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Electronic Fee Collection (EFC) — Application interface definition between DSRC-OBE and external invehicle devices

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National foreword

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Electronic Fee Collection (EFC) — Application 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 dispostifs externes embarqués

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Foreword

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

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

Background and motivation

In recent years, the road tolling policy in the world has spread to other than conventional toll road tolling such as funding for road infrastructure management and maintenance, environmental measures, and traffic management. Specifically, in order to accommodate the widespread use of low-fuel-consumption and electric vehicles, introduction of road use tolling 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 presently non-toll roads become a significant issue to be considered and solved.

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 those situations:

— Case-1: Existing DSRC-based EFC system is extended and introduced on new roads.

— Case-2: Autonomous tolling system is introduced on both new roads and the existing toll roads.

— Case-3: DSRC-based EFC system continues to operate on existing toll roads, and the autonomous tolling system is introduced on new toll roads.

For Case-1 and Case-2, the necessary interface definitions and the test procedures are already 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 tolling system covering new roads and existing toll roads.

DSRC-OBE is possible to be reused for new EFC environments consisting of DSRC-based EFC and the autonomous tolling system by expanding functionally by interfacing with the external in-vehicle device that includes global navigation satellite systems (GNSS) module, cellular module and other related modules.

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

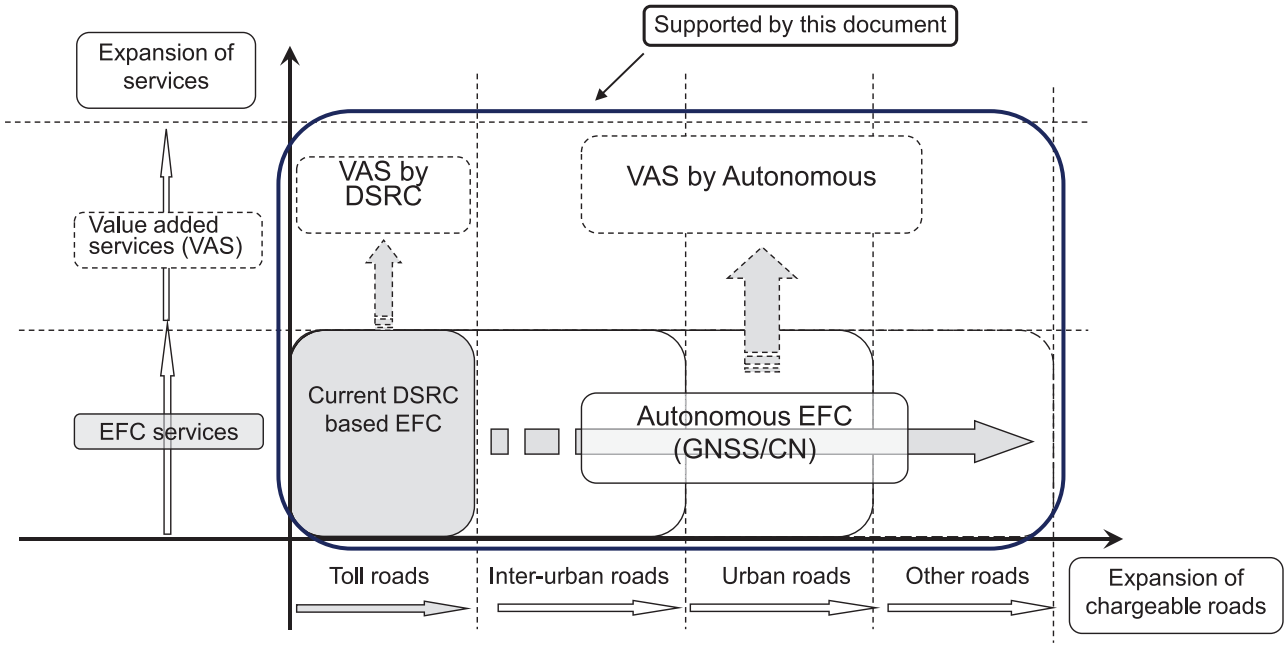

Figure 1 — Image of expanding toll roads and services (Case-3)

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 aims at defining:

— A tolling model with the external in-vehicle devices (in the main part of the document);

— Definitions of data groups and data elements (in the main part of the document);

— Data type definition and implementation conformance statement (ICS) proforma (in Annexes A and B).

Applicable DSRC-OBE

There are five major DSRC standards currently deployed for EFC around the world. In standardizing an application interface between DSRC-OBE and an external on-vehicle device, the interface should be applied for every type of DSRC as shown in Figure 2.

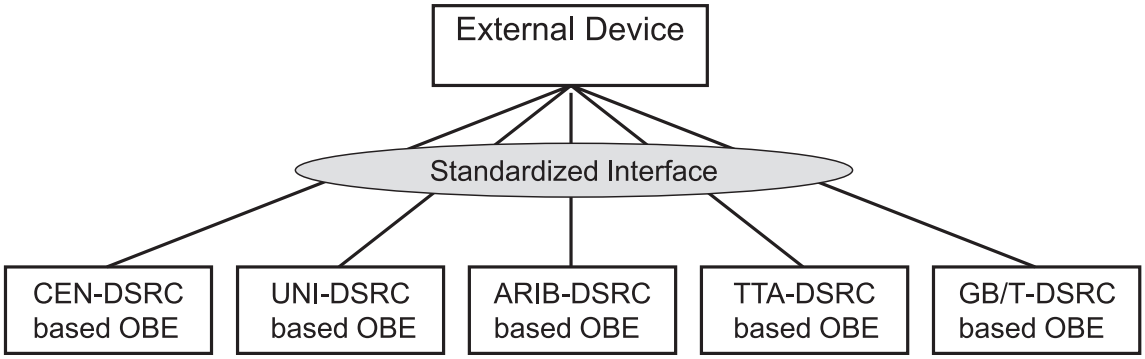

Figure 2 — Applicable DSRC-OBE

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

Once an application interface has been standardized, DSRC-OBE can be used continuously in a variety of EFC environments with an enhanced new external in-vehicle device as shown in Figure 3.

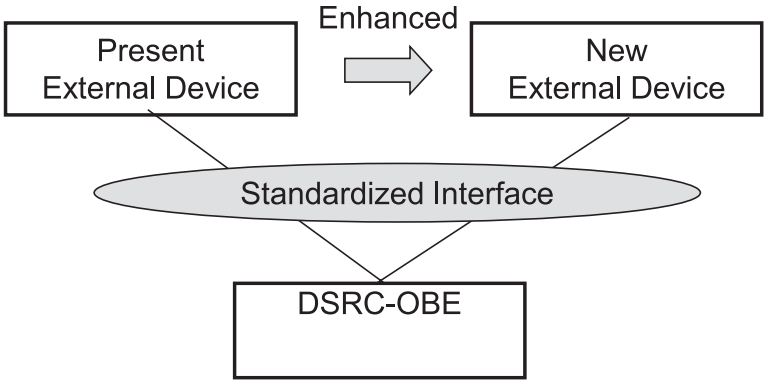

Figure 3 — Applicability for future upgrading

Electronic Fee Collection (EFC) — Application interface definition between DSRC-OBE and external invehicle devices

1 Scope

This document defines an application interface between DSRC-based OBE (hereinafter referred to as "DSRC-OBE") and an external in-vehicle device (hereinafter referred to as "the external device") to make DSRC-OBE applicable for diversified external devices.

NOTE For use in autonomous tolling and DSRC-based (CEN, UNI, ARIB, TTA and GB/T) electronic fee collection (EFC) systems. For use in urban and inter-urban toll schemes.

The scope of this document covers the following items (as shown in Figure 4):

— definitions of the application interface between DSRC-OBE and external devices, including global navigation satellite system (GNSS), cellular network (CN) and controller area network (CAN) device;

— definitions of data groups and data elements.

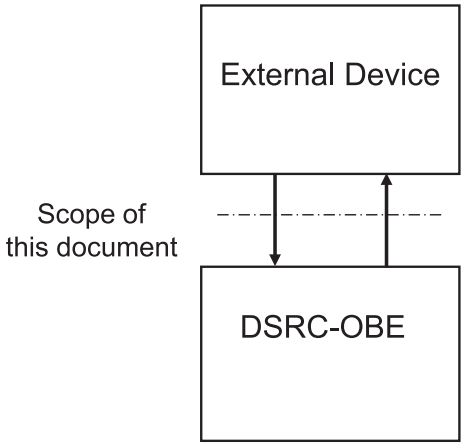

Figure 4 — Scope of this document

The following items are out of the scope of this document:

— definitions of hardware components in the external device such as GNSS module, CN module and mobile devices;

— definitions of the physical interface between DSRC-OBE and the external device such as USB and Bluetooth;

— definition of ITS services other than EFC;

— definition of algorithms for authentication, encryption and key management.

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.