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

Part 3: Requirements and specification for indoor positioning reference data

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

Partie 3: Exigences et spécification pour les données de référence de positionnement intérieur

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Foreword

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

A list of all parts in the ISO 17438 series can be found on the ISO website.

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

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 a basic data model and encoding format for indoor positioning reference data required for indoor navigation functionality for ITS applications. This document is intended to be used by designers, developers and providers of indoor navigation services. When implemented, this document is intended to:

1) provide developers and designers with concepts and appropriate information to implement indoor navigation services;

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

3) enable the provision of indoor navigation services to users;

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

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

Part 3: Requirements and specification for indoor positioning reference data

1 Scope

This document defines requirements and specifications for indoor positioning references, which can be referenced for positioning in indoor space, for supporting indoor navigation functionality of a personal/vehicle (P/V) ITS station.

This document defines:

a) the composition of indoor positioning references for use in obtaining indoor positions for indoor navigation of P/V-ITS-stations;

b) the schema and encoding format of indoor positioning references for P/V-ITS-stations.

This document focuses on indoor positioning references. 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;

— low-level communication protocols required to transfer and share data from and to a roadside ITS station or a central ITS station;

— other issues dependent on implementation of an instance of indoor navigation.

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 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 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 given in ISO 13184-2 and ISO 17438-1 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/

3.1.1
nomadic device
ND
implementation of a personal ITS station which provides communication connectivity via portable equipment such as cellular telephones, wireless communication network (3G, 4G and 5G), mobile wireless broadband (WIMAX, HC-SDMA, etc.), etc. and includes short range links, such as IEEE 802.11x, etc. to connect portable devices to the motor vehicle communications system network

Note 1 to entry: Nomadic devices that have hardware security modules and have been certified to be ITS-trusted are called a personal ITS station.

[SOURCE: ISO 23795-2:2024, 3.1.1, modified — Note 1 to entry has been added.]

3.1.2
navigation
combination of routing, route transversal and tracking

Note 1 to entry: This is essentially the common term "navigation", but the definition decomposes the process in terms used in the packages defined in ISO 19133.

[SOURCE: ISO 19133:2005, 4.15, modified — “this International Standard” has been replaced by “ISO 19133” in the definition.]

3.1.3
indoor navigation
navigation provided in indoor space

[SOURCE: ISO 17438-4:2019, 3.1.2]

3.1.4
indoor navigation data
data needed for indoor navigation, which includes indoor maps and indoor positioning infrastructure information

[SOURCE: ISO 17438-4:2019, 3.1.13]

3.1.5
indoor space
space within artificial structures such as buildings and facilities connected with transport corridors or roads

EXAMPLE A building or indoor parking lot.

[SOURCE: ISO 17438-1:2016, 3.1.2]

3.1.6
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]

3.1.7
personal/vehicle ITS station
P/V-ITS-S
ITS station implemented in a vehicle or personal mobile device

[SOURCE: ISO 17438-4:2019, 3.1.4, modified — "personal mobile device" has been replaced by "mobile device" in the definition.]

3.1.8
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.

[SOURCE: ISO 13184-2:2016, 3.9, modified — "and determines the situation, in order to provide the safety warning and parking guide service to vehicles and pedestrians" has been removed from the definition.]

3.1.9
central ITS station
central ITS-S
C-ITS-S
implementation of an ITS-S in a central ITS subsystem

[SOURCE: ISO 17438-4:2019, 3.1.6]

3.1.10
indoor positioning
determination of a location in an indoor space

[SOURCE: ISO 17438-4:2019, 3.1.7]

3.1.11
client-based indoor positioning
indoor positioning executed at a personal/vehicle ITS station (P/V-ITS-S)

[SOURCE: ISO 17438-4:2019, 3.1.8]

3.1.12
server-based indoor positioning
indoor positioning executed at a central ITS station (C-ITS-S)

[SOURCE: ISO 17438-4:2019, 3.1.9]

3.1.13
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.

[SOURCE: ISO 17438-4:2019, 3.1.11]

3.1.14
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 A good example of an indoor positioning reference is information about indoor positioning infrastructure. 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.

[SOURCE: ISO 17438-4:2019, 3.1.12, modified — Example 1 and Example 2 have been combined into a single Example.]

3.1.15
fingerprint map
map including information about specific positioning resources at target locations.

Note 1 to entry: Examples of positioning resources are WiFi, BLE, LTE, etc.

Note 2 to entry: For Wi-Fi based positioning, WiFi fingerprint map can be defined.

Note 3 to entry: The concrete concept of a fingerprint map for indoor positioning can be a form of the indoor positioning reference.

3.1.16
WGS84 coordinate system
reference system used in the satellite-based positioning system, Global Positioning System (GPS)

Note 1 to entry: The World Geodetic System (WGS) is a standard for use in cartography, geodesy and navigation. The latest version is WGS84.

[SOURCE: ISO 13184-2:2016, 3.11, modified — "NAVSTAR Global Positioning System" has been updated to "Global Positioning System" in the definition.]

3.2 Abbreviated terms

AP	access point
ASN	abstract syntax notation
BLE	bluetooth low energy
BS	base station
C-ITS-S	central ITS station
CID	cell identifier
CRS	coordinate reference system
EPSG	European Petroleum Survey Group
GNSS	global navigation satellite system
GPS	global positioning system
ITS	intelligent transport systems
ITS-S	ITS station
LTE	long term evolution
M/O	mandatory/optional
MBR	minimum bounding rectangle
MCC	mobile country code
MNC	mobile network code
MO	maximum occurrence