



BSI Standards Publication

**Electronic Fee Collection (EFC)
— Interface definition between
DSRC-OBE and external in-
vehicle devices**

National foreword

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**Electronic Fee Collection (EFC) —
Interface definition between DSRC-
OBE and external in-vehicle devices**

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



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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 documents 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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

Introduction

Background and motivation

With regards to reassessing the present fuel tax schemes to cope with prevailing plug-in hybrid vehicle and electric vehicle or introducing congestion charging system to urban roads or inter-urban roads etc., the needs for expanding toll roads are becoming worthy of notice in the world.

In countries where Dedicated Short-Range Communication (DSRC)-based Electronic Fee Collection (EFC) systems were introduced for toll roads and have been operated widely, making their EFC equipment applicable to present non-toll roads, such as urban roads or inter-urban roads, becomes a significant issue to be considered and solved.

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

- Case-1: DSRC-based EFC should be introduced to new toll roads, as well as present toll roads.
- Case-2: Autonomous EFC should be introduced to new toll roads and present toll roads as replacing.
- Case-3: DSRC-based EFC should be operated for present toll roads as they are, and autonomous EFC should be introduced to new toll roads.

In case of both Case-1 and Case-2, necessary interface definitions and test procedures are already covered by existing EFC standards. However, in Case-3, as shown in [Figure 1](#), current On-Board Equipment (OBE) used for DSRC-based EFC should be considered to be used for autonomous EFC covering new toll roads in keeping consistency with present toll roads.

DSRC-OBE should be expanded functionally by cooperating with external in-vehicle devices composed of a Global Navigation Satellite Systems (GNSS) module and/or a cellular module and/or other related modules; therefore, DSRC-OBE is possible to be reused for new EFC environment consisting of DSRC-based EFC and autonomous systems.

Consequently, an application interface definition between DSRC-OBE and external in-vehicle devices is essential and should be standardized.

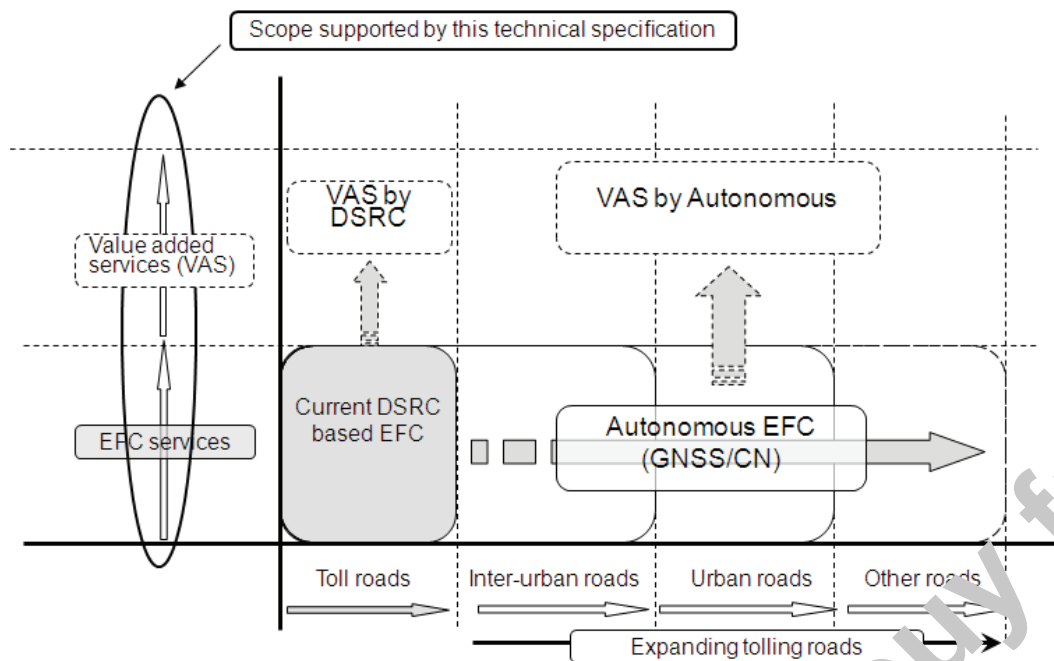


Figure 1 — Image of expanding toll roads and services (Case-3)

Purpose of this Technical Specification

This Technical Specification aims to make it possible for toll road operators to introduce autonomous systems to present non-toll roads by enhancing the functionalities of DSRC-On-Board Equipment (OBE) cooperating with external in-vehicle devices.

As listed below, this Technical Specification defines several tolling models, message sets, and data elements to cope with diversified EFC environment in the main body, as well as data type definition and Protocol Implementation Conformance Statement (PICS) proforma defined in [Annex A](#) and [Annex B](#) respectively. Finally, applicable ITS-services with cooperation of DSRC-OBE and external in-vehicle devices are listed in [Annex E](#) with an example for each of them. This Technical Specification aims at defining the following:

- tolling models with external in-vehicle devices (in main body);
- definitions of message sets and data elements;
- data type definition and PICS proforma (in [Annexes A](#) and [B](#));
- related example and applicable Intelligent Transport System (ITS) services (in [Annex E](#)).

Electronic Fee Collection (EFC) — Interface definition between DSRC-OBE and external in-vehicle devices

1 Scope

This Technical Specification defines an application interface between DSRC-based OBE and external in-vehicle devices to make DSRC-OBE applicable for diversified tolling environment.

The scope of this Technical Specification covers the following items (also shown in [Figure 2](#)):

- Definitions of the application interface between DSRC-OBE and external in-vehicle devices (including GNSS, cellular units, CAN interface, etc.).
- Definitions of message sets and data elements on the interface (based on a sets of base standards, such as ISO 14906:2011, ISO/TS 17575, ISO/TS 13141, ISO/TS 12813, and ISO/TS 25110).
- For use in autonomous EFC systems, as well as DSRC-based EFC.
- For use in diversified tolling environment (in toll roads, inner-urban, inter-urban, etc.).
- For use in every kind of DSRC-OBE (based on CEN, UNI, AR, JTA, and GB/T).

The following items are out of the scope for this TS:

- Definitions of hardware in the external in-vehicle devices such as GNSS modules, cellular modules, mobile devices, smartphones, etc.
- Definitions of physical interface between DSRC-OBE and external in-vehicle devices such as USB, Bluetooth, etc.
- Definition of any ITS service other than EFC.
- Definition of algorithms for authentication, as well as encryption, and key management.

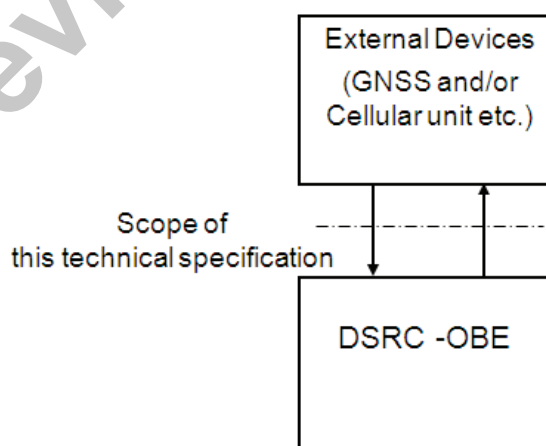


Figure 2 — Scope of this Technical Specification

Applicable DSRC-OBE

When standardizing an application interface between DSRC-OBE and external in-vehicle devices, external in-vehicle devices should be commonly applied for every kind of DSRC-based OBE as shown in [Figure 3](#).