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Intelligent transport systems — Indoor navigation for personal and vehicle ITS station —

Part 4: Requirements and specifications for interface between personal/vehicle and central ITS stations

Systèmes de transport intelligents — Navigation interne pour station personelle et véhicule ITS —

Partie 4: Exigences et spécifications de l'interface entre les stations personnelle/véhicule et centrale ITS

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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*.

For a list of all the parts in the ISO 17438 series, see the ISO website www.iso.org.

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

With the spread of nomadic and mobile devices such as smart phones and the rapid expansion of indoor spaces, many of the services and facilities related to the transport system have become accessible to indoor spaces. Consequently, navigation in indoor space is considered a new killer application in the transport industry.

The objective of this document is to provide message specifications required for indoor navigation functionality. This document is intended to be used by designers, developers and providers of indoor navigation services. This document defines use cases, requirements and message specifications for supporting indoor navigation in intelligent transport systems. When implemented, this document will:

1) Provide developers and designers with concepts and appropriate information to implement indoor navigation service;

2) Provide developers and designers with interoperable ways to use indoor navigation data from various sources for indoor navigation;

3) Enable users to be provided with indoor navigation;

4) Provide developers and designers with an extendable base for indoor navigation.

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Intelligent transport systems — Indoor navigation for personal and vehicle ITS station —

Part 4: Requirements and specifications for interface between personal/vehicle and central ITS stations

1 Scope

This document defines detailed use cases, requirements and message specifications for supporting indoor navigation functionality between a personal/vehicle (P/V) ITS station and a central ITS station.

This document defines:

a) Clusters of use cases based on processing flows for indoor navigation between a P/V ITS station and a central ITS station;

b) Detailed use cases derived from the clusters of use cases for indoor navigation;

c) Message specifications to support some of the detailed use cases. The message specifications include mandatory, conditional and optional elements.

This document is only applicable to the core flow for the navigational functionality in indoor space. The following issues which are adjunctive but essential for commercial navigation services are beyond the scope of this document:

— Authorized and authenticated access of users and services, including security;

— Payment;

— Preparation of indoor data which are necessary for indoor navigation;

— Detailed data formats for indoor navigation data, including indoor maps and indoor positioning references (these form a part of ISO 17438-2[1)] and ISO 17438-3[2)]);

— How to transfer and share data required for indoor navigation between a roadside ITS station and a central ITS station, i.e. low-level communication protocols;

— Other issues dependent on implementation of an instance of indoor navigation, e.g. indoor-outdoor seamless navigation.

This document uses the XML and Data eXchange Message (DXM) format defined in ISO 13184-2 to encode defined messages.

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.

1) Under development. Current stage 0.00.

2) Under development. Current stage 0.00.

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ISO 13184-2, *Intelligent transport systems (ITS) — Guidance protocol via personal ITS station for advisory safety systems — Part 2: Road guidance protocol (RGP) requirements and specification*

ISO 17423, *Intelligent transport systems — Cooperative systems — Application requirements and objectives*

ISO/TS 17429, *Intelligent transport systems — Cooperative ITS — ITS station facilities for the transfer of information between ITS stations*

ISO 17438-1, *Intelligent transport systems — Indoor navigation for personal and vehicle ITS station — Part 1: General information and use case definition*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 13184-2 and ISO 17438-1 and the following apply.

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/

3.1.1
indoor space
space within artificial structures such as buildings and facilities connected with transport corridors or roads

EXAMPLE A building or indoor parking lot.

3.1.2
indoor navigation
navigation provided in indoor space

3.1.3
ITS station
ITS-S
entity in a communication network, comprised of application, facilities, networking and access layer components specified in ISO 21217 that operate within a bounded secure management domain

[SOURCE: ISO 13184-2:2016, 3.5]

3.1.4
personal/vehicle ITS station
P/V-ITS-S
ITS station implemented in a vehicle or mobile device

3.1.5
roadside ITS station
R-ITS-S
system that receives and processes vehicular and pedestrian information within a certain zone

Note 1 to entry: The system is installed at the roadside.

3.1.6
central ITS station
central ITS-S
C-ITS-S
implementation of an ITS-S in a central ITS subsystem

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3.1.7
indoor positioning
determination of a location in an indoor space

3.1.8
client-based indoor positioning
indoor positioning executed at a personal/vehicle ITS station (P/V-ITS-S)

3.1.9
server-based indoor positioning
indoor positioning executed at a central ITS station (C-ITS-S)

3.1.10
indoor map
map required for indoor navigation, which includes an indoor POI map, an indoor network map, an indoor cell map, and an indoor background map

3.1.11
indoor positioning infrastructure
infrastructure used to determine locations of personal/vehicle ITS stations (P/V-ITS-S) in an indoor space

EXAMPLE Wi-Fi, Bluetooth, etc.

3.1.12
indoor positioning reference
information to support indoor positioning

Note 1 to entry: Detailed specifications and contents of indoor positioning references depend on the specific indoor positioning technologies.

EXAMPLE 1 A good example of an indoor positioning reference is information about indoor positioning infrastructure.

EXAMPLE 2 For Wi-Fi based positioning, the indoor positioning infrastructure information includes the Wi-Fi APs information, such as location, SSID, and RSSI values of APs.

3.1.13
indoor navigation data
data needed for indoor navigation, which includes indoor maps and indoor positioning infrastructure information

3.2 Abbreviated terms

ITS	Intelligent Transport Systems
ITS-S	ITS Station
P/V-ITS-S	Personal/Vehicle ITS Station
R-ITS-S	Roadside ITS Station
C-ITS-S	Central ITS Station
CRD	Cardinality
CRS	Coordinate Reference System
DXM	Data eXchange Message (from ISO 13184-2)
EPSG	European Petroleum Survey Group

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GNSS	Global Navigation Satellite System
GPS	Global Positioning System
M/O	Mandatory/Optional
MO	Maximum Occurrence
POI	Point of Interest
SI	International System of Units
XML	eXtensible Markup Language
WLAN	Wireless Local Area Network

4 Conformance

4.1 Conformance requirements

For conformance with this document, the requirements described in Clause 9 shall be met.

4.2 Obligation and conditions

For the purpose of conformance tests according to Clause 9, the elements in a message shall be considered to be mandatory, conditional or optional as specified in this document.

5 Conventions

This document is based on the conventions of XML and DXM (Data eXchange Message) formats defined in normative references.

6 Overview of indoor navigation

6.1 Indoor navigation

Indoor navigation involves indoor spaces with routes of navigation. Figure 1 shows an indoor navigation implementation environment and ITS entities that compose this environment.

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