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Elektronsko pobiranje pristojbin - Sistemska arhitektura za cestninjenje vozil - 1. del: Referenčni model (ISO/DIS 17573-1:2018)

Electronic fee collection - System architecture for vehicle related tolling - Part 1: Reference model (ISO/DIS 17573-1:2018)

Elektronische Gebührenerhebung - Systemarchitektur für fahrzeugrelevante Maut - Teil 1: Referenzmodell (ISO/DIS 17573-1:2018)

Perception du télépéage - Architecture de systèmes pour le péage lié aux véhicules (ISO/DIS 17573-1:2018)

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Electronic fee collection — Systems architecture for vehicle-related tolling —

Part 1:
Reference model

Perception du télépéage — Architecture de systèmes pour le péage lié aux véhicules

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Foreword

This document (prEN ISO/DIS 17573-1:2018) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN, in collaboration with Technical Committee ISO/TC 204 “Intelligent transport systems”.

This document is currently submitted for DIS Ballot

This document will supersede ISO 17573:2010.

Introduction

The widespread use of tolling also requires provisions for users of vehicles that are roaming through many different toll domains. Users should be offered a single contract for driving a vehicle through various toll domains and those vehicles require onboard equipment (OBE) that is interoperable with the toll system in the various toll domains. In Europe, for example, this need has been officially recognised and legislation on interoperability already has been adopted (Directive 2004/52).

In addition to specialised standards there is also a further need for a system architecture that:

— provides an architectural “umbrella” for other EFC standards in terms of a common definition of terms and concepts, basic system functionalities, and structure

— provides a common terminology which enables its users

— to improve the quality of specifications to be used in an international market,

— to reduce the risk for conflicting interpretations of specifications (purchaser) and descriptions (supplier),

— to simplify the communication between experts from different continents, and

— to enhance the potential use of other EFC standards;

— defines a common framework, that enables both:

— identification of potential activities subject to standardization, and

— maintaining a common and consistent view of the whole area;

— defines the boundaries between the EFC and external domains;

— identifies all architectural objects that lay inside the EFC boundaries;

— provides a basic understanding of EFC, EFC interoperability, and the EFC services being offered.

Toll systems covered by the present document may be used for various purposes including measured distance toll, road segment toll, closed network toll, cordon toll, area toll, time-based toll and collecting fees for the use of bridges, tunnels, ferries, or for parking.

The first edition of the present document was based on a conceptual model defined in ENV ISO 14904. Since then ideas on conceptual models have evolved in several regional projects and implementations, e.g. in Japan and Europe. Those new models have been detailed to a further extent compared to ISO 17573 and are more close to real life implementations. The second edition of the present document is based on these new conceptual models and uses the associated terms and definitions.

Although there are many differences, collecting toll for vehicles can be to some extent compared with collecting fare for public transport. Architectural harmonisation of the collection of fee and fare may be desirable from a policy and from a user point of view. In the past EN ISO 24014-1 *Interoperable Fare Management system - Part 1: Architecture (IFMSA)* prepared by CEN TC 278 WG 3 Public Transport used ISO 17573:2010 as a starting point for their work. This present document has benefited from that and has also taken ISO/FDIS 24014-1 into account.

In this present document the Open Distributed Processing (ODP) standard is used for the description of the architecture.

The ODP standard gives a vocabulary and modelling tools to see the architecture of a system from different perspectives (the viewpoints), in order to cover, e.g., hardware components as well as network protocols or interfaces or roles and general policies of the system itself. This is accomplished using different sets of concepts and terminologies, each one of those expressed as a viewpoint language. A complete description of a real system can only be achieved when all viewpoint models are designed.

This allows for a clear separation of concerns and an easier way to define a system. A brief description of the ODP concepts can be found in Annex A.

In more recent years, the development of concepts and standards in the field of Cooperative ITS (C-ITS, ISO TC204/WG18 and CEN TC278/WG16) led to the definition of a general Enterprise viewpoint architecture for C-ITS (ISO 17427-1) that, by following the same approach of using the ODP architecture to model a complex system, extended the concepts and terms defined by the second edition of the present document to the more general realm of Cooperative ITS.

This third edition of the present document gives a description of the architecture of the toll systems environment from the enterprise viewpoint, by refining and extending what had been already done in the second edition, and using terms and concepts developed in ISO 17427-1. In addition, the present document gives the foundations of the information viewpoint by defining information interactions and general information objects, and gives the basis for the computational view, by identifying needed computational objects and their interfaces. With respect to the second edition, this third edition removes all security requirements on interfaces, which are better and more generally dealt with in EN ISO/TS 19299.

The present document is Part 1 of a multipart standard that is made of the following parts:

— ISO IS 17573-1: Electronic fee collection — System architecture for vehicle related tolling — Part 1: Reference Model (this document)

— ISO/TR 17573-2: Electronic fee collection — System architecture for vehicle related tolling — Part 2: Terminology

Electronic fee collection — Systems architecture for vehicle-related tolling —

Part 1: Reference model

1 Scope

The present document defines the architecture of toll system environments in which a customer with one contract may use a vehicle in a variety of toll domains and with a different Toll charger for each domain.

Toll systems conforming to the present document may be used for various purposes including road (network) tolling, area tolling, collecting fees for the usage of bridges, tunnels, ferries, for access or for parking. From a technical point of view the considered toll systems use electronic equipment on board of a vehicle.

From a process point of view the architectural description focuses on toll determination, toll charging, and the associated enforcement measures. The actual collection of the toll, i.e. collecting payments, is outside of the scope of the present document.

The architecture in the present document is defined with no more details than those required for an overall overview, a common language, an identification of the need for and interactions among other standards, and the drafting of these standards.

The present document as a whole provides:

— The enterprise view on the architecture, which is concerned with the purpose, scope and policies governing the activities of the specified system within the organization of which it is a part.

— Terms and definitions for common use in a toll environment

— A decomposition of the toll systems environment into its main enterprise objects

— The roles and responsibilities of the main actors

— Identification of the provided services by means of action diagrams that underline the needed standardised exchanges

— Identification of the interoperability interfaces for EFC systems, to be specified in specialised standards.

2 Normative references

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

ISO/IEC 7498-1:1994, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model — Part 1*

ISO/IEC 10746-1, *Information technology — Open Distributed Processing — Reference model: Overview — Part 1*

ISO/IEC 10746-2, *Information technology — Open distributed processing — Reference model: Foundations — Part 2*

ISO/IEC 10746-3, *Information technology — Open distributed processing — Reference model: Architecture — Part 3*

ISO/IEC 10746-4, *Information technology — Open Distributed Processing — Reference Model: Architectural semantics — Part 4*

ISO/IEC 15414, *Information technology — Open distributed processing — Reference model — Enterprise language*

ISO 17427-1, *Intelligent transport systems — Cooperative ITS — Part 1: Roles and responsibilities in the context of co-operative ITS architecture(s)*

3 Terms and definitions

For the purpose of this document, terms and definitions given in ISO/IEC 7498-1:1994, ISO/IEC 10746-2, ISO/IEC 10746-3, ISO/IEC 15414 are used. The following terms are defined in the present document.

3.1
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.

3.2
electronic fee collection (EFC)
fee collection by electronic means.

Note 1 to entry: The actual payment (collection of the fee) may take place outside the toll system.

3.3
enforcement
measures or actions performed to achieve compliance with laws, regulations or rules.

Note 1 to entry: In this context: the process of compelling observance of a toll regime.

3.4
interoperability
ability of systems to exchange information and to make mutual use of the information that has been exchanged.

EXAMPLE Tolling interoperability aims at enabling a vehicle to drive through various toll domains while having only one OBE operating under one contract with a toll service provider.

3.5
localisation augmentation
information sent by the roadside equipment to the onboard equipment to augment the positioning for autonomous systems

3.6
onboard equipment (OBE)
all required equipment on-board a vehicle for performing required electronic fee collection (EFC) functions and communication services.

3.7
roadside equipment
equipment located along the road, either fixed or mobile.

3.8
role
set of responsibilities

3.9
short range communication
tolling technique based on transfer of information via a radio connection between a roadside equipment and an onboard equipment

Note 1 to entry: This includes 5.8 GHz DSRC as well as ITS-G5 and RFID.

3.10
tariff scheme
set of rules to determine the fee due for a vehicle within a toll domain.

3.11
toll
charge, tax or duty levied in connection to using a vehicle in a toll domain

3.12
toll charger
entity which levies toll for the use of vehicles in a toll domain

3.13
toll declaration
statement to declare the usage of a given toll service to a toll charger

3.14
toll domain
area or part of a road network where a certain toll regime is applied

3.15
toll regime
set of rules, including enforcement rules, governing the collection of toll in a toll domain.

3.16
toll scheme
organizational view of a toll regime, including the actors and their relationships.

3.17
toll service
service enabling users to pay toll.

3.18
toll service provider
entity providing toll services in one or more toll domains.

3.19
transport service
transport infrastructure related service which is offered to the user.

3.20
trust object
information object that is exchanged between entities to ensure mutual trust.

EXAMPLE A trust object may be e.g. an electronic signature or an electronic certificate.

4 Abbreviations and symbols

4.1 Abbreviations

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

CE	Central Equipment
CRM	Customer Relationship Management
DSRC	Dedicated Short-Range Communication
EETS	European Electronic Toll Service
EFC	Electronic Fee Collection
GNSS	Global Navigation Satellite Systems
ID	Identity
IFMSA	Interoperable Fare Management system Architecture
OBU	On-board Unit
ODP	Open Distributed Processing
RFID	Radio Frequency IDentification
RSE	Roadside Equipment
SLA	Service Level Agreements
SRC	Short Range Communication
TC	Toll Charger
TMS	Traffic Management system
TTP	Trusted Third Party
UML	Unified Modelling Language

4.2 Symbols

In action diagrams, the following graphical conventions apply:

Rounded corner boxes indicate responsibilities and related activities within roles

Horizontal arrows indicate information exchanges between roles as activities performed within responsibilities

Vertical arrows represent execution steps within activities