TECHNICAL REPORT

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Intelligent transport systems — Mobility integration — Digital infrastructure service role and functional model for urban ITS service applications

Systèmes de transport intelligents - Intégration de la mobilité - Rôle des services d'infrastructure numérique et modèle fonctionnel pour les applications de services ITS urbains

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Foreword

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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 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.

Introduction

Currently, more than 70 % of the world's people live in cities. The proportion of people living in cities is rising around the world as civilizations develop and congregate around the areas where employment opportunity most arises. Societies develop more innovatively and more rapidly in cities, adding to their attraction. Finally, cities present better entertainment opportunities. These points all add to their attraction and popularity, hence the continuing trend. It has recently been forecast that by 2045, an additional 2 billion people will live in urban areas.[4] Due to the concentration of the population that this causes, various issues arise, such as road congestion due to increases in vehicle population and environmental pollution due to exhaust gas and tyre erosion. This has been attributed to increases in the amount of delivery trucks, taxis and town centre traffic and is further exacerbated by obstacles to effective use of urban space due to private ownership of cars (parking lots, street parking).

In line with scientific advice that significant action and change of behaviour is needed to ameliorate the adverse effects of climate change, more environmentally-friendly use of the transport system is required.

It is also recognized that within cities, there is a general deterioration in road infrastructure, lack of provision of information on the use of public transportation, driver shortages (due to an increase in the number of elderly people) and inconvenience of multimodal fare payments. Action to improve this situation is urgently needed.

Therefore, in recent years, in Europe, studies on the development of mobility integration standards have been active in solving urban problems. There are also various movements around the world making efforts to address such issues. In the United States, for example, intelligent transport system (ITS) technology is used to try to solve urban problems in the Smart City Pilot Project. Important key factors here are the core architectural elements of smart cities and urban ITS sharing of probe data (also called sensor data), connected cars and automated driving. In addition, new issues have been recognized with the introduction of the connected car to the real world regarding privacy protection, the need to strengthen security measures, big data collection and processing measures, which are becoming important considerations.

In terms of effective use of urban space, it is hoped that the introduction of connected cars and automated driving can significantly reduce the requirements for urban parking lots (redistribution of road space). If technology can eliminate congestion, city road area usage can also be minimized or reallocated (space utilization improvement) to improve the living environment and quality of life in the city. In addition, the environment around the road will be improved by improving enforcement (e.g. overloaded vehicles). It is possible, even in rural areas, to introduce automated driving robot taxis and other shared mobility that saves labour (and is therefore more affordable) and improves the mobility of elderly people.

To achieve this, the following points will need to be achieved:

— cooperation in the harmonization of International Standards and other industry standards;

— recognition of the significance of international standardization (for example, in reducing implementation costs);

— recognition of the significance of harmonization activities by countries around the world;

— cooperation and contribution between ISO/TC 22 for in-vehicle systems and ISO/TC 204 for ITS technology.

ITS technology is an important element for realizing smart cities, and it is important to clearly understand the role model of ITS service applications when developing standards to achieve these objectives.

ISO/TR 4445 is already an important resource for this objective, providing consideration of the emerging direction of mobility electrification, automated driving and the direction of an environmentally friendly

society, whilst also incorporating other urban data such as traffic management into city management within the context of improving the mobility of urban society.

This document, ISO/TR 7872, describes how ITS sensor data can be integrated into a valuable data cluster presented on map data, so that ITS service providers can provide services such as automated driving, parking, kerb operations, etc.

This document does not describe smart city use cases for ITS data in detail, nor does it describe in detail any specific ITS use-cases; it is instead focussed on the generic role model for digital infrastructure service.

Intelligent transport systems — Mobility integration — Digital infrastructure service role and functional model for urban ITS service applications

1 Scope

This document describes a basic role and functional model of digital infrastructure service for urban intelligent transport system (ITS) service applications. It provides an extension of the information given in ISO/TR 4445. It lays out a paradigm describing:

a) a framework for the provision of digital infrastructure for cooperative ITS service application;

b) a description of the concept of roles and functional models for such services;

c) a conceptual architecture between actors involved in the provision/receipt of digital infrastructure services;

d) references for the key documents on which the architecture is based; and

e) a taxonomy of the organization of generic procedures.

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/TS 14812, *Intelligent transport systems — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 14812 and the following 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 Abbreviated terms

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

AI	artificial intelligence
AVPS	automated valet parking system
AV	automated vehicle
CAV	connected and automated vehicle
CONOPS	concept of operations