOURCE: ISO/TS 19299:2015, 3.42]

NOTE The definition is the generalization of the classic definition of a toll as a charge, a tax, or a duty for permission to pass a barrier or to proceed along a road, over a bridge, etc. The definition also includes fees regarded as an (administrative) obligation, e.g. a tax or a duty.

3.17

tolled area

geographic area where a *toll* (3.16) is charged for road usage

[SOURCE: ISO 17575-3:2016, 3.17]

3.18

toll context

logical view as defined by *attributes* (3.2) and functions of the basic elements of a toll scheme consisting of a single basic tolling principle, a spatial distribution of the *charge objects* (3.5) and a single behaviour of the related *Front End* (3.11)

[SOURCE: ISO 17575-1:2016, 3.17]

3.19

toll context data

information defined by the responsible Toll Charger necessary to establish the *toll* (3.16) due for using a vehicle on a particular *toll context* (3.18) and to conclude the toll transaction

[SOURCE: ISO 12855:2015, 3.15]

3.20

toll domain

area or part of a road network where a certain *toll regime* (3.21) is applied

[SOURCE: ISO 17573:2010, 3.18]

3.21

toll regime

set of rules, including enforcement rules, governing the collection of *toll* (3.16) in a *toll domain* (3.20)

[SOURCE: ISO 17573:2010, 3.20]

3.22

toll scheme

organizational view of a toll regime (3.21), including the actors and their relationships

[SOURCE: ISO 17575-3:2016, 3.22]

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

ADU	Application data unit (ISO 14906)
ASN.1	Abstract Syntax Notation One (ISO/IEC 8824-1)
ATS	Abstract Test Suite
BI	Invalid Behaviour
BV	Valid Behaviour
CCC	Compliance Check Communication (ISO 12813)
CN	Cellular network
DUT	Device Under Test
EFC	Electronic Fee Collection (ISO 14906)
GNSS	Global Navigation Satellite Systems
HMI	Human Machine Interface
ID	Identifier
OBE	On-board Equipment (ISO 14906)
PCTR	Proforma Conformance Test Report
PICS	Protocol Implementation Conformance Statements
TP	Test Purposes
TSS	Test Suite Structure
TTCN	Testing and Test Control Notation
VAT	Value Added Tax

5 Test Suite Structure

5.1 Structure

Table 1 shows the Test Suite Structure (TSS).

Table 1 — Test Suite Structure

Group	Type of DUT	Behaviour
Charge Report	Front End	Valid Behaviour
		Invalid Behaviour not applicable
Back End Feedback	Front End	Valid Behaviour
		Invalid Behaviour not applicable
Charge Report Response	Back End	Valid Behaviour
		Invalid Behaviour not applicable

5.2 Reference to conformance test specifications

This part of ISO 16407 takes into account already defined test purposes for conformance to the base standards by referencing them, so that

- for test purposes that are **identical** to those defined in this specification or the base standards conformance test cases 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,
- 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,
- for test purposes that are **specific** to ISO 17575-1:2016 a complete description is given, and
- 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, including the special notation and symbol conventions that shall be used. The data structures that shall be used are specified in Annex C and defined in ISO 17575-1:2016.

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 TP belongs to;

<dut> : type of DUT (i.e. FE or BE);

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>		
<i>applicable for FE</i>	CR	Charge Report
<i>applicable for FE</i>	BEF	Back End Feedback
<i>applicable for BE</i>	CRR	Charge Report Response
<dut> = type of DUT	FE	Front End
	BE	Back End
x = Type of testing	BV	Valid Behaviour Tests
	BI	Invalid Behaviour Tests
<nn> = sequential number	(01-99)	Test Purpose Number

5.4 Conformance test report

The supplier of the Front End and Back End, respectively, is responsible for providing a conformance test report.

The supplier of the Front End shall complete the proforma conformance test report (PCTR) for Front End as defined in Annex D.

The supplier of the Back End shall complete the proforma conformance test report (PCTR) for Back End as defined in Annex E.

Annex A (normative)

Test Purposes (TP) for Front End

A.1 Introduction

This annex contains the test purposes (TP) for the conformity evaluation of Front End to ISO 17575-1:2016.

A.2 TP symbols conventions

A special notation and symbol convention shall be 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
$XXX.rq \Rightarrow$	The Tester sends the XXX.rq to the DUT
$\Leftarrow YYY.rs$	The DUT sends the YYY.rs to the Tester
$\Leftarrow YYY.rs = \{\text{attribute1}, \text{attribute2}, \text{attribute3}\}$	The DUT sends the YYY.rs to the Tester. YYY.rs shall not consist of any attributes different than attribute1, attribute2, attribute3. If any of attributes in the list is optional it may be missing in YYY.rs.
$\Leftarrow YYY.rs = \{\text{attribute1} = \text{value1}\}$	The DUT sends the YYY.rs to the Tester with attribute1. Value of attribute1, i.e. value1 shall be stored by the tester and will be utilized in further TP steps.
$A \equiv B$	A “is equal to” B
$A \rightarrow B$	A “is transformed” into B
$\emptyset$	Means “empty” or “not set”
$A B$	A OR B
$x \rightarrow n^-$	Value of parameter x is very close to n and x is less than n
$x \rightarrow n^+$	Value of parameter x is very close to n and x greater than n

In addition, it has to be noted that the sequence of ADUs issued by the Front End is not constrained by ISO 17575-1:2016. This means that ADU cannot in general be forced to be generated by the DUT. To

execute the test purposes it may be needed to filter out some ADUs, as they might not be applicable for TP, e.g. some ADUs are applicable for different toll context. Such situation is illustrated in Figure A.1.

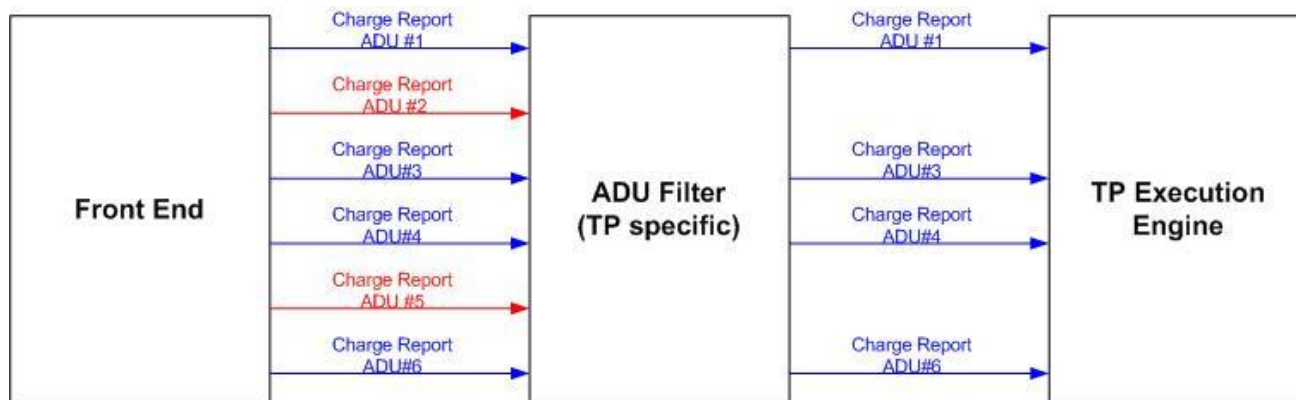


Figure A.1 — Handling of ADUs applicable for particular TP

A.3 Charge Report

These Test Purposes apply to data elements in Charge Report as claimed in ISO 17575-1:2016:

- Clause B.6/1 – Charge Report,
- Clause B.6/3 – Usage Statement,
- Clause B.7/1 – AuthenticatedChargeReport,
- Clause B.7/2 – protocolVersion,
- Clause B.7/3 – obId,
- Clause B.7/4 – vehicleLPNr,
- Clause B.7/8 – chargeReportFinalRecipient,
- Clause B.7/9 – timeOfReport,
- Clause B.7/10 – reportPeriod,
- Clause B.7/15 – chargeReportCounter,
- Clause B.7/16 – mileage,
- Clause B.9/1 – usageStatementID.

NOTE No test purposes for invalid behaviour are specified (BI), as ISO 17575-1:2016 does not specify any invalid behaviour of Front End.

A.3.1 BV test purposes

Test subgroup objective:

- to test the behaviour of the DUT with respect to data elements contained in Charge Report.

TP_CR_FE_BV_01	Protocol version handling		
TP Origin	Specific		
Reference	ISO 17575-1:2016, Clause 7.8.1		
Initial condition	Front End is initialized and has a toll context activated. Front End sends context data in the format defined by ISO 17575-1:2016. Authentication is not used.		
Stimulus and Expected Behaviour			
	DUT		Tester
1	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCAttributes }	⇒	
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
3			IF verify NOT “OK” THEN TP failed
4			Verify that protocolVersion is iso17575-1-2016

5			IF verify "OK" THEN TP passed ELSE TP failed ENDIF
6		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = ChargeReport.timeofReport ChargeReport.mileage ChargeReport.chargeReportCounter, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }

TP_CR_FE_BV_02	Verify that Time of Report is according to the local time
TP Origin	Specific
Reference	ISO 17575-1:2016, Clause 7.3.1
Initial condition	Front End received already Context Data with correctly set timeZone attribute and requesting presence of timeOfReport. Front End is initialized and has a toll context activated. Authentication is not used.

Stimulus and Expected Behaviour

	DUT		Tester
1	ChargeReport = { protocolVersion, obeId, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCAttributes }	⇒	

2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
3			IF verify NOT "OK" THEN TP failed
4			Verify that timeofReport is according to the local time
5			IF verify "OK" THEN TP passed ELSE TP failed ENDIF
6		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = ChargeReport.timeofReport ChargeReport.mileage ChargeReport.chargeReportCounter, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }

TP_CR_FE_BV_03	Verify that Charge Report Counter is incremented		
TP Origin	Specific		
Reference	ISO 17575-1:2016, Clause 7.3.4		
Initial condition	Front End received already Context Data requesting presence of chargeReportCounter. Front End is initialized and has a toll context activated. Authentication is not used.		
Stimulus and Expected Behaviour			
	DUT		Tester
1	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod,	⇒	

	<pre> versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter = v1, mileage, listOfCCCAttributes </pre>		
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
3			IF verify NOT "OK" THEN TP failed
4		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = v1, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }
5	ChargeReport = { protocolVersion, obeId, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter = v2, mileage, listOfCCCAttributes }	⇒	
6			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
7			IF verify NOT "OK" THEN TP failed
8			IF v2 > v1 THEN TP passed ELSE TP failed ENDIF
9		⇐	ChargeReportResponse = { chargeReportRespSender = any,

			dataReceived = v2, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }
--	--	--	--

TP_CR_FE_BV_04	Charge Report Counter Overflow
TP Origin	Specific
Reference	ISO 17575-1:2016, Clause 7.3.4
Initial condition	Front End received already Context Data requesting presence of chargeReportCounter. Front End is initialized and has a toll context activated. Next charge Report Counter value is a maximum value (i.e. 4294967295) Authentication is not used.

Stimulus and Expected Behaviour

	DUT		Tester
1	ChargeReport = { protocolVersion, obeId, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter = 4294967295, mileage, listOfCCCAttributes }	⇒	
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.

3			IF verify NOT "OK" THEN TP failed
4		←	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = 4294967295, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }
5	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter = v1, mileage, listOfCCCAttributes }	⇒	
6			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
7			IF verify NOT "OK" THEN TP failed
8			IF v1 equals to 0 THEN TP passed ELSE TP failed ENDIF
9		←	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = v1, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }

TP_CR_FE_BV_05	Verify that mileage is not decreasing
TP Origin	Specific

Reference	ISO 17575-1:2016, Clause 7.3.5		
Initial condition	Front End received already Context Data requesting presence of mileage. Front End is initialized and has a toll context activated. Authentication is not used.		
Stimulus and Expected Behaviour			
	DUT		Tester
1	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage = v1, listOfCCCAttributes }	⇒	
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
3			IF verify NOT "OK" THEN TP failed
4		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = v1, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }
5	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod.	⇒	

	versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter = v2, mileage, listOfCCCAttributes }		
6			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
7			IF verify NOT "OK" THEN TP failed
8			IF v2-v1 >= 0 THEN TP passed ELSE TP failed ENDIF
9		←	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = v2, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }

TP_CR_FE_BV_06	Verify that mileage counter restarts from zero in case of overflow		
TP Origin	Specific		
Reference	ISO 17575-1:2016, Clause 7.3.5		
Initial condition	Front End received already Context Data requesting presence of mileage. Front End is initialized and has a toll context activated. Mileage.dist is about to roll-over, e.g. its value is close to 4294967295 Authentication is not used.		
Stimulus and Expected Behaviour			
	DUT		Tester
1	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext	⇒	

	<pre> chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage → 4294967295, listOfCCCAttributes </pre>		
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
3			IF verify NOT "OK" THEN TP failed
4		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = ChargeReport.mileage, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }
5	Mileage has changed enough to overflow		
6	ChargeReport = { protocolVersion, obeId, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter = v1, mileage, listOfCCCAttributes }	⇒	
7			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
8			IF verify NOT "OK" THEN TP failed
9			IF v1 → 0* (i.e. mileage counts again from zero

			being close to zero value) THEN TP passed ELSE TP failed ENDIF
10		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = v1, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }

TP_CR_FE_BV_07	Verify that OBE ID is fixed
TP Origin	Specific
Reference	ISO 17575-1:2016, Clause 7.5.1
Initial condition	Front End received already Context Data requesting presence of obeId. Front End is initialized and has a toll context activated. Authentication is not used.

Stimulus and Expected Behaviour

	DUT		Tester
1	ChargeReport = { protocolVersion, obeId, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCAttributes }	⇒	
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements

			according to Table C.1.
3			IF verify NOT "OK" THEN TP failed
4		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = ChargeReport.timeofReport ChargeReport.mileage ChargeReport.chargeReportCounter, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }
5	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCCAttributes }	⇒	
6			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
7			IF verify NOT "OK" THEN TP failed
8		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = ChargeReport.timeofReport ChargeReport.mileage ChargeReport.chargeReportCounter, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }
...			
n	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract,	⇒	

	tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCAttributes }		
			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
			IF verify NOT "OK" THEN TP failed
			IF (obeId the same in every ChargeReport) THEN TP passed ELSE TP failed ENDIF
		←	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = ChargeReport.timeofReport ChargeReport.mileage ChargeReport.chargeReportCounter, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }

TP_CR_FE_BV_08	Verify that Vehicle License Plate Number is not used in Charge Report once it is used in lower level data elements		
TP Origin	Specific		
Reference	ISO 17575-1:2016, Clause 7.5.2		
Initial condition	Front End received already Context Data requesting presence of vehicleLPNr. Front End is initialized and has a toll context activated. Authentication is not used.		
Stimulus and Expected Behaviour			
	DUT		Tester

1	ChargeReport = { protocolVersion, obeId, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCAttributes }	⇒	
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
3			IF verify NOT "OK" THEN TP failed
4			IF (vehicleLPNr present in usageStatementList at any level) AND (vehicleLPNr present in ChargeReport) THEN TP failed ELSE TP passed ENDIF
5		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = ChargeReport.timeofReport ChargeReport.mileage ChargeReport.chargeReportCounter, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }

TP_CR_FE_BV_09	Verify the uniqueness of Usage Statement ID
TP Origin	Specific
Reference	ISO 17575-1:2016, Clause 7.6.3
Initial condition	Front End received already Context Data.

		Front End is initialized and has a toll context activated.	
		Authentication is not used.	
Stimulus and Expected Behaviour			
	DUT		Tester
1	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCAttributes }	⇒	
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
3			IF verify NOT “OK” THEN TP failed
4			IF each usageStatementId unique within usageStatementList THEN TP passed ELSE TP failed ENDIF
5			IF verify “OK” THEN TP passed ELSE TP failed ENDIF
6		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = ChargeReport.timeofReport ChargeReport.mileage ChargeReport.chargeReportCounter, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }

TP_CR_FE_BV_10	Verify that begin period is lower than end period in Report Period
TP Origin	Specific
Reference	ISO 17575-1:2016, Clause 7.3.2
Initial condition	Front End received already Context Data requesting presence of reportPeriod. Front End is initialized and has a toll context activated. Authentication is not used.

Stimulus and Expected Behaviour

	DUT		Tester
1	ChargeReport = { protocolVersion, obId, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCAttributes }	⇒	
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.1.
3			IF verify NOT "OK" THEN TP failed
4			IF (reportPeriod.beginOfPeriod < reportPeriod.endOfPeriod) THEN TP passed ELSE TP failed ENDIF
5		⇐	ChargeReportResponse = { chargeReportRespSender = any,

			<pre> dataReceived = ChargeReport.timeofReport ChargeReport.mileage ChargeReport.chargeReportCounter, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ </pre>
--	--	--	--

TP_CR_FE_BV_16	Verify that chargeReportFinalRecipient is the same in Context Data and Charge Report
TP Origin	Specific
Reference	ISO 17575-1:2016, Clause 7.5.6
Initial condition	Front End received already Context Data: — requesting presence of chargeReportFinalRecipient in tollContextOverview, usageStatement and chargeObjectId, AND — consisting of chargeReportFinalRecipient (which equals to v1) in tollContextPartitionOverview. Front End is initialized and has a toll context activated. Authentication is not used.

Stimulus and Expected Behaviour

	DUT		Tester
1	ChargeReport = { protocolVersion, obeld, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, usageStatementList, sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCAttributes }	⇒	
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements

			according to Table C.1.
3			IF verify NOT "OK" THEN TP failed
4			Verify that all chargeReportFinalRecipient elements used in ChargeReport equals to v1
5			IF verify "OK" THEN TP passed ELSE TP failed ENDIF
6		⇐	ChargeReportResponse = { chargeReportRespSender = any, dataReceived = ChargeReport.timeofReport ChargeReport.mileage ChargeReport.chargeReportCounter, versionsResponse = ∅, obeStatusForDriver = 0, accountUpdate = ∅ }

TP_CR_FE_BV_17	Verify that Authenticated Charge Report is used		
TP Origin	Specific		
Reference	ISO 17575-1:2016, Clause 7.2.1, 7.4.1		
Initial condition	Front End received already Context Data. Front End is initialized and has a toll context activated. Authentication is used using Authenticated Charge Report.		
Stimulus and Expected Behaviour			
	DUT		Tester
1	AuthenticatedChargeReport = { chargeReportPer, messageAuthenticator }	⇒	
2			Verify the structure of sent AuthenticatedChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.2.

3			IF verify NOT“OK” THEN TP failed ELSE TP passed ENDIF
---	--	--	--

TP_CR_FE_BV_18	Verify that authenticated usage statement is used		
TP Origin	Specific		
Reference	ISO 17575-1:2016, Clause 7.4.3		
Initial condition	Front End received already Context Data. Front End is initialized and has a toll context activated. Authentication is used for Usage Statement within a Charge Report.		
Stimulus and Expected Behaviour			
	DUT		Tester
1	ChargeReport = { protocolVersion, obId, vehicleLPNr, paymentMeans, serviceProviderContract, tollContext, chargeReportFinalRecipient, timeOfReport, reportPeriod, versionInfo, authenticatedUsageStatement , sumVatForThisSession, accountStatus, chargeReportCounter, mileage, listOfCCCAttributes }	⇒	
2			Verify the structure of sent ChargeReport , taking presence and absence of data elements into account and verify allowed values of present data elements according to Table C.3.
3			IF verify NOT “OK” THEN TP failed ELSE TP passed ENDIF