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Entwurf

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**Elektronische Gebührenerhebung –
Interoperable Anwendungsprofile für den Informationsaustausch
zwischen den Dienste-Versorgern und Mauterhebern;
Englische Fassung prEN 16986:2023**

Electronic fee collection –

Interoperable application profiles for information exchange between Service Provision and Toll Charging;

English version prEN 16986:2023

Perception de télépéage –

Profil d'application interopérabilité pour échange d'informations entre la prestation de service et la perception du péage;

Version anglaise prEN 16986:2023

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2023-01-20 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 215 Seiten

DIN-Normenausschuss Automobiltechnik (NAAutomobil)

Nationales Vorwort

Dieses Dokument (prEN 16986:2023) wurde vom Technischen Komitee ISO/TC 204 „Intelligent Transport Systems“ in Zusammenarbeit mit dem Technischen Komitee CEN/TC 278 „Intelligente Verkehrssysteme“, dessen Sekretariat von NEN (Niederlande) gehalten wird, erarbeitet.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-00-71 GA „Gemeinschaftsarbeitsausschuss NAAutomobil/DKE: Intelligente Verkehrssysteme“ des DIN-Normenausschusses Automobiltechnik (NAAutomobil).

Dieses Dokument ist derzeit zur parallelen Abstimmung vorgelegt.

Dieses Dokument enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 1/2004 nur die englische Originalfassung von EN 16986.

Dieses Dokument für den Informationsaustausch zwischen bereitgestellten Diensten zur Mauterhebung (z. B. ISO 12855:2015), ist eine sogenannte „Werkzeugnorm“. Das bedeutet, dass sie eine breitbandige Auswahl von Optionen bereitstellt, die zur Unterstützung verschiedener Bedürfnisse von Mauterhebern und Maut-Diensteanbietern verwendet werden kann.

Ziel dieses Dokumentes ist, eine Profilspezifikation zu erstellen, welche technische Interoperabilität zur Unterstützung des EFC-Informationsaustausches zwischen Maut Diensteanbietern und Mauterhebern nach den folgenden Mautgrundsätzen gewährleistet:

- basierend auf den Verfahrensabschnitten von Straßen,
- basierend auf Fahrten innerhalb von Geltungsbereichen;
- basierend auf den netzartigen Verfahrensabschnitten von Straßen.

Dieses Dokument wird vorrangig von Mauterhebern und Mautdiensteanbietern angewendet.

Aktuelle Informationen zu diesem Dokument können über die Internetseiten von DIN (www.din.de) durch eine Suche nach der Dokumentennummer aufgerufen werden.

Änderungen

Gegenüber DIN CEN/TS 16986:2016-12 wurden folgende Änderungen vorgenommen:

- a) überarbeitete interoperable Anwendungsprofile wurden und die Richtlinien der elektronischen Gebührenerhebung (EFC) und hauptsächlich verwendete Technologie angepasst;
- b) Datendefinitionen wurden angepasst, um Änderungen in den zugrundeliegenden Grundnormen (DIN EN 12855:2022) zu berücksichtigen;
- c) die Verwendung von ASN.1-Typen mit Nachfolgern wurde eingeführt;
- d) Begriffe wurden angepasst, um harmonisierte Begriffe zwischen allen EFC-Normen nach ISO/TS 17573-2 zu berücksichtigen;
- e) normative formale Spezifikation mit Daten-Profilbeschränkungen wurde eingefügt;
- f) Anhang E wurde überarbeitet.

Nationaler Anhang NA (informativ)

Begriffe

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

ISO und IEC stellen terminologische Datenbanken für die Verwendung in der Normung unter den folgenden Adressen bereit:

- IEC Electropedia: verfügbar unter <http://www.electropedia.org/>
- ISO Online Browsing Platform: verfügbar unter <http://www.iso.org/obp>

3.1

Attribut

en attribute

adressierbares Datenpaket, welches aus einem einzelnen Datenelement (3.13) oder strukturierten Sequenzen von Datenelementen besteht

[QUELLE: ISO/TS 17575-2:2020, 3.2]

3.2

Authentifizierung

en authentication

Sicherheitsmechanismus, der die Überprüfung der bereitgestellten Identität ermöglicht

[QUELLE: ISO/TS 17573-2:2020, 3.15]

3.3

Authentifikator

en authenticator

Daten, wenn möglich verschlüsselt, die zur *Authentifizierung* (3.2) verwendet werden

[QUELLE: ISO/TS 17573-2:2020, 3.16]

3.4

Verfügbarkeit

en availability

Merkmal der Zugänglichkeit und Nutzbarkeit nach einer Aufforderung einer autorisierten Einheit

[QUELLE: CEN ISO/TS 19299:2015, 3.6]

3.5

Grundnorm

en base standard

genehmigte internationale Norm, technische Spezifikation oder ITU-T-Empfehlung

[QUELLE: ISO/IEC TR 10000-1:1998, 3.1.1, modifiziert]

3.6

Abrechnungsdetails

en billing detail

notwendige Informationen zur Bestimmung oder Verifizierung der Gebührenhöhe zur Nutzung eines gegebenen Dienstes

[QUELLE: EN ISO 12855:2015, 3.1]

3.7

Kanal

en channel

Informationsübertragungsweg

[QUELLE: ISO 7498-2:1989, 3.3.13]

3.8

Abrechnungsobjekt

en charge object

geografisches- oder straßenbezogenes Objekt zur abrechnungsbezogenen Nutzung

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

3.9

Abrechnungsbericht

(en: charge report)

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

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

3.10

Abbuchungsdaten

en charging data

relevante Daten zur Nutzung eines bestimmten Dienstes

[QUELLE: EN ISO 12855:2015, 3.4]

3.11

Konformitätsprüfung

en conformance testing

Bewertung, um festzustellen, ob eine Implementierung den Anforderungen entspricht

3.12

Inhaltsdaten

en context data

Information, die vom verantwortlichen Mauterheber festgelegt wurde und notwendig ist, um die Mautgebühr zur Nutzung eines Fahrzeugs in einem bestimmten Mautbereich festzusetzen und um die Mauttransaktion abzuschließen

3.13

Datenelement

en data element

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

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

3.14

elektronische Gebührenerhebung

en electronic fee collection

Mautabbuchung mittels Elektronik

[QUELLE: EN ISO 12855:2015, 3.6]

3.15

Vollstreckung

en enforcement

Maßnahmen oder Aktionen zur Einhaltung von Gesetzen, Regulierungen oder Regeln

[QUELLE: CEN ISO/TS 19299:2015, 3.15]

3.16

Auswertung

en evaluation

systematischer Prozess, um festzustellen, wie Personen, Verhalten, Systeme oder Programme formal zugestimmten Zielvorstellungen und Anforderungen eingehalten haben

[QUELLE: ISO 10795:2011, 1.90]

3.17

Front End

en front end

Teile eines Mautsystems, bestehend aus einer OBE und wahrscheinlich einem optionalen Vertreter (Proxy), mit dem Mautinformationen und Nutzungsdaten zur Übermittlung an das Back-End gesammelt werden

[QUELLE: CEN ISO/TS 19299:2015, 3.20]

3.18

Erklärung zur Konformität der Implementierung

en implementation conformance statement

Erklärung bezogen auf die implementierte Leistungsfähigkeit und Optionen, die festlegt, in welchem Ausmaß die Implementierung zu einer gegebenen Spezifikation konform ist

[QUELLE: CEN ISO/TS 14907-2:2016, 3.6]

3.19

Prüfimplementierung

en implementaion under test

Implementierung eines oder mehreren Referenzmodell-Protokolls(en) (OSI, en: open system interconnection) in einer untergelagerten Nutzer/Anbieter-Beziehung, als Teil eines realen Systems, welches durch Prüfung beobachtet wird

3.20

international genormtes Profil

en international standardised profile

international abgestimmtes, harmonisiertes Dokument, welches ein oder mehrere Profil(e) beschreibt

[QUELLE: ISO/IEC TR 10000-1:1998, 3.1.2]

3.21

Interoperabilität

en interoperability

Fähigkeit eines Systems, Informationen auszutauschen und diese ausgetauschten Informationen vielfältig anzuwenden

[QUELLE: ISO/IEC TR 10000-1:1998, 3.2.1, modifiziert]

3.22

Aussteller

en issuer

Einheit, die für die Bearbeitung der Gebühren an den Nutzer verantwortlich ist

[QUELLE: ISO/TS 16785:2014, 3.9]

3.23

fahrzeuginterne Einrichtung

en on-board equipment

alle notwendigen fahrzeuginternen Einrichtungen die notwendig sind, um Funktionen zur elektronischen Gebührenerhebung und zur Kommunikationsdienste durchzuführen

3.24

Zahlungsanspruch

en payment claim

wiederkehrende Aussage bezüglich abgeschlossener Rechnungsdetails, die vom Bezahlten dem Bezahler zur Verfügung gestellt werden, welche die Höhe der Gebühr angibt und bewertet

[QUELLE: EN ISO 12855:2015, 3.10]

3.25

Profil

en profile

Menge von Anforderungen und ausgewählten Optionen von Grundnormen oder international genormten Profilen, die für eine spezifische Funktionalität verwendet werden

[QUELLE: ISO/IEC TR 10000-1:1998, 3.1.4, modifiziert]

3.26

Rolle

en role

Menge von Verantwortlichkeiten

[QUELLE: ISO 17573:2010, 3.13]

3.27

zu prüfendes System

en system under test

reales System, welches die zu prüfende Implementierung beinhaltet

[QUELLE: ISO/IEC 9646-1:1994, 3.3.103, modifiziert]

3.28

Prüfung

en test

spezifizierte Prüfprozedur zur Messung der Charakteristik einer Komponente oder eines Systems unter bestimmten Bedingungen

[QUELLE: CEN ISO/TS 14907-1:2015, 3.20]

3.29

Maut

en toll

Gebühr, Steuer oder Verpflichtung in Verbindung einer Fahrzeugbenutzung innerhalb eines Mautgebiets

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

3.30

Mauterheber

en toll charger

Instanz, die Maut zur Nutzung von Fahrzeugen in einem Mautgebiet einzieht

[QUELLE: ISO 17573-2:2020, 3.194]

3.31

Mautzusammenhang

en toll context

logischer Blick auf ein Mautschema, welcher Anhand von Attributen und Funktionen eines Basiselements definiert ist und aus einem einzelnen Basismautprinzip, der räumlichen Verteilung eines Abrechnungsobjektes und dem einzelnen Verhalten des betroffenen Front Ends besteht

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

3.32

Mauterklärung

en toll declaration

Aussage, um die Nutzung eines gegebenen Mautdienstes an einen Mauterheber zu vereinbaren

[QUELLE: ISO 17573:2010, 3.17, modifiziert]

3.33

Mautgebiet

en toll domain

Bereich oder Teil eines Straßennetzwerks, in der ein bestimmtes Mautregime angewendet wird

[QUELLE: ISO 17573:2010, 3.18, modifiziert]

3.34

Mautregime

en toll regime

Regelwerk, einschließlich Vollstreckungsregeln, welches die Erhebung von Maut in einem Mautgebiet regelt

[QUELLE: ISO 17573:2010, 3.20]

3.35

Mautschema

en toll scheme

organisatorischer Blick auf ein Mautregime inklusive der Akteure und deren Beziehungen

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

3.36

Maut-Dienstanbieter

TSP, en: toll service provider

Instanz, welche Mautdienste für ein oder mehrere Mautgebiet(e) anbietet

[QUELLE: ISO 17573:2010, 3.23, modifiziert]

3.37

Transaktion

en transaction

Ganzheit des Austausches von Informationen zwischen zwei, physikalisch separat kommunizierenden, Einrichtungen

[QUELLE: EN ISO 17575-1:2016, 3.21]

3.38

Transaktionstyp

en transaction typ

Bezeichner oder Menge von Transaktionen, die denselben Regeln für die auszutauschenden Dateneinheiten des Anwendungsprotokolls bezüglich Auslösungen, Zeitvorgaben, Inhalt und Sequenz unterliegen

3.39

Auslöser

en trigger

Ereignis, das einer Transaktion erlaubt zu beginnen

3.40

vertrauenswürdiges Objekt

en trust object

Informationsobjekt, welches zwischen Einheiten mit gegenseitigem Vertrauen ausgetauscht wird

[QUELLE: ISO 17573:2010, 3.28]

3.41

XML-Schema Festlegung

XSD, en: XML schema definition

formale Festlegung der Wechselbeziehung zwischen den Attributen und Elementen eines XML-Objektes

[QUELLE: W3C Empfehlung 28 Oktober 2004, XML Schema Part 0: Primer Second Edition]

English Version

Electronic fee collection - Interoperable application profiles for information exchange between Service Provision and Toll Charging

Perception de télépéage - Profil d'application
interopérabilité pour échange d'informations entre la
prestation de service et la perception du péage

Elektronische Gebührenerhebung - Interoperable
Anwendungsprofile für den Informationsaustausch
zwischen den Dienste-Versorgern und Mauterhebern

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 278.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 16986:2023) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede CEN/TS 16986:2016.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

In comparison to the previous edition, the following main technical changes have been made:

- updated interoperability application profiles tailored according to electronic fee collection (EFC) charging policies and primary used technologies;
- updated data definitions to reflect changes made to the underlying base standard, i.e., EN ISO 12855:2022;
- addition of a second level of the version identifier (i.e. minor version) of the abstract syntax notation one (ASN.1) module to provide enhanced support to standards that import data types from this document;
- introduction of use of imported ASN.1 types with successors (i.e. including all future minor versions);
- updated terms and definitions, including reference to ISO/TS 17573-2 as the primary source;
- inserted a normative formal specification of profiles’ restrictions on data, both as ASN.1 data types, and as XSD specifications as Annex A and renumbered other annexes consequently;
- updated informative Annex E on the “Use of this document for the European electronic toll service” (EETS), so as to reflect the recast of the EETS legislation (i.e. Directive (EU) 2019/520^[16] and the corresponding Commission Implementing Regulation^[18]).

Introduction

The CEN ISO Standard on *Electronic fee collection - Information exchange between service provision and toll charging* (i.e. EN ISO 12855) is a so-called toolbox standard. That means that it provides a large number of options that can be used to support various needs of toll chargers (TCs) and toll service providers (TSPs). As such, it provides useful but not sufficient support to ensure technical interoperability.

The aim of this document is to produce a profile specification that provides technical interoperability to support the EFC information exchange between TSPs and TCs according to the following tolling policies:

- based on traversing sections of roads;
- based on travelling within areas of territory;
- based on traversing meshed networks of roads.

This document covers the definition of interoperable application profiles (IAP) applicable for the use of EN ISO 12855:2022. These profiles define a specific coherent set of transactions, triggers, conditions, data elements, transfer mechanisms and supporting functions for an interoperable exchange of data between the back end systems of TCs and TSPs (in Europe).

This document defines profiles using the concept of “International Standardized Profiles (ISP)”, as defined in ISO/IEC TR 10000-1. The ISP concept is specifically suited for defining interoperability specifications where a set of base standards can be used in different ways. This is exactly the case for EN ISO 12855:2022, where the base standard allows for different choices that are not interoperable.

The principles of the ISP-concept can be summarized as follows:

- an ISP will make references only to base standards or other ISPs;
- the profile will restrict the choice of base standard options to the extent necessary to maximize the probability of interoperability (e.g. chosen classes, conforming subsets, options and parameter values of base standards);
- the ISP will not copy content of the base standards (in order to avoid consistency problems with the base standards);
- the profile will not specify any requirements that would contradict or cause non-conformance to the base standards;
- the profile may contain conformance requirements that are more specific and limited in scope than those of the base standards;
- conformance to a profile implies by definition conformance to a set of base standards, whereas conformance to that set of base standards does not necessarily imply conformance to the profile.

The present document is intended to provide support for the technical specification of the recast of the EETS legislation as laid down in the European Directive (EU) 2019/520 and in its Commission Delegated Regulation (EU) 2020/203 and Commission Implementing Regulation (EU) 2020/204. See Annex E on the “Use of this document for the EETS legislation.

This document will be complemented by standard EN 17154 that will specify how to evaluate implementations of EN 16986 (this document).

1 Scope

This document specifies interoperable application profiles for information exchanges between toll chargers (TCs) and toll service providers (TSPs), by selecting suitable options from the base standard EN ISO 12855:2022.

This document covers:

- exchange of information between back end systems of TCs and TSPs, e.g.:
 - charging related data (toll declarations, billing details, payment claims, payment announcements);
 - administrative data (trust objects, EFC context data, contact details for enforcement, etc.);
 - user related data (exception lists, user details, abnormal OBE information, CCC event data, user complaints);
 - confirmation data.
- transfer mechanisms and supporting functions;
- semantics of data elements;
- formal definitions (Annex A) of restrictions on data types w.r.t. the ASN.1 definitions in the base standard EN ISO 12855:2022 by introducing an XML Schema Definition (XSD) for each specified profile;
- implementation conformance statement proforma (Annex B), as a basis for evaluation of implementation for conformity to this document;
- an interoperability statement proforma (Annex C), as a basis for assessment of transactional interoperability of two technical implementations;
- a web service definition (Annex D) for the use of web services as communication technology.

The implementation of the underlying back end systems and their business processes is not covered. Therefore, the following aspects are outside the scope of this document:

- details about how back end systems use the authenticator data elements of the base standard to implement security;
- how to operate compliance checking and the enforcement process;
- commercial aspects;
- definition of non-functional features such as performance indicators, acceptable fault levels, availability of interfaces of TC and TSP, and reporting requirements.

This document further explains the correspondence between the European electronic toll service (EETS) legislation and this document (Annex E).

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.

EN ISO 12855:2022, *Electronic fee collection — Information exchange between service provision and toll charging*

EN ISO 17573-3, *Electronic fee collection — System architecture for vehicle related tolling — Part 3: Data dictionary*

IETF RC 959, *File Transfer Protocol [Oct 1985]*

IETF RFC 4217, *Securing FTP with TLS [Oct 2015]*

WSDL 1.1, *Web Services Description Language (WSDL) 1.1*¹⁾

3 Terms and definitions

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

3.1

attribute

addressable package of data consisting of a single *data element* (3.13) or structured sequences of data elements

[SOURCE: ISO/TS 17575-2:2020, 3.2]

3.2

authentication

security mechanism allowing verification of the provided identity

[SOURCE: ISO/TS 17573-2:2020, 3.15]

3.3

authenticator

data, possibly encrypted, that is used for *authentication* (3.2)

[SOURCE: ISO/TS 17573-2:2020, 3.16]

3.4

availability

property of being accessible and useable upon demand by an authorized entity

[SOURCE: CEN ISO/TS 19299:2015, 3.6]

3.5

base standard

approved international standard, technical specification or ITU-T Recommendation

[SOURCE: ISO/IEC TR 10000-1:1998, 3.1.1, modified]

1) <http://www.w3.org/TR/2001/NOTE-wsdl-20010315> [15.03.2001]

3.6

billing detail

information needed to determine or verify the amount due for the usage of a given service

[SOURCE: EN ISO 12855:2015, 3.1]

3.7

channel

information transfer path

[SOURCE: ISO 7498-2:1989, 3.3.13]

3.8

charge object

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

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

3.9

charge report

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

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

3.10

charging data

relevant data on the usage of a certain service

[SOURCE: EN ISO 12855:2015, 3.4]

3.11

conformance testing

assessment to determine whether an implementation complies with the requirements

3.12

context data

information defined by the responsible toll charger necessary to establish the toll due for using a vehicle on a particular toll context and to conclude the toll transaction

3.13

data element

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

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

3.14

electronic fee collection

fee collection by electronic means

[SOURCE: EN ISO 12855:2015, 3.6]

3.15

enforcement

measures or actions performed to achieve compliance with laws, regulations or rules

[SOURCE: CEN ISO/TS 19299:2015, 3.15]

3.16

evaluation

systematic process of determining how individuals, procedures, systems or programs have met formally agreed objectives and requirements

[SOURCE: ISO 10795:2011, 1.90]

3.17

front end

part of a tolling system consisting of OBE and possibly a proxy where tolling information and usage data are collected and processed for delivery to the back end

[SOURCE: CEN ISO/TS 19299:2015, 3.20]

3.18

implementation conformance statement

statement of capabilities and options that have been implemented defining to what extent the implementation is compliant with a given specification

[SOURCE: CEN ISO/TS 14907-2:2016, 3.6]

3.19

implementation under test

implementation of one or more open systems interconnection (OSI) protocols in an adjacent user/provider relationship, being part of a real system, which is to be studied by testing

3.20

international standardized profile

internationally agreed-to, harmonised document which describes one or more profiles

[SOURCE: ISO/IEC TR 10000-1:1998, 3.1.2]

3.21

interoperability

ability of systems to exchange information and to make mutual use of the information that has been exchanged

[SOURCE: ISO/IEC TR 10000-1:1998, 3.2.1 modified]

3.22

issuer

entity responsible for issuing the payment means to the user

[SOURCE: ISO/TS 16785:2014, 3.9]

3.23

on-board equipment

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

3.24

payment claim

recurring statement referring to concluded billing details made available to the payer by the payee indicating and justifying the amount due

[SOURCE: EN ISO 12855:2015, 3.10]

3.25

profile

set of requirements and selected options from base standards or international standardized profiles used to provide a specific functionality

[SOURCE: ISO/IEC TR 10000-1:1998, 3.1.4 modified]

3.26

role

set of responsibilities

[SOURCE: ISO 17573:2010, 3.13]

3.27

system under test

real system in which the implementation under test resides

[SOURCE: ISO/IEC 9646-1:1996, 3.3.103 modified]

3.28

test

procedure designed to measure characteristics of a component or system in specified conditions

[SOURCE: CEN ISO/TS 14907-1:2020; 3.20]

3.29

toll

charge, tax or duty levied in connection to using a vehicle in a toll domain

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

3.30

toll charger

entity which levies toll for the use of vehicles in a toll domain

[SOURCE: ISO 17573-2:2020, 3.194]

3.31

toll context

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

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

3.32

toll declaration

statement to declare the usage of a given toll service to a toll charger

[SOURCE: ISO 17573:2010, 3.17 modified]

3.33

toll domain

area or a part of a road network where a certain toll regime is applied

[SOURCE: ISO 17573:2010, 3.18 modified]

3.34

toll regime

set of rules, including enforcement rules, governing the collection of toll in a toll domain

[SOURCE: ISO 17573:2010, 3.20]

3.35

toll scheme

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

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

3.36

toll service provider

entity providing toll services in one or more toll domains

[SOURCE: ISO 17573:2010, 3.23 modified]

3.37

transaction

whole of the exchange of information between two physically separated communication facilities

[SOURCE: EN ISO 17575-1:2016, 3.21]

3.38

transaction type

identifier of a set of transactions that adhere to the same rules for the exchanged application protocol data units in terms of triggers, timings, content and sequence

3.39

trigger

event that allows a transaction to start.

3.40

trust object

information object that is exchanged between entities to ensure mutual trust

[SOURCE: ISO 17573:2010, 3.28]

3.41

XML schema definition

Formal definition of the interrelationship between the attributes and elements of an XML object.

[SOURCE: W3C Recommendation 28 October 2004, XML Schema Part 0: Primer Second Edition]

4 Abbreviated terms

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

ADU	Application Data Unit
ANPR	Automatic Number Plate Recognition
APCI	Application Protocol Control Information
APDU	Application Protocol Data Unit
CCC	Compliance Check Communication
CN	Cellular Network
CRL	Certificate Revocation List
DSRC	Dedicated Short-Range Communication
EETS	European Electronic Toll Service
EFC	Electronic Fee Collection
FE	Front End
FTP	File Transfer Protocol
GNSS	Global Navigation Satellite System
IAP	Interoperability Application Profile
IP	Internet Protocol
IUT	Implementation Under Test
MAC	Message Authentication Code
LAC	Localisation Augmentation Communication
LPN	Licence Plate Number
OBE	On-Board Equipment
OSI	Open Systems Interconnection
PAN	Personal Account Number
PICS	Protocol Implementation Conformance Statement
RSE	Roadside Equipment
SOAP	Simple Object Access Protocol
SU	Service User
SUT	System Under Test
TC	Toll Charger
TCP	Transmission Control Protocol
TSP	Toll Service Provider
UML	Unified Modelling Language
VPN	Virtual Private Network
XER	XML Encoding Rules

XML eXtensible Markup Language
XSD XML schema definition

5 Conformance

5.1 General

This clause describes the profiles that are specified by this document and the respective conformance requirements for TCs and TSPs. Profiles are fully specified in clauses 8 to 11.

5.2 Base standard

This document relies on EN ISO 12855:2022 as its base standard. It limits or restricts options and ranges of data types defined in the base standard. In some cases, it limits the range of data types imported into the base standard from other standards. These limitations are specified in the clauses for the common transactions (clauses 6 and 6.6) and the specified profiles (clauses 8 to 11), and are formally defined in Annex A.

The syntax of an InfoExchange application protocol data unit (APDU) shall be according to the ASN.1 definitions of the ASN.1 code in EN ISO 12855:2022 with the limitations and semantics relevant for the profile(s) to which conformance is claimed.

5.3 Main contents of the IAPs in this document

5.3.1 General requirements

The following general requirements are valid anywhere in this document:

- 1) The following application data units (ADUs) defined in EN ISO 12855:2022 are not supported by the profiles defined in this document, but can be used if specified in bilateral agreements:
 - a) ReportCccEventAdu;
 - b) MediaSettlementDataAdu;
 - c) StatusAdu.
- 2) The AckAdu shall be supported.
- 3) The genericRequest variant of the RequestAdu shall not be supported;
- 4) The cccEventRequest variant of the RequestAdu shall not be supported;
- 5) The mediaSettlementDataRequest variant of the RequestAdu shall not be supported.

An implementation that conforms to this document shall also implement one or more profiles herein specified.

5.3.2 Profiles

The variety of possible tolling policies in the various tolling domains leads to the need of the following different classes of profiles:

1. Sections: profiles for information exchange for tolling policies based on travelling on sections of roads.
2. AreaStaying: profiles for information exchange for tolling policies based on staying time within areas of territory.
3. AreaTravel: profiles for information exchange for tolling policies based on distances travelled within areas of territory.

4. Cordon: profiles for information exchange for tolling policies based on crossing borders between territories (cordon-crossing).
5. Meshed: profiles for information exchange for tolling policies based on travelling in meshed networks of roads.

Within a profile class, a further distinction is made in terms of the tolling technology that is used in a given tolling domain. The following technologies are recognized by this document:

1. **DSRC.** Vehicles' OBEs are tracked when passing at given locations where TC's DSRC RSEs are positioned.
2. **Autonomous.** Vehicle's OBEs are capable of autonomously track their positions and of communicating that information to TSPs back end systems.
3. **Automatic number plate recognition (ANPR).** Vehicles are not equipped with any on board tolling equipment. Their positions are tracked by detecting their registration information at given locations where TC's number plate detecting equipment is positioned.

In addition to that, a further distinction may be made according to the responsibilities fulfilled by the TC and TSP roles, particularly about who is **dominant**, that is, who has the role of leading the back end information exchange. This role is identified in the function of calculating the fee for the usage of a tolled road. Two cases are identified:

- 1) TC dominant: The TC calculates the fee due for the use of a tolled network element;
- 2) TSP dominant: The TSP calculates the fee due for the use of a tolled network element.

The resulting 30 theoretical combinations of tolling policies, tolling equipment and dominant responsibility are not all implemented in real systems, nor are they all realistic ones. Indeed, all combinations where the TSP plays a dominant role imply a vehicle detection technology capable of communicating with the TSP's system under TSP's responsibility, which, although technically feasible, is likely to be excluded for both DSRC- and ANPR- based technologies.

Table 1 shows practical combinations of tolling policies, tolling equipment and dominant responsibilities that may be considered for this document. For each feasible combination, a short description of the tolling policy is given. Empty cells indicate non-feasible combinations.

Table 1 — Tolling policies vs. tolling technologies

Tolling policy/Dominance	Technology		
	DSRC	Autonomous	ANPR
Sections/TC	Tolling by means of DSRC transactions for travelling on sections of roads, with the TC playing the dominant role.	Tolling by means of autonomous positioning recognition for travelling on sections of roads, with the TC playing the dominant role.	Tolling by means of ANPR positioning recognition for travelling on sections of roads, with the TC playing the dominant role.
Sections/TSP		Tolling by autonomous positioning recognition for travelling on sections of roads, with the TSP playing the dominant role.	

	Technology		
Tolling policy/Dominance	DSRC	Autonomous	ANPR
Area Staying/TC	Tolling by means of DSRC transactions for time of staying in identified areas, with the TC playing the dominant role.	Tolling by means of autonomous positioning recognition for time of staying in identified areas, with the TC playing the dominant role.	Tolling by means of ANPR positioning recognition for time of staying in identified areas, with the TC playing the dominant role.
Area Staying/TSP		Tolling by means of autonomous positioning recognition for time of staying in identified areas, with the TSP playing the dominant role.	
Area Travel/TC	Tolling by means of DSRC transactions for travelling in identified areas, with the TC playing the dominant role.	Tolling by means of autonomous positioning recognition for travelling in identified areas, with the TC playing the dominant role.	Tolling by means of ANPR positioning recognition for travelling in identified areas, with the TC playing the dominant role.
Area Travel/TSP		Tolling by means of autonomous positioning recognition for travelling in identified areas, with the TSP playing the dominant role.	
Cordon/TC	Tolling by means of DSRC transactions for crossing borders of identified areas, with the TC playing the dominant role.	Tolling by means of autonomous positioning recognition for crossing borders of identified areas, with the TC playing the dominant role.	Tolling by means of ANPR positioning recognition for crossing borders of identified areas, with the TC playing the dominant role.
Cordon/TSP		Tolling by means of autonomous positioning recognition for crossing borders of identified areas, with the TSP playing the dominant role.	
Meshed/TC	Tolling by means of DSRC transactions for travelling in a meshed network of roads, with the TC playing the dominant role.	Tolling by means of autonomous positioning recognition for travelling in a meshed network of roads, with the TC playing the dominant role.	Tolling by means of ANPR positioning recognition for travelling in a meshed network of roads, with the TC playing the dominant role.
Meshed/TSP		Tolling by means of autonomous positioning recognition for travelling in a meshed network of roads, with the TSP playing the dominant role.	

The supported combinations in Table 1 give rise to the specification of profiles, where specific provisions of the base standard EN ISO 12855 are chosen to support one combination of tolling policy and used tolling technology. Some combinations are not considered in this edition because of lack of specific requirements for them. Consequently, while leaving the specification of further profiles to subsequent editions of this document, only the profiles listed in Table 2 are herein specified. For each specified profile, a reference to tolling policy, to the primary tolling technology, and to the dominance is given, together with an indication of the clause where the profile is fully specified.

Table 2 — Profiles

Profile name	Tolling policy/dominance	Tolling technology	Clause
SectionDiscrete	Sections/TC	DSRC	8
SectionAutonomous	Sections/TC or Sections/TSP	Autonomous	9
MeshedDiscrete	Meshed/TC	DSRC	10
AreaDistanceAutonomous	Area Travel/TC	Autonomous	11

TCs shall select one of the profiles to be associated to a given toll domain.

TSPs shall support all profiles that are selected by the TCs with whom the TSP has a contract.

After selection of the applicable profile, TCs need to decide which of the profile's optional transaction types shall be supported and inform the TSPs about this selection. This selection is supported by the interoperability statement, i.e., the completed interoperability statement proforma (see Annex C).

5.3.3 Interaction protocol

5.3.3.1 Transaction types

The rules for exchanging individual ADUs (interaction protocol) are defined by transaction types. A transaction type specifies:

- The sequence of exchanged ADUs;
- Triggers initiating an exchange of a certain ADU (see 5.3.3.4);
- Timers between ADUs within the same transaction (see 5.3.3.5.2);
- Timers between ADUs belonging to different transactions of the same or different types (see 5.3.3.5.4);
- Restrictions on the use of data elements;
- Restrictions on the use of certain values within data elements.

Transaction types may be common to some or all profiles, or they may be specific of a given profile. In case significant differences in the usage of data elements are specified by different profiles for the same transaction type, that transaction type is not considered common. Any difference that alters the behaviour of a transaction type is considered “significant”.

Example: The BILLINGDETAILS_TC transaction type is a common transaction. The specification of the tolling information elements and the data types used to transfer billing details are different in the different profiles that use this transaction type. However, the way BILLINGDETAILS_TC transactions are performed by different profiles, and the resulting systems' behaviour are the same irrespective of the billing specific data definition.

Table 3 lists the transaction types specified in this document. For each transaction type, the following is indicated in Table 3:

- Whether the transaction type is common to more than one profile (indicated by YES), or specific to one profile(indicated by NO);
- the clause where the transaction type is specified, and
- which ADUs are used to implement it. The order in the list of ADUs presented in Table 3 follows the interaction sequence in transactions of the specific type. Detailed protocol interactions are specified for each single transaction type in its specific clause.

Each single profile specifies whether a given supported transaction is mandatory, optional or not supported.

Table 3 — Transaction types and used EN ISO 12855 ADUs

Transaction type	Used by multiple profiles	Clause	ADUs (EN ISO 12855)
USERDETAILS	YES	7.1	RequestAdu
			ProvideUserDetailsAdu
			AckAdu
LISTOFUSERS	YES	7.2	RequestAdu
			ProvideUserIdListAdu
			AckAdu
EXCEPTIONLIST	YES	7.3	ExceptionListAdu
			AckAdu
TRUSTOBJECTS	YES	7.4	TrustObjectAdu
			AckAdu
CONTRACTISSUERLIST	YES	7.5	ContractIssuerListAdu
			AckAdu
EFCCONTEXTDATA	YES	7.6	EfcContextDataAdu
			AckAdu
BILLINGDETAILS_TC	YES	7.7	BillingDetailsAdu
			AckAdu
BILLINGDETAILS_TSP	YES	7.8	BillingDetailsAdu
			AckAdu
PAYMENTCLAIM	YES	7.9	PaymentClaimAdu
			AckAdu
REPORTABNORMALLOBE	YES	7.10	ReportAbnormalObeAdu
			AckAdu
USERCOMPLAINT	YES	7.11	UserComplaintAdu
			AckAdu
			UserComplaintResponseAdu
			AckAdu

Transaction type	Used by multiple profiles	Clause	ADUs (EN ISO 12855)
QAINFO	YES	7.12	ReportQaAdu
			AckAdu
TOLLDECLARATION_SECT	NO	9.4.1	TollDeclarationAdu
			AckAdu
PAYMENTANNOUNCEMENT	NO	9.4.2	PaymentAnnouncementAdu
			AckAdu
TOLLDECLARATIONS_AREA	NO	11.4.1	RequestAdu
			TollDeclarationAdu
			AckAdu

5.3.3.2 General transaction requirements

ADUs shall be sent using InfoExchange APDUs as defined in EN ISO 12855:2022, with the specific restrictions stated for each transaction type. Each ADU shall be uniquely identified by an `aduIdentifier`.

Each transaction type is composed of an ordered sequence of APDU exchanges. Each APDU shall contain one or more ADUs which all have the same type. Because of that, in the transaction diagrams that illustrate transaction types, exchanged APDUs are named by the ADU types they are carrying.

The order of a given APDU exchange is indicated in what follows by a transaction sequence number.

The sequence of APDUs in a transaction type prescribes the flow of information between TC and TSP. It does not prescribe the actual flow of messages when implementing the transaction using the chosen communication technology.

5.3.3.3 Data requirements

Data element restrictions are specified within each transaction type, and further refined, when necessary, within each profile. An ADU used in different transaction types may have different restrictions according to the transaction type.

EXAMPLE: The restrictions for `NominalVehicleParameters` differ between the `ExceptionListAdu` and the `EfcContextDataAdu`.

Data requirements are textually specified in tables with three columns:

- Data element – The ASN.1 data element from EN ISO 12855:2022. Data elements are also described when they are imported from other standards by EN ISO 12855:2022 to an extent needed for interoperability.
- Restrictions – Specifies whether an optional data element in EN ISO 12855:2022 shall be unconditionally supported, supported under conditions, or not supported. Data elements which are marked as mandatory in the base standard are also mandatory for the profile. Restrictions can also specify precise values or range of values for data elements, whether they are optional or mandatory.
- Comment/Rationale – Informative information explaining the restriction, if applicable.

No further restrictions than those prescribed in EN ISO 12855 are applied to data elements not listed in the tables.

Data element restrictions are formally defined in Annex A.

5.3.3.4 Trigger conditions

Transactions of the transaction types described in clause 6 shall only be initiated by their respective triggers. The following rules apply for triggers:

1. Triggers in a transaction type are numbered sequentially within a transaction type.
2. A transaction that has been initiated by a trigger shall disregard all subsequent trigger conditions for that transaction.
3. Any APDU exchanges that are preceding an activated trigger shall not be considered as part of that transaction.

The triggers in the transactions of the selected profile shall be implemented as defined in the respective clauses.

Triggers are referenced to in the following way:

[transaction type name].TR_[TC/TSP]_[n]

where:

- [transaction type name] is the name assigned to the transaction type, for example EFCCONTEXTDATA, TRUSTOBJECTS etc. If it is evident from the context, the transaction type name may be omitted.
- TR is a prefix indicating “trigger”.
- [TC/TSP] indicates the entity triggering the transaction.
- [n] is the trigger sequence number in the transaction.

An example for a transaction sequence is given in Figure 1. As already indicated, interactions in the sequence diagrams are named after the ADU(s) carried in the APDUs.

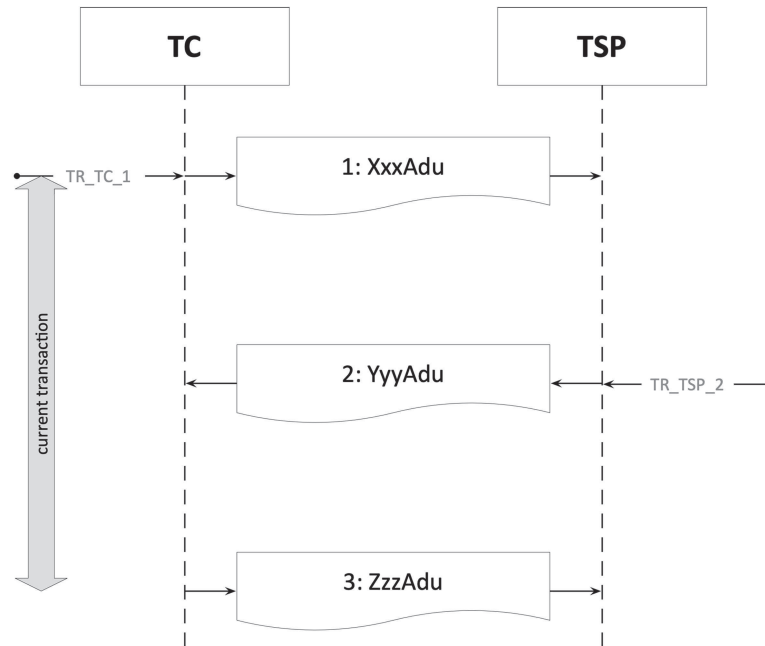


Figure 1 — Example of sequence diagram to describe a transaction and its triggers

The example in Figure 1 shows the general case where a transaction can be initiated by either side (TC or TSP) by means of either TR_TC_1 or TR_TSP_2. According to the rules for triggers:

1. If TR_TC_1 is fired, then:
 - a. All three APDU exchanges defined for the transaction are executed;
 - b. TR_TSP_2 is ignored.
2. If TR_TSP_2 is fired, then:
 - a. APDU exchange 1, carrying XxxAdu, is not executed
 - b. When TR_TSP_2 is fired, only APDU exchanges 2 and 3 are executed.

5.3.3.5 Timing behaviour

5.3.3.5.1 Introduction

Timings describe the temporal relationships between the sending of APDUs, and are divided into three groups, according to the involved APDUs being transferred:

- in the same transaction;
- between the start of a transaction and the start of another transaction of the same type;
- between any APDU exchange in one transaction and any APDU exchange in another transaction of the same or different type (generalisation of the previous case).

The present document specifies some timers for each defined transaction type that are deemed necessary for achieving interoperability. An implementation may specify additional timers, to be agreed upon via bilateral agreements between TC and TSP.

5.3.3.5.2 Timings within transactions

Timings within a transaction are referenced to in the following way:

[*transaction type name*].TIME[*m*].[MIN/MAX].[TC/TSP]

where:

- *[transaction type name]* is the name assigned to the transaction type,
- a keyword “TIME”, suffixed with a number $[m > 0]$ which indicates the timing related to the m^{th} APDU exchanged in the transaction,
- a keyword which indicates whether the timing expresses a minimum (MIN) or a maximum (MAX) time,
- a keyword that indicates whether the timer is specified by the TC or by the TSP.

TIMEm thus represents a data structure potentially consisting of four data elements: TIMEm_MIN_TSP, TIMEm_MAX_TSP, TIMEm_MIN_TC and TIMEm_MAX_TC. Both TC and TSP shall specify their values for the timers defined in a transaction in the Interoperability Statement (see Annex C) and shall decide which values will be used as TIMEm_MIN and TIMEm_MAX. The timers indicated in the sequence diagrams are intended to be the result of that agreement, so they will not carry the _TC nor the _TSP suffix.

TIMEm imposes the following conditions for APDU exchanges:

- It is “Not OK” sending a new APDU in the current transaction before TIMEm_MIN has elapsed after the sending of the last APDU. This could be caused by either the sender not yet being able to send an APDU or the recipient not yet being able to receive an APDU.
- It is “OK” sending an APDU between the timespan of TIMEm_MIN and TIMEm_MAX. If TIMEm_MIN is not defined in a transaction it is considered to be 0. If TIMEm_MAX is not defined in a transaction it is considered to be infinite.
- It is “Not OK” sending a new APDU in the current transaction after TIMEm_MAX has elapsed after the sending of the last APDU. This could be caused by either the sender no longer being able to send an APDU or the recipient no longer being able to receive an APDU.

An example of a transaction diagram with TIME1 and TIME2 between three consecutive APDU exchanges within a transaction is shown in Figure 2.

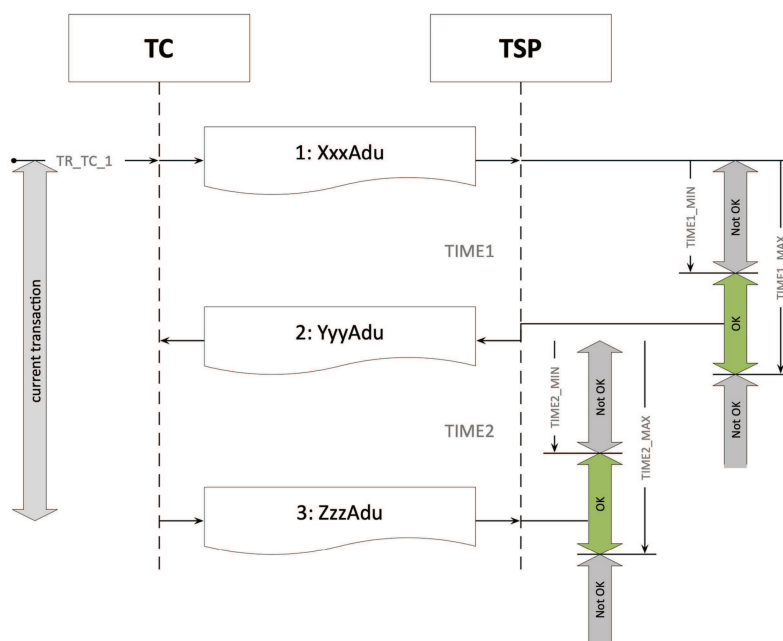


Figure 2 — Example of a sequence diagram for TIMEm

NOTE Previous editions of this document defined a TIME0 as the time between the last APDU exchange in a transaction and the first APDU exchange in the next transaction of the same type. The specification of general timings between transactions (see 5.3.3.5.4) covers the case of TIME0, which has consequently been removed.

5.3.3.5.3 Timings between starts of transactions of the same type

Of all possible timers between different transactions, TIMEA is further explicitly defined as the timing between the first APDU exchange of a transaction and the first APDU exchange of another transaction of the same type. The following Figure 3 explains the usage of TIMEA.

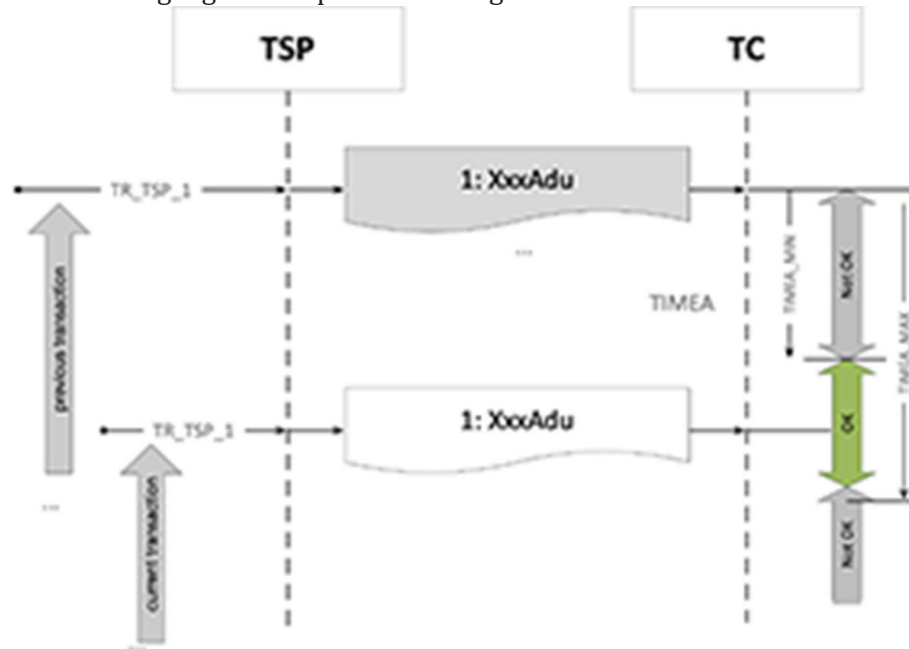


Figure 3 — Sequence diagram to illustrate TIMEA

The specification of TIMEA allows specifying conditions to manage parallel processing of transactions of the same type. Such conditions depend on the values of the TIME_m timers defined for the transaction:

- If the sum of TIME_m_MAX is smaller than the TIMEA_MIN, there is no parallel processing of transactions of the same type, as the previous transaction is always finished before it is allowed to start the current transaction;
- If the sum of TIME_m_MIN is smaller than the TIMEA_MIN and the sum of TIME_m_MAX is bigger than the TIMEA_MAX, parallel processing of transactions of the same type may occur, depending on the actual timing of execution;
- If the sum of TIME_m_MIN is bigger than the TIMEA_MAX, parallel processing of transactions of the same type may occur without further conditions, as the previous transaction will not finish before the current transaction is allowed to start.

In case the transaction is the first transaction of a specific transaction type in an implementation (i.e., there is no previous transaction of the same transaction type) then TIMEA is the time between system start and the first APDU exchange for the given transaction.

5.3.3.5.4 Generalized timings

Generalized timers express interrelationships between APDU exchanges between different transactions (of the same or different types).

These timers are referenced in the following way:

[transaction type name].TIME[o]_[MIN/MAX]_[TC/TSP]

where:

- [transaction type name] is the name assigned to the transaction type;
- a keyword “TIME”, suffixed with a letter of the Latin alphabet [$o > A$]. Each letter identifies a different set of time intervals for the specific transaction type;
- a keyword which indicates whether the timing expresses a minimum (MIN) or a maximum (MAX) time;
- a keyword that indicates whether the timer is to be specified by the TC or the TSP.

A generalized TIME_o is defined in what follows.

Given a transaction, TIME_o is the MIN (MAX) time between the sending of the m^{th} APDU within one transaction and the sending of the n^{th} APDU in the current transaction, be the transactions of the same or different type.

Figure 4 shows the generic TIME_o concept.

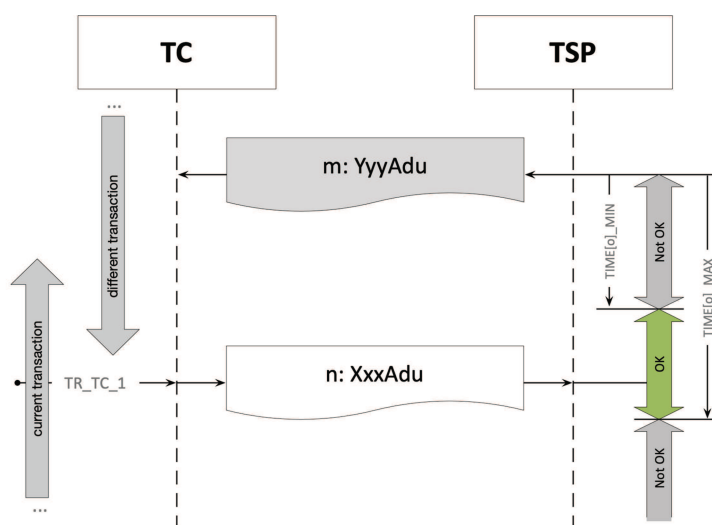


Figure 4 — Sequence diagram showing TIME[o] between transactions

5.4 Conformance requirements

5.4.1 Relations between this document and the base standard

The present document:

1. Limits the optionality present in the base standard it is derived from, by selecting part of the functions, and mandatorily supporting or mandatorily excluding a number of the optional data elements specified in it;
2. Extends the ranges and related semantics of some numerical codes by using CEN/ISO reserved ranges in the base standard.

In terms of limitations, the present document applies restrictions to the base standard by following the approach shown in Figure 5.

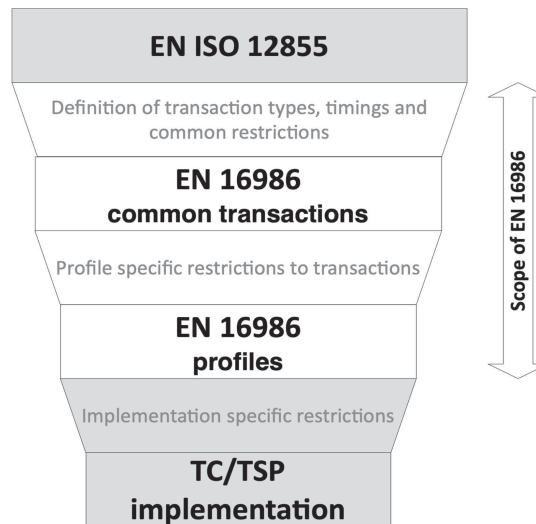


Figure 5 — Restrictions to the base standard

The first level of restrictions applied to the base standard is covered in clauses 6 and 6.6. These restrictions are valid for all profiles.

The second level of restrictions is applied to the already restricted common transactions. These restrictions may vary for each profile and are specified in clauses 8 to 11.

A third level of restrictions, which is outside the scope of this document, may further restrict the remaining optional data elements or values in a profile, if so deemed in individual implementations. These restrictions are typically specified in top-up specifications.

5.4.2 Conformance to profiles

A specific profile consists of:

- the list of the transaction types that shall be supported (see Table 3), both mandatory and optional. These include transaction types common to more than one profile and, possibly, profile-specific transactions;
- further specific restrictions to ADUs and data elements used in the selected transactions.

To be compliant to the **SectionDiscrete** profile, the implementation shall fulfil the requirements of the following clauses:

- Clause 5.3.1 "General requirements";
- Clause 6 "General restrictions";
- Clause 8 "SectionDiscrete profile".
- Clause 6.6 "APDU Transfer mechanisms".

To be compliant to the **SectionAutonomous** profile, the implementation shall fulfil the requirements of the following clauses:

- Clause 5.3.1 "General requirements";
- Clause 6 "General restrictions";
- Clause 9 "SectionAutonomous profile";

- Clause 6.6 “APDU Transfer mechanisms”.

To be compliant to the **MeshedDiscrete** profile, the implementation shall fulfil the requirements of the following clauses:

- Clause 5.3.1 “General requirements”;
- Clause 6 “General restrictions”;
- Clause 10 “MeshedDiscrete profile”;
- Clause 6.6 “APDU Transfer mechanisms”.

To be compliant to the **AreaDistanceAutonomous** profile, an implementation shall fulfil the requirements of the following clauses:

- Clause 5.3.1 “General requirements”;
- Clause 6 “General restrictions”;
- Clause 11 “AreaDistanceAutonomous profile”;
- Clause 6.6 “APDU Transfer mechanisms”.

5.5 Conformance statement

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented. Such a statement is called an implementation conformance statement (ICS). A supplier that claims conformity its implementation to this document shall complete the ICS proforma as specified in Annex B.

The evaluation of an implementation for conformity to this ICS can be made by executing conformity test procedures according to the specifications laid down in EN 17574.

NOTE The use of EN 17574 implies the use of other underlying test standards for evaluation of conformance to this document. EN 17154 is at the time of writing of this document planned through the revision and conversion of CEN/TS 17154-1:2019 to EN 17154.

5.6 Interoperability

While conformance to this IAP can be achieved by a single implementation, it is also important to check if **interoperability** has been achieved if two implementations are effectively interacting. Syntax and semantics are defined by the compliance statement, while dynamic transactional behaviour (timings) for exchanging APDUs are not.

In order to facilitate interoperability, **two compliant implementations** of this IAP need to compare their timing parameters according to the rules described in Annex C. If all the interoperability conditions are fulfilled, then the two implementations are also interoperable in terms of the dynamic behaviour of the transactions.

NOTE 1 Even if two implementations fulfil the proforma ICS templates as well the interoperability conditions, full interoperability may depend on a number of further aspects, e.g. business process implementations and the respective back ends or technical implications of contractual agreements, not covered by this IAP.

NOTE 2 An implementation could also support a cluster of several TCs which share a common specification for data exchange with TSPs.

Annex E describes how the requirements of the EETS decision are supported by the defined profiles.

6 General restrictions

6.1 General

This clause specifies restrictions on types and data elements common to all transaction types and all profiles in this document. It also specifies common choices for transmission mechanisms.

6.2 Coded values and ranges

Private use codes shall not be used except otherwise noted.

This document specifies a few additional numerical codes w.r.t. those defined in EN ISO 12855:2022 by using CEN/ISO reserved ranges. It is intended that these codes will be incorporated in a new edition of EN ISO 12855, and consequently be removed by a new edition of this document.

Table 4 lists the added codes for type `ApduReasonCode`

Table 4 — Added numerical codes for type `ApduReasonCode`

Code identifier	Code value	Comment/ Rationale
<i>transferMediumNameError</i>	11	Error recognized on the identification of the stream used to transfer the APDU. APDU rejected.
<i>apciError</i>	12	blocking error recognized on APCI. APDU rejected.
<i>integrityError</i>	13	content integrity compromised. APDU rejected.
<i>sequenceNumberError</i>	14	An APDU has been received, whose identifier is much greater than expected (in case an implementation relies on progressive identifiers to regulate the APDU flow). The maximum expected gap is to be agreed upon between TC and TSP via bilateral agreement. APDU rejected.
<i>apciWarning</i>	15	Some non-blocking errors have been discovered in a received APDU. APDU accepted.
<i>sequenceNumberWarning</i>	16	A gap has been discovered in identifier's sequence numbers, but not causing rejection of the APDU. APDU accepted.
<i>sequenceOrderWarning</i>	17	An APDU has been received, which is not in the expected chronological order with the previous APDUs. This is a non-blocking error. APDU accepted.

Table 5 lists the added codes for type `AduReasonCode`

Table 5 — Added numerical codes for type `AduReasonCode`

Code identifier	Code value	Comment/ Rationale
<i>exceptionListsDiscountMissingDiscountId</i>	408	There was no means to indicate a missing discount in a discount list.
<i>exceptionListDiscountJustificationIncorrect</i>	409	Documentation in support of discount incorrect
<i>exceptionListEntryClassificationIncorrect</i>	410	User classification incorrect
<i>exceptionListEntryUserIdentificationMissingOrExpired</i>	411	Provided user identification missing or expired

Code identifier	Code value	Comment/ Rationale
<i>exceptionListEntryUserResidenceNotAllowedForDiscounts</i>	412	User residence not entitling requested discount
<i>exceptionListEntryUserDeclarationErroneous</i>	413	User provided declaration incorrect
<i>exceptionListEntryOtherIncompatibleDiscountAlreadyActive</i>	414	Requested discount incompatible with already existing discount
<i>exceptionListEntryUserOutdatedDocumentation</i>	415	User documentation outdated or expired
<i>exceptionListEntryUserDocumentationNotCompatibleWithDiscount</i>	416	User documentation not entitling requested discount

Table 6 lists the added codes for type `LocationType`

Table 6 — Added numerical codes for type `LocationType`

Code identifier	Code value	Comment/ Rationale
<i>mountainRoad</i>	4	There was no means to indicate a mountain road.
<i>tunnel</i>	5	There was no means to indicate a tunnel.
<i>bridge</i>	6	There was no means to indicate a bridge.
<i>parking</i>	7	There was no means to indicate a parking.
<i>ferry</i>	8	There was no means to indicate a ferry.

Table 7 lists the added codes for type `QualityParameterStatus`

Table 7 — Added numerical codes for type `QualityParameterStatus`

Code identifier	Code value	Comment/ Rationale
<i>parameterValueNotAvailable</i>	8	There was no means to indicate a missing QA information.

Table 8 lists the added codes for type `EfcContextMarkVersion`.

Table 8 — Added numerical codes for type `EfcContextMarkVersion`

Code identifier	Code value	Comment/ Rationale
<i>iso12813Version2022</i>	45	Indicates further version of ISO 12813
<i>iso13141Version2022</i>	84	Indicates further version of ISO 13141

Table 9 lists the added codes for type `UserStatus`.

Table 9 — Added numerical codes for type `UserStatus`

Code identifier	Code value	Comment/ Rationale
<i>notToBeDisclosed</i>	7	Not disclosed because of privacy reasons
<i>userDataNotAvailable</i>	8	User data no longer available

Table 10 lists the added codes for type `AbnormalObeReasonCode`.

Table 10 — Added numerical codes for type `AbnormalObeReasonCode`

Code identifier	Code value	Comment/ Rationale
<i>revokeDiscountToUser</i>	22	TC indicates user not to be granted a discount any longer
<i>userNotLiableToToll</i>	23	TC indicates user not liable to toll any longer
<i>grantDiscountToUser</i>	24	TC indicates user eligible for discount
<i>insufficientPrepaidBalance</i>	25	TC indicates insufficient balance in a prepaid OBE

Table 11 lists the added codes for type `UserParameterRequest`

Table 11 — Added numerical codes for type `UserParameterRequest`

Code identifier	Code value	Comment/ Rationale
<i>cO2EmissionValueLoad</i>	29	Needed to apply CO2 charging according to EuroVignette EU directive
<i>initialVehicleRegistrationDate</i>	30	Needed to apply CO2 charging according to EuroVignette EU directive
<i>euVehicleGroup</i>	31	Needed to apply CO2 charging according to EuroVignette EU directive
<i>engineDetails</i>	32	Needed to apply CO2 charging according to EuroVignette EU directive
<i>cabType</i>	33	Needed to apply CO2 charging according to EuroVignette EU directive
<i>euCO2EmissionClass</i>	34	Needed to apply CO2 charging according to EuroVignette EU directive

Table 12 lists the added codes for type `ExceptionListReasonType`.

Table 12 — Added numerical codes for type `ExceptionListReasonType`

Code identifier	Code value	Comment/ Rationale
<i>invalidatedPaymentMeans</i>	30	The payment means for the identified user has been invalidated.
<i>insufficientPrepaidBalance</i>	31	The TSP signals an insufficient balance in a prepaid account.
<i>whiteListChangedPan</i>	32	The TSP signals a changed PAN on the white list
<i>whiteListChangedContractSerialNumber</i>	33	The TSP signals a changed contract serial number on the white list
<i>whiteListChangedLicencePlate</i>	34	The TSP signals a changed licence plate on the white list
<i>whiteListChangedObu</i>	35	The TSP signals a changed OBU on the white list
<i>whiteListChangedCustomerId</i>	36	The TSP signals a changed customer id on the white list

Table 13 lists the added codes for type `CertificateType`.

Table 13 — Added numerical codes for type `CertificateType`

Code identifier	Code value	Comment/ Rationale
<i>certTcHttpsAuth</i>	11	TC HTTPS Client Authentication Certificate

Code identifier	Code value	Comment/ Rationale
certTspHttpAuth	12	TSP HTTPS Client Authentication Certificate

6.3 Extended data types

6.3.1 General

The ASN.1 extension feature of data types, which is symbolized the ellipsis (..) shall not be used unless otherwise specified.

6.3.2 NominalVehicleParameters

In order to support the new EU EuroVignette Directive 2022/362^[19], this document extends the NominalVehicleParameters data type w.r.t. the definition in EN ISO 12855:2022 by adding a few data elements. Such extension is formally possible by using the ASN.1 extension feature symbolised by the ellipsis (...) in the data type definition. The extended NominalVehicleParameters data type is shown in Table 14. Added data elements are shown in **boldface**. It is expected that the extended NominalVehicleParameters data type will be incorporated in a new edition of EN ISO 12855, and consequently be removed in a new edition of this document.

Table 14 — Extended NominalVehicleParameters fields

Field name	Data type/data description	m/o
vehicleClasses	List (ASN.1 SEQUENCE OF) of elements of type VehicleClass	m
vehicleTrainAxles	List (ASN.1 SEQUENCE OF) of elements of type INTEGER ranging from 0 to 15	o
euroValues	List (ASN.1 SEQUENCE OF) of elements of type EuroValue	o
copValues	List (ASN.1 SEQUENCE OF) of elements of type CopValue	o
engineCharacteristics	List (ASN.1 SEQUENCE OF) of elements of type EngineCharacteristics	o
vehicleCategoryType	List (ASN.1 SEQUENCE OF) of elements of type VehicleCategoryType	o
co2EmissionValuesLoads	List (ASN.1 SEQUENCE OF) of elements of type CO2EmissionValueLoad	o
initialVehicleRegistrationDates	List (ASN.1 SEQUENCE OF) of elements of type InitialVehicleRegistrationDate	o
euVehicleGroups	List (ASN.1 SEQUENCE OF) of elements of type EuVehicleGroup	o
engineDetails	List (ASN.1 SEQUENCE OF) of elements of type EngineDetails	o
cabTypes	List (ASN.1 SEQUENCE OF) of elements of type CabType	o
vehicleIdentificationNumbers	List (ASN.1 SEQUENCE OF) of elements of type VehicleIdentificationNumber	o
co2Classes	List (ASN.1 SEQUENCE OF) of elements of type Co2Class	o

Field name	Data type/data description	m/o
chassisTypes	List (ASN.1 SEQUENCE OF) of elements of type ChassisType	o
wheelsConfigurations	List (ASN.1 SEQUENCE OF) of elements of type WheelsConfiguration	o
vehicleTechnicalPermissibleMaxLadenMasses	List (ASN.1 SEQUENCE OF) of elements of type VehicleTechnicalPermissibleMaxLadenMass	o

The formats and semantics of the inserted data elements are explained in what follows. It is expected that these data elements, when not already there, be defined in a new version of EN ISO 17573-3, and subsequently imported in a new edition of EN ISO 12855.

Co2EmissionValuesLoads may optionally be used to specify as an **INTEGER** the CO2 emission value of a vehicle in g/tkm. The value is encoded in 0.01g steps.

InitialVehicleRegistrationDates may optionally be used to specify as a **DateCompact** the initial registration date of vehicle to allow calculate the date of a re-evaluation of the EU CO2 Emission class.

EuVehicleGroups may optionally be used to specify the vehicle group. It is made of the following fields:

- **mainEuVehicleGroup** shall be used to specify the main vehicle group range using an **INTEGER** ranging from 1 to 17 according to (EU) 2017/2400^[20].
- **subgroup** may optionally be used to specify as a **UTF8String** of 2 characters a sub group for certain main vehicle groups according to (EU) 2019/1242^[21].

EngineDetails may optionally be used to specify engine capacity and engine power. It is imported from EN ISO 17573-3.

CabType may optionally be used to specify as an **INTEGER** the type of the cabin of a vehicle according to (EU) 2019/1242.

VehicleIdentificationNumbers may optionally be used to specify as a **VisibleString** the vehicle identification number.

CO2Class may optionally be used to specify as an **INTEGER** ranging from 1 to 5 the CO2 emission class.

ChassisType may optionally be used to specify as an **INTEGER** ranging from 0 to 1 the type of chassis of the vehicle.

WheelsConfiguration may optionally be used to specify the wheels configuration. It is made of the following fields:

- **numberOfWheels** shall be used to specify the number of wheels of the vehicle as an **INTEGER** ranging from 1 to 15.
- **numberOfDrivenWheels** shall be used to specify the number of driven wheels of the vehicle as an **INTEGER** ranging from 1 to 15.
- **numberOfSteeredWheels** may optionally be used to specify the number of steering wheels of the vehicle as an **INTEGER** ranging from 1 to 15.
- **rearWheelsSteeringType** may optionally be used to specify the type of rear steering wheels of the vehicle as an **INTEGER** ranging from 1 to 3 with the following meanings: noRearWheels, foreMostRearWheels, rearMostRearWheels, allRearWheels.

VehicleTechnicalPermissibleMaxLadenMass may optionally be used to specify as an INTEGER ranging from 0 to 65536 the max laden mass (in kilograms) permitted for the vehicle.

6.3.3 UserParameterResponseDetails

In order to support the new EU EuroVignette Directive 2022/362^[19], this document extends the UserParameterResponseDetails data type w.r.t. the definition in EN ISO 12855:2022 by adding a few data elements. Such extension is formally possible by using the ASN.1 extension feature symbolised by the ellipsis (...) in the data type definition. The UserParameterResponseDetails data type is a selection (ASN.1 CHOICE) among several possible data types. The list of UserParameterResponseDetails data types is shown in Table 15. Added data types are shown in **boldface**. It is expected that the extended UserParameterResponseDetails data type will be incorporated in a new edition of EN ISO 12855, and consequently be removed in a new edition of this document. The definitions of the added data types are specified in 6.3.2.

Table 15 — Extended UserParameterResponseDetails fields

Data element	Id	Data type/data description
contractSerialNumber	[1]	ContractSerialNumber
contractValidity	[2]	ContractValidity
driverCharacteristics	[3]	DriverCharacteristics
efcContextMark	[4]	EfcContextMark
environmentalCharacteristics	[5]	EnvironmentalCharacteristics
engineCharacteristics	[6]	EngineCharacteristics
equipmentObuId	[7]	EquipmentObuId
equipmentStatus	[8]	EquipmentStatus
paymentMeans	[9]	PaymentMeans
paymentMeansBalance	[10]	PaymentMeansBalance
payUnit	[11]	PayUnit
personalAccountNumber	[12]	PersonalAccountNumber
provider	[13]	Provider
receiptContract	[14]	ReceiptContract
validityOfContract	[15]	ValidityOfContract
vehicleAuthenticator	[16]	VehicleAuthenticator
vehicleClass	[17]	VehicleClass
vehicleDimensions	[18]	VehicleDimensions
vehicleLicencePlateNumber	[19]	VehicleLicencePlateNumber
vehicleIdentificationNumber	[20]	VehicleIdentificationNumber
vehicleWeightLaden	[21]	VehicleWeightLaden
vehicleWeightLimits	[22]	VehicleWeightLimits
vehicleAxles	[23]	VehicleAxles
exhaustEmissionValues	[24]	ExhaustEmissionValues

Data element	Id	Data type/data description
dieselEmissionValues	[25]	DieselEmissionValues
userPostalAddress	[26]	UserPostalAddress
preferredUserLanguage	[27]	PreferredUserLanguage
equipmentIccId	[28]	EquipmentIccId
cO2EmissionValueLoad	[29]	CO2EmissionValueLoad
initialVehicleRegistrationDate	[30]	InitialVehicleRegistrationDate
euVehicleGroup	[31]	EuVehicleGroup
engineDetails	[32]	EngineDetails
cabType	[33]	CabType
euCO2EmissionClass	[34]	EuCO2EmissionClass

6.4 InfoExchange APDU

6.4.1 Information sender and information originator

The data elements `apduOriginator` and `informationSenderId` allow for two different communication architectures to be deployed for the exchange of information between TC and TSP:

- One in which the involved TC and TSP directly exchange information without any intermediary. In such a case, the `apduOriginator` and the `informationSenderId` elements contain the same value.
- One in which the involved TC and TSP exchange information indirectly via an intermediary, typically a service hub. The `apduOriginator` and the `informationSenderId` contain different values, corresponding, respectively, to the TC or TSP and to the intermediary.

The two possible communication architectures are depicted in Figure 6.

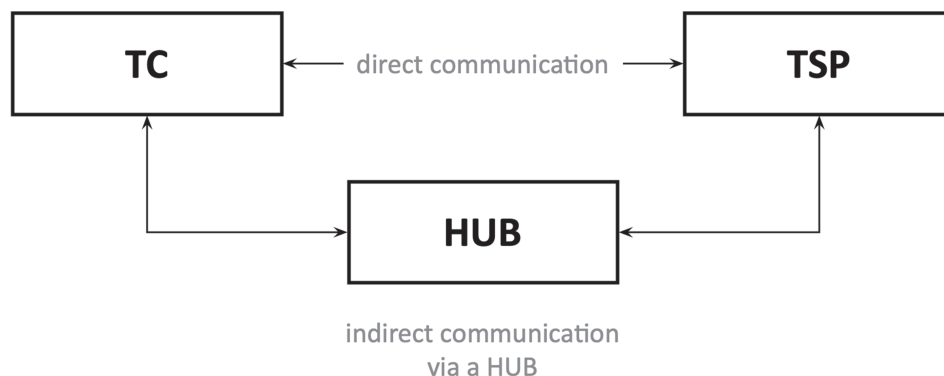


Figure 6 — Entities involved in the communication between TC and TSP

6.4.2 Restrictions in InfoExchangeContent data elements

The application protocol control information data elements of the APDU shall be according to the restrictions in Table 16 unless otherwise specified for the individual transactions.

Table 16 — Apci data elements restrictions

Data element	Restrictions	Comment/ Rationale
aidIdentifier	Private use values are allowed.	Mandatory in the base standard.
informationRecipientId	Value shall not be 0	Base standard allows 0 value with the semantics “if the value is 0, the PDU is meant to be sent to all connected entities”
previousApduId	Shall not be used	Optional in the base standard.
nextApduId	Shall not be used	Optional in the base standard. Multi-part APDUs to split up long ADUs are not supported.
inResponseToApduId	Condition: - Shall not be used in the first message in a transaction - Shall be specified in APDUs carrying ADUs in response of a RequestAdu in the same transaction. - May be specified in AckAdus. If specified, the apduOriginator value in RelatedAPDUId shall be equal to the apduOriginator in the APDU that is being responded to and the apduIdentifier value in RelatedAPDUId shall be equal to the apduIdentifier in the APDU that is responded to.	Optional in the base standard.
apduDate	Shall specify the time the APDU is generated.	Optional in the base standard.

No restrictions are imposed by this document on the contents of either apduOriginator or informationSenderId. However, a security issue may arise if improper values are used for these elements. Implementations should take care of this issue by, e.g., verifying the communication channel or by means of signatures to identify the real sender or originator of the APDU.

When the informationRecipientId value does not correspond to the actual receiver of the APDU, the receiver shall respond with an AckAdu containing apduReasonCode with value “recipientUnknown”.

When the informationSenderId value does not correspond to the actual sender of the APDU, the receiver shall respond with an AckAdu containing an apduReasonCode with the value “originatorRejected”.

The `inResponseToAduId` data element is used to identify messages that are chained. In case the `inResponseToAduId` contains a not acceptable value, an `AckAdu` with a reason code of value “*sequenceError*” shall be used.

6.4.3 InfoExchangeAuthenticator

Table 17 specifies the restrictions on the `infoExchangeAuthenticator`.

Table 17 — InfoExchangeAuthenticator restrictions

Data element	Restrictions	Comment/ Rationale
<code>infoExchangeAuthenticator</code>	Condition: 1. Mandatory, if authenticity or non-repudiation cannot be provided by the underlying communication services. 2. Otherwise, shall not be used.	Optional in the base standard.

6.5 AckAdu

6.5.1 General

The `AckAdu` is used in nearly all transactions in a similar way. To avoid duplication, this clause defines common restrictions to the `AckAdu` which is used in all occurrences in this document if no other extensions or modifications are specified for a specific transaction.

NOTE Although timing may be an important issue in acknowledgements, no fixed values for timeouts are specified in this document. Annex C gives the possibility of specifying acceptable timeout values.

6.5.2 Transaction protocol

The following rules apply for `AckAdu`s:

- 1) A negative `AckAdu` (where `AduReasonCode` is different from *apduOk*) shall reject the related APDU as a whole (no explicit partial rejections are allowed).
- 2) The receiver of a partially accepted negative `AckAdu` may correct and resend the rejected APDU/ADU. The process of correction and retransmission of faulty APDUs/ADUs is based on bilateral agreements between the TC and the TSP.
- 3) A positive `AckAdu` may be used to partially accept the related ADU only for the following ADUs:
 - a) `TollDeclarationsAdu`
 - b) `BillingDetailsAdu`
 - c) `PaymentClaimAdu`
 - d) `PaymentAnnouncementAdu`
- 4) A `RequestAdu` (e.g. to request `UserDetails`, `ListOfUsers` or `TollDeclarations`) shall not be acknowledged with an `AckAdu`, rather by an ADU carrying the requested information.

6.5.3 Syntax and semantics

The restrictions on syntax and semantics of the `AckAdu` shall be according to Table 18 unless specified otherwise for the individual transactions.

Table 18 — Restrictions to the AckAdu definition for all transactions

Data element	Restrictions	Comment/ Rationale
issues	Condition: - Mandatory, if issues need to be reported. - Shall not be used if no issues to be reported. See specific restrictions in Table 19.	Optional in the base standard
actionCode	Mandatory. Allowed values: Send	Optional in the base standard

Table 19 — Restrictions to the Issues definition in AckAdu for all transactions

Data element	Restrictions	Comment/ Rationale
issueAduIdentifier	Mandatory	Use AduIdentifier as sole addressing scheme
issueLocation	Mandatory	Optional in the base standard
issueContent	Mandatory	Optional in the base standard
issueCode	Only values that are explicitly defined or reserved for future CEN and ISO use in EN ISO 12855:2022 shall be used.	Private codes hinder interoperability.

6.6 APDU Transfer mechanisms

6.6.1 ASN.1 encoding

APDUs shall be encoded according to Annex A.

6.6.2 Generic transfer mechanisms

The application layers used to transfer APDUs shall be either:

- 1) web services as defined by the WSDL 1.1 specification in Annex D (using SOAP version 1.2). The APDUs shall be encapsulated by the tag < iap:Apdu > and < /iap:Apdu >
- 2) FTP, as defined by IETF RFC 959 over a virtual private network (VPN)
- 3) FTPS as defined by IETF RFC 4217

The VPN shall be defined according to bilateral agreements between TC and TSP.

6.6.3 Alternative transfer mechanisms for transaction type TRUSTOBJECTS

For data exchanges in a transaction of the type TRUSTOBJECTS, transfer may alternatively be carried out through other interfaces, for example physical handover of paper documents or USB-memories containing files, e-mail, etc. The protocol (data formats and exchange mechanisms) to be used in such cases shall be defined by bilateral agreements.

7 Common transactions

7.1 USERDETAILS - Retrieve and Provide User Details

7.1.1 Transaction sequence, triggers and timings

More than one USERDETAILS transaction may be started in parallel. TC and TSP may bilaterally agree on a maximum number of parallel transactions.

The sequence of APDUs carrying the specified type of ADU in the USERDETAILS transaction type shall be according to Table 20.

Table 20 — Transaction sequence for USERDETAILS

Transaction Sequence Number	ADU contained in APDU	Sender	Receiver
1	RequestAdu	TC	TSP
2	ProvideUserDetailsAdu	TSP	TC
3	AckAdu	TC	TSP

Figure 7 illustrates the transaction sequence, its triggers and timings.

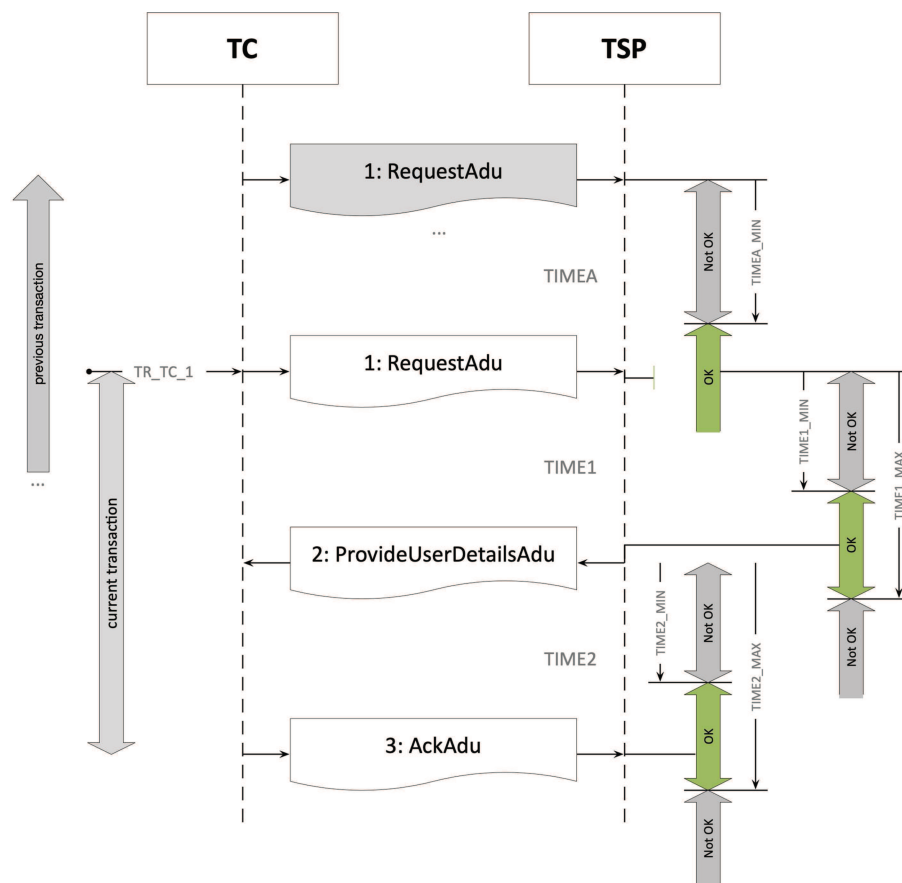


Figure 7 — Sequence diagram of the USERDETAILS transaction

Table 21 lists the possible triggers that can initiate the transaction type.

Table 21 — Triggers for the USERDETAILS transaction type

Trigger	Condition
TR_TC_1	A TC may initiate the trigger at any time after TIMEA_MIN

Both TC and TSP shall fill in forms defined in Annex C to specify their values for the timings defined in Table 22. Bilateral agreements determine which values will be actually used in operation. TC and TSP implementations shall be tested for conformance against their own specified values in Annex C.

Table 22 — Timings for USERDETAILS transactions

Timing	Definition
TIMEA_MIN	The minimum time between sending of two <code>RequestAdu</code> s in two consecutive USERDETAILS transactions
TIME1_MIN	The minimum time required to provide the requested user details in a <code>ProvideUserDetailsAdu</code> in the USERDETAILS transaction.
TIME1_MAX	The maximum time allowed to provide the requested user details in a <code>ProvideUserDetailsAdu</code> in the USERDETAILS transaction.
TIME2_MIN	The minimum time required to acknowledge the received <code>ProvideUserDetailsAdu</code> by an <code>AckAdu</code> .
TIME2_MAX	The maximum time allowed to acknowledge the provided <code>ProvideUserDetailsAdu</code> by an <code>AckAdu</code> .

7.1.2 Syntax and semantics

7.1.2.1 RequestAdu

The restrictions and semantics in this clause shall be applied to the instantiation of the `RequestAdu` type and its sub-types in the USERDETAILS transaction, and are shown in Table 23.

Table 23 — Restrictions to the `RequestAdu` definition for USERDETAILS

Data element	Restrictions	Comment/ Rationale
Choice of request type (<code>requestedAduType</code>)	<code>userDetailsRequest</code> value shall be used	
<code>aduIdentifier</code>	Mandatory	Optional in the base standard. Needed to reference the <code>RequestAdu</code> in the subsequent exchange.
<code>userId</code>	The element <code>equipmentIccId</code> shall not be used.	All parameters inside <code>userId</code> are optional in the base standard, however at least one shall be specified.
<code>listOfParametersRequested</code>	Mandatory. The sequence of <code>UserParameterRequest</code> shall contain at least one element. The value <code>icc</code> shall not be used.	Just requesting everything that is available (by omitting the presence of this attribute) is not allowed (support for data privacy).
<code>userDetailsRequestReason</code>	Mandatory	Optional in the base standard.

Data element	Restrictions	Comment/ Rationale
period	Optional. If used, values of beginOfPeriod and endOfPeriod shall be equal, signifying an exact moment in time.	Optional in the base standard.
actionCode	Mandatory. Allowed values: Send	Optional in the base standard.

7.1.2.2 ProvideUserDetailsAdu

At least one ADU of this type shall be sent in the APDU.

The semantics of the ProvideUserDetailsAdu shall be according to Table 24.

Table 24 — Restrictions to the ProvideUserDetailsAdu definition for USERDETAILS

Data element	Restrictions	Comment/ Rationale
userId	Shall contain all available elements in the set {pan, contractSerialNumber, licencePlateNumber, obeId} corresponding to what was requested in the originaluserIdRequest.	
statusFlag	Mandatory. Only values that are explicitly defined or reserved for future CEN and ISO use in EN ISO 12855:2022 shall be used.	Optional in the base standard
listOfUserParameters	Condition: Mandatory if statusFlag value is neither <i>noContractualRelation</i> , <i>notToBeDisclosed</i> <i>userDataNotAvailable</i> nor <i>noStatus</i> . See Table 25 for restrictions. Shall not be used otherwise.	Optional in the base standard.
actionCode	Mandatory. Allowed values: Send	Optional in the base standard

NOTE The base standard EN ISO 12855:2022 allows for one request for user details to be responded to with a ProvideUserDetailsAdu containing multiple UserParameterResponse-structures if period specifies a time interval. This document's version requires user parameters related to a specific time. Consequently, the cardinality of listOfUserParameters is limited to 1.

Table 25 — Restrictions to the UserParameterResponse definition for USERDETAILS

Data element	Restrictions	Comment/ Rationale
requestedUserParameter	Shall not be used	Optional in the base standard.

Data element	Restrictions	Comment/ Rationale
userParameterResponse	Mandatory. See values list in Table 15.	The data in userParameterResponse is only valid at the time of delivery and may change at any time.
userParameterStatus	Mandatory	Optional in the base standard.
userInfoValidityPeriod	Shall not be used	Optional in the base standard.

7.1.2.3 AckAdu

No further restrictions than those in 6.5 are provided for this transaction.

7.2 LISTOFUSERS – Provide a list of users

7.2.1 Transaction sequence, triggers and timings

More than one LISTOFUSERS transaction may be started in parallel. TC and TSP may bilaterally agree on a maximum number of parallel transactions.

The sequence of APDUs carrying the specified type of ADU in the LISTOFUSERS transaction type shall be according to Table 26. The transaction shall contain at least one ProvideUserIdListAdu. At least the userId of the request shall be sent back.

Table 26 — Transaction sequence for LISTOFUSERS

Transaction Sequence Number	ADU contained in APDU	Sender	Receiver
1	RequestAdu	TC	TSP
2	ProvideUserIdListAdu	TSP	TC
3	AckAdu	TC	TSP

Figure 8 illustrates the transaction sequence, its triggers and timings.

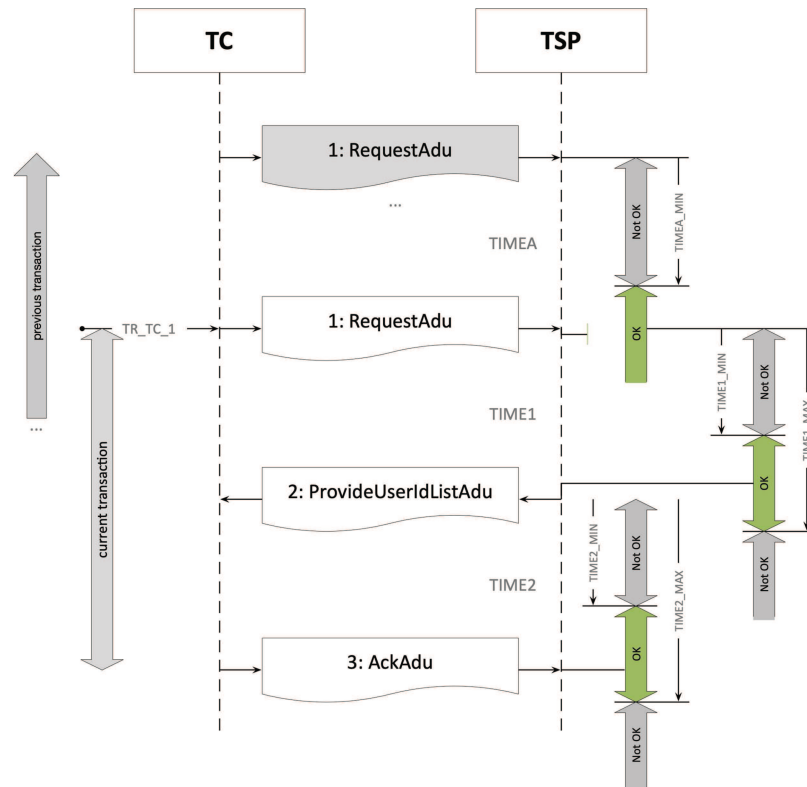


Figure 8 — Sequence diagram of the LISTOFUSERS transaction

Table 27 lists the possible triggers that can initiate the transaction type.

Table 27 —Triggers for the LISTOFUSERS transaction type

Trigger	Condition
TR_TC_1	A TC may initiate the trigger at any time after TIMEA_MIN

Both TC and TSP shall fill in forms defined in Annex C to specify their values for the timings defined in Table 28. Bilateral agreements determine which values will be actually used in operation. TC and TSP implementations shall be tested for conformance against their own specified values in Annex C.

Table 28 — Timings between different transactions

Timing	Definition
TIMEA_MIN	The minimum time between sending of two RequestAduS in two consecutive LISTOFUSERS transactions
TIME1_MIN	The minimum time required to provide the requested list of userIds in a ProvideUserIdListAdu in the LISTOFUSERS transaction.
TIME1_MAX	The maximum time allowed to provide the requested list of userIds in a ProvideUserIdListAdu in the LISTOFUSERS transaction.
TIME2_MIN	The minimum time required to acknowledge the ProvideUserIdListAdu by an AckAdu.

Timing	Definition
TIME2_MAX	The maximum time allowed to acknowledge the ProvideUserIdListAdu by an AckAdu.

7.2.2 Syntax and semantics

7.2.2.1 RequestAdu

The semantics of the RequestAdu shall be according to Table 29.

Table 29 — Restrictions to the RequestAdu definition for LISTOFUSERS

Data element	Restrictions	Comment / Rationale
CHOICE	Only userListRequest shall be used	
aduIdentifier	Mandatory	Optional in the base standard. Needed to reference the RequestAdu in the subsequent exchanges.
userIdRequestType	Allowed values: <i>allUserIdsToGivenCustomer</i>	
userId	Mandatory At least one of the attributes pan, licencePlateNumber, obeId or contractSerialNumber shall be present. equipmentIccId shall not be used.	
userIdRequestTime	Mandatory	According to EN ISO 12855:2022, the TSP shall answer the request based on data valid at the provided point of time and not at the time of the request.
actionCode	Mandatory. Allowed values: <i>Send</i>	Optional in the base standard

7.2.2.2 ProvideUserIdListAdu

The semantics of the ProvideUserIdListAdu shall be according to Table 30.

Table 30 — Restrictions to the ProvideUserIdListAdu definition for LISTOFUSERS

Data element	Restrictions	Comment / Rationale
originalUserIdRequestType	Only <i>allUserIdsToGivenCustomer</i> value allowed	
originalUserId	Mandatory	Optional in the base standard.