INTERNATIONAL STANDARD

**ISO 20524-2**

First edition
2020-11

# Intelligent transport systems — Geographic Data Files (GDF) GDF5.1 —

## Part 2: Map data used in automated driving systems, Cooperative ITS, and multi-modal transport

*Systèmes de transport intelligents — Fichiers de données géographiques (GDF) GDF5.1 —*

*Partie 2: Partie 2 : Données cartographiques utilisées dans les systèmes de conduite automatisée, les ITS coopératifs et le transport multimodal*

Reference number
ISO 20524-2:2020(E)

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Published in Switzerland

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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.*

This first edition cancels and replaces ISO 14825:2011, which has been technically revised.

The main changes compared to the previous edition are as follows:

— this document is newly dedicated to automated driving systems, Cooperative ITS and multi-modal transport.

A list of all parts in the ISO 20524 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.

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# Introduction

GDF5.0 (ISO 14825) defines the map database exchange format for ITS. Its primary application is in car navigation systems and it assumes the provision of the map database by a single provider. However, ITS applications have been expanding to Cooperative ITS and automated driving systems through the recent progress of technology. In addition, there is demand for capabilities such as the accommodation of map databases from multiple providers and cooperation with externally connecting databases, such as Transmodel (EN 12896-1 and EN 12896-2).

Given this environment, ISO 14296 was published in February 2016 as an extension of map database specifications for applications of Cooperative ITS. However, GDF5.0 (ISO 14825) does not define some elements used in this document and automated driving systems require additional elements based on their unique application requirements. Furthermore, because GDF5.0 (ISO 14825) does not define a method to connect with external databases, the formulation of GDF5.1 (the ISO 20524 series) has become indispensable.

On revising GDF, the changes of conventional GDF are applied in GDF5.1 Part 1 (ISO 20524-1). The addition of a concept, a data model and specifications to satisfy new requirements applies to GDF5.1 Part 2 (this document). The new GDF document (the ISO 20524 series) is accordingly composed of two separate volumes: Part 1(ISO 20524-1) and Part 2 (this document).


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# Intelligent transport systems — Geographic Data Files (GDF) GDF5.1 —

## Part 2:
## Map data used in automated driving systems, Cooperative ITS, and multi-modal transport

## 1 Scope

This document specifies the conceptual and logical data model in addition to the physical encoding formats for geographic databases for Intelligent Transport Systems (ITS) applications and services. This document includes a specification of potential contents of such databases (data dictionaries for Features, Attributes and Relationships), a specification of how these contents are to be represented, and how relevant information about the database itself can be specified (metadata). This document further defines map data used in automated driving systems, Cooperative-ITS, and Multi-modal transport.

The focus of this document is firstly on emerging ITS applications and services, such as Cooperative-ITS and automated driving systems, and it emphasizes road, lane and relevant information on road and lane. However, ITS applications and services also require other information in addition to road and road-related information, which are provided as external databases to connect with GDF and to complement each other. Highly defined public transport databases, for instance, are indispensable in multi-modal transport applications and services in particular. Thus, this document focuses secondly on an expansion of the specification to connect with externally existing databases. It is particularly designed to connect a Transmodel (EN 12896-1 and EN 12896-2) conformant public transport database.

Typical ITS applications and services targeted by this document are in-vehicle or portable navigation systems, traffic management centres, or services linked with road management systems, including public transport systems.

The conceptual data model specified here has a broader focus than ITS applications and services. It is application independent, allowing for future harmonization of this model with other geographic database standards.

## 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 20524-1:2020, *Intelligent Transport Systems — Geographic Data Files (GDF) GDF5.1 — Part 1: Application independent map data shared between multiple sources*

ISO 639-2, *Codes for the representation of names of languages — Part 2: Alpha-3 code*

NOTE Codes are available at http://www.loc.gov/standards/iso639-2/.

## 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**
**Belt Feature**
two-dimensional Feature, bounded by three or more Edges or four or more NET coordinate Tuple

**3.2**
**belt**
configuration concept for specifying an area bounded by *side lines* (3.4) and *terminal lines* (3.5), characterized by *directions* (3.3) and represented as one or more linear axes when skeletonized

Note 1 to entry: The number of skeletonized axes differs depending on the feature class. In the case of a belt applied to a one-way lane, the number is one. When applied to an intersection, the belt has axes corresponding to the number of unique allowable traffic directions.

**3.3**
**direction**
signature of a *belt* (3.2), determined by an allowed connection between a pair of *terminal lines* (3.5)

**3.4**
**side line**
type of boundary line constituting a *Belt Feature* (3.1) other than a *terminal line* (3.5)

**3.5**
**terminal line**
type of boundary line constituting a *Belt Feature* (3.1) and designated for determining a *direction* (3.3) of a Belt Feature in combination with another terminal line

# 4 Abbreviated terms, symbols and notation elements

## 4.1 Abbreviated terms

| | |
|---|---|
| AAA | attribute addition area |
| AAL | attribute addition line |
| AAP | attribute addition point |
| ADS | automated driving system |
| BOP | BeltOptionalPoint |
| BRL | BeltRepresentativeLine |
| C-ITS | cooperative intelligent transport systems |
| IB | IntersectionBelt |
| ICP | IntersectionConnectionPoint |
| LCP | LaneConnectionPoint |
| NET | non-explicit topology |
| PEA | potential evasion area |


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