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Elektronische Gebührenerhebung – Kommunikation zur genauen Ortsbestimmung für autonome Systeme (ISO 13141:2024); Englische Fassung EN ISO 13141:2024 Electronic fee collection – Localization augmentation communication for autonomous systems (ISO 13141:2024); English version EN ISO 13141:2024 Perception de télépéage – Communications d’augmentation de localisations pour systèmes autonomes (ISO 13141:2024); Version anglaise EN ISO 13141:2024		
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Nationales Vorwort

Dieses Dokument (EN ISO 13141:2024) wurde vom Technischen Komitee ISO/TC 204 „Intelligent transport systems“ in Zusammenarbeit mit dem Technischen Komitee CEN/TC 278 „Intelligente Verkehrssysteme“, dessen Sekretariat von NEN (Niederlande) gehalten wird, erarbeitet.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-00-71 GA „Gemeinschaftsarbeitsausschuss NAAutomobil/DKE: Intelligente Verkehrssysteme“ im DIN-Normenausschuss Auto und Mobilität (NAAutomobil).

Dieses Dokument enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 1/2004 nur die Englische Fassung von EN ISO 13141:2024.

Fahrzeuginterne Einrichtungen (OBE), die auf satellitengestützter Positionierung zur Datensammlung für Gebührenerhebung zur Straßennutzung dienen, werden autonom gegenüber der Straßenrandinfrastruktur betrieben. Die OBE zeichnet dabei die gefahrene Entfernung in einem mautpflichtigen Gebiet auf.

Dieses Dokument legt ein Attribut für erweiterte Lokalisierungskommunikationsdaten (LACData) fest, welches von einer Straßenrand-Einrichtung zur OBE als bestätigter Schreibdienst übertragen wird. Dieses Attribut ist über den SET-Dienst in DSRC (Schicht 7) implementiert (nach ISO 15628 und EN 12834).

Für die in diesem Dokument zitierten Dokumente wird im Folgenden auf die entsprechenden deutschen Dokumente hingewiesen:

ISO 14906:2022	siehe	DIN EN ISO 14906:2023-04
ISO 17573-3:2023	siehe	DIN EN ISO 17573-3:2023-11
ISO 12813	siehe	DIN EN ISO 12813
ISO 13140	siehe	DIN EN ISO 13140
ISO/TS 17573-1:2019	siehe	DIN EN ISO 17573-1:2020-03
ISO/TS 17574	Siehe	DIN CEN ISO/TS 17574

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

Änderungen

Gegenüber DIN EN ISO 13141:2017-10 wurden folgende Änderungen vorgenommen:

- a) Konformitätsanforderungen in Abschnitt 6 ergänzt;
- b) Überarbeitung einiger Begriffe basierend auf ISO/TS 17573-2 als primäre Quelle;
- c) einige Datenfestlegungen wurden, basierend auf ISO/TS 17573-3 als primäre Quelle, angepasst;
- d) Verwendung von importierten ASN.1-Typen einschließlich Nachfolger (d. h. einschließlich aller zukünftigen Unterversionen);
- e) Änderungen basierend auf Aktualisierungen und Revisionen in darunterliegenden EFC-Normen;
- f) Überarbeitung des informativen Anhangs G basierend auf den Weiterentwicklungen des Europäischen elektronischen Mautsystems (EETS);
- g) redaktionelle und formale Korrekturen, sowie Änderungen, um die Lesbarkeit zu verbessern

Frühere Ausgaben

DIN CEN ISO/TS 13141 (DIN SPEC 91132): 2011-07
DIN EN ISO 13141: 2016-04, 2017-10

Nationaler Anhang NA (informativ)

Begriffe

Reihenfolge und Inhalt der folgenden Begriffe sind identisch mit denen im Abschnitt Begriffe der Englischen Fassung.

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

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

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

3.1

Zugriffsbeglaubigung

en **access credentials**

vertrauliche Bescheinigung oder sicheres Modul, welches die geforderte Identität eines Objektes oder einer Anwendung schafft

[QUELLE: ISO/TS 17573-2:2020, 3.4]

3.2

Attribut

en **attribute**

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

[QUELLE: ISO/TS 17573-2:2020, 3.13]

3.3

Authentifizierung

en **authentication**

Sicherheitsmechanismus, welcher die Überprüfung der bereitgestellten Identität ermöglicht

[QUELLE: EN 301 175 V1.1.1:1998, 3]

3.4

Authentifikator

en **authenticator**

Daten, wenn möglich verschlüsselt, die zur *Authentifizierung* (3.3) verwendet werden

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

3.5

mautpflichtiges Objekt

en **charge object**

geographisches oder straßenbezogenes Objekt, für das eine Mautgebühr angewendet wird

[QUELLE: ISO/TS 17573-2:2020, 3.31]

3.6**Datenintegrität**en **data integrity**

Eigenschaft, dass Daten nicht in unautorisierter Art und Weise verändert oder vernichtet wurden

[QUELLE: ISO 7498-2:1989, 3.3.21]

3.7**fahrzeuginterne Einrichtung**en **on-board equipment**

alle erforderlichen Einrichtungen im Fahrzeug, die zur Durchführung notwendiger EFC-Funktionen (en: electronic fee collection, EFC) und Kommunikationsdienste benötigt werden

[QUELLE: ISO/TS 17573-2:2020, 3.126]

3.8**straßenseitige Einrichtung**en **roadside equipment**

feste oder mobile Einrichtung zur elektronischen Gebührenerhebung (EFC) entlang oder an der Straße

Anmerkung 1 zum Begriff: Mobile straßenseitige Einrichtungen (RSE) können temporär entlang oder an der Straße befestigt sein.

[QUELLE: ISO/TS 17573-2:2020, 3.161]

3.9**Dienstprimitive**en **service primitive**

elementarer Kommunikationsdienst, der durch die Anwendungsschicht den Anwendungsprozessen zur Verfügung gestellt wird

[QUELLE: ISO/TS 17573-2:2020, 3.173]

3.10**Mauterheber**en **toll charger**

Instanz, die Maut erhebt, um ein Fahrzeug in einem Mautgebiet zu nutzen

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

3.11**Mautkontext**en **toll context**logische Sicht, die anhand von *Attributen* (3.2) und Funktionen eines Basiselements eines Mautsystems definiert ist und aus einem einzelnen Basismautprinzip, einer räumlichen Verteilung eines *mautpflichtigen Objektes* (3.5) und einem einzelnen Verhalten des betroffenen Front Ends besteht

[QUELLE: ISO/TS 17573-2:2020, 3.196]

3.12**Mautdienstanbieter**en **toll service provider**

Organisation, die Mautdienste in einem oder mehreren Mautgebieten anbietet

[QUELLE: ISO/TS 17573-2:2020, 3.206]

3.13

Transaktion

en **transaction**

Gesamtheit eines Informationsaustausches zwischen zwei physisch getrennten Kommunikationseinheiten

[QUELLE: ISO/TS 17573-2:2020, 3.211]

Nationaler Anhang NB (informativ)

Abkürzungen

AC_CR	Zugriffsbeglaubigung (en: access credentials)
ADU	Anwendungsdateneinheit (en: application data unit)
AID	Anwendungsbezeichner (en: application identifier)
ASN.1	abstrakte Syntaxnotation 1 (en: abstract syntax notation one)
BST	Bakendienst-Tabelle (en: beacon service table)
CCC	Kommunikation zur Überprüfung der Einhaltung der Vorschriften (en: compliance check communication)
DSRC	dedizierte Nahbereichskommunikation (en: dedicated short-range communication)
EID	Element-Bezeichner (en: element identifier)
EFC	elektronische Gebührenerhebung (en: electronic fee collection)
ETRF	europäische terrestrische Bezugsrahmen (en: European terrestrial reference frames)
IR	Infrarot (en: infrared)
ITRF	internationale terrestrische Bezugsrahmen (en: international terrestrial reference frames)
IUT	zu testende Implementierung (en: implementation under test)
LAC	Kommunikation zur genauen Ortsbestimmung (en: localization augmentation communication)
MAC	Nachrichten-Authentifizierungs-Code (en: message authentication code)
OBE	fahrzeuginterne Einrichtung (en: on-board equipment)
PICS	Protokollimplementierungs-Konformitätserklärung (en: protocol implementation conformance statement)
PSC	Anbieter-Dienst-Kontext (en: provider service context)
RSE	straßenseitige Einrichtung (en: roadside equipment)
TC	Mauterheber (en: toll charger)
TSP	Mautdienstanbieter (en: toll service provider)
VST	Fahrzeug-Service-Tabelle (en: vehicle service table)
WGS84	geodätisches Weltsystem 1984 (en: World Geodetic System 1984)
WSA	WAVE-Dienstanzeige (en: WAVE service advertisement)

Nationaler Anhang NC (informativ)

Literaturhinweise

DIN CEN ISO/TS 17574, *Elektronische Gebührenerhebung — Leitfaden für Sicherheitsprofile*

DIN EN ISO 12813, *Elektronische Gebührenerhebung — Kommunikation zur Übereinstimmungsprüfung für autonome Systeme*

DIN EN ISO 13140, *Elektronische Gebührenerhebung — Bewertung der Konformität fahrzeuginterner und straßenseitiger Ausrüstung nach ISO 13141*

DIN EN ISO 14906:2023-04, *Elektronische Gebührenerhebung — Anwendungsschnittstelle zur dezidierten Nahbereich-Kommunikation (ISO 14906:2022); Englische Fassung EN ISO 14906:2023*

DIN EN ISO 17573-1:2020-03, *Elektronische Gebührenerhebung — Systemarchitektur für fahrzeugbezogene Maut — Teil 1: Referenzmodell*

DIN EN ISO 17573-3:2023-11, *Elektronische Gebührenerhebung — Systemarchitektur für fahrzeugbezogene Maut — Teil 3: Datendefinition (ISO 17573-3:2023); Englische Fassung EN ISO 17573-3:2023*

English Version

Electronic fee collection -
Localization augmentation communication for
autonomous systems (ISO 13141:2024)

Perception de télépéage -
Communications d'augmentation de
localisations pour systèmes autonomes
(ISO 13141:2024)

Elektronische Gebührenerhebung -
Kommunikation zur genauen Ortsbestimmung für
autonome Systeme (ISO 13141:2024)

This European Standard was approved by CEN on 8 October 2023.

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

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European foreword

This document (EN ISO 13141:2024) has been prepared by Technical Committee ISO/TC 204 "Intelligent transport systems" in collaboration with Technical Committee CEN/TC 278 "Intelligent transport systems" the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2024, and conflicting national standards shall be withdrawn at the latest by September 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 13141:2015.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 13141:2024 has been approved by CEN as EN ISO 13141:2024 without any modification.

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 13141:2015), which has been technically revised. It also incorporates the Amendment ISO 13141:2015/Amd. 1:2017.

The main changes are as follows:

- Clause 6 has been added, concerning conformance requirements;
- Clause 3 has been updated and ISO/TS 17573-2 has been made the primary source for terms and definitions;
- data definitions in Clause 8 have been updated, including making reference to ISO 17573-3 as the primary source;
- imported ASN.1 types with successors (i.e. including all future minor versions) have been used;
- Annex G has been revised to align with the evolution of the European Electronic Toll Service (EETS);^{[19],[20],[21]}
- various editorial changes have been made to improve readability.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

On-board equipment (OBE) that uses satellite-based positioning technology to collect data required for charging for the use of roads operates in an "autonomous" way (i.e. generally without relying on dedicated roadside infrastructure). However, these autonomous systems can, in some places, need some roadside infrastructure support for proper identification of charge objects. Such assistance can be required at places where satellite-based localization 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 localization information be available in a standardized way. This document specifies requirements for localization augmentation by dedicated short-range communication (DSRC) between roadside equipment (RSE) and OBE. This document makes no assumptions about the operator of the RSE in terms of its role according to ISO 17573-1, i.e. whether the RSE is operated by an entity in the service provision role or in the toll charging role.

This document has been prepared considering the following points.

- The localization augmentation communication (LAC) serves to transmit localization information to passing OBE without identifying individual OBE.
- The localization information contains both geographical location independent of charging context, and context-dependent identification of charge objects.
- A single roadside installation is able to provide localization augmentation for several overlapping electronic fee collection (EFC) contexts.
- This document is based on the EFC architecture specified in ISO 17573-1.
- The communication applies to all OBE architectures.
- This document is applicable to various DSRC media, especially the CEN DSRC stack.
- The communication supports security services for data origin authentication, integrity and non-repudiation.

This document specifies an attribute, LacData, which is communicated from the RSE 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 specified as a self-contained DSRC application with its own application identifier (AID). Regarding the DSRC communications stack, this document provides specific definitions regarding the CEN DSRC stack as specified in EN 15509. Annexes C, D, E and H provide for use of the Italian DSRC as specified in ETSI/ES 200 674-1.^[9] ISO CALM IR,^[3] ARIB DSRC^[10] and WAVE DSRC.^[11]

All data relevant for the LAC application have been put into the attribute LacData, to create a single standard communications content which is transmitted by LAC RSE and always signed as a whole. LacData can transport both the geographic coordinates (latitude, longitude and altitude) and the identification of a specific charge object. All elements of LacData are mandatory, but Null values are specified to allow LAC installations to transmit only a selection of all specified data elements.

Access credentials are mandatory for writing LacData to protect OBE from non-authentic RSE. LacData are critical for charge determination and for providing evidence. For these purposes, the authenticators which are specified can be used to provide for data origin authentication, data integrity and non-repudiation for LacData. There are two separate authenticator fields specified to allow for separate authentication and non-repudiation, if required by the institutional arrangements of a toll system.

This document is "minimalist" in the sense that it covers what is required for operational systems and planned systems.

A test suite for checking an OBE or RSE implementation for conformance with ISO 13141:2015 is specified in ISO 13140-1:2016. This test suite will be updated to reflect the changes incorporated into this second edition of ISO 13141.

Electronic fee collection — Localization augmentation communication for autonomous systems

1 Scope

This document establishes requirements for short-range communication for the purposes of augmenting the localization in autonomous electronic fee collection (EFC) systems. Localization augmentation serves to inform on-board equipment (OBE) about geographical location and the identification of a charge object. This document specifies the provision of location and heading information and security means to protect against the manipulation of the OBE with false RSE.

The localization augmentation communication (LAC) takes place between an OBE in a vehicle and fixed RSE. This document is applicable to OBE in an autonomous mode of operation.

This document specifies attributes and functions for the purpose of localization augmentation, by making use of the dedicated short-range communications (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 specified on the level of application data units (ADUs; see Figure 1).

As depicted in Figure 1, this document 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 LAC is suitable for a range of short-range communication media. This document provides specific definitions regarding the CEN-DSRC stack as specified in EN 15509. Annexes C, D, E and H provide for the use of the Italian DSRC as specified in ETSI/ES 200 674-1,^[9] ISO CALM IR,^[3] ARIB DSRC^[10] and WAVE DSRC.^[11]

This document contains a protocol implementation conformance statement (PICS) proforma in Annex B and transaction examples in Annex F. Annex G highlights how to use this document for the European Electronic Toll Service (EETS).

Test specifications are not within the scope of this document.