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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

This Technical Specification (CEN/TS) was approved by CEN on 8 January 2012 for provisional application.

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Management Centre: Avenue Marnix 17, B-1000 Brussels

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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.

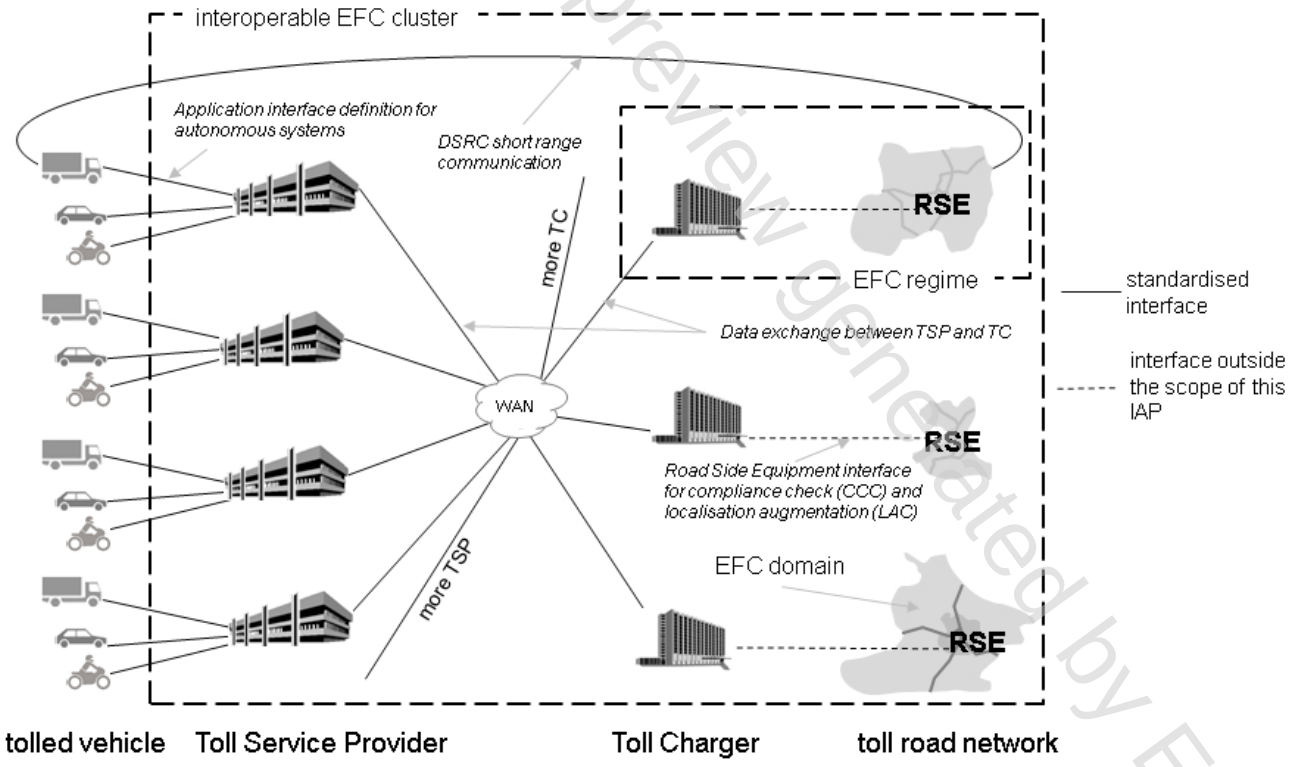

Figure 1 — Actors and interfaces within an interoperable EFC cluster

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.

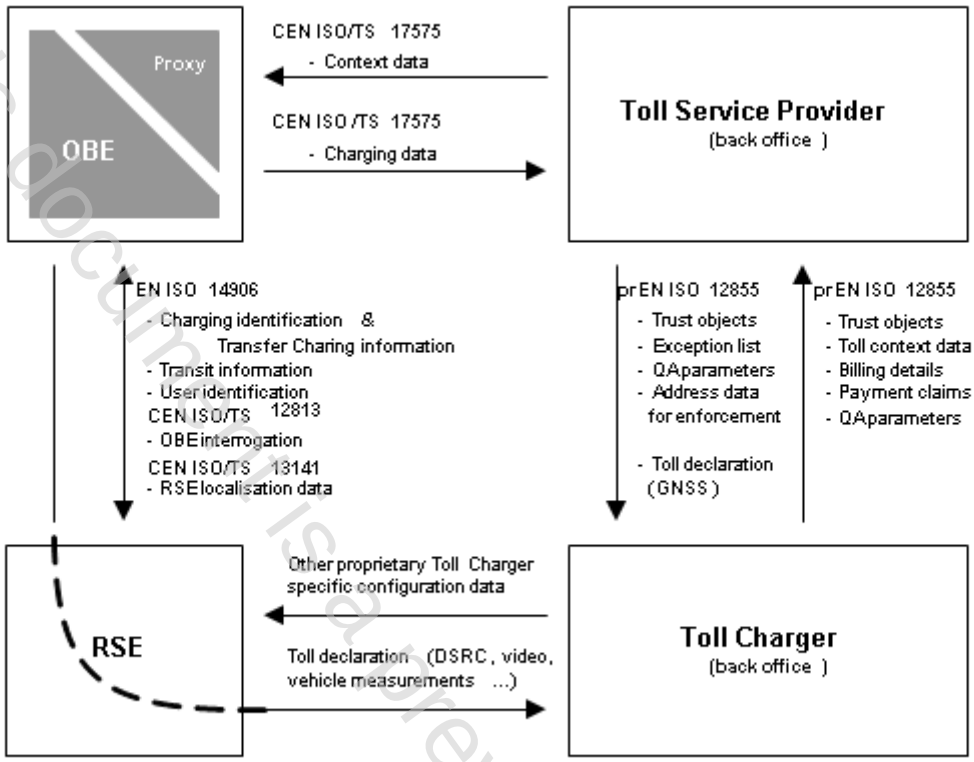

Figure 2 — Suite of EFC related standards

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.

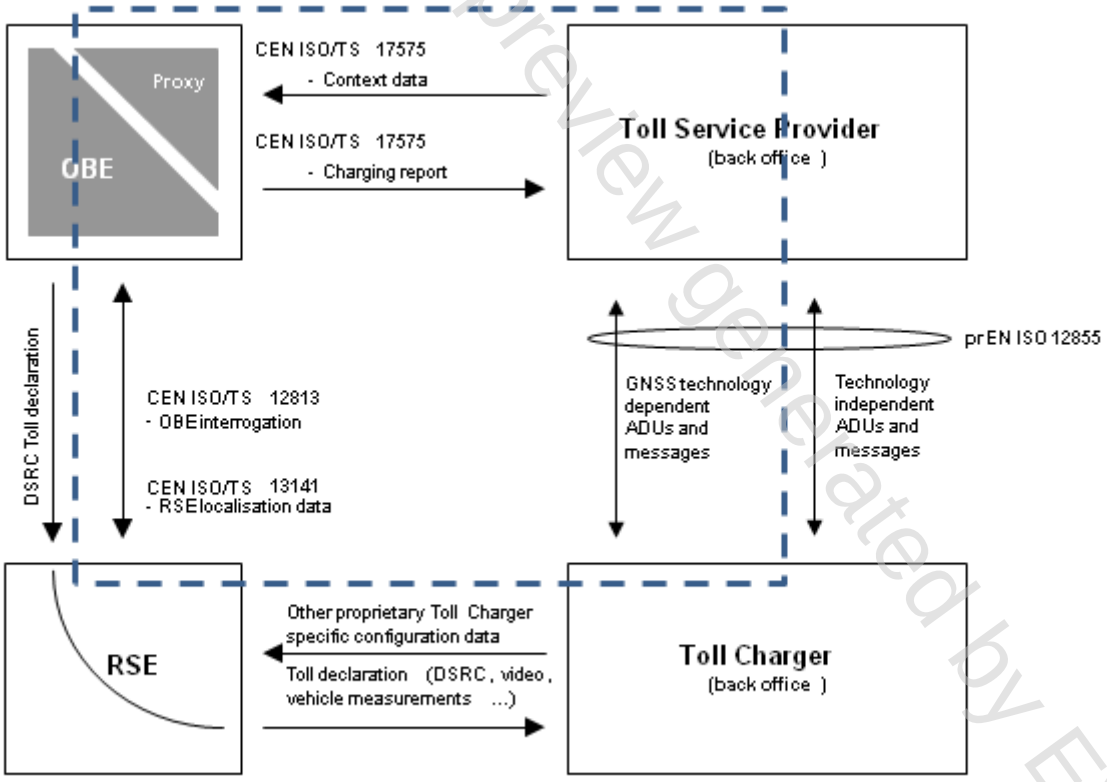

Figure 3 — The scope of this IAP covers the interfaces within the dotted lined box

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)*