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Electronic fee collection — Investigation of charging policies and technologies for future standardization

Perception du télépéage — Examen sur les politiques et technologies de tarification pour la future normalisation

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

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.

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Introduction

An electronic fee collection (EFC) system, introduced in many countries around the world, is used for collecting road construction funds or repaying loans for construction of toll roads. Toll roads have enabled large-capacity and high-speed movement of people and goods, and contributed greatly to social and economic development in the introduced countries. As an internalization of external costs for road pavement damage by heavy goods vehicles (HGV), HGV charging has been introduced in member countries widely under the support of the European Commission. EFC is also effectively used for mitigating congestion in urban area as a traffic management measure.

The EFC technology that realizes these charging policies is classified as dedicated short-range communication (DSRC)-based system and autonomous system, and EFC systems developed based on these major standards have been introduced in countries all over the world. In addition to the above charging policies and technologies, several important new charging policies realized by new technologies are planned and trial operations are being carried out.

In Tokyo metropolitan area, road users can use smart route selection from among several optional routes according to their judgment of whether a priority given to reduction of travel time or priority to charge amount. As another new policy, several pilot operations of road usage charging have been introduced in the United States to raise funds for road maintenance as an alternative for the current fuel tax.

These new charging policies can make road users more convenient or road maintenance sustainable in accordance with evolution of technologies. As an another example of new charging policy, there is the managed lane such as high occupancy tolling/high occupancy vehicle (HOT/HOV) lane which is already operated in the United States, where it can be used for free with a certain number of crew members, but paying the fee with existing charging technology enable road users to use it even under a certain number of crew members.

In this document, the relationship between charging policies and EFC technologies are investigated in order to propose future standardization themes.

Table 1 shows the major charging systems realized from charge policy and EFC technology.

Table 1 — Major charging systems realized from charging policy and EFC technology

Charging policies EFC technologies	Conventional charging policy	New charging policy
Existing technology	— Toll road charging (ETC) — HGV charging — Congestion charging	— Managed lane (HOT/HOV)
Emerging technology	(Applicable to the above charging systems)	— Smart route selection — Road usage charging (RUC)

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Electronic fee collection — Investigation of charging policies and technologies for future standardization

1 Scope

This document investigates the stemming from requirements of charging policies and corresponding charging technologies in order to propose future standardization theme candidates.

This document reports the findings of the investigation of charging policies and technologies in order to:

— Classify the conventional charging policies and the new charging policies and their functional requirements.

— Classify the existing technologies and the emerging technologies to be used for EFC services or other intelligent transport system (ITS) services.

— Conduct a gap analysis between the needs of the new charging policies and the existing standardized technologies for EFC.

— Recommend development of emerging standards or amendments for existing EFC standards according to the results of the gap analysis.

Figure 1 shows the process for preparing this document and the scope.

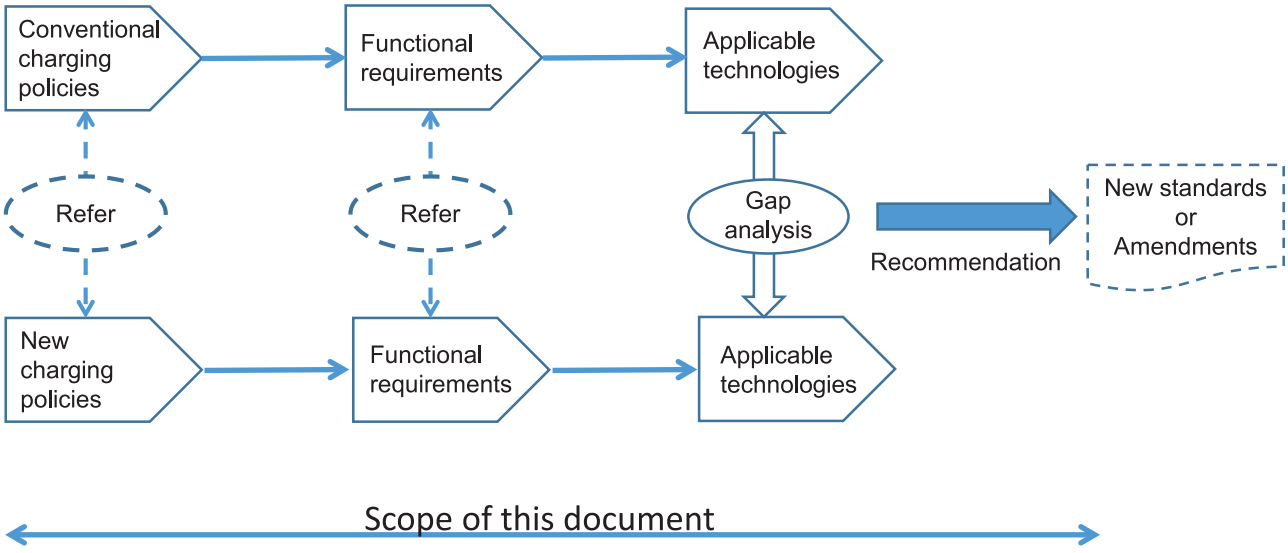


Figure 1 — Scope and process flow of this document

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
level of service
LOS
rating of the quality of transportation facilities and services from the user's perspective, which refers to the speed, convenience and comfort to evaluate problems and potential solutions

3.2
open payment
system that uses open interfaces for validating payment

3.3
passive RFID
RFID system, where the OBU is a passive-backscattering device

3.4
passive ultra high frequency RFID
passive UHF RFID
passive RFID, operating in the 860 MHz to 960 MHz frequency range

Note 1 to entry: Note 1 to entry: Passive UHF RFID as defined in ISO/IEC 18000-63 unless otherwise specifically stated.

3.5
transport performance requirement
needed level of service related to a set of operational goals and performance measures, e.g. speed, travel time, freedom to manoeuvre, traffic interruptions, comfort or convenience

3.6
radio frequency identification
RFID
wireless non-contact system that uses radio-frequency electromagnetic fields to transfer data from an OBU attached to an object, for the purposes of automatic identification and tracking

Note 1 to entry: Adapted from ISO/TS 16791:2014, 3.1.24.

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

A-GNSS	Authenticated GNSS
AES	Advanced Encryption Standard
AET	All Electronic Tolling
ANPR	Automatic Number Plate Recognition
ASTM	American Society for Testing and Materials
CCC	Compliance check communication for autonomous systems (ISO 12813)
C-ITS	Cooperative – ITS
CN	Cellular Network

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