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English Version

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

Perception de télépéage - Communications d'augmentation
de localisations pour systèmes autonomes (ISO/TS
13141:2010)

Elektronische Gebührenerfassung - Genauere
Ortsbestimmung für autonome Systeme (ISO/TS
13141:2010)

This Technical Specification (CEN/TS) was approved by CEN on 23 January 2010 for provisional application.

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Foreword

This document (CEN ISO/TS 13141:2010) 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".

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Foreword

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

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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ISO/TS 13141 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Road transport and traffic telematics*, in collaboration with ISO Technical Committee ISO/TC 204, *Intelligent transport systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Introduction

On-board equipment (OBE) working with satellite-based positioning to collect data required for charging for the use of roads operate in a so-called autonomous way (i.e. generally without relying on dedicated road-side infrastructure). However, these autonomous systems can, in particular places, need some road-side infrastructure support for proper identification of charge objects. Such assistance might be required at places where satellite-based localisation accuracy or availability is insufficient or at places where the OBE is directly informed about the identity of the relevant charge object.

In an interoperable environment, it is essential that this localisation information be available in a standardized way. This Technical Specification defines requirements for localisation augmentation by dedicated short-range communication (DSRC) between road-side equipment and on-board equipment. This Technical Specification makes no assumptions about the operator of the road-side equipment, in terms of his role according to ISO 17573, i.e. whether the road-side equipment is operated by an entity in the Service Provision role or in the Toll Charging role.

This Technical Specification has been prepared considering the following requirements:

- the localisation augmentation communication (LAC) serves to transmit localisation information to passing OBE without identifying individual OBE;
- the localisation information contains both geographical location independent of charging context, and context-dependent identification of charge objects;
- a single road-side installation is able to provide localisation augmentation for several overlapping EFC contexts;
- this Technical Specification is according to the EFC architecture specified in ISO 17573;
- the communication applies to all OBE architectures;
- this Technical Specification is applicable to various DSRC media, including the CEN DSRC stack;
- the communication supports security services for data origin authentication, integrity and non-repudiation.

This Technical Specification defines an attribute, LACData, which is communicated from the roadside to the OBE by means of an acknowledged writing service, which is implemented through the SET service of DSRC Layer 7 (ISO 15628 and EN 12834). The LAC application is defined as a self-contained DSRC application with its own application identifier (AID). Regarding the DSRC communications stack, this Technical Specification gives definitions for the CEN DSRC stack, as used in EN 15509 and the Annexes C, D and E demonstrate the use of ISO CALM IR, UNI DSRC and ARIB DSRC.

All data relevant for the LAC application have been put into the attribute LACData, in order to create a single standard communications content transmitted by all road-side equipment, and always signed as a whole. LACData can transport both geographic coordinates (Lat, Long, Alt) and the identification of a specific charge object. All elements of LACData are mandatory, but Null values are defined to allow LAC installations to transmit only a selection of all defined data elements.

Access credentials are mandatory for writing LACData in order to protect OBE from non-authentic road-side equipment. LACData are critical for charge determination and need to have evidentiary quality. For these purposes, the authenticators which are defined can be used to provide for data origin authentication, data integrity and non-repudiation for LACData. There are two separate authenticator fields defined to allow for separate authentication and non-repudiation, if required by the institutional arrangements of a toll system.

This Technical Specification is minimal, in order to be able to cover what is required by operational EFC systems and systems planned in the foreseeable future.

Electronic fee collection — Localisation augmentation communication for autonomous systems

1 Scope

This Technical Specification establishes requirements for short-range communication for the purposes of augmenting the localisation in autonomous electronic fee collection (EFC) systems. Localisation augmentation serves to inform OBE about geographical location and the identification of a charge object. This Technical Specification specifies the provision of location and heading information and security means to protect from the manipulation of the OBE with false road-side equipment (RSE).

The localisation augmentation communication takes place between an OBE in a vehicle and fixed road-side equipment. This Technical Specification is applicable to OBE in an autonomous mode of operation.

This Technical Specification defines attributes and functions for the purpose of localisation augmentation, by making use of the DSRC communication services provided by DSRC Layer 7, and makes these LAC attributes and functions available to the LAC applications at the RSE and the OBE. Attributes and functions are defined on the level of ADUs (Application Data Units, see Figure 1).

As depicted in Figure 1, this Technical Specification is applicable to:

- the application interface definition between OBE and RSE;
- the interface to the DSRC application layer, as specified in ISO 15628 and EN 12834;
- the use of the DSRC stack.

The localisation augmentation communication is suitable for a range of short-range communication media. This Technical Specification gives specific definitions regarding the CEN DSRC stack as used in EN 15509, and Annexes C, D and E give the use of ISO CALM IR, UNI DSRC and ARIB DSRC.

This Technical Specification contains a protocol implementation conformance statement (PICS) proforma and informative transaction examples. This Technical Specification is not applicable to test specifications.

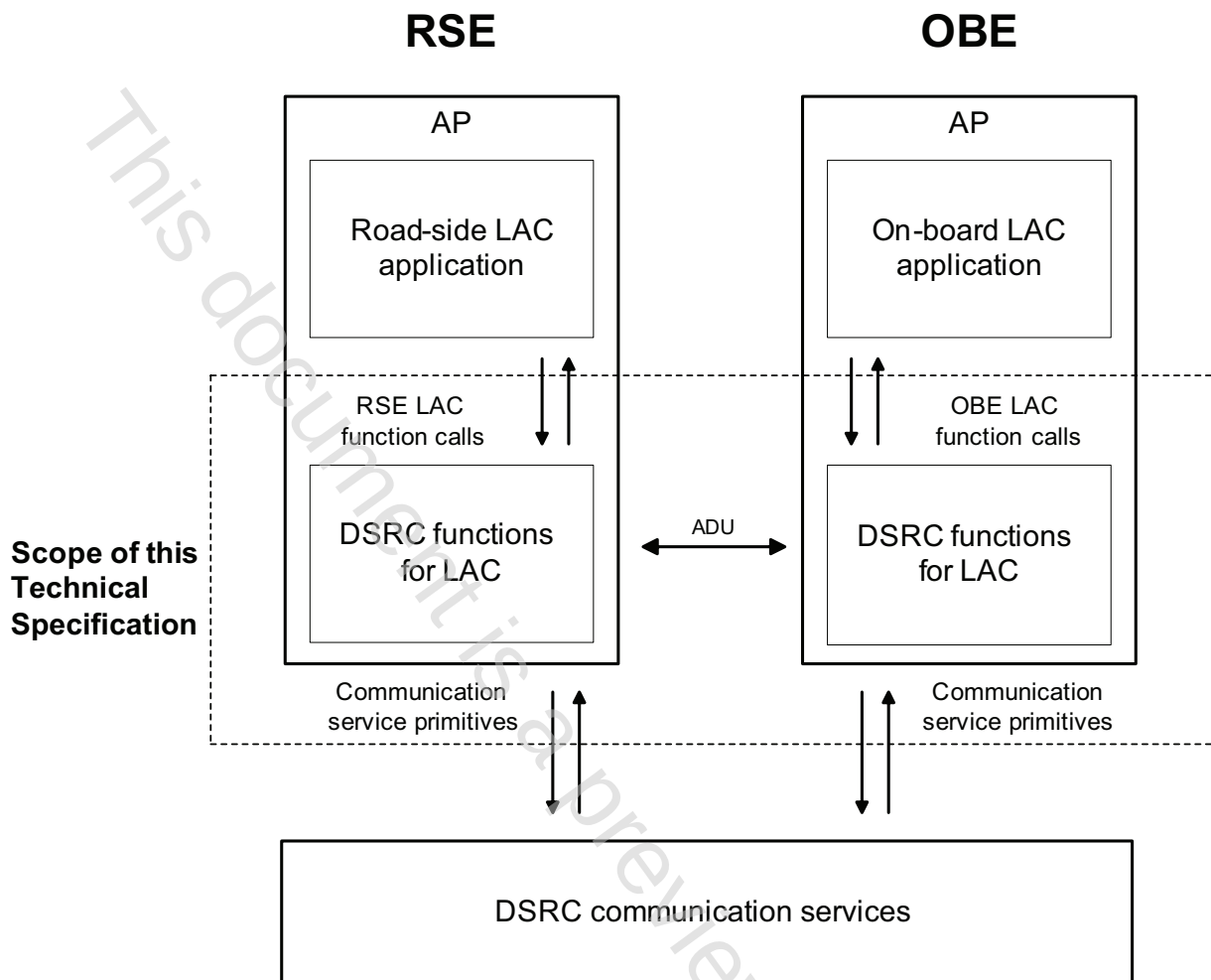


Figure 1 — The LAC application interface

2 Normative references

The following referenced documents are indispensable for the application 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/TS 12813, *Electronic fee collection — Compliance check communication for autonomous systems*

ISO 14906:—¹⁾, *Road transport and traffic telematics — Electronic fee collection — Application interface definition for dedicated short-range communication*

ISO 15628:2007, *Road transport and traffic telematics — Dedicated short range communication (DSRC) — DSRC application layer*

ISO/IEC 8824-1:2002, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation — Part 1*

¹⁾ To be published. (Revision of ISO 14906:2004).

ISO/IEC 8825-2, *Information technology — ASN.1 encoding rules: Specification of Packed Encoding Rules (PER) — Part 2*

EN 12834, *Road transport and traffic telematics — Dedicated Short Range Communication (DSRC) — DSRC application layer*

EN 15509:2007, *Road transport and traffic telematics — Electronic fee collection — Interoperability application profile for DSRC*

3 Terms and definitions

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

3.1

access credentials

data that are transferred to on-board equipment in order to establish the claimed identity of a road-side equipment application process entity

[ISO 14906]

3.2

attribute

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

NOTE Adapted from ISO 14906:—, definition 3.3.

3.3

authenticator

data appended to, or a cryptographic transformation of, a data unit that allows a recipient of the data unit to prove the source and/or the integrity of the data unit and protect against forgery

NOTE Adapted from ISO 14906:—, definition 3.4.

3.4

charge object

geographic object where a charge for the use of infrastructure is due according to the definition in the toll regime

3.5

contract

expression of an agreement between two or more parties concerning the use of the road infrastructure

[ISO 14906]

3.6

data integrity

property that data has not been altered or destroyed in an unauthorized manner

[ISO 14906]

3.7

road-side equipment

equipment installed at a fixed position along the road transport network, for the purposes of communication and data exchange with the on-board equipment of passing vehicles

[ISO 14906]