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Electronic fee collection — Interoperable application profiles for autonomous systems

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National foreword

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Electronic fee collection - Interoperable application profiles for autonomous systems

Perception du télépéage - Profil d'application d'interopérabilité pour les systèmes autonomes

Elektronische Gebührenerhebung - Interoperable Anwendungsprofile für unabhängige Systeme

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Foreword

This document (CEN/TS 16331:2012) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN.

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Introduction

This Technical Specification should be used by stakeholders of a group of electronic fee collection (EFC) regimes as a guide when planning to establish or extending an EFC cluster providing interoperability for tolled vehicles in all participating EFC domains.

The scope of this document covers the tolling principles for autonomous EFC systems.

The goal of an interoperable EFC cluster is to ensure that all tolled vehicles can be charged the due toll amount in all EFC domains. This can be achieved by requiring that all necessary equipment, whether in the tolled vehicles, the Toll Service Providers' central systems, the Toll Chargers' central systems and along the roadside in the EFC domains, conform to the same interface standards and to an Interoperable Application Profile, as defined in this Technical Specification.

The system architecture defined in ISO 17573 is the basis for all standards that relate to Electronic Fee Collection systems. It specifies the roles and responsibilities needed within an interoperable EFC cluster. Such a cluster is illustrated in Figure 1, and consists of multiple Toll Service Providers and multiple Toll Chargers. Each Toll Charger has its own EFC Domain and its own EFC regime. Conversely, each Toll Service Provider has a number of clients, who own vehicles and may be liable to pay toll in the EFC domains of the Toll Chargers.

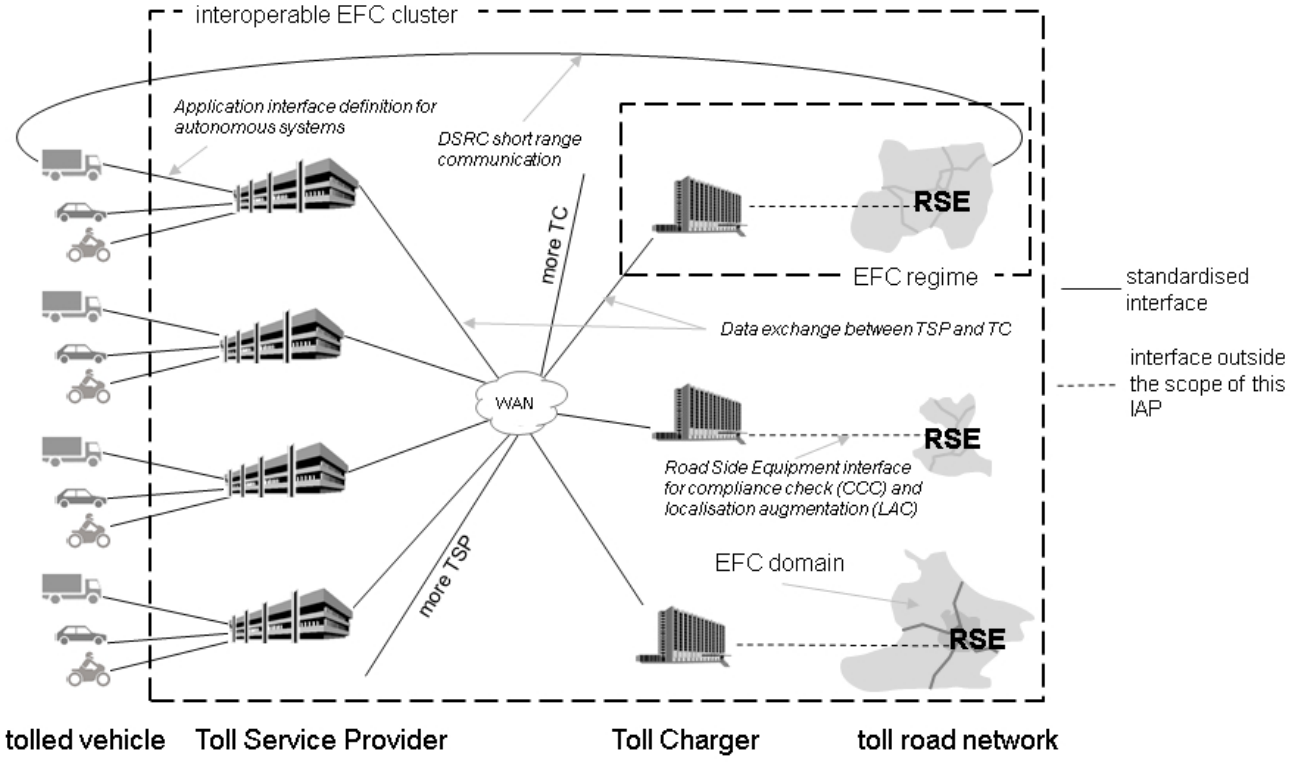

Figure 1 — Actors and interfaces within an interoperable EFC cluster

CEN has produced a set of standards that together specify a basis for EFC systems. This document refers to these standards as the 'base standards'. They are necessary to ensure technical interoperability between different EFC-systems, but in themselves they are not sufficient to achieve this, as they contain a large number of options and choices to be made in a concrete implementation.

Figure 2 shows the base standards and their relationships.

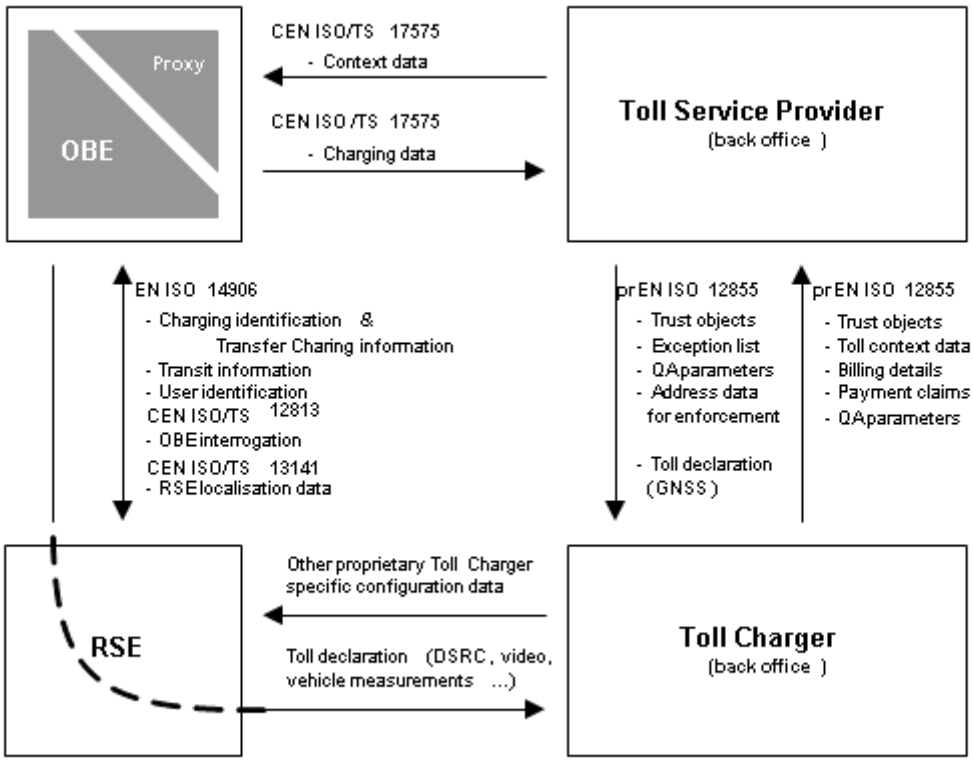

Figure 2 — Suite of EFC related standards

NOTE There may be one or more instances of each box representing an actor

This set of base standards includes the CEN ISO/TS 17575-suite, ISO 17573, EN ISO 12855, CEN ISO/TS 13141 and CEN ISO/TS 12813. These standards have the characteristic of toolbox standards, specifying messages and data elements, which - if used – are to be used in the prescribed way. However, these base standards contain many optional features that may or may not be implemented by different Toll Chargers or Service Providers. Therefore, the base standards alone do not guarantee interoperability between the systems of different actors without further restrictions of the use of optional features of these base standards. This is the purpose of this profile standard – to restrict the choices from the above listed set of base standards.

This Technical Specification defines a number of Interoperable Application Profiles (IAP) for autonomous Electronic Fee Collection systems, according to the concept of "International Standardised Profiles (ISP)" as defined in ISO IEC/TR 10000-1. Each profile provides a coherent set of choices from among the options in the base standards. A profile thus may be used to determine a concrete set of requirements for EFC constituents. When multiple EFC systems are based on the same profile, the profile will serve as a common technical platform for EFC interoperability. Which profile should be chosen will depend on the needs of all participants in this EFC cluster and on the outcome of negotiations between them.

The profiles in this Technical Specification were created in order to meet the requirements of early adoptions of the general principles of autonomous interoperable EFC clusters, such as the upcoming European Electronic Toll Service. This Technical Specification specifies also a methodology to define a customised profile if none of the specified profiles are acceptable to all participants in an interoperable EFC cluster.

Each Toll Service Provider taking part in an EFC cluster should be aware that he needs to implement all the features of the chosen profile. Therefore, it will generally be in the best interest of the Service Providers to select the simplest profile that is still acceptable to all Toll Chargers.

Toll Chargers within the same EFC cluster, however, still have the choice to use any of these features or not.

1 Scope

This Technical Specification defines a set of interoperable application profiles suitable to be used defining the overall functionality of an interoperable EFC cluster using autonomous vehicle equipment. Doing so, it also defines a way of defining further profiles for future use.

The profiles cover a wide range from simple toll road systems up to very complex tolling principles and tariff rules. An EFC cluster shall select and use one of these profiles covering the needs of all participating Toll Chargers.

The scope is limited to those base standards providing data elements or messages to be used specifically when defining the data exchange for autonomous tolling principles. This covers ISO 17573 and the base standards CEN ISO/TS 17575 parts 1 to 4, CEN ISO/TS 12813, CEN ISO/TS 13141 and those parts of EN ISO 12855 specifying messages which are only relevant for autonomous systems.

Figure 3 provides a graphical illustration of the scope of this Interoperable Application Profile which is based on the ISP concept according to ISO IEC/TR 10000-1.

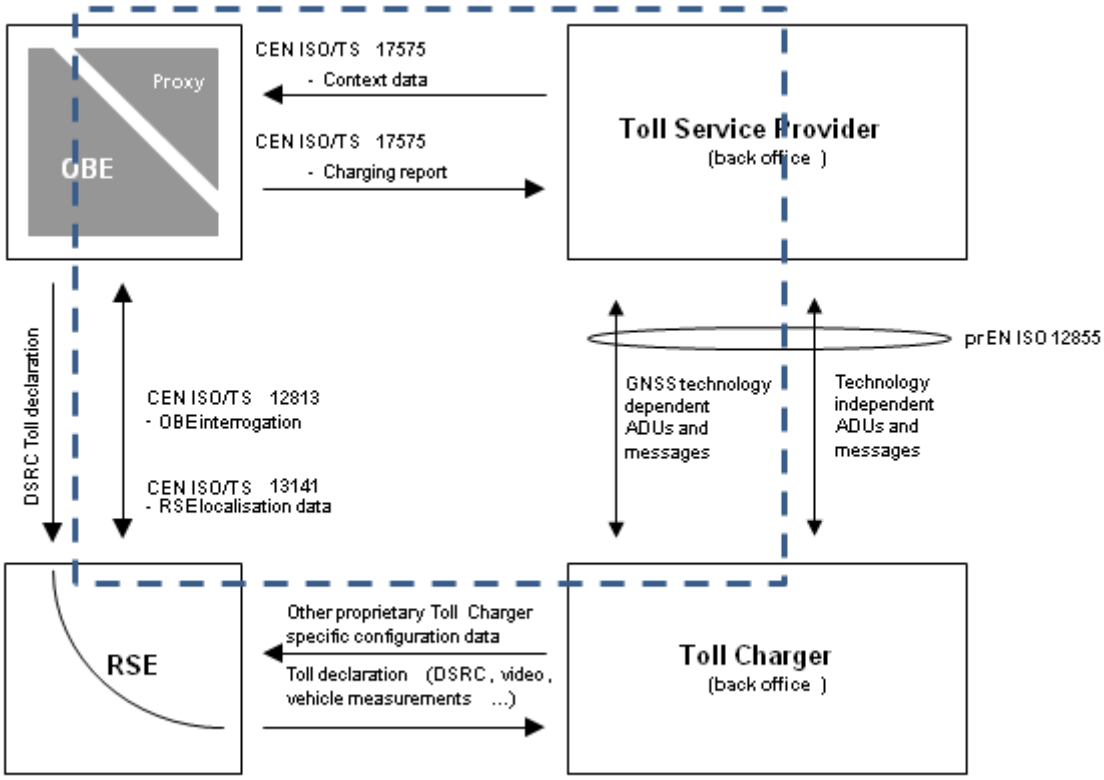

Figure 3 — The scope of this IAP covers the interfaces within the dotted lined box

For each specified profile, the conditional requirements resulting from the actual use of data elements being still optional according to this profile are specified in Annex A. A set of rules on how to re-use identifiers of a specific entity within the full chain of transactions is specified in Annex B and a protocol implementation conformance statement (PICS) proforma in Annex C.

Outside of the scope are:

— details on how to achieve security using the authenticator data elements of the base standards;

— how to operate the enforcement process;

— commercial aspects and the billing process;

— the handling of DSRC charging transactions;

— system monitoring and performance indicators;

— test standards;

— the initial configuration of the OBE.

2 Normative references

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

ISO 17573:2010, *Electronic fee collection - Systems architecture for vehicle-related tolling*

EN ISO 12855:2009, *Electronic fee collection – Information exchange between service provision and toll charging (ISO/DIS 12855:2009)*

CEN ISO/TS 12813:2009, *Electronic fee collection - Compliance check communication for autonomous systems (ISO/TS 12813:2009)*

CEN ISO/TS 13141:2010, *Electronic fee collection - Localisation augmentation communication for autonomous systems (ISO/TS 13141:2010)*

CEN ISO/TS 17575-1:2010, *Electronic fee collection - Application interface definition for autonomous systems - Part 1: Charging (ISO/TS 17575-1:2010)*

CEN ISO/TS 17575-2:2010, *Electronic fee collection - Application interface definition for autonomous systems - Part 2: Communication and connection to the lower layers (ISO/TS 17575-2:2010)*

CEN ISO/TS 17575-3:2011, *Electronic fee collection - Application interface definition for autonomous systems - Part 3: Context data (ISO/TS 17575-3:2011)*

CEN ISO/TS 17575-4:2011, *Electronic fee collection - Application interface definition for autonomous systems - Part 4: Roaming (ISO/TS 17575-4:2011)*

3 Terms and definitions

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

3.1
attribute
application information formed by one or by a sequence of data elements, used for implementation of a transaction

[SOURCE: EN ISO 14906:2011]

3.2
back end
generic name for the computing and communication facilities of the Service Provider and/or the Toll Charger

[SOURCE: CEN ISO/TS 17575-1:2010]

3.3
charge report
data structure transmitted from the Front End to the Back End to report road usage data and supplementary related information

[SOURCE: CEN ISO/TS 17575-1:2010]

3.4
context data
information defined by the responsible Toll Charger necessary to establish the toll due for circulating a vehicle on a particular Toll Domain and to conclude the toll transaction

[ISOURCE: SO 17573:2010]

3.5
context layout
group of attributes of the context data providing the geographic information of the EFC domain

3.6
EFC cluster
a group of toll schemes operating under a common agreement providing interoperability for vehicles equipped with an appropriate OBE and being contracted under a Toll Service Provider being part of the cluster

[SOURCE: CEN ISO/TS 17575-4:2011]

3.7
EFC domain
same as toll domain: area or part of a road network where a toll regime is applied

[SOURCE: ISO 17573:2010]

3.8
EFC regime
same as toll regime: set of rules, including enforcement rules, governing the collection of toll in a toll domain

[SOURCE: ISO 17573:2010]

3.9
front end
part(s) of the toll system where road usage data for an individual road user are collected, processed and delivered to the Back End

Note to entry The Front End comprises the on-board equipment and an optional proxy.

[SOURCE: CEN ISO/TS 17575-1:2010]

3.10
overview
attribute and group of data elements providing the information if an EFC context is relevant for a specific vehicle or not

3.11
relative time
point in time relative to a defined event e.g. the entrance of a vehicle into an EFC specific area in minutes and/or hours

3.12
roaming rules
set of attributes for Front Ends according to CEN ISO/TS 17575-4, defining the group of associated EFC contexts and their relationships; and/or for Back Ends according to EN ISO 12855, defining the relations for multi-context EFC domains

4 Abbreviations

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

ADU	Application Data Unit
CCC	Compliance Check Communication
DSRC	Dedicated Short Range Communication
EFC	Electronic Fee collection
GDF	Geographic Data File
GNSS	Global Navigation Satellite System
IAP	Interoperable Application Profile
IUT	Implementation Under Test
ISP	International Standardised Profile
LAC	Localisation Augmentation Communication
OBE	On Board Equipment
OBU	On Board Unit
OSD[1]	Overlapping Sectioned Roads tolling and Distance based Area pricing
OSDT[1]	Overlapping Sectioned Roads tolling and Distance and Time based Area pricing
OSDTC[1]	Overlapping Sectioned Roads tolling, Distance and Time based Area and Cordon pricing
PICS	Protocol Implementation Conformance Statement
SD	Short form for the profile covering Sectioned Roads tolling and Distance based Area pricing
SR	Short form for the profile covering Sectioned Roads tolling
RSE	Road Side Equipment
SP	Service Provider (Toll Service Provider)
SUT	System Under Test
TC	Toll Charger
TSP	Toll Service Provider

[1] Short form for the profile covering.

5 General profile independent IAP requirements

5.1 The principle defining EFC cluster supported regime characteristics using profiles

This Technical Specification shall be used specifying the supported frame of the functional characteristics of an EFC cluster. This includes the supported basic tolling principles as well as details of the tariff models and the formats and details of toll declarations to be reported to the Toll Chargers. Each participating EFC regime shall be described staying within the EFC cluster specific functional frame.

The frame of the functional details supported in an EFC cluster is defined by including or excluding optional data elements of the base standards. These data elements represent parameters describing details of the rules to be observed by tolled vehicles, its users and the associated Service Providers. Hence, including or excluding a certain data element will result in allowing or not allowing a certain detail of the EFC regime characteristics.

Therefore, it is important, when defining this frame of defined characteristics within an EFC cluster, to include all the needs of all participating EFC regimes. This will form the basis for the associated EFC cluster specific profile.

To ease this selection process this Technical Specification provides a set of optional data elements of the base standards which are in different lists marked as allowed which means mandatory (m) or not allowed which means not applicable (n/a).

Each of these lists represents an interoperable application profile (IAP), also referred to as a profile (in short form) (see also Table 1, Table 2 and 7.2).

Stakeholders of an EFC cluster may agree to use one of these standardised IAPs or they agree to define an own profile using the same methodology as used within this Technical Specification.

From that follows that according to the variety of required tolling principles and other details a more or less complex profile may be selected as the EFC cluster profile.

5.2 Toll Charger requirements

5.2.1 General

Profiles according to this Technical Specification are constituted by a list of optional data elements of base standards which are re-classified as mandatory (m) or not applicable (n/a) for a specific profile (see Table 1).

To be compliant with any profile a Toll Chargers shall be compliant with all the base standards listed in Clause 2.

To be compliant with a specific profile a Toll Charger shall also follow the following rules:

— For all data elements where the Toll Charger is listed as the sender of a message the Toll Charger shall use only those data elements of the profile specific list which are marked as mandatory (m) and which are actually required for the toll domain specific needs (see the TC->TSP indication in the column "information flow" in Table 1).

NOTE 1 From that follows that Toll Chargers still have the choice using mandatory data elements or not.

— For all data elements where the Toll Charger is listed as the receiver of a message the Toll Charger shall be prepared to receive and process all data elements marked as mandatory and which could be not logically excluded (see the TC<-TSP indication in the column "information flow" in Table 1).

NOTE 2 A mandatory data element may be logically excluded if in other configuration settings under the control of the Toll Charger this data element was "deselected" e.g. in the `ChargeReportConfiguration`

If the actual use of profile conformant data elements causes conditional requirements then the Toll Charger shall comply with them. These conditional requirements are specified in individual clauses in Annex A and they are referenced in the data element list (see Table 1). Other optional data elements of the base standards which are not mentioned in the data element tables remain optional. Toll chargers shall be prepared to process these data elements as specified in the base standards.

5.2.2 Toll Charge Back End requirements

For data exchange with the central equipment of one or more Service Providers the Toll Charger shall provide a Back End interface compliant with EN ISO 12855 for the following ADUs:

— `efcContextDataADU`

— `tollDeclarationADU`

NOTE 1 Within the context of this IAP only EFC contexts according to the GNSS choice are specified.

NOTE 2 The use of other ADUs defined in EN ISO 12855 may be specified in other profile standards or documents.

To be compliant with a specific profile a Toll Charger shall use only those or a subset of those optional data elements of the `efcContextDataADU` which are specified in Table 1 in Clause 7 as being mandatory for this profile and shall also fulfil the conditional requirements referenced for each used data element in the same table.

In general optional data elements within the underlying ASN1 structure of the used data elements are remained. However, explicit restrictions on that specified within Table 1 or within the applicable conditional requirements specified in Annex A shall be observed. The Toll Charger shall use the `tollDeclarationADU` received from the Service Provider to initiate the billing process.

The Toll Charger shall use the `requestADU, ackADU` and the `retrieveTollDeclarationADU` as specified in EN ISO 12855.

5.3 Toll Charger RSE requirements

For data exchange with OBE for the purpose of compliance, check the Toll Charger shall provide RSE compliant with CEN ISO/TS 12813. The underlying communication stack shall comply with the CEN DSRC choice as specified in CEN ISO/TS 12813:2009, 5.5.

NOTE 1 The density and locations of CCC RSE are decided by the Toll Charger.

For data exchange with OBE for the purpose of localisation augmentation the Toll Charger shall provide RSE compliant with CEN ISO/TS 13141. The underlying communication stack shall comply with the CEN DSRC choice as specified in CEN ISO/TS 13141:2010, 5.5.

NOTE 2 The locations of LAC RSE are decided collectively by the Toll Charger and the Service Providers.

5.4 Service Provider requirements

5.4.1 General

As mentioned above profiles according to this Technical Specification are constituted by a list of optional data elements of base standards which are re-classified as mandatory (m) or not applicable (n/a) for a specific profile (see Table 1 and Table 2).

To be compliant with any profile a Service Provider shall be compliant with all the base standards listed in Clause 2.

To be compliant with a specific profile a Service Provider shall also follow the following rules:

— For all data elements where the Service Provider is listed as the sender of a message the Service Provider shall use only those data elements of the profile specific list which are marked as mandatory (m) and which are actually required for the toll domain specific needs (see the TSP->TC or TSP-> FE indication in the column "information flow" in Table 1 and Table 2).

NOTE From that follows that a Service Provider needs to select the choices using mandatory data elements or not according to the actual needs of a toll domain. These needs can be extracted from the EFC context data or contractual agreements.

— For all data elements where the Service Provider is listed as the receiver of a message the Service Provider shall be prepared to receive and process all data elements marked as mandatory.

If the actual use of profile conformant data elements causes conditional requirements then the Service Provider shall comply with them. These conditional requirements are specified in individual clauses in Annex A and they are referenced in the data element list (see Table 1 and Table 2).

Other optional data elements of the base standards which are not mentioned in the data element tables remain optional. Service providers shall be prepared to process these data elements as specified in the base standards.

5.4.2 Service Provider Back End Requirements

For data exchange with one or more Toll Chargers the Service Provider shall provide an interface compliant with EN ISO 12855 for the following ADUs:

— **`efcContextDataADU`**

— **`tollDeclarationADU`**

NOTE The use of other ADUs defined in EN ISO 12855 may be specified in other profile standards or documents.

To be compliant with a specific profile the Service Provider shall support all of the optional data elements of the **`efcContextDataADU`** which are specified in Table 1 in Clause 7 as being mandatory for this profile. This shall include all optional data elements and choices used to specify their type and formats in all levels of the underlying ASN1 code.

The Service Provider shall assemble **`tollDeclarationADU(s)`** compliant with the content of the data element **`chargeReportConfiguration`** in the **`efcContextDataADU`** received from the Toll Charger.

The Service Provider shall forward a **`tollDeclarationADU`** to the Toll Charger at events as specified in the **`chargeReportingEvents`** data element in the **`efcContextDataADU`** received from the Toll Charger.

The Service Provider shall use the **`requestADU, ackADU`** and **`tollDeclarationADU`** as specified in EN ISO 12855.

Identifiers received by the Service Provider which are re-used in other message exchanges pointing to the same entity shall be used as specified in Annex B.

5.4.3 Front End specific requirements

Service Providers shall use Front Ends

— compliant with CEN ISO/TS 17575 and;

— compliant with the envisaged profile specified within this IAP document and;

— according to one of the OBE classes as specified in **Table** 3.

In case the Front Ends do not process on their own the required choice of data elements of the **tollDeclarationADU** as required by the Toll Charger, the Service Provider shall complete the missing data elements using further back end processes.

NOTE 1 This concept is called the use of thin clients together with a proxy server.

Service Providers shall originate context and roaming data according to CEN ISO/TS 17575-3 and -4 and forward them to their Front Ends.

These context and roaming data shall include only those or a subset of those optional data elements as defined in CEN ISO/TS 17575-3 and 4 which are marked as mandatory in Table 2 in Clause 7 for the envisaged profile. In addition to these requirements the context and roaming data shall only contain data elements which are marked as mandatory in Table 3 for the envisaged class of Front Ends.

The context and roaming data shall also fulfil the conditional requirements referenced for each used data element in Table 2 and Table 3.

In cases the Service provider communicates directly with the OBE the Service Provider shall comply with CEN ISO/TS 17575-2.

To be compliant with a specific Front End class Front Ends shall support all the data elements listed in Table 3 and which are marked as being mandatory for the specific Front End class.

To be compliant with a specific profile the Front Ends shall support the optional data elements of the attributes listed in Table 2 which are marked as being mandatory for the envisaged profile. This includes only those data elements which are required to process the Front End measurements up to the level requested for the envisaged Front End class as specified in the conditional requirements referenced in Table 3.

Used data elements shall support all optional data elements and choices used to specify data element types and formats in all levels of the underlying ASN1 code.

Front Ends shall process OBE specific measurements according to the settings in the EFC domain specific context and roaming data received from the Service Provider to assemble charge reports and to prepare the content of the CCC attributes.

Front Ends may use all or none of the LAC messages provided by the Toll Charger. In case Front Ends using this support a LAC message shall be used to process charge relevant measurements in case it was received from any authentic LAC RSE.

NOTE 2 Front Ends may be able to handle the charge object recognition function without LAC support. In this case the TSP should be aware of this fact to consider this feature when extending the toll road network in critical environments.

NOTE 3 Details on how to verify if an LAC beacon is authentic is outside the scope of this IAP.

NOTE 4 It is at the discretion of the Service Provider whether the OBE actually takes into account the LAC messages or not as long as the **tollDeclarationADU** meets the performance related requirements, which are outside the scope of this standard. It is anticipated that the Service Provider informs the Toll Charger whether the OBE uses or not the LAC messages,

Front Ends shall assemble charge reports according to CEN ISO/TS 17575-1. These charge reports shall contain those optional data elements which are requested in the **chargeReportConfiguration** data element of the EFC domain specific context data and the **combinedChargeReportContexts** data element of the roaming data (if applicable), which the font end has received from the Service Provider.

Front Ends shall forward a **ChargeReport** to the Service Provider at events as specified in the **chargeReportingEvents** data element in the context data received from the Service Provider.

In cases the OBE communicates directly with the Service Provider the OBE shall comply with CEN ISO/TS 17575-2.

NOTE 5 The underlying communication stack and media is of the choice of the Service Provider.

NOTE 6 The connection to the lower communication layers of a communication link between the Service Provider and a proxy is not specified within this profile standard.

Identifiers received by the Front End which are re-used in other message exchanges pointing to the same entity shall be used as specified in Annex B.

For data exchange with RSE for the purpose of compliance check the OBE shall provide an interface compliant with CEN ISO/TS 12813. The underlying communication stack shall comply with the CEN DSRC choice as specified in CEN ISO/TS 12813:2009, 5.5.

For data exchange with RSE for the purpose of localization augmentation the OBE shall provide an interface compliant with CEN ISO/TS 13141. The underlying communication stack shall comply with the CEN DSRC choice as specified in CEN ISO/TS 13141:2010, 5.5.

6 The use of conditional requirements

Entities agreeing on a specific profile to ensure interoperability within their EFC cluster shall comply with the requirements as specified in Clause 5. Supplementary requirements may come up if certain allowed data elements are actually used. These conditional requirements are specified in Annex A. Each clause in Annex A specifies the conditional requirements which shall be complied with if a specific data element classified as mandatory (m) in Table 1 to Table 3 is actually used.

NOTE As specified already above, even if the use of a specific data element is classified as "mandatory" in Table 1 to Table 3 it may still be optional for the sender, e.g. **`sectionedRoads`** specific data elements may be used only if **`sectionedRoads`** are used in a scheme. On the other hand the receiver of this message is prepared to receive all the mandatory data elements including all data elements resulting from the conditional requirements as well as all the optional data elements within the underlying structure of the ASN1 code. These details are specified as conditional requirements in Annex A.

All the data elements classified in the base standards as being optional and listed and marked in Table 1 to Table 3 as being mandatory for a specific profile may cause conditional requirements. If this is the case the relevant clause or clauses in Annex A where these requirements are specified are referenced in the column named "conditional requirements" in the tables. These conditional requirements shall be complied with by the sender as well as the receiver of the related data element, attribute or ADU.

7 Standardised profiles

7.1 General

Within this document a set of profiles comprising a variety of different functionalities for participating EFC regimes is specified. Table 1 lists the "high level" optional data elements of the base standards which are relevant for the data exchange between Toll Chargers and Service Providers. 'Table 2 lists these for the Service Provider Front End interconnection. Both tables provide columns where the listed data elements are classified as mandatory (m) or not applicable (n/a) separately for each of the defined profiles.

A detailed functional description of each of these profiles is provided in 7.2.

NOTE 1 Other profiles providing different functional elements may be defined using the same methodology (see also Annex E).

Table 1 and Table 2 provide also for each of the listed optional data elements of the base standards a reference to clauses in Annex A where conditional requirements are specified. These conditional requirements shall be complied with by the Toll Chargers and Service Providers if the data element within this row in the tables is actually used.

For all the profiles where the data element in one of the rows is set to n/a the associated reference to the conditional requirement in the same row is irrelevant.

NOTE 2 In some rows there are references to Annex A although for all defined profiles this data element is classified as n/a. This is done to support other profiles where these data elements may be allowed (see also Annex E).

The responsible entity or entities of an interoperable EFC cluster shall select one single profile to be applied by all entities exchanging messages within this EFC cluster using interfaces as specified in the base standards relevant for this IAP. The selection process of an adequate profile shall follow the rules as specified in 7.2.

In addition to the definition of a common EFC cluster specific profile each Service Provider has still the choice of selecting Front Ends according to one or more Front End classes as specified in 7.3.

NOTE 3 The use of Front Ends by the Service Provider compliant with a specific Front End class is opaque for the Toll Charger.

Table 1 – The profile specific use of data elements exchanged between Service Provider and Toll Charger

EN ISO 12855specific Attribute or ADU	Path to and optional Data element of the attribute	Definition	profile					conditional requirements	Information flow
			SR	SD	OSD	OSDT	OSDTC		
efcContextDataADU. gnssContext	...contextInterrelations	EN ISO 12855:2009, 6.7	n/a	n/a	m	m	m	A.2.1	TC -> TSP
	...regimeContextData, Iso17575-3AduBody, tollContextOverview. tollSchemeType.roadSectionPricing	CHOICE CEN ISO/TS 17575-3:2011, 8.3.2	m	m	m	m	m	A.2.2	TC -> TSP
	... regimeContextData.Iso17575-3AduBody, tollContextOverview, tollSchemeType, areaPricingDistance	CHOICE CEN ISO/TS 17575-3:2011, 8.3.2	n/a	m	m	m	m	A.2.3	TC -> TSP
	... regimeContextData, Iso17575-3AduBody. tollContextOverview, tollSchemeType, areaPricingDistance, roadNetworks	CEN ISO/TS 17575-3:2011, 8.3.4.2	n/a	n/a	n/a	n/a	n/a	A.2.4	TC -> TSP
	... regimeContextData, Iso17575-3AduBody, tollContextOverview, tollSchemeType, areaPricingTime	CHOICE CEN ISO/TS 17575-3:2011, 8.3.2	n/a	n/a	n/a	m	m	A.2.5	TC -> TSP
	... regimeContextData, Iso17575-3AduBody, tollContextOverview, tollSchemeType, cordonPricing	CHOICE CEN ISO/TS 17575-3:2011, 8.3.2	n/a	n/a	n/a	n/a	m	A.2.6	TC -> TSP
	...regimeContextData, gnssGDFLayout	EN ISO 12855:2009, 6.7	m	m	m	m	m	A.2.7	TC -> TSP
	... regimeContextData, Iso17575-3AduBody, tollContextLayout	CEN ISO/TS 17575-3:2011, 8.3.4	m	m	m	m	m	A.2.7	TC -> TSP
	... regimeContextData, Iso17575-3AduBody, tariffTable	CEN ISO/TS 17575-3:2011, 8.3.3.2	m	m	m	m	m	A.2.8	TC -> TSP
	... regimeContextData, Iso17575-3AduBody, tariffClassDefinition	CEN ISO/TS 17575-3:2011, 8.3.3.3	m	m	m	m	m	A.2.9	TC -> TSP
	... regimeContextData, Iso17575-3AduBody, localVehicleClassDefinition	all nominal and ordinal options CEN ISO/TS 17575-3:2011, 8.3.3.4	m	m	m	m	m	A.2.10	TC -> TSP
	...timeClassDefinition	CEN ISO/TS 17575-3:2011, 8.3.3.5	m	m	m	m	m	A.2.11	TC -> TSP
	...timeClassDefinition, relativeTimePeriods	CEN ISO/TS 17575-3:2011, 8.3.3.5.1	n/a	n/a	n/a	m	m	A.2.12	TC -> TSP
	...timeClassDefinition, classesSetExternally	CEN ISO/TS 17575-3:2011, 8.3.3.5.1	n/a	n/a	n/a	n/a	n/a	A.2.13	TC -> TSP
	...userClassDefinition	CEN ISO/TS 17575-3:2011, 8.3.3.6	m	m	m	m	m	A.2.14	TC -> TSP
	...userClassDefinition, actualNumbersOfPassengers	CEN ISO/TS 17575-3:2011, 8.3.3.6.1	n/a	n/a	n/a	n/a	n/a	A.2.15	TC -> TSP
	...tollContextLayout, SectionLayout	CEN ISO/TS 17575-3:2011, 8.3.4	m	m	m	m	m	A.2.16	TC -> TSP
	...tollContextLayout, AreaLayout	CEN ISO/TS 17575-3:2011, 8.3.4	n/a	m	m	m	m	A.2.17	TC -> TSP
	...tollContextLayout, AreaLayout, roadNetworks	CEN ISO/TS 17575-3:2011, 8.3.4.2	n/a	n/a	n/a	n/a	n/a	A.2.4	TC -> TSP
	...chargeReportingEvents	CEN ISO/TS 17575-3:2011, 8.3.5.1	m	m	m	m	m	A.2.19	TC -> TSP
	...chargeReportConfiguration	CEN ISO/TS 17575-3:2011, 8.3.5.2	m	m	m	m	m	A.2.20	TC -> TSP
tollDeclarationADU	...ChargeReport	content as requested	m	m	m	m	m	A.3.1	TC<- TSP

Table 2 – The profile specific use of data elements exchanged between Service Provider and Front End

CEN ISO/TS 17575 specific Attributes	Path to and optional Data element of the attribute	Definition	profile					conditional requirements	Information flow
			SR	SD	OSD	OSDT	OSDTC		
RoamingRules	...combinedChargeReportContexts	CEN ISO/TS 17575-4:2011, 6.2.3	n/a	n/a	m	m	m	A.3.2	TSP -> FE
	...relevantEfcContext, precedenceLevel	CEN ISO/TS 17575-4:2011, 6.2.2.8	n/a	n/a	m	m	m	A.3.3	TSP -> FE
tollContextOverview	...tollContextOverview, tollSchemeType, roadSectionPricing	CEN ISO/TS 17575-3:2011, 8.3.2	m	m	m	m	m	A.3.4	TSP -> FE
	... tollContextOverview, tollSchemeType, areaPricingDistance	CEN ISO/TS 17575-3:2011, 8.3.2	n/a	m	m	m	m	A.2.3	TSP -> FE
	...Iso17575-3AduBody, TollContextOverview, tollSchemeType, areaPricingDistance, roadNetworks	CEN ISO/TS 17575-3:2011, 8.3.4.2	n/a	n/a	n/a	n/a	n/a	A.3.6	TSP -> FE
	tollContextOverview, tollSchemeType, areaPricingTime	CEN ISO/TS 17575-3:2011, 8.3.2	n/a	n/a	n/a	m	m	A.3.7	TSP -> FE
	... tollContextOverview, tollSchemeType, cordonPricing	CEN ISO/TS 17575-3:2011, 8.3.2	n/a	n/a	n/a	n/a	m	A.3.8	TSP -> FE
tariffTable	full structure	CEN ISO/TS 17575-3:2011, 8.3.3.2	m	m	m	m	m	A.3.9	TSP -> FE
tariffClassDefinition	full structure	CEN ISO/TS 17575-3:2011, 8.3.3.3	m	m	m	m	m	A.3.10	TSP -> FE
localVehicleClassDefinition	...localVehiceClasses	CEN ISO/TS 17575-3:2011, 8.3.3.4	m	m	m	m	m	A.3.11	TSP -> FE
timeClassDefinition	...timeClasses (all with exceptions)	CEN ISO/TS 17575-3:2011, 8.3.3.5	m	m	m	m	m	A.3.12	TSP -> FE
	...timeClasses, ordinalElements, relativeTimeClasses	CEN ISO/TS 17575-3:2011, 8.3.3.5.1	n/a	n/a	n/a	m	m	A.3.13	TSP -> FE
	...timeClasses, nominalElements, classesSetEexternally	CEN ISO/TS 17575-3:2011, 8.3.3.5.1	n/a	n/a	n/a	n/a	n/a	A.3.14	TSP -> FE
userClassDefinition	...userClasses	CEN ISO/TS 17575-3:2011, 8.3.3.6	m	m	m	m	m	A.3.15	TSP -> FE
tollContextLayout	accoding to conditional requirements drived from tollContextOverview	CEN ISO/TS 17575-3:2011, 8.3.4	m	m	m	m	m	A.3.16	TSP -> FE
chargeReportingEvents	all BOOLEAN marks	CEN ISO/TS 17575-3:2011, 8.3.5.1	m	m	m	m	m	A.3.17	TSP -> FE
chargeReportConfiguration		CEN ISO/TS 17575-3:2011, 8.3.5.2	acording to class definitions in Table 3					A.3.18	TSP -> FE
ChargeReport	all other elements than usageStatement	CEN ISO/TS 17575-1:2010, 6.2	m	m	m	m	m	A.4.1	TSP <- FE
	...usageStatementList, usageStatement	CEN ISO/TS 17575-1:2010, 6.5.1	acording to class definitions in Table 3					A.4.2	TSP <- FE

Table 3 – Front End classes in respect to their ability processing optional contents of usage statements

CEN ISO/TS 17575 specific Attributes	Path to and optional Data element of the attribute	Definition	Front End class				conditional requirements	information flow
			a	b	c	d		
ChargeReport	...usageStatementList, UsageStatement, aggregatedFee	5.2.2	n/a	n/a	n/a	m	A.4.3	TSP <- FE
	...usageStatementList, UsageStatement, aggregatedSingleTariffClassSession	5.2.2	n/a	n/a	m	m	A.4.4	TSP <- FE
	...usageStatementList, UsageStatement, listOfChargeObjects	5.2.2	n/a	m	m	m	A.4.5	TSP <- FE
	...usageStatementList, UsageStatement, listOfRawUsageData	5.2.2	m	m	m	m	A.4.6	TSP <- FE

7.2 How to use standardised profiles

7.2.1 General

This clause provides rules on how an EFC cluster owner shall select its cluster specific profile. These rules follow the objective to select the simplest possible profile, which fulfils the functional requirements of all participating Toll Chargers, to reduce overall costs.

The markings as (m) or (n/a) of optional data elements of the base standards in Table 1 and Table 2 constitute the definition of the set of profiles defined within this Technical Specification.

This is summarised and illustrated in Figure 4.

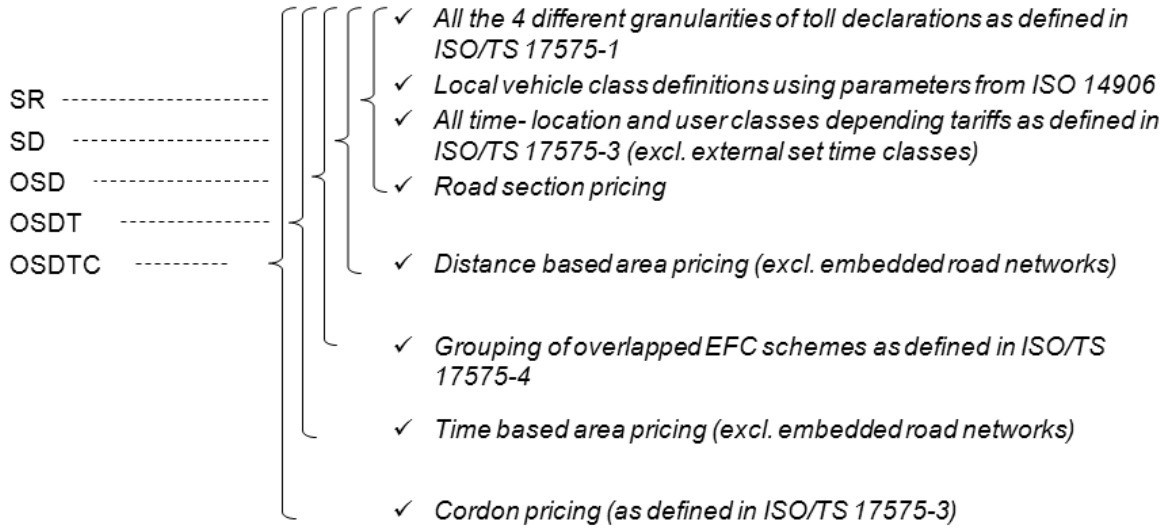

Figure 4 — Functional details of the 5 profiles for autonomous systems

NOTE In the figure above it becomes visible that an EFC cluster may start with an allowed functionality as defined in one of the profiles listed in the upper lines. After start of operation, a new Toll Charger may join the cluster requesting features listed only in profiles listed in the next lines. Then it is possible to change the cluster specific profile to a profile covering also the needs of the new TC without the need of any change for the existing Toll Chargers. However, all the Service Providers need to add the new functions of the new profile into their equipment.

7.2.2 SR (Sectioned Roads tolling)

The responsible entities of an EFC cluster shall select the **SR** (Sectioned Roads tolling) profile as the EFC cluster profile if all of the participating EFC regimes in place and in a foreseeable future are using the sectioned roads tolling principle in none overlapping domains.

7.2.3 SD (Sectioned Roads tolling or Distance based Area pricing)

The responsible entities of an EFC cluster shall select the **SD** (Sectioned Roads tolling or Distance based Area pricing) profile as the EFC cluster profile if all of the participating EFC regimes in place and in a foreseeable future are using either the distance based area pricing or the sectioned roads tolling principle in none overlapping domains.

At borders Front Ends need to be prepared operating according to the rules of the adjacent domain before it is actual entered. This temporary multi context process is not seen as processing overlapping domains in the context of these profiles.

7.2.4 OSD (Overlapping Sectioned Roads tolling or Distance based Area pricing)

The responsible entities of an EFC cluster shall select the **OSD** (Overlapping Sectioned Roads tolling or Distance based Area pricing) profile as the EFC cluster profile if all of the participating EFC regimes in place and in a foreseeable future are using either the distance based area pricing or the sectioned roads tolling principle in one or more overlapping domains. Multi context data EFC regimes shall be handles here as overlapping domains.

NOTE Front Ends being able to operate according to the OSD profile are able to assemble more than one set of charging relevant data at the same time.

7.2.5 OSDT (Overlapping Sectioned Roads tolling or Distance or Time based Area pricing)

The responsible entities of an EFC cluster shall select the **OSDT** (Overlapping Sectioned Roads tolling or Distance or Time based Area pricing) profile as the EFC cluster profile if all of the participating EFC regimes in place and in a foreseeable future are using either the

— distance based area pricing or the;

— time based area pricing or the;

— sectioned roads tolling principle

in none or more overlapping domains. Multi context data EFC regimes shall be handles here as overlapping domains.

7.2.6 OSDTC (Overlapping Sectioned Roads tolling or Distance or Time based Area or Cordon pricing)

The responsible entities of an EFC cluster shall select the **OSDTC** (Overlapping Sectioned Roads tolling or Distance or Time based Area or Cordon pricing) profile as the EFC cluster profile if all of the participating EFC regimes in place and in a foreseeable future are using either the

— distance based area pricing or the;

— time based area pricing or the;

— cordon pricing or the;

— sectioned roads tolling principle

in none or more overlapping domains. Multi context data EFC regimes shall be handles here as overlapping domains.

7.3 Front End classes selection

The Service Providers shall use Front Ends compliant to one of the Front End classes as specified in **Table** 3.

If Service Providers using Front Ends not able to process the measurements of the OBE up to the aggregation level requested by the Toll Charger for the `UsageStatement` of the `chargeReport` in the `tollDeclarationADU` then the Service Provider shall request the `chargeReport` from the Front End in an aggregation level the Front End can provide. This Front End report shall be post processed within the back office of the Service Provider up to the aggregation level the Toll Charger requests within the settings of his `efcContextDataADU`.

NOTE Service Providers may choose Front Ends able to aggregate charging details up to any level - even higher than any Toll Charger requests for the `tollDeclarationADU`. This is commercially overdone but may be decided so due to other reasons.

Service Providers shall observe the conditional requirements referenced in **Table** 3 in the column named "conditional requirements" for the used Front End class.

Annex A
(normative)

Conditional profile requirements

A.1 General

The following clauses define details of conditional requirements coming up if other optional data elements are actually used. These conditional requirements in most cases represent requirements resulting from the implicit logic that the use of some data elements causes the presence of the contents of others.

NOTE These requirements also follow the general rule, that the sender of a data element takes due notice that this data element is classified as being mandatory for the given profile and that this data element is actually required for his own needs. From that follows that calling a data element mandatory, addresses mostly the receiver of this message. In some cases however, the use of optional data elements follows a configuration message which was received earlier.

A.2 Conditional requirements to be observed by the Toll Charger

A.2.1 When using contextInterrelations

Toll Chargers using the optional data element `contextInterrelations` within the `EFCContextDataADU` shall also provide the choice `TollContextOverview` of the `Iso17575-3AduBody` for each `tollContext` used in the `relevantTollContexts` list.

A.2.2 When using roadSectionPricing

Toll Chargers using within the `TollContextOverview` the choice `roadSectionPricing` as the `TollSchemeType` of a toll context shall provide an `Iso17575-3AduBody` within the `EFCContextDataADU` including either the optional data element `TollContextLayout` with a `layoutDescription` of the choice `SectionLayout` or the optional data element `SectionTollingLayoutGDF.`

A.2.3 When using arePricingDistance

Toll Chargers using within the `TollContextOverview` the choice `areaPricingDistance` as the `TollSchemeType` of an EFC context shall also provide an `Iso17575-3AduBody` within the `EFCContextDataADU` including the optional data element `TollContextLayout` with a `layoutDescription` of the choice `AreaLayout`.

A.2.4 When using roadNetworks

Not applicable for all profiles specified within this document.

A.2.5 When using arePricingTime

Toll Chargers using within the `TollContextOverview` the choice `areaPricingTime` as the `TollSchemeType` of an EFC context shall also provide an `Iso17575-3AduBody` within the `EFCContextDataADU` including the optional data element `TollContextLayout` with a `layoutDescription` of the choice `AreaLayout`.

A.2.6 When using cordonPricing

Toll Chargers using within the `TollContextOverview` the choice `cordonPricing` as the `TollSchemeType` of an EFC context shall also provide an `Iso17575-3AduBody` within the `EFCContextDataADU` including the optional data element `TollContextLayout` with a `layoutDescription` of the choice `CordonLayout.`

A.2.7 When using agnssGDFLayout or tollContextLayout

Toll Chargers using the optional data element `SectionTollingLayoutGDF` within an `EFCContextDataADU` shall not use the optional data element `TollContextLayout` within an `Iso17575-3AduBody` for the same toll context.

Toll Chargers using the optional data element `TollContextLayout` within an `Iso17575-3AduBody` within an `EFCContextDataADU` shall not use the optional data element `SectionTollingLayoutGDF` for the same toll context.

If in the layout description the optional data element `applicableTimeClasses` is used then the `Iso17575-3AduBody` shall include the optional data element `TimeClassDefinition` specifying time classes with a consistent `TimeClassId`.

A.2.8 When using tariffTable

Toll Chargers which require a certain configuration of the `ChargeReport` containing aggregated fee in some form shall use the data element `TariffTable` mandatorily.

Toll Chargers using the optional data element `TariffTable` within the `Iso17575-3AduBody` shall also use the optional data element `TariffClassDefinition.`

NOTE To be logically consistent the **`TariffTable`** should include for each **`TariffClass`** defined in the **`TariffClassDefinition`** an entry within the sequence of **`tariffs`**.

A.2.9 When using tariffClassDefinition

Toll Chargers using the optional data element `TariffClassDefinition` within the `Iso17575-3AduBody` shall also use the optional data elements

- `LocalVehicleClassDefinition` – (unconditioned),
- `TimeClassDefinition` – in case the optional data element `timeClasses` is used within the `tariffClassDefinition` and
- `UserClassDefinition` – in case the optional data element `contractTypes` and/or `actualNumberOfPassengers` is used within the `tariffClassDefinition.`

A.2.10 When using localVehicleClassDefinition

The use of the optional data element `LocalVehicleClassDefinition` within the `Iso17575-3AduBody` does not cause any conditional requirements for the use of other optional data elements within the profiles defined in this document.

NOTE It should be considered if forwarding the data set for a definition of a **`localVehicleClassDefinition`** makes sense in case the definitions within the **`usageStatementContent`** for the **`ChargeReport`** is made so that the resulting vehicle class would be used nowhere at the receiver side.

A.2.11 When using timeClassDefinition

The use of the optional data element `TimeClassDefinition` within the `Iso17575-3AduBody` does not cause any conditional requirements for the use of other optional data elements within the profiles defined in this document.

A.2.12 When using relativeTimePeriods

The optional data element `relativeTimePeriods` within the optional data element `TimeClassDefinition` shall be used only if the `tollSchemeType` specified in the `TollContextOverview` is set to `areaPricingTime`.

A.2.13 When using classesSetExternally

Not applicable for all profiles specified within this document.

A.2.14 When using userClassdefinition

The use of the optional data element `UserClassDefinition` within the `Iso17575-3AduBody` does not cause any conditional requirements for the use of other optional data elements within the profiles defined in this document.

A.2.15 When using actualNumberOfPassengers

Not applicable for all profiles specified within this document.

A.2.16 When using SectionLayout

Toll Chargers using within the `TollContextLayout` the choice `SectionLayout` as the type of the `layoutDescription` and using there the optional data element `applicableTimeClasses` shall also provide in the `Iso17575-3AduBody` the optional data element `TimeClassDefinition.`

A.2.17 When using AreaLayout

The use of the choice `AreaLayout` within the `TollContextLayout` in the `Iso17575-3AduBody` does not cause any conditional requirements for the use of other optional data elements within the profiles defined in this document.

A.2.18 When using roadNetwork

Not applicable for all profiles specified within this document.

A.2.19 When using chargeReportingEvents

The use of the optional data element `ChargeReportingEvents` within the `Iso17575-3AduBody` does not cause any conditional requirements for the use of other optional data elements within the profiles defined in this document.

NOTE The implicit logic not to define events which will never happen – like detecting a charge object within an area pricing scheme – should be observed but the semantic of the content of used data elements is outside the scope of this IAP.

From the options provided in the list of BOOLEAN elements indicating an event to forward a `tollDeclarationADU` to the Toll Charger at least one element shall be set to TRUE.

A.2.20 When using chargeReportConfiguration

Toll Chargers shall use the BOOLEAN settings in the `ChargeReportConfiguration` according to their needs without any conditional requirements.

Toll Chargers shall set the BOOLEAN element `vatForThisSession` in the `ChargeReportContent` only if they also request the data element `aggregatedFee` within the data element `UsageStatementContent or if they request` the data element `feeExclVat` or `vat` within the optional data element `aggregatedSingleTariffClassSessionContent.`

Toll Chargers shall not request the data element `accountStatus` in the `ChargeReportContent.`

Toll Chargers shall set the BOOLEAN element **mileage** in the **ChargeReportContent** only if they also request the data element **totalDistanceCovered** within the data element **AggregatedSingleTariffClassSessionContent.**

Toll Chargers setting the BOOLEAN element **aggregatedFee** within the data element **UsageStatementContent** within the optional data element **ChargeReportConfiguration** within the data element **Iso17575-3AduBody** to TRUE shall also provide the optional data elements

— **TollContextOverview**

— **TariffTable**

— **TariffClassDefinition**

— **LocalVehicleClassDefinition**

— **TimeClassDefinition** – only if time classes are used

— **UserClassDefinition** – only if user classes are used

— **TollContextLayout.**

NOTE 1 This would allow the Service Provider calculating the value of the optional data element **aggregatedFee.**

Toll Chargers setting the BOOLEAN element **aggregatedSingleTariffClassSession** within the data element **UsageStatementContent** within the optional data element **ChargeReportConfiguration** within the data element **Iso17575-3AduBody** to TRUE shall also provide the optional data elements

— **TollContextOverview**

— **TariffClassDefinition**

— **LocalVehicleClassDefinition**

— **TimeClassDefinition** – only if time classes are used

— **UserClassDefinition** – only if user classes are used

— **TollContextLayout.**

NOTE 2 This would allow the Service Provider to assemble the optional data element **aggregatedSingleTariffClassSession** within the **tollDecrarationADU** however, only without the optional elements **feeExclVat** and **vat**.

In case the BOOLEAN element **feeExclVat** or the BOOLEAN element **vat** within the optional data element **aggregatedSingleTariffClassSessionContent** is set to TRUE also the

— **TariffTable.**

shall be provided by the Toll Charger.

Toll Chargers shall set the BOOLEAN element **listOfChargeObjects** within the data element **UsageStatementContent** within the optional data element **ChargeReportConfiguration** within the data element **Iso17575-3AduBody** to TRUE only if within the **tollContextOverview** the **tollSchemeType** was set to **roadSectionPricing.**

Toll Chargers setting the BOOLEAN element **listOfChargeObjects** to TRUE shall also provide the optional data elements

— **TollContextOverview**

— **TariffClassDefinition**

— **LocalVehicleClassDefinition**

— **TimeClassDefinition** – only if time classes are used

— **UserClassDefinition** – only if user classes are used

— **TollContextLayout.**

NOTE 3 This would allow the Service Provider to assemble the optional data element **listOfChargeObjects** within the **tollDecrarationADU** however, only without the optional elements **feeExclVat** and **vat**.

In case the BOOLEAN element **feeExclVat** or the BOOLEAN element **vat** within the optional data element **detectedChargeObjectContent** is set to TRUE also the

— **TariffTable.**

shall be provided by the Toll Charger.

Toll Chargers setting the BOOLEAN element **listOfRawUsageData** within the data element **UsageStatementContent** within the optional data element **ChargeReportConfiguration** within the data element **Iso17575-3AduBody** to TRUE shall also provide the optional data element

— **TollContextOverview.**

NOTE 4 This would allow the Service Provider to assemble the optional data element **listOfRawUsageData** for the **tollDecrarationADU** only containing raw data relevant for this toll context.

Toll Chargers shall use the optional data elements

— **cccAttributesContentsetting** defining their required content of a CCC transaction

— **aggregatedSingleTariffClassSessionContent** only if the **aggregatedSingleTariffClassSession** element is requested in the **usageStatementContent**

— **detectedChargeObjectContent** only if the **listOfChargeObjects** element is requested in the **usageStatementContent**

— **listOfRawUsageDataContent** only if the **listOfRawUsageData** element is requested in the **usageStatementContent**

— **vehicleDescriptionContent** only if the **vehicleDescription** element is requested in any **usageStatementContent**

A.3 Conditional requirements to be observed by the Service Provider

A.3.1 When using tollDeclarationADU

Service Providers sending a **tollDeclarationADU** within the **InfoExchange** APDU as specified in EN ISO 12855 to a Toll Charger shall use

— the underlying data element **ChargeReport** of this **tollDeclarationADU** in a structure as specified in CEN ISO/TS 17575-1

— including those optional data elements of this **ChargeReport** as requested in the BOOLEAN settings of the **ChargeReportConfiguration** as specified in CEN ISO/TS 17575-3 and received from this Toll Charger for this toll context except:

— **accountStatus** shall not be supported

— and send it at events according to the settings in the **ChargeReportingEvents** as specified in CEN ISO/TS 17575-3 and received from this Toll Charger for this toll context

A.3.2 When using combinedChargeReportContexts

Service Providers using within **RoamingRules** as defined in CEN ISO/TS 17575-4 which are forwarded to the Front Ends the optional data element **combinedChargeReportContexts** shall also provide context data for each of the toll contexts included there.

These context data shall contain at least the attributes

— **TollContextOverview**

and additionally those attributes from the list

— **TollContextOverview**

— **TarifTable**

— **TariffClassDefinition**

— **LocalVehicleClassDefinition**

— **TimeClassDefinition**

— **userClassDefinition**

— **TollContextLayout**

— **ChargeReportingEvents**

— **ChargeReportConfiguration**

which are required to assemble the requested aggregation of charge relevant information as defined in the attribute **chargeReportConfiguration** forwarded to the Front Ends. Details of interrelation to be observed are specified in CEN ISO/TS 17575-4.

Service Providers requesting their Front Ends to provide combined charge reports shall do this only if an optional post processing within the realm of the Service Provider allows remaining compliant with the requirements related to the format of the **tollDeclarationADU** specified by the Toll Charger within the data element **contextInterrelations** within the **EFCContextDataADU** received from the Toll Charger.

A.3.3 When using precedenceLevel

Service Providers using within the data element **RelevantEfcContext** within the **RoamingRules** provided for the Front Ends the optional data element **precedenceLevel** do not cause any conditional requirements with this.

NOTE It is obvious and outside the scope of this IAP that the content of the optional data element **precedenceLevel** complies with the settings of the Toll Charger.

A.3.4 When using roadSectionPricing

Service Providers using within the **TollContextOverview** provided to the Front Ends the choice **roadSectionPricing** of the **TollSchemeType,** shall also provide the optional data element **TollContextLayout** with a **layoutDescription** of the choice **SectionLayout** as specified in CEN ISO/TS 17575-3.

A.3.5 When using areaPricingDistance

Service Providers using within the `TollContextOverview` provided for the Front Ends the choice `areaPricingDistance` as the `TollSchemeType` of a toll context shall also provide the optional data element `TollContextLayout` with a `layoutDescription` of the choice `AreaLayout` as specified in CEN ISO/TS 17575-3.

A.3.6 When using areaPricingDistance.roadNetworks

Not applicable for all profiles specified within this document.

A.3.7 When using areaPricingTime

Service Providers using within the `TollContextOverview` provided to the Front Ends the choice `areaPricingTime` of the `TollSchemeType,` shall also provide the optional data element `TollContextLayout` with a `layoutDescription` of the choice `AreaLayout` as specified in CEN ISO/TS 17575-3.

A.3.8 When using cordonPricing

Service Providers using within the `TollContextOverview` provided for the Front Ends the choice `cordonPricing` as the `TollSchemeType` of a toll context shall also provide the optional data element `TollContextLayout` with a `layoutDescription` of the choice `CordonLayout` as specified in CEN ISO/TS 17575-3.

A.3.9 When using tariffTable

Service Providers using the optional data element `TariffTable` within the `Iso17575-3AduBody` provided to the Front Ends shall also use the optional data element `TariffClassDefinition.`

NOTE To be logically consistent the `TariffTable` should include for each `TariffClass` defined in the `TariffClassDefinition` an entry within the sequence of `tariffs`.

A.3.10 When using tariffClassDefinition

Service Providers using the optional data element `TariffClassDefinition` within the `Iso17575-3AduBody` provided to the Front Ends shall comply with the accordant requirements for the Toll Chargers as specified in A.2.9

A.3.11 When using localVehiceClasses

The use of the optional data element `LocalVehicleClassDefinition` within the `Iso17575-3AduBody` provided for the Front Ends does not cause any conditional requirements for the use of other optional data elements within the profiles defined in this document.

NOTE It should be considered if forwarding the data set for a definition of a `localVehicleClassDefinition` makes sense in case the definitions within the `usageStatementContent` for the `ChargeReport` is made so that the resulting vehicle class would be used nowhere at the receiver side.

A.3.12 When using timeClasses

The use of the optional data element `TimeClassDefinition` within the `Iso17575-3AduBody` provided for the Front Ends does not cause any conditional requirements for the use of other optional data elements within the profiles defined in this document.

A.3.13 When using timeClasses.ordinalElements.relativeTimeClasses

The optional data element `relativeTimePeriods` within the optional data element `TimeClassDefinition` shall be used only if the `tollSchemeType` specified in the `TollContextOverview` is set to `areaPricingTime`.

A.3.14 When using timeClasses.nominalElements.classesSetEexternally

Not applicable for all profiles specified within this document.

A.3.15 When using userClasses

The use of the optional data element `UserClassDefinition` within the `Iso17575-3AduBody` does not cause any conditional requirements for the use of other optional data elements within the profiles defined in this document.

A.3.16 When using tollContextLayout

Service Providers using the optional data element `tollContextLayout` within the `Iso17575-3AduBody` provided for the Front Ends shall select in the sub-element `Layout` only the specific choice which corresponds to the settings for the `tollSchemeType` in the `tollContextOverview` of this toll context.

A.3.17 When using chargeReportingEvents

The use of the optional data element `ChargeReportingEvents` within the `Iso17575-3AduBody` does not cause any conditional requirements for the use of other optional data elements within the profiles defined in this document.

NOTE The implicit logic not to define events which will never happen – like detecting a charge object within an area pricing scheme – should be observed but the semantic of the content of used data elements is outside the scope of this IAP.

From the options provided in the list of BOOLEAN elements indicating an event to forward a `tollDeclarationADU` to the Service Provider at least one element shall be set to TRUE.

A.3.18 When using chargeReportConfiguration

Service Providers shall set the BOOLEAN elements in the `chargeReportConfiguration` sent to the Front Ends in accordance with the Front Ends classes used.

NOTE In case the Toll Charger requires a higher processing or aggregation level of charging details then the Service Provider may post process the reports of the Front Ends accordingly.

The conditional settings of the `usageStatementContent` and the other content control data elements shall be set in accordance to the definitions in A.2.20.

A.4 Conditional requirements to be observed by the Front End

A.4.1 When using in the ChargeReport all other elements than usageStatement

Front Ends shall forward the `ChargeReport` at events compliant with the settings in the data element `chargeReportingEvent`. All options defined in CEN ISO/TS 17575-3 shall be supported.

Front Ends shall assemble the data element `ChargeReport` compliant with the settings in the data element `chargeReportConfiguration` as defined in CEN ISO/TS 17575-3 and received from the Service Provider.

Front Ends except Front Ends of the class (a) shall support all optional data elements of the `ChargeReport` as specified in CEN ISO/TS 17575-1 except for the `usageStatementList`. The conditional requirements for the use of the `usageStatementList` are defined in A.4.2

A.4.2 When using in the ChargeReport the usageStatementList

Front Ends shall assemble the data elements `usageStatementList` compliant with their Front End Class (see A.4.3 to A.4.6). Front Ends shall derive the requested level of the aggregated charge details from the content of the `usageStatementContent` received from the Service Provider.

A.4.3 When using aggregatedFee

Front Ends operating according to the `aggregatedFee` processing level (Front End class d) do not cause conditional requirements to be observed. The only optional element `vat` shall be supported and calculated in case the optional `vat` sub-element is present in the `TariffTable`.

Front Ends of this Front End class shall also provide `ChargeReport` of a lower processing level if required.

A.4.4 When using aggregatedSingleTariffClassSession

Front Ends operating according to the `aggregatedSingleTariffClassSession` processing level (Front End class c and higher) shall use the optional data element `aggregatedSingleTariffClassSessionContent` as specified in CEN ISO/TS 17575-3 to configure the use of optional elements.

Front Ends of this Front End class shall also provide `ChargeReport` of a lower processing level if required.

A.4.5 When using listOfChargeObjects

Front Ends operating according to the `listOfChargeObjects` processing level (Front End class b and higher) shall use the optional data element `detectedChargeObjectContent` as specified in CEN ISO/TS 17575-3 to configure the use of optional elements.

Front Ends of this Front End class shall also provide `ChargeReport` of a lower processing level if required.

A.4.6 When using listOfRawUsageData

Front Ends operating according to the `listOfRawUsageData` processing level (all Front End classes) shall use the optional data element `dlistOfRawUsageDataContent` and `vehicleDescriptionContent` both as specified in CEN ISO/TS 17575-3 to configure the use of optional elements.

In case no higher measurement data aggregation is requested in the relevant `chargeReportConfiguration` the data elements `tariffTable, tariffClassDefinition, and tollContextLayout` shall not be used.

Annex B
(normative)

The use of identifiers

B.1 General

This annex specifies the relationships between many of the identifiers used in the CEN ISO/TS 17575-suite, ISO 17573, EN ISO 12855, CEN ISO/TS 13141 and CEN ISO/TS 12813. Transactions defined in the base standard are combined into consistent information flows between Toll Charger and Service Provider, as depicted in Figure 1. The value of some identifiers in a message specified in one base standard is therefore often mapped to the corresponding value of some other identifiers in a message specified in another base standard.

REF TableB1 \h Table B.1.below specifies which identifiers taken from different standards shall have the same value. Identifiers mentioned in the same row shall have the same value under the circumstances explained in the sections in this annex. This applies as well if two identifiers from one standard are mentioned in the same row, separated by a /.

The column 'Issued by' specifies for each of the identifiers which entity is responsible for issuing a value for that identifier. The column 'Requested by' specifies which entity is responsible for triggering the process of issuing a value for that identifier. As an example, a Toll Charger requests a value for the identifier `tollCharger`, and that value is issued by the national standardisation body of that Toll Charger.

NOTE It should be noted that ISO 17573 and CEN ISO/TS 17575-2 do not contain any formal (ASN.1) definition of identifiers, and are therefore not mentioned in this annex.

Table B.1 — Identifiers from different base standards that shall be given the same value

CEN ISO/TS 17575-1	CEN ISO/TS 17575-3	CEN ISO/TS 17575-4	CEN ISO/TS 13141	EN ISO 12855	CEN ISO/TS 12813	Issued by	Requested by
`regimeId`	`contextId` / `tollContext` (not possible in current versions of CEN ISO/TS 17575-1 and 3)	`efcContextId`, `reuseTariffInformationFrom`, `reuseReportingRulesFrom`, `sendChargeReportIfEntering`, `involvedEfcContexts`	`regimeId`	`contextId`	`contextID`	Toll Charger	Toll Charger
Part of `versionInfo`	`tollContextVersion`				`contextVersion`	Toll Charger	Toll Charger
Part of `versionInfo`	`tollContextOverviewVersion`						
Part of `versionInfo`	`tariffTableVersion`					Toll Charger	Toll Charger
Part of `versionInfo`	`tariffClassDefinitionVersion`					Toll Charger	Toll Charger
Part of `versionInfo`	`localVehicleClassVersion`					Toll Charger	Toll Charger
Part of `versionInfo`	`timeClassDefinitionVersion`					Toll Charger	Toll Charger
Part of `versionInfo`	`userClassDefinitionVersion`					Toll Charger	Toll Charger
Part of `versionInfo`	`chargeReportingEventsVersion`					Toll Charger	Toll Charger
Part of `versionInfo`	`chargeReportConfigurationVersion`					Toll Charger	Toll Charger
Part of `versionInfo`		`roamingRulesVersion`				Toll Charger	Toll Charger
`versioninfo` / `versionsResponse`						Toll Charger	Toll Charger
`chargeObjectNumber`	`chargeObjectId` (For `AreaLayouts: AreaId` For `SectionLayouts: chargeObjectId` For `CordonLayouts: CordonId`)		`chargeObjectNumber`			Toll Charger	Toll Charger
`chargeObjectId`	concatenation of `contextId` and `areaID`, `chargeObjectID` or `cordonId`, see explanation					Toll Charger	Toll Charger

`subObjectNumber`	For `AreaLayouts:` not used or equal to `networkId`, see explanation For `SectionLayouts:` not used. For `CordonLayouts:` concatenation of `exitLocationId` and `entryLocationId` (not possible in current versions of CEN ISO/TS 17575-1 and 3)					Toll Charger	Toll Charger
`serviceProviderContract`			`lAC-ContextMark`		`CCC-ContextMark`	Service Provider	Service Provider
`tollCharger`	`tollCharger` (in the `tollContextOverview`)		`tollCharger`			National standardisation body	Toll Charger
`equipmentOBUId`					`equOBUId`	OBE Manufacturer	OBE Manufacturer
`manufacturerId`						NEN	OBE Manufacturer
			`lAC-Operator`		`lACOperator`	National standardisation body	LAC Operator
			`rSEId`		`rSEId`	LAC Operator	LAC Operator
`vehicleLPNr`					`vehLPN` (in `Container`)		
`contractProvider` / `reportRecipientId`	`informationSender` / `contractProvider`			`messageOriginator` (possibly, see explanation) / `tSPId`		National standardisation body	Service Provider
`efcOperator` or `recipient`	`informationOriginator` / `efcOperator` or `recipient`, see explanation			`messageOriginator` (possibly, see explanation) / `tCId`		National standardisation body	Toll Charger
`efcOperator`	`efcOperator`					National standardisation body	Toll Charger
`recipient`	`recipient` (in `tollCharger` in the `tollContextOverview`)	`tollRecipient`				National standardisation body	Toll Charger

locationClassId	One of the **locationClassId** listed in **locationClasses**					Toll Charger	Toll Charger
timeClassId	One of the **timeClassId** listed in **timeClasses**					Toll Charger	Toll Charger
userClassId	One of the **userClassId** listed in **userClasses**					Toll Charger	Toll Charger
transactionCounter (in Charge Report) / **transactionCounter** (in **dataReceived** in Charge Report Response)						Front End	Front End

B.2 Identifiers specified in CEN ISO/TS 13141

Identifiers specified in CEN ISO/TS 13141 shall have the following interrelationships with identifiers specified in other standards:

— **chargeObject:** The charge object identification in the LAC Data and in the toll context layout shall be the same for the same charge object. This identifier is composed of **regimeId** and **chargeObjectNumber.** It is the responsibility of the LAC Operator to ensure that the value of these identifiers, as sent in LAC data, is consistent with the value of **contextId** and **chargeObjectId** (respectively) used by the Toll Charger to define the toll context layout according to CEN ISO/TS 17575-3.

NOTE If in the actual versions of CEN ISO/TS 13141 and CEN ISO/TS 17575-3 the format of these parameters differ, then they should be coded using the same semantics.

— **lAC-ContextMark:** The value of this identifier, sent from the OBE to the RSE in a LAC transaction according to CEN ISO/TS 13141, shall be the same as the value sent for identifier **serviceProviderContract** in a Charge Report to the Service Provider according to CEN ISO/TS 17575-1

— **lACOperator:** If a LAC transaction is reported in a subsequent CCC-transaction, the value of **lACOperator** shall be the same as the value of **lACOperator** in the data element **lastLAC** in the CCC-transaction according to CEN ISO/TS 12813.

— **rSEId:** If a LAC transaction is reported in a subsequent CCC-transaction, the value of **rSEId** shall be the same as the value of **rSEId** in the data element **lastLAC** in the CCC-transaction according to CEN ISO/TS 12813.

— **tollCharger:** The Toll Charger in charge of a given charge object shall be identically identified in botch the LAC Data and the toll context data. Therefore the value of this identifier, sent in the LAC Data according to CEN ISO/TS 13141, shall be the same as that of **tollCharger** used by the Toll Charger in the applicable toll context overview according to CEN ISO/TS 17575-3.

B.3 Identifiers specified in CEN ISO/TS 17575-1

Identifiers specified in CEN ISO/TS 17575-1 shall have the following interrelationships with identifiers specified in other standards:

— **obeID:** This identifier is composed of **manufacturerId** and **equipmentOBUId.** For the same OBE, **equipmentOBUId** in a Charge Report shall have the same value as **equOBUId** in a CCC-transaction according to CEN ISO/TS 12813.

— **VehicleLPNr:** For the same vehicle, **VehicleLicensePlateNumber** sent in a CCC-transaction according to 12183 shall be the same as **VehicleLPNr** (optionally) sent in the Charge Reports according to CEN ISO/TS 17575-1.

— **regimeId:** If the OBE sends a charge report to the Service Provider according to CEN ISO/TS 17575-1, based upon a certain set of toll context data according to CEN ISO/TS 17575-3, the value of **regimeId** in the usage statement shall be identical to the value of **tollContext** in the **tollContextOverview** defined in CEN ISO/TS 17575-3.

NOTE 1 If in the actual versions of CEN ISO/TS 17575-1 and CEN ISO/TS 17575-3 the format of these parameters differ, then they should be coded using the same semantics.

— **locationClassId**: the value of this identifier shall be the value of the applicable **locationClassId** from the list in the identifier **locationClasses** in CEN ISO/TS 17575-3.

— **timeClassId**: the value of this identifier shall be the value of the applicable **timeClassId** from the list in the identifier **timeClasses** in CEN ISO/TS 17575-3.

— **userClassId**: the value of this identifier shall be the value of the applicable **userClassId** from the list in the identifier **userClasses** in CEN ISO/TS 17575-3.

— **listOfChargeObjects** (with identifiers **regimeId, chargeObjectNumber** and **subObjectNumber):**

  — For AreaLayouts:

    — **regimeID:** see above.

    — **chargeObjectNumber** shall get the value of **areaID** from **AreaLayout.**

    — **subObjectNumber** shall not be used, unless the charge is based upon the use of a specified road network within the area. In that case, **subObjectNumber** shall be equal to the relevant **networkId.**

  — For SectionLayouts:

    — **regimeID:** see above.

    — **chargeObjectNumber** shall get the value of **chargeObjectID** from **SectionLayout.**

    — **subObjectNumber** shall not be used.

  — For CordonLayouts:

    — regimeID: see above.

    — chargeObjectNumber shall get the value of cordonID from CordonLayout.

    — subObjectNumber shall be the concatenation of the exitLocationId and the entryLocationId of the exit- and entry points during the current trip.

  NOTE 2 If in the actual versions of CEN ISO/TS 17575-1 and CEN ISO/TS 17575-3 the format of these parameters differ then they should be coded using the same semantics.

— **transactionCounter:** The **transactionCounter** in the identifier **dataReceived** in the Charge Report Response shall have the same value as the **transactionCounter** in the corresponding Charge Report.

— **versionsResponse:** The **versionsResponse** in the identifier **dataReceived** in the Charge Report Response shall have the same value as the **versionInfo** in the corresponding Charge Report.

— **versionInfo:** This identifier should contain the concatenation of **tollContextOverviewVersion, tariffTableVersion, tariffClassDefinitionVersion, localVehicleClassVersion, timeClassDefinitionVersion, userClassDefinitionVersion, chargeReportingEventsVersion** and **chargeReportConfigurationVersion** from the toll context data according to CEN ISO/TS 17575-3 that was used to create the data in the current Charge Report.

— **usageStatementID:** : Not used in other base standards.

B.4 Identifiers specified in CEN ISO/TS 17575-3

Identifiers specified in CEN ISO/TS 17575-3 shall have the following interrelationships with identifiers specified in other standards:

— **informationSender**: This identifier indicates the Service Provider that is responsible for sending the toll context data to the Front End. Its value shall be equal to that of **contractProvider** (if present) in the **contractTypes** identifier of the **userClass**. Its value shall also be equal to those of **contractProvider** and **reportRecipientId** in the Charge Reports sent according to CEN ISO/TS 17575-1.

— **informationOriginator:** This identifier indicates the originator of the toll context data, who is ultimately responsible for its correctness. This responsibility rests either with the operator of the toll domain (**efcOperator** in CEN ISO/TS 17575-1 and -3) or with the party receiving the toll (**recipient** in CEN ISO/TS 17575-1 and -3).

— **tollContextVersion:** The value of this identifier shall be the same as the value of **tollContextVersion** in the toll context data used by the OBE at the time of the CCC-transaction according to CEN ISO/TS 12813**.**

— **tollContextOverviewVersion, tariffTableVersion, tariffClassDefinitionVersion, localVehicleClassVersion, timeClassDefinitionVersion, userClassDefinitionVersion, chargeReportingEventsVersion** and **chargeReportConfigurationVersion:** The values of these identifiers that were applicable while creating the data in a certain Charge Report shall be part of the **versionInfo** identifier in that Charge Report.

— **areaId:** If the tolling principle used is that of area tolling, the value of **areaId** shall be used as the value of the **chargeObjectNumber** in the **listOfChargeObjects** in the Charge Report according to CEN ISO/TS 17575-1.

— **cordonId:** If the tolling principle used is that of cordon tolling, the value of **cordonId** shall be used as the value of the **chargeObjectNumber** in the **listOfChargeObjects** in the Charge Report according to CEN ISO/TS 17575-1.

— **entryLocationId** and **exitLocationId:** If the tolling principle used is that of cordon tolling, the concatenated value of these identifiers shall be used as the value of the **subObjectNumber** in the **listOfChargeObjects** in the Charge Report according to CEN ISO/TS 17575-1.

— **chargeObjectId:** If the tolling principle used is that of cordon tolling, the value of **chargeObjectId** shall be used as the value of the **chargeObjectNumber** in the **listOfChargeObjects** in the Charge Report according to CEN ISO/TS 17575-1.

— **networkId**: If the tolling principle is that of area tolling, but the user is charged for the use of an underlying road network, then the **networkId** shall be used as the value of the **subObjectNumber in the listOfChargeObjects** in the Charge Report according to CEN ISO/TS 17575-1.

— **contractProvider** (in **UserClass**): The value of this identifier shall be equal to the value of **contractProvider** sent in the Charge Report according to CEN ISO/TS 17575-1.

— **cordonSegmentId**: Not used in other base standards.

— **linkId**: Not used in other base standards.

— **pointIdentifier**: Not used in other base standards.

— **pointId**: Not used in other base standards.

— **aduSequenceNumber**: Not used in other base standards.

B.5 Identifiers specified in CEN ISO/TS 17575-4

Identifiers specified in CEN ISO/TS 17575-4 shall have the following interrelationships with identifiers specified in other standards:

— **efcContextId, reuseTariffInformationFrom, reuseReportingRulesFrom:** The value of these identifiers shall be identical to the value of the identifier **contextId** in the header of one of the sets of toll context data that is known by the Front End.

— **sendChargeReportIfEntering, involvedEfcContexts:** The value of all identifiers in these sequences shall be identical to the value of the identifier **contextId** in the header of one of the sets of toll context data that is known by the Front End.

— **efcRoamingRulesId:** Not used in other base standards.

— **roamingRulesVersion:** The value of this identifier that was applicable while creating the data in a certain Charge Report shall be part of the **versionInfo** identifier in that Charge Report.

— **reportingClusterId:** Not used in other base standards.

— **tollRecipient:** The value of this identifier shall be equal to the **recipient** identifier in **tollContextOverview.tollCharger** of all toll contexts (according to CEN ISO/TS 17575-3) indicated in **involvedEfcContexts.**

B.6 Identifiers specified in CEN ISO/TS 12813

Identifiers specified in CEN ISO/TS 12813 shall have the following interrelationships with identifiers specified in other standards:

— **cCC-ContextMark:** The value of this identifier, sent from the OBE to the RSE in a CCC-transaction according to CEN ISO/TS 12813, shall be the same as the value sent for identifier **serviceProviderContract** in a Charge Report to the Service Provider according to CEN ISO/TS 17575-1

— **contextVersion:** The value of this identifier shall be the same as the value of **tollContextVersion** in the toll context data (according to CEN ISO/TS 17575-3) used by the OBE at the time of the CCC-transaction**.**

B.7 Identifiers specified in EN ISO 12855

Identifiers specified in EN ISO 12855 shall have the following interrelationships with identifiers specified in other standards:

— **messageOriginator:** The **messageOriginator** shall be the identifier of the entity responsible for the content of the message. Therefore this identifier shall identify either the Service Provider or the Toll Charger involved in the transaction. In the case of the Service Provider, the value of this identifier shall be equal to **contractProvider** used in CEN ISO/TS 17575-1 and -3. In the case of the Toll Charger, its value shall be equal to either **efcOperator** or **recipient** used in CEN ISO/TS 17575-1 and -3. Consequently, the **messageOriginator** shall also be equal to either the **TSPid** or the **TCid**.

— **`informationSenderId:`** The value of this identifier is not connected to any other identifier in one of the other standards.

— **`tSPId:`** The value of this identifier shall be equal to **`contractProvider`** used in CEN ISO/TS 17575-1 and -3.

— **`tCId:`** The value of this identifier shall be equal to either **`efcOperator`** or **`recipient`** used in CEN ISO/TS 17575-1 and -3.

— **`contextID:`** The value of this identifier shall be equal to the identifier **`regimeId`** used in the Charge Reports sent according to CEN ISO/TS 17575-1.

Annex C
(normative)

Protocol Implementation Conformance Statement

C.1 Guidance for completing the PICS proforma

C.1.1 Purposes and structure

The purpose of this PICS proforma is to provide a mechanism whereby a supplier of an implementation of the requirements defined in the present standard may provide information about the implementation in a standardized manner.

The PICS proforma is subdivided into clauses for the following categories of information:

— guidance for completing the PICS proforma;

— identification of the implementation;

— identification of the protocol;

— global statement of conformance;

— PICS proforma tables.

C.1.2 Abbreviations and conventions

The PICS proforma contained in this annex is comprised of information in tabular form in accordance with the guidelines presented in ISO/IEC 9646-7.

Item column

The item column contains a number which identifies the item in the table.

Item description column

The item description column describes in free text each respective item (e.g. parameters, timers, etc.). It implicitly means "is <item description> supported by the implementation?".

Status column

The following notations, defined in ISO/IEC 9646-7 are used for the status column:

m	mandatory - the capability is required to be supported.
o	optional - the capability may be supported or not.
n/a	not applicable - in the given context, it is impossible to use the capability.
x	prohibited (excluded) - there is a requirement not to use this capability in the given context.
o.i	qualified optional - for mutually exclusive or selectable options from a set. "i" is an integer which identifies an unique group of related optional items and the logic of their selection which is defined immediately following the table.
ci	conditional - the requirement on the capability ("m", "o", "x" or "n/a") depends on the support of other optional or conditional items. "i" is an integer identifying an unique conditional status expression which is defined immediately following the table.

Reference column

The reference column makes reference to the present standard, except where explicitly stated otherwise.

Support column

The support column shall be filled in by the supplier of the implementation. The following common notations, defined in ISO/IEC 9646-7, are used for the support column:

Y or y	supported by the implementation.
N or n	not supported by the implementation.
N/A, n/a or -	no answer required (allowed only if the status is n/a, directly or after evaluation of a conditional status).

NOTE As stated in ISO/IEC 9646-7, support for a received PDU requires the ability to parse all valid parameters of that PDU. Supporting a PDU while having no ability to parse a valid parameter is non-conformant. Support for a parameter on a PDU means that the semantics of that parameter are supported.

Values allowed column

The values allowed column contains the type, the list, the range, or the length of values allowed. The following notations are used:

— range of values: <min value> .. <max value>

EXAMPLE 1 5 .. 20

— list of values: <value1>, <value2>, ..., <valueN>

EXAMPLE 2 2 ,4 ,6 ,8, 9

EXAMPLE 3 '1101'B, '1011'B, '1111'B

EXAMPLE 4 '0A'H, '34'H, '2F'H

— list of named values: <name1>(<val1>), <name2>(<val2>), ..., <nameN>(<valN>)

EXAMPLE 5 reject(1), accept(2)

— length: size (<min size> .. <max size>)

EXAMPLE 6 size (1 .. 8)

Values supported column

The values supported column shall be filled in by the supplier of the implementation. In this column, the values or the ranges of values supported by the implementation shall be indicated.

References to items

For each possible item answer (answer in the support column) within the PICS proforma a unique reference exists, used, for example, in the conditional expressions. It is defined as the table identifier, followed by a solidus character "/", followed by the item number in the table. If there is more than one support column in a table, the columns are discriminated by letters (a, b, etc.), respectively.

EXAMPLE 7 A.5/4 is the reference to the answer of item 4 in Table 5 of Annex A.

EXAMPLE 8 A.6/3b is the reference to the second answer (i.e. in the second support column) of item 3 in Table 6 of Annex A.

Prerequisite line

A prerequisite line takes the form: Prerequisite: <predicate>.

A prerequisite line after a clause or table title indicates that the whole clause or the whole table is not required to be completed if the predicate is FALSE.

C.1.3 Instructions for completing the PICS proforma

The supplier of the implementation shall complete the PICS proforma in each of the spaces provided. In particular, an explicit answer shall be entered, in each of the support or supported column boxes provided, using the notation described previously.

If necessary, the supplier may provide additional comments in space at the bottom of the tables or separately.

C.2 PICS proforma for the Toll Charger's Back-end

C.2.1 Identification of the implementation

Identification of the Implementation Under Test (IUT) and the system in which it resides (the System Under Test (SUT)) should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the PICS should be named as the contact person.

C.2.1.1 Date of the statement

.....

C.2.1.2 Implementation Under Test (IUT) identification

IUT name:

.....

.....

IUT version:

.....

C.2.1.3 System Under Test (SUT) identification

SUT name:

.....

.....

Hardware configuration:

.....

.....

.....

Operating system:

.....

C.2.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

C.2.1.5 Client (if different from product supplier)

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

C.2.1.6 PICS contact person

(A person to contact if there are any queries concerning the content of the PICS)

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

C.2.2 Identification of the protocol

This PICS proforma applies to the following standard:

CEN/TS 16331:2011 “Electronic fee collection — Interoperable application profiles for autonomous systems".

C.2.3 Global statement of conformance

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE Answering "No" to this question indicates non-conformance to the protocol specification. Non-supported mandatory capabilities should be identified in the PICS, with an explanation of why the implementation is non-conforming, on pages attached to the PICS proforma.

C.2.4 Profiles

Table C.1 – Profiles

Item	Supported Profile	Reference	Status	Support (Y/N)
1	SR – Sectioned Roads tolling profile	7.1, **Table** 1	o.1	
2	SD – Sectioned Roads tolling or Distance based Area pricing profile	7.1, **Table** 1	o.1	
3	OSD – Overlapping Sectioned Roads tolling or Distance based Area pricing profile	7.1, **Table** 1	o.1	
4	OSDT – Overlapping Sectioned Roads tolling or Distance or Time based Area pricing profile	7.1, **Table** 1	o.1	
5	ODTC - Overlapping Sectioned Roads tolling or Distance or Time based Area or Cordon pricing profile	7.1, **Table** 1	o.1	

o.1: it is mandatory to support at least one of these options.

C.2.5 EN ISO 12855

This part of the PICS proforma identifies the elements to be supported from EN ISO 12855.

C.2.5.1 Functionalities

Table C.2 – Functionalities

Item	Supported types	Reference	Status	Support (Y/N)
1	Basic protocol mechanisms	EN ISO 12855:2009, 5.2.3	m	
2	Originating and providing EFC context data	EN ISO 12855:2009, 5.2.5	m	
3	Report Toll declarations	EN ISO 12855:2009, 5.2.7	m	

C.2.5.2 Protocol data units

Table C.3 – InfoExchange APDU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	infoExchangeContent	EN ISO 12855:2009, 6.1	m		EN ISO 12855:2009, 6.1	m	
2	infoExchangeAuthenticator	EN ISO 12855:2009, 6.1	o		EN ISO 12855:2009, 6.1	m	

Table C.4 – Application Protocol Control Information

Item	Field name	Reference	Status	Support (Y/N)
1	messageOriginator	EN ISO 12855:2009, 6.2.1	m	
2	informationSenderID	EN ISO 12855:2009, 6.2.1	m	
3	informationRecipientID	EN ISO 12855:2009, 6.2.1	m	
4	contextID	EN ISO 12855:2009, 6.2.1	o	
5	messageIdentifier	EN ISO 12855:2009, 6.2.1	m	
6	relatedMessageID	EN ISO 12855:2009, 6.2.1	o	
7	aduType	EN ISO 12855:2009, 6.2.1	m	
8	numberOfStructs	EN ISO 12855:2009, 6.2.1	m	
9	messageDate	EN ISO 12855:2009, 6.2.1	m	

Table C.5 – Application Data Units

Item	ADU	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	RequestADU	5.2.2	m		EN ISO 12855:2009, 6.1, 6.3	m	
2	AckADU	5.2.2	m		EN ISO 12855:2009, 6.1, 6.4	m	
3	StatusADU	EN ISO 12855:2009, 6.1, 6.5	o		EN ISO 12855:2009, 6.1, 6.5	m	
4	EFCContextDataADU	EN ISO 12855:2009, 6.1, 6.7	m		EN ISO 12855:2009, 6.1, 6.7	n/a	
5	RetrieveTollDeclarationADU	5.2.2	m		EN ISO 12855:2009, 6.1, 6.10	n/a	
6	TollDeclarationADU	EN ISO 12855:2009, 6.1, 6.11	n/a		EN ISO 12855:2009, 6.1, 6.11	m	

Table C.6 – requestADU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	requestedADUType	EN ISO 12855:2009, 6.3	m		EN ISO 12855:2009, 6.3	m	
2	ADUIdentifier	EN ISO 12855:2009, 6.3	o		EN ISO 12855:2009, 6.3	m	
3	numberOfADUStructs	EN ISO 12855:2009, 6.3	o		EN ISO 12855:2009, 6.3	m	

Table C.7 – ackADU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	ADUIdentifier	EN ISO 12855:2009, 6.4	m		EN ISO 12855:2009, 6.4	m	
2	numberOfADUStructs	EN ISO 12855:2009, 6.4	o		EN ISO 12855:2009, 6.4	m	
3	ackCode	EN ISO 12855:2009, 6.4	m		EN ISO 12855:2009, 6.4	m	
4	aduCode	EN ISO 12855:2009, 6.4	o		EN ISO 12855:2009, 6.4	m	

Table C.8 – statusADU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	generalStatusCode	EN ISO 12855:2009, 6.5	m		EN ISO 12855:2009, 6.5	m	
2	messageStatusCode	EN ISO 12855:2009, 6.5	o		EN ISO 12855:2009, 6.5	m	

Table C.9 - EFC Context type support

Item	Supported type	Reference	Status	Support (Y/N)
1	DSRC Tolling	EN ISO 12855:2009, 6.7	o	
2	Autonomous tolling	EN ISO 12855:2009, 6.7	m	

Table C.10 – GNSS Context fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	contextInterrelations	EN ISO 12855:2009, 6.7	c.1		EN ISO 12855:2009, 6.7	n/a	
2	regimeContextData	EN ISO 12855:2009, 6.7	m		EN ISO 12855:2009, 6.7	n/a	

c.1 IF (Table C.1/3) OR (Table C.1/4) OR (Table C.1/5) THEN m ELSE o

Table C.11 – DSRC Context fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	regimeContextData	EN ISO 12855:2009, 6.7	c.1		EN ISO 12855:2009, 6.7	n/a	

c.1 IF (Table C.9/1) THEN m ELSE n/a

Table C.12 – RetrieveTollDeclarationADU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	userID	EN ISO 12855:2009, 6.10	o		EN ISO 12855:2009, 6.10	n/a	
2	startTime	EN ISO 12855:2009, 6.10	o		EN ISO 12855:2009, 6.10	n/a	
3	EndTime	EN ISO 12855:2009, 6.10	o		EN ISO 12855:2009, 6.10	n/a	

Table C.13 – TollDeclarationADU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	tollDeclarationId	EN ISO 12855:2009, 6.11	o		EN ISO 12855:2009, 6.11	m	
2	gnssTollDeclaration	EN ISO 12855:2009, 6.11	o		EN ISO 12855:2009, 6.11	m	

C.3 PICS proforma for the Toll Charger RSE

C.3.1 Identification of the implementation

Identification of the Implementation Under Test (IUT) and the system in which it resides (the System Under Test (SUT)) should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the PICS should be named as the contact person.

C.3.1.1 Date of the statement

.....

C.3.1.2 Implementation Under Test (IUT) identification

IUT name:

.....

.....

IUT version:

.....

C.3.1.3 System Under Test (SUT) identification

SUT name:

.....

.....

Hardware configuration:

.....

.....

.....

Operating system:

.....

C.3.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

C.3.1.5 Client (if different from product supplier)

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

C.3.1.6 PICS contact person

(A person to contact if there are any queries concerning the content of the PICS)

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

C.3.2 Identification of the protocol

This PICS proforma applies to the following standard:

CEN/TS 16331:2011 “Electronic fee collection — Interoperable application profiles for autonomous systems".

C.3.3 Global statement of conformance

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE Answering "No" to this question indicates non-conformance to the protocol specification. Non-supported mandatory capabilities should be identified in the PICS, with an explanation of why the implementation is non-conforming, on pages attached to the PICS proforma.

C.3.4 Support for CCC and LAC Applications

Table C.14 – CCC and LAC Infrastructure

Item	Installed Infrastructure	Reference	Status	Support (Y/N)
1	CCC	5.3	o	
2	LAC	5.3	o	

Table C.15 – Implemented DSRC stacks for CCC

Item	Element	Reference	Status	Support
1	CEN DSRC	CEN ISO/TS 12813:2009, 5.5.2	c.1	
2	CALM IR	CEN ISO/TS 12813:2009, Annex C	c.2	
3	UNI DSRC	CEN ISO/TS 12813:2009, Annex D	c.2	
4	ARIB DSRC	CEN ISO/TS 12813:2009, Annex E	c.2	

c.1 IF (Table C.14/1) THEN m ELSE n/a

c.1 IF (Table C.14/1) THEN o ELSE n/a

Table C.16 – Implemented DSRC stacks for LAC

Item	Element	Reference	Status	Support
1	CEN DSRC	CEN ISO/TS 13141:2010, 5.5.2	c.1	
2	CALM IR	CEN ISO/TS 13141:2010, Annex D	c.2	
3	UNI DSRC	CEN ISO/TS 13141:2010, Annex C	c.2	
4	ARIB DSRC	CEN ISO/TS 13141:2010, Annex E	c.2	

c.1 IF (Table C.14/2) THEN m ELSE n/a

c.2 IF (Table C.14/2) THEN o ELSE n/a

C.4 PICS proforma for the Service Provider Back-end

C.4.1 Identification of the implementation

Identification of the Implementation Under Test (IUT) and the system in which it resides (the System Under Test (SUT)) should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the PICS should be named as the contact person.

C.4.1.1 Date of the statement

.....

C.4.1.2 Implementation Under Test (IUT) identification

IUT name:

.....

.....

IUT version:

.....

C.4.1.3 System Under Test (SUT) identification

SUT name:

.....

.....

Hardware configuration:

.....

.....

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Operating system:

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C.4.1.4 Product supplier

Name:

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Address:

.....

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Telephone number:

.....

Facsimile number:

.....

E-mail address:

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Additional information:

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.....

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C.4.1.5 Client (if different from product supplier)

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

C.4.1.6 PICS contact person

(A person to contact if there are any queries concerning the content of the PICS)

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

C.4.2 Identification of the protocol

This PICS proforma applies to the following standard:

CEN/TS 16331:2011 “Electronic fee collection — Interoperable application profiles for autonomous systems".

C.4.3 Global statement of conformance

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE Answering "No" to this question indicates non-conformance to the protocol specification. Non-supported mandatory capabilities should be identified in the PICS, with an explanation of why the implementation is non-conforming, on pages attached to the PICS proforma.

C.4.4 Profiles

Table C.17 – Profiles

Item	Supported Profile	Reference	Status	Support (Y/N)
1	SR – Sectioned Roads tolling profile	7.1, **Table** 1	o.1	
2	SD – Sectioned Roads tolling or Distance based Area pricing profile	7.1, **Table** 1	o.1	
3	OSD – Overlapping Sectioned Roads tolling or Distance based Area pricing profile	7.1, **Table** 1	o.1	
4	OSDT – Overlapping Sectioned Roads tolling or Distance or Time based Area pricing profile	7.1, **Table** 1	o.1	
5	OSDTC - Overlapping Sectioned Roads tolling or Distance or Time based Area or Cordon pricing profile	7.1, **Table** 1	o.1	

o.1: it is mandatory to support at least one of these options.

C.4.5 EN ISO 12855

This part of the PICS proforma identifies the elements to be supported from EN ISO 12855

C.4.5.1 Functionalities

Table C.18 – Functionalities

Item	Supported types	Reference	Status	Support (Y/N)
1	Basic protocol mechanisms	5.4.2	m	
2	Originating and providing EFC context data	5.4.2	m	
3	Report Toll declarations	5.4.2	m	

C.4.5.2 Protocol data units

Table C.19 – InfoExchange APDU fields

Item	Field	Sending			Receiving		
		Reference	**Status**	**Support** (Y/N)	**Reference**	**Status**	**Support** (Y/N)
1	infoExchangeContent	EN ISO 12855:2009, 6.1	m		EN ISO 12855:2009, 6.1	m	
2	infoExchangeAuthenticator	EN ISO 12855:2009, 6.1	o		EN ISO 12855:2009, 6.1	m	

Table C.20 – Application Protocol Control Information

Item	Field name	Reference	Status	Support (Y/N)
1	messageOriginator	EN ISO 12855:2009, 6.2.1	m	
2	informationSenderID	EN ISO 12855:2009, 6.2.1	m	
3	informationRecipientID	EN ISO 12855:2009, 6.2.1	m	
4	contextID	EN ISO 12855:2009, 6.2.1	o	
5	messageIdentifier	EN ISO 12855:2009, 6.2.1	m	
6	relatedMessageID	EN ISO 12855:2009, 6.2.1	o	
7	aduType	EN ISO 12855:2009, 6.2.1	m	
8	numberOfStructs	EN ISO 12855:2009, 6.2.1	m	
9	messageDate	EN ISO 12855:2009, 6.2.1	m	

Table C.21 – Application Data Units

Item	ADU	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	RequestADU	5.4.2	m		EN ISO 12855:2009, 6.1, 6.3	m	
2	AckADU	5.4.2	m		EN ISO 12855:2009 6.1, 6.4	m	
3	StatusADU	EN ISO 12855:2009, 6.1, 6.5	o		EN ISO 12855:2009, 6.1, 6.5	m	
4	EFCContextDataADU	EN ISO 12855:2009, 6.1, 6.7	n/a		EN ISO 12855:2009, 6.1, 6.7	m	
5	RetrieveTollDeclarationADU	EN ISO 12855:2009, 6.1, 6.10	n/a		EN ISO 12855:2009, 6.1, 6.10	m	
6	TollDeclarationADU	5.4.2	m		EN ISO 12855:2009, 6.1, 6.11	n/a	

Table C.22 – requestADU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	requestedADUType	EN ISO 12855:2009, 6.3	m		EN ISO 12855:2009, 6.3	m	
2	ADUIdentifier	EN ISO 12855:2009, 6.3	o		EN ISO 12855:2009, 6.3	m	
3	numberOfADUStructs	EN ISO 12855:2009, 6.3	o		EN ISO 12855:2009, 6.3	m	

Table C.23 – ackADU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	ADUIdentifier	EN ISO 12855:2009, 6.4	m		EN ISO 12855:2009, 6.4	m	
2	numberOfADUStructs	EN ISO 12855:2009, 6.4	o		EN ISO 12855:2009, 6.4	m	
3	ackCode	EN ISO 12855:2009, 6.4	m		EN ISO 12855:2009, 6.4	m	
4	aduCode	EN ISO 12855:2009, 6.4	o		EN ISO 12855:2009, 6.4	m	

Table C.24 – statusADU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	generalStatusCode	EN ISO 12855:2009, 6.5	m		EN ISO 12855:2009, 6.5	m	
2	messageStatusCode	EN ISO 12855:2009, 6.5	o		EN ISO 12855:2009, 6.5	m	

Table C.25 – EFC Context type support

Item	Supported type	Reference	Status	Support (Y/N)
1	DSRC Tolling	EN ISO 12855:2009, 6.7	o	
2	Autonomous tolling	EN ISO 12855:2009, 6.7	m	

Table C.26 – GNSS Context fields

Item	Field	Sending			Receiving		
		Reference	**Status**	**Support** (Y/N)	**Reference**	**Status**	**Support** (Y/N)
1	contextInterrelations	EN ISO 12855:2009, 6.7	n/a		EN ISO 12855:2009, 6.7	c.1	
2	regimeContextData	EN ISO 12855:2009, 6.7	n/a		EN ISO 12855:2009, 6.7	m	

c.1 IF (Table C.17/3) OR (Table C.17/4) OR (Table C.17/5) THEN m ELSE o

Table C.27 – DSRC Context fields

Item	Field	Sending			Receiving		
		Reference	**Status**	**Support** (Y/N)	**Reference**	**Status**	**Support** (Y/N)
1	regimeContextData	EN ISO 12855:2009, 6.7	n/a		EN ISO 12855:2009, 6.7	c.1	

c.1 IF (Table C.25/1) THEN m ELSE n/a

Table C.28 – RetrieveTollDeclarationADU fields

Item	Field	Sending			Receiving		
		Reference	**Status**	**Support** (Y/N)	**Reference**	**Status**	**Support** (Y/N)
1	userID	EN ISO 12855:2009, 6.10	n/a		EN ISO 12855:2009, 6.10	m	
2	startTime	EN ISO 12855:2009, 6.10	n/a		EN ISO 12855:2009, 6.10	m	
3	EndTime	EN ISO 12855:2009, 6.10	n/a		EN ISO 12855:2009, 6.10	n/a	

Table C.29 – TollDeclarationADU fields

Item	Field	Sending			Receiving		
		Reference	Status	Support (Y/N)	Reference	Status	Support (Y/N)
1	tollDeclarationId	EN ISO 12855:2009, 6.11	m		EN ISO 12855:2009 6.11	n/a	
2	gnssTollDeclaration	EN ISO 12855:2009, 6.11	m		EN ISO 12855:2009, 6.11	n/a	

C.5 PICS proforma for the Service Provider Front End

C.5.1 Identification of the implementation

Identification of the Implementation Under Test (IUT) and the system in which it resides (the System Under Test (SUT)) should be filled in so as to provide as much detail as possible regarding version numbers and configuration options.

The product supplier information and client information should both be filled in if they are different.

A person who can answer queries regarding information supplied in the PICS should be named as the contact person.

C.5.1.1 Date of the statement

.....

C.5.1.2 Implementation Under Test (IUT) identification

IUT name:

.....

.....

IUT version:

.....

C.5.1.3 System Under Test (SUT) identification

SUT name:

.....

.....

Hardware configuration:

.....

.....

.....

Operating system:

.....

C.5.1.4 Product supplier

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

C.5.1.5 Client (if different from product supplier)

Name:

.....

Address:

.....

.....

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

C.5.1.6 PICS contact person

(A person to contact if there are any queries concerning the content of the PICS)

Name:

.....

Telephone number:

.....

Facsimile number:

.....

E-mail address:

.....

Additional information:

.....

.....

.....

C.5.2 Identification of the protocol

This PICS proforma applies to the following standard:

CEN/TS 16331:2011 “Electronic fee collection — Interoperable application profiles for autonomous systems".

C.5.3 Global statement of conformance

Are all mandatory capabilities implemented? (Yes/No) .....

NOTE Answering "No" to this question indicates non-conformance to the protocol specification. Non-supported mandatory capabilities should be identified in the PICS, with an explanation of why the implementation is non-conforming, on pages attached to the PICS proforma.

C.5.4 Front End Class

Table C.30 – Class

Item	Front End Class	Reference	Status	Support (Y/N)
1	Class A	**Table** 3	o.1	
2	Class B	**Table** 3	o.1	
3	Class C	**Table** 3	o.1	
4	Class D	**Table** 3	o.1	

o.1: it is mandatory to support at least one of these options.

C.5.5 CEN ISO/TS 17575-1 Charge Report - Usage Statement

Table C.31 – Usage Statement

Item	Element	Reference	Status	Support (Y/N)
1	usageStatementID	CEN ISO/TS 17575-1:2010, 6.5.1	o	
2	regimeID	CEN ISO/TS 17575-1:2010, 6.5.1	o	
3	aggregatedFee	CEN ISO/TS 17575-1:2010, 6.5.1	c.1	
4	vat	CEN ISO/TS 17575-1:2010, 6.5.1	c.1	
5	aggregatedSingleTariffClassSession	CEN ISO/TS 17575-1:2010, 6.5.1	c.2	
6	list OfChargeObjects	CEN ISO/TS 17575-1:2010, 6.5.1	c.3	
7	listOfDSRCUsageData	CEN ISO/TS 17575-1:2010, 6.5.1	o	
8	listOfRawUsageData	CEN ISO/TS 17575-1:2010, 6.5.1	m	
9	noUsage	CEN ISO/TS 17575-1:2010, 6.5.1	o	
10	additionalUsageInformation	CEN ISO/TS 17575-1:2010, 6.5.1	o	
11	usageAuthenticator	CEN ISO/TS 17575-1:2010, 6.5.1	o	

c.1 IF (Table C30/4) m ELSE o

c.2 IF (Table C30/3) m ELSE o

c.3 IF (Table C30/2) m ELSE o

C.5.6 CEN ISO/TS 17575-3 –Charge Report Configuration

Table C.32 – UsageStatementContent

Item	Element	Reference	Status	Support (Y/N)
1	cccAttributesContent	CEN ISO/TS 17575-3:2011, 8.3.5.2.2	o	
2	aggregatedSingleTariffClassSessionContent	CEN ISO/TS 17575-3:2011, 8.3.5.2.2	c.1	
3	detectedChargeObjectContent	CEN ISO/TS 17575-3:2011, 8.3.5.2.2	c.2	
4	listOfRawUsageDataContent	CEN ISO/TS 17575-3:2011, 8.3.5.2.2	m	
5	vehicleDescriptionContent	CEN ISO/TS 17575-3:2011, 8.3.5.2.2	m	
6	chargeReportConfigurationAuthenticator	CEN ISO/TS 17575-3:2011, 8.3.5.2.2	m	

c.1 IF (Table C32/1 OR TableC32/2) o ELSE m

c.2 IF (Table C32/1) o ELSE m

C.5.7 Support for CCC and LAC Applications

Table C.33 – CCC and LAC Interface

Item	Installed Interface	Reference	Status	Support (Y/N)
1	CCC	5.4.3	m	
2	LAC	5.4.3	m	

Table C.34 – Implemented DSRC stacks for CCC

Item	Element	Reference	Status	Support
1	CEN DSRC	CEN ISO/TS 12813:2009, 5.5.2	m	
2	CALM IR	CEN ISO/TS 12813:2009, Annex C	o	
3	UNI DSRC	CEN ISO/TS 12813:2009, Annex D	o	
4	ARIB DSRC	CEN ISO/TS 12813:2009, Annex E	o	

Table C.35 – Implemented DSRC stacks for LAC

Item	Element	Reference	Status	Support
1	CEN DSRC	CEN ISO/TS 13141:2010, 5.5.2	m	
2	CALM IR	CEN ISO/TS 13141:2010, Annex D	o	
3	UNI DSRC	CEN ISO/TS 13141:2010, Annex C	o	
4	ARIB DSRC	CEN ISO/TS 13141:2010, Annex E	o	

Annex D
(informative)

IAP taxonomy and numbering

D.1 General

The intentions of application profiling are outlined in this annex together with a basic taxonomy and numbering of IAPs. The annex may be used for referencing, e.g. when stating conformance to this Technical Specification, or when preparing future editions of this IAP standard.

D.2 Taxonomy of Interoperable Application Profiles (IAP)

D.2.1 Specified profiles

The purpose of an IAP is to ensure technical interoperability between different EFC-systems. Therefore, the stakeholders of an interoperable EFC cluster need to agree on a single profile to be applied by all stakeholders to ensure interoperability. All these stakeholders need to make sure that all used processes and equipment are compliant with this EFC cluster specific IAP. This may be evaluated within a "suitability for use test". Processes and equipment may be certified in case the test was passed successfully.

Profiles as specified in this IAP define the functional frame of EFC clusters. To be as close as possible to the functional needs of newly planned EFC clusters this IAP has defined 5 different profiles for autonomous systems or for the autonomous part of technology open EFC systems. These profile specific characteristics comprise a stepwise increased functionality allowing EFC clusters to select its appropriate complexity fulfilling all the needs of the participating Toll Chargers and respect the requirements of Service Providers to keep the complexity of their system as low as possible.

It is anticipated that the "classical" highway tolling system which is named "sectioned roads tolling" in the CEN ISO/TS 17575-3 base standard is the most common used tolling principle and therefore it is the first and simplest profile within this suite of profiles characterised with the name SR (**S**ectioned **R**oads tolling).

The first step extending the functional frame above that what is defined in SR is specified in a second profile and comprises another basic tolling principle. This is the area pricing scheme according to measured travelled distance. These both principles are covered by the SD (**S**ectioned Roads pricing or **D**istance based Area pricing) IAP.

The third defined profile allows the combination of more than one DSA in the same EFC domain. This covers the functional frame of EFC domain characteristics where in several overlapped areas the fee per travelled distance is different e.g. in rural or urban or even downtown areas. And additionally an overlapped sectioned roads system may be defined for highways or arterial roads with a different tariff structure. This profile is called the OSD (**O**verlapped **S**ectioned Roads tolling or **D**istance based Area pricing) IAP and is anticipated to cover most or all of the actually planned tolling principles.

The next standardised profile covers in addition to the functionality of the OSD IAP the basic tolling principle of area pricing according to the time being inside the area and named accordingly OSDT (**O**verlapped **S**ectioned Roads tolling or **D**istance or **T**ime based Area pricing). This is anticipated to be an adequate profile for large EFC clusters where the traffic management objective includes getting vehicles out of the downtown areas of cities - moving or parking.

The last and most comprehensive profile specified in this edition of the IAP is the OSDTC (**O**verlapped **S**ectioned Roads tolling or **D**istance or **T**ime based Area pricing **C**ordon pricing). It covers in addition to the last profile the basic tolling principle of cordon pricing. This profile might be adequate for EFC clusters where the traffic management objective for large cities requires either not to burden local residents too much and/or

to distinguish in the tariffs between through-going traffic and supply traffic with downtown destinations. Details on how that can be set in the context data are specified in CEN ISO/TS 17575-3.

D.2.2 Future new profiles

The current set of specified profiles covers EFC domain characteristics which are currently used or which have been discussed to be applied in future. However, not all the standardised features specified in the base standards have been used in this edition of the IAP to keep the resulting complexity of the Front Ends within an acceptable frame.

If requirements will come up in future to increase the frame of the functionality of EFC schemes one or more new profiles may be defined using the methodology as illustrated in Annex E. These new profile should stay within the scope of this IAP or should become a new IAP standard.

From the current view extensions may be required using the embedded road networks in area pricing schemes or the external set time classes to implement a "congestion charging" scheme where the fee depends on actual measurements which may be the actual or predicted traffic density. For both of these functionalities the required data elements are specified in CEN ISO/TS 1757-3.

There may also come up new requirements to reduce the complexity of the Front Ends and leaving out what is actually not needed. This may be specified in new profile leaving one or more of the basic tolling principles out. Examples would be other combinations of basic tolling principles as e.g. just sectioned roads and cordon pricing – or leaving out the time based area pricing but keeping the cordon pricing scheme.

Also features may be left out which are in the currents profiles still optional and therefore not mentioned. This may be elements of the tariff model or how to describe charge objects or others. In these cases Tables 1 and 2 of this IAP may be extended using new lines for each of the optional data elements and it should be specified if these data elements are to be handled mandatory (m) or if they are not applicable (n/a). The conditional requirements which may come up with this should be specified in extensions of Annex A.

D.3 IAP numbering and referencing

D.3.1 IAP numbering

This Technical Specification defines 5 different profiles providing a stepwise increased functionality of EFC schemes. The names of these profiles were defined using the initial letter of the keywords defining the main elements of the IAP characteristics.

With increasing functionality covered by a profile its name got longer and longer. However, it is anticipated that still it is easy to grasp its features even with the 7 letters of the most complex profile specified within this IAP.

Future profiles should use the same numbering or naming scheme. To reduce the length of these names other characters like F for "full" or others may be used to combine features and keep the length limited.

If minor features are left out in a new profile it should be named by adding after a dot a number allowing to distinguish between a large number of combinations in functional details.

D.3.2 IAP referencing

The numbering methodology of this IAP may help characterising equipment and devices and even software features. This should be used to specify EFC system constituents. For example a Service Provider Back End software package is compliant with the OSD profile. Or a Front End is compliant with the SR.1 profile if a new profile was defined reducing some minor details of optional data elements.

Annex E
(informative)

How to define new profiles - the profile creation principle

The profiles defined in this Technical Specification where defined using 2 tables (Table 1 and Table 2) listing the "high level" data elements which are classified as optional in the base standards. All these data elements represent parameters which may be used defining specific details of EFC scheme characteristics like tolling principles and tariff models.

For each of the standardised profiles – and that may also be used defining new profiles – each of these data elements are marked in the column "profile" either as mandatory (m) or not applicable (n/a). All other optional data elements of the base standards remain optional. This column of marked m or n/a constitutes a single profile.

If a data element of the base standard in these tables is marked as mandatory (m) then the clause referenced in the column "conditional requirements" is relevant for an implementation if this data element is actually used. A data element which is listed in these tables and marked as mandatory (m) may be used by the sender of a message or not. Only for the receiver of the message this data element is mandatory to be evaluated and interpreted if it was received.

Some of the optional data elements of the base standards listed in the tables are not selected as being mandatory for any of the specified profiles and still have a reference to conditional requirements in Annex A. This should be seen as a preparation for the definition of new profiles and may help finding the implicit conditional requirements. The content of the referenced clause in Annex A will be updated according to these future needs.

So all what is needed to do defining a new profile is adding a new sub-column in the 2 tables below the main column named "profile" and marking all the data elements of the base standards required in the new profile as mandatory (m). All data elements not required in any toll scheme should be marked as not applicable (n/a).

For all the stakeholders follows that being conformant to the new profile requires that the sender (in most cases the Toll Charger) uses only data elements marked as (m) and that the conditional requirements listed in the column "conditional requirements" for each of these data elements are observed. Not mentioned data elements are still optional and may be used or not. The receiver need to implement in its devices all what is needed to receive and react on all the data elements marked as mandatory (m) independently if it is used by any of the senders or not.

If new profiles are created using this methodology each resulting profile should be named according to the principles of taxonomy and numbering as defined in Annex D.

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