



International
Standard

ISO 16785

**Electronic fee collection —
Application interface definition
between dedicated short-range
communication on-board
equipment (DSRC-OBE) and
external in-vehicle devices**

**First edition
2026-08**

*Perception de télépéage — Définition de l'interface entre
l'équipement de bord à communications dédiées à courte portée
(DSRC-OBE) et des dispositifs externes embarqués*

Sample Document

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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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This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This first edition cancels and replaces the second edition (ISO/TS 16785:2020), which has been technically revised.

The main changes are as follows:

- [Clause 3](#) has been updated and ISO 17573-2 has been made the primary source for terms and definitions;
- addition of information regarding the application data units (ADUs) for information exchange between dedicated short-range communication on-board equipment (DSRC-OBE) (see [Clause 6](#));
- modification of information regarding the external in-vehicle device (see [5.2.1](#));
- modification of the ASN.1 code; see [Annex A](#) and attached ASN.1 file;
- revision of data elements related to compliance checking communication imported from ISO 12813 (see [5.2.3](#));
- deletion of the charge report and reference to ISO 17575-1.

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

0.1 Background and motivation

For sustainable road environment, the road tolling policy in different regions of the world has spread from conventional road tolling, such as funding for road infrastructure management and maintenance, environmental measures, and traffic management, to other aspects. Specifically, to accommodate the widespread use of low-fuel-consumption and electric vehicles, introduction of road user charging instead of fuel tax, congestion tolling on urban roads and inter-urban roads is planned and implemented.

In the countries where dedicated short-range communication (DSRC) based electronic fee collection (EFC) systems are widely deployed, upgrading and extension of the schemes, to include roads that are currently not tolled become a significant issue to consider.

This document describes how DSRC-based EFC systems, especially on-board equipment (OBE), can be enhanced to meet these needs.

There are three cases of introducing EFC systems to cope with these situations:

- Case-1: An existing DSRC-based EFC system is extended and introduced on new roads.
- Case-2: An autonomous EFC system is introduced on both new roads and the existing toll roads.
- Case-3: A DSRC-based EFC system continues to operate on existing toll roads, and an autonomous EFC system is introduced on new toll roads.

For Case-1 and Case-2, the interface definitions and the test procedures are defined by existing EFC standards. For Case-3 as shown in [Figure 1](#), the OBE used for DSRC-based EFC can also be used for the autonomous EFC system covering new roads and existing toll roads.

A DSRC-OBE can be applied in new EFC environments consisting of DSRC-based EFC and the autonomous EFC system by expanding its functionality by interfacing with the external in-vehicle devices that includes a global navigation satellite system (GNSS) module, cellular network communication (CN) module and other related modules.

Consequently, an application interface definition between DSRC-OBE and the external in-vehicle devices is described in this document.

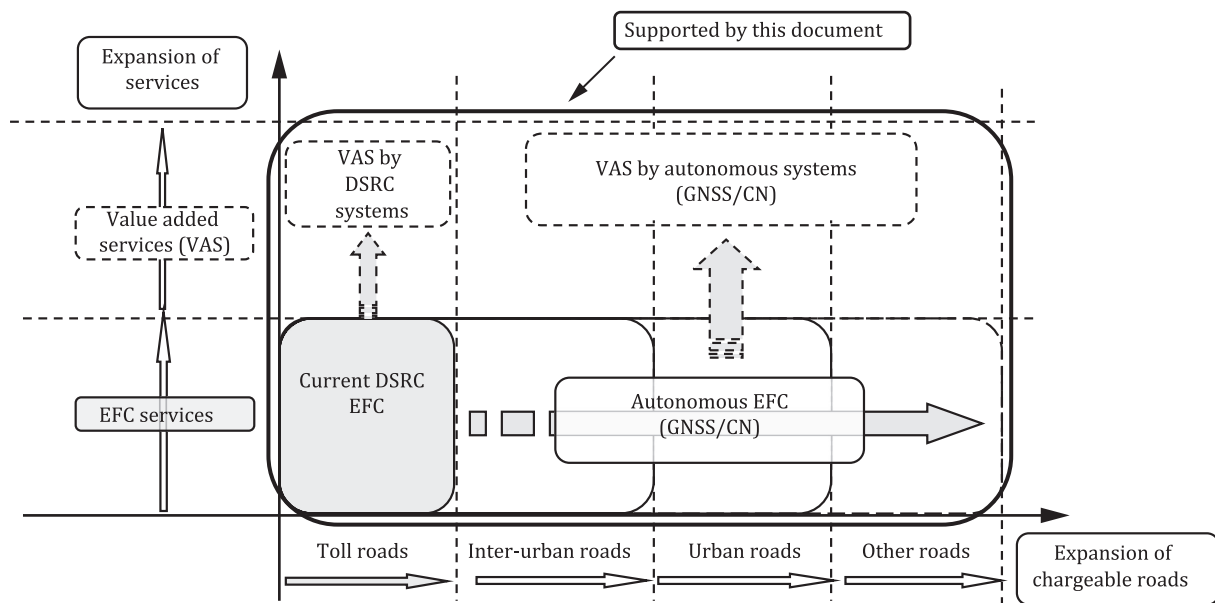


Figure 1 — Image of expanding toll roads and services (Case-3)

0.2 Purpose of this document

The purpose of this document is to provide support for enhanced functionalities of DSRC-OBE by means of external in-vehicle devices.

This document intends to define:

- a tolling model with the external in-vehicle devices (see in [subclause 5.2](#));
- data groups and data elements (see [Clauses 5](#) and [6](#));
- data types and the protocol implementation conformance statement (PICS) proforma (in [Annexes A](#) and [B](#)).

0.3 Applicable dedicated short-range communication on-board equipment (DSRC-OBE)

There are five major DSRC standards currently being deployed for EFC around the world: CEN-DSRC, UNI-DSRC, ARIB-DSRC, TTA-DSRC and GB-DSRC. In standardizing an application interface between DSRC-OBE and an external in-vehicle devices, the interface should be applied for every type of DSRC as shown in [Figure 2](#).

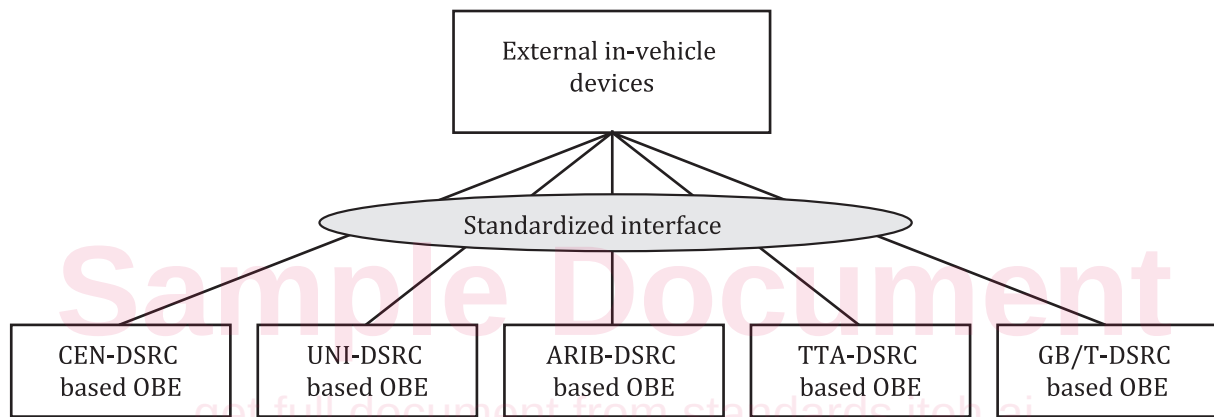


Figure 2 — Applicable DSRC-OBE

Due to its operational reliability, DSRC-OBE is suitable for EFC. On the other hand, each component of an external in-vehicle devices typically has a shorter product life than DSRC-OBE to meet changing user demands for multi-functional and high-performance components.

Once an application interface has been standardized, DSRC-OBE can be used seamlessly in a variety of EFC environments with an enhanced new external in-vehicle devices as shown in [Figure 3](#).

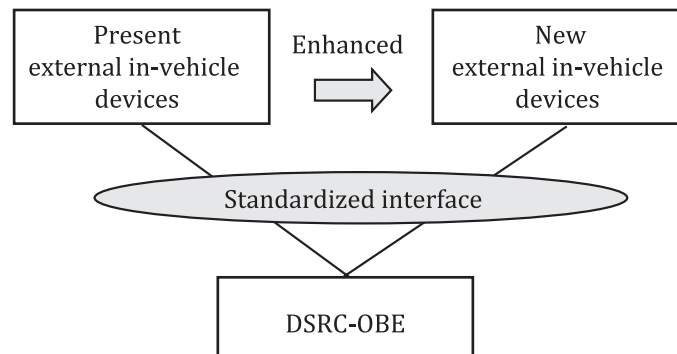


Figure 3 — Applicability for future upgrading

Electronic fee collection — Application interface definition between dedicated short-range communication on-board equipment (DSRC-OBE) and external in-vehicle devices

1 Scope

This document specifies requirements for an application interface between dedicated short-range communication on-board equipment (DSRC-OBE) and external in-vehicle devices to make DSRC-OBE applicable for diversified electronic fee collection (EFC) systems.

This document applies to:

- definitions of the application interface between DSRC-OBE and external in-vehicle devices;
- definitions of data groups and data elements.

The scope of this document is illustrated in [Figure 4](#):

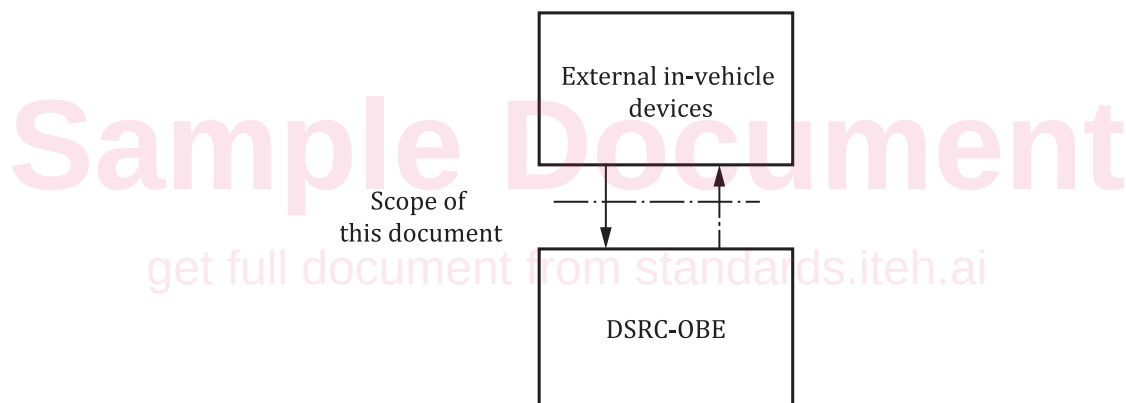


Figure 4 — Scope of this document

This document is not applicable to:

- definitions of hardware components in the external in-vehicle devices such as GNSS receiver, CN mobile device;
- definitions of the physical interface between DSRC-OBE and the external in-vehicle devices;
- definition of value-added services (VAS);
- definition of algorithms for authentication, encryption and key management for security aspect.

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

ISO 12813, *Electronic fee collection — Compliance check communication for autonomous systems*

ISO 12855, *Electronic fee collection — Information exchange between service provision and toll charging*

ISO 13141, *Electronic fee collection — Localization augmentation communication for autonomous systems*

ISO 15628:2013, *Intelligent transport systems — Dedicated short range communication (DSRC) — DSRC application layer*

ISO 17573-2, *Electronic fee collection — System architecture for vehicle related tolling — Part 2: Vocabulary*

ISO 17573-3, *Electronic fee collection — System architecture for vehicle-related tolling — Part 3: Data dictionary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17573-2 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Symbols and abbreviated terms

ADU application data unit

APDU application protocol data unit

ARIB Association of Radio Industries and Businesses

NOTE 1 ARIB is a communication standardization organization in Japan.

ASN.1 abstract syntax notation one

CAN controller area network

CCC compliance check communication

CN cellular network

DSRC dedicated short-range communication

EFC electronic fee collection

GB Guojia Biaozhun

NOTE 2 GB is a national standard published by Standardization Administration of China.

GNSS global navigation satellite system

HMI human-machine interface

IUT implementation under test

LAC localization augmentation communication

OBE on-board equipment

OBD on-board diagnostics

OBU	on-board unit
PICS	protocol implementation conformance statement
RSE	roadside equipment
TC	toll charger
TSP	toll service provider
TTA	Telecommunications Technology Association
	NOTE 3 TTA is a communication standardizing body in the Republic of Korea.
UNI	Ente Nazionale Italiano di Unificazione
	NOTE 4 UNI is a communication standardizing body in Italy.
URL	uniform resource locator
VAS	value added services

5 Tolling models with the in-vehicle devices

5.1 General

The DSRC-OBE with the external in-vehicle devices can support various EFC environments and further VAS as shown in [Figure 1](#).

There are two kinds of settlement method in EFC, one is the on-board account system, and the other method is the central account system. In the case of on-board account system, payment means may be connected to DSRC-OBE as shown in [Figure 5](#), and the toll amount determined by the tolling transaction processes is directly deducted from payment means in the case of pre-payment. In the case of post payment system, the toll amount is posted to the central system with a personal account number transmitted from payment means.

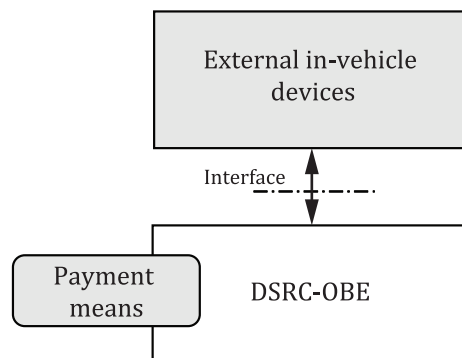


Figure 5 — Arrangement of payment means

5.2 Tolling model

5.2.1 Operating environment

The system in which DSRC-OBE is connected to the external in-vehicle devices should support the diversified tolling system that supports both the autonomous EFC system and DSRC-based EFC system as shown in [Figure 6](#). In the figure, RSE(L), RSE(C) and RSE(T) are equipment to communicate with DSRC-OBE via DSRC communication. RSE(L) is used for localization checking by toll charger (TC) to verify the existence of the