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## Intelligent transport systems — Cooperative ITS — Dictionary of in-vehicle information (IVI) data structures

*Systèmes de transport intelligents — de transport — Coopérative, STI coopératifs — Dictionnaire de structures de données pour l'information d'informations dans le véhicule les véhicules (IVI)*

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Case postale 56 • CP 401 • Ch. de Blandonnet 8

CH-1211 1214 Vernier, Geneva-20

Tel. Phone: + 41 22 749 01 11

Fax + 41 22 734 10 79

E-mail [copyright@iso.ch](mailto:copyright@iso.ch)

Web [www.iso.ch](http://www.iso.ch)

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**Contents—Page**

Foreword .....	ix
Introduction .....	xi
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	1
4 Abbreviated terms .....	4
5 In-vehicle information data structure .....	5
5.1 Structural model .....	5
5.1.1 General model .....	5
5.1.2 Conceptual zones .....	6
5.2 Location referencing .....	10
5.2.1 General .....	10
5.2.2 Geographic location referencing .....	10
5.2.3 Map-based location referencing .....	11
6 IVI Containers .....	11
6.1 Management Container .....	11
6.1.1 Definition .....	11
6.1.2 Usage — Management Container .....	12
6.2 Location Containers .....	13
6.2.1 General .....	13
6.2.2 Geographic Location Container .....	14
6.2.3 Map Location Container .....	15
6.3 Application Containers .....	16
6.3.1 General .....	16
6.3.2 General IVI Container .....	17
6.3.3 Road Configuration Container .....	20
6.3.4 Text Container .....	21
6.3.5 Layout Container .....	23
6.3.6 Automated Vehicle Container .....	24
6.3.7 Road Surface Container .....	26
6.3.8 Infrastructure Support Container .....	27
7 Description of data frames and data elements .....	28
7.1 General .....	28
7.2 Data frames .....	29

7.2.1	AbsolutePosition .....	29
7.2.2	AbsolutePositionWAltitude .....	29
7.2.3	AnyCatalogue .....	29
7.2.4	AutomatedVehicleRule .....	30
7.2.5	CompleteVehicleCharacteristics .....	31
7.2.6	ComputedSegment .....	31
7.2.7	DeltaPosition .....	31
7.2.8	InfrastructureSupportInformation .....	32
7.2.9	ISO14823Attribute .....	32
7.2.10	ISO14823Code .....	32
7.2.11	LaneInformation .....	32
7.2.12	LaneCharacteristics .....	34
7.2.13	LayoutComponent .....	34
7.2.14	LoadType .....	34
7.2.15	MapReference .....	35
7.2.16	PlatooningRule .....	35
7.2.17	PolygonalLine .....	36
7.2.18	RoadSurfaceDynamicCharacteristics .....	36
7.2.19	RoadSurfaceStaticCharacteristics .....	37
7.2.20	RSCode .....	37
7.2.21	Segment .....	37
7.2.22	SegmentExtended .....	38
7.2.23	SupportItem .....	39
7.2.24	Text .....	39
7.2.25	TractorCharacteristics .....	39
7.2.26	TrailerCharacteristics .....	40
7.2.27	TrainCharacteristics .....	40
7.2.28	VcCode .....	40
7.2.29	VehicleCharacteristicsFixValues .....	40
7.2.30	VehicleCharacteristicsRanges .....	41
7.2.31	Zone .....	42
7.2.32	Data frames which are lists .....	42
7.3	Data Elements .....	44
7.3.1	BankingAngle .....	44
7.3.2	ComparisonOperator .....	44
7.3.3	Condition .....	44

7.3.4	DefinitionAccuracy	44
7.3.5	Depth	45
7.3.6	Direction	45
7.3.7	DriverCharacteristics	45
7.3.8	FrictionCoefficient	45
7.3.9	GapBetweenVehicles	45
7.3.10	GoodsType	45
7.3.11	IviIdentificationNumber	46
7.3.12	IviLaneWidth	46
7.3.13	IviPurpose	46
7.3.14	IviStatus	47
7.3.15	IviType	47
7.3.16	LaneDelimitation	47
7.3.17	LaneId	48
7.3.18	LaneMarkingStatus	48
7.3.19	LaneStatus	48
7.3.20	LaneType	48
7.3.21	MarkingColour	49
7.3.22	MaterialType	49
7.3.23	MaxLenghtOfPlatoon	49
7.3.24	MaxNoOfVehicles	49
7.3.25	PriorityLevel	49
7.3.26	Provider	50
7.3.27	RSCUnit	50
7.3.28	SaeAutomationLevel	50
7.3.29	Temperature	51
7.3.30	TreatmentType	51
7.3.31	VcClass	51
7.3.32	VcOption	51
7.3.33	WearLevel	51
7.3.34	Zid	51
Annex A (normative) ASN.1 modules		53
Annex B (informative) Visual examples of Location Container		55
B.1	Overview	55
B.2	Geographic Location Container (GLC)	55
B.2.1	GLC with one reference zone per carriageway	55

B.2.2	GLC with one reference zone per lane.....	57
B.2.3	GLC with one adjacent reference zones.....	62
B.2.4	GLC with lane closure and re-opening.....	63
B.3	Map Location Container (MLC).....	64
B.3.1	MLC with relevance zones on an intersection.....	64
	Bibliography.....	67

Foreword — v

Introduction — vii

5.1 — Structural model — 4

5.1.1 — General model — 4

5.1.2 — Conceptual zones — 5

5.2 — Location referencing — 7

5.2.1 — General — 7

5.2.2 — Geographic location referencing — 7

5.2.3 — Map-based location referencing — 8

6.1 — Management Container — 8

6.1.1 — Definition — 8

6.1.2 — Usage — Management Container — 9

6.2 — Location Containers — 10

6.2.1 — General — 10

6.2.2 — Geographic Location Container — 11

6.2.3 — Map Location Container — 12

6.3 — Application Containers — 13

6.3.1 — General — 13

6.3.2 — General IVI Container — 13

6.3.3 — Road Configuration Container — 16

6.3.4 — Text Container — 17

6.3.5 — Layout Container — 19

6.3.6 — Automated Vehicle Container — 19

6.3.7 — Road Surface Container — 21

6.3.8 — Infrastructure Support Container — 22

7.1 — General — 23

7.2 — Data Frames — 23

7.2.1 — AbsolutePosition — 23

7.2.2	AbsolutePositionWAltitude	23
7.2.3	AnyCatalogue	23
7.2.4	AutomatedVehicleRule	24
7.2.5	CompleteVehicleCharacteristics	25
7.2.6	ComputedSegment	25
7.2.7	DeltaPosition	25
7.2.8	InfrastructureSupportInformation	26
7.2.9	ISO14823Attribute	26
7.2.10	ISO14823Code	26
7.2.11	LaneInformation	26
7.2.12	LaneCharacteristics	27
7.2.13	LayoutComponent	28
7.2.14	LoadType	28
7.2.15	MapReference	28
7.2.16	PlatooningRule	29
7.2.17	PolygonalLine	30
7.2.18	RoadSurfaceDynamicCharacteristics	30
7.2.19	RoadSurfaceStaticCharacteristics	30
7.2.20	RSCode	31
7.2.21	Segment	31
7.2.22	SegmentExtended	31
7.2.23	SupportItem	32
7.2.24	Text	32
7.2.25	TractorCharacteristics	33
7.2.26	TrailerCharacteristics	33
7.2.27	TrainCharacteristics	33
7.2.28	VcCode	33
7.2.29	VehicleCharacteristicsFixValues	34
7.2.30	VehicleCharacteristicsRanges	34
7.2.31	Zone	35
7.2.32	Data frames which are lists	35
7.3	Data Elements	37
7.3.1	BankingAngle	37
7.3.2	ComparisonOperator	37
7.3.3	Condition	37
7.3.4	DefinitionAccuracy	37

7.3.5	Depth	38
7.3.6	Direction	38
7.3.7	DriverCharacteristics	38
7.3.8	FrictionCoefficient	38
7.3.9	GapBetweenVehicles	38
7.3.10	GoodsType	38
7.3.11	IviIdentificationNumber	39
7.3.12	IviLaneWidth	39
7.3.13	IviPurpose	39
7.3.14	IviStatus	39
7.3.15	IviType	40
7.3.16	LaneDelimitation	40
7.3.17	LaneId	40
7.3.18	LaneMarkingStatus	41
7.3.19	LaneStatus	41
7.3.20	LaneType	41
7.3.21	MarkingColour	41
7.3.22	MaterialType	41
7.3.23	MaxLenghtOfPlatoon	42
7.3.24	MaxNoOfVehicles	42
7.3.25	PriorityLevel	42
7.3.26	Provider	42
7.3.27	RSCUnit	42
7.3.28	SaeAutomationLevel	43
7.3.29	Temperature	43
7.3.30	TreatmentType	43
7.3.31	VcClass	43
7.3.32	VcOption	43
7.3.33	WearLevel	44
7.3.34	Zid	44
Annex A (normative)	ASN.1 modules	45
Annex B (informative)	Visual examples of Location Container	47
Bibliography		54



## 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](http://www.iso.org/directives)).

~~Attention is drawn~~ ISO draws attention to the possibility that ~~some of the elements~~ implementation of this document may ~~be involve~~ the subject of (a) patent(s). ~~ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights. ISO in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). 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](http://www.iso.org/patents)).~~

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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 ~~the following URL:~~ [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 204, Intelligent transport systems, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Intelligent transport systems (ITS)*, ~~in collaboration with Technical Committee ISO/TC 204, Intelligent transport systems~~, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This ~~second~~ third edition cancels and replaces the ~~first~~ second edition (ISO/TS 19321:2015)2020, which has been technically revised.

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

- ~~— The Scope has been edited.~~
- ~~— Several containers have been renamed or newly introduced and an "Automated Vehicle Container" has been added to better manage automated vehicles.~~

~~The abstract syntax notation one (ASN.1) code in Annex A has been captured separately. This edition is backwards compatible with the previous edition in that it adds information elements (e.g. data elements and data frames) to the IVI Structure by using ASN.1 extensions. The ASN.1 extension feature ensures that implementations of the previous edition can correctly parse IVI Structures compliant with this edition and process the information specified in the previous edition without needing knowledge about the extensions.~~

~~The former Annex B has been replaced with new visual examples.~~

~~C-Roads and Eco-AT documents have been added to the Bibliography.~~

~~Data types are imported from ISO 14823-1 which are backwards compatible with the first edition of this document.~~

~~Data types are imported from editions of ISO 17573-3 and ETSI/TS 102 894-2, which are backwards compatible with the first and second edition of this document.~~

~~additional explanations have been added in 5.2.2;~~

~~the Infrastructure Support Container and related data frames and data elements have been added;~~

~~the data frame SegmentExtended has been added.~~

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](http://www.iso.org/members.html)

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ISO/DTS 19321

<https://standards.iteh.ai/catalog/standards/iso/3b16786a-2f35-42fd-8e7b-46fd3d125d0d/iso-dts-19321>

## Introduction

In a Cooperative Intelligent Transport System (C-ITS), presenting information related to the traffic situation or regulation of a road to the driver of a vehicle is an important component of road operations. The road operators are responsible for road setup, operation, signage, and maintenance for traffic management and road safety, and in some countries, also for the enforcement of road laws. For road operators, efficient transport of vehicles on roadways ensures a safe and predictable trip for all road users. Road operators, together with equipment manufacturers, whether of vehicles or of roadside equipment, contribute to how road information is properly presented to drivers.

So far, one defined C-ITS method for notifying road users of road and/or traffic situations and events is by transmission of messages such as Cooperative Awareness Messages (CAM), Decentralized Environment Notification Messages (DENM), or Basic Safety Messages (BSM).

This document supports mandatory and advisory road signage such as contextual speeds and road works warnings. In-vehicle information can be sent by an ITS station (ITS-S) and either corresponds to physical road signs such as static or variable road signs or does not correspond to physical road signs (a virtual sign), or corresponds to road works. In-vehicle information (IVI) does not include identification of road events as already provided by DENM.

This document provides a toolbox of information elements for IVI. It can be used ~~to fulfil~~ **for fulfilling** the requirements of the service provider considering the needs of **the** receiving ITS-S. The container concept provides a way for an ITS-S to manage the relevant IVI information, determine where the IVI is relevant, and to provide details for the application of **the** IVI. The description of data elements encompasses the data syntax and semantics, i.e. a definition of data format and content, together with a description of how to use those data elements.

This document is of an enabling nature. It does not specify which information is necessary for a certain service, but it supports those IVI information elements that **it** can be necessary to be transmitted to a receiving ITS-S to carry out a certain service. Usage of the IVI information elements depends on the specific context and application of IVI for a specific service and usage is established as mandatory or optional only for messaging purposes, not for application purposes. In order to fulfil the requirements of a specific service, the IVI ~~Structure~~ **structure** can be appropriately profiled.

This document refers to ISO 14823-1 as one system of standardized codes for existing road signs codes.

NOTE ISO 14823-1 does not contain codes for specific national or regional signs that are not commonly used, and it does not represent a catalogue of road sign pictograms for all applicable nations.



# Intelligent transport systems — Cooperative ITS — Dictionary of in-vehicle information (IVI) data structures

## 1 Scope

This document specifies the in-vehicle information (IVI) data structures that are required by different intelligent transport system (ITS) services for exchanging information between ITS stations (ITS-S). A general, extensible data structure is specified, which is split into structures called containers to accommodate current-day information. Transmitted information includes IVI such as contextual speed, road works warnings, vehicle restrictions, lane restrictions, road hazard warnings, location-based services, and re-routing. The information in the containers is organized in sub-structures called data frames and data elements, which are described in terms of ~~its~~their content and ~~its~~ syntax.

The data structures are specified as communications-agnostic. This document does not provide the communication protocols. This document provides scenarios for usage of the data structure, e.g. in case of real time, short-range communications.

## 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 639-1:2002, Codes: 2023, Code for the representation of names of individual languages — Part 1: Alpha-2 code and language groups~~

~~ISO 14823-1:2018, Intelligent transport systems — Graphic data dictionary — Part 1: Specification~~

~~ISO/TS 17573-3:2018, Electronic fee collection — System architecture for vehicle-related tolling — Part 3: Data dictionary~~

~~ISO/TS 19091:2019, Intelligent transport systems — Cooperative ITS — Using V2I and I2V communications for applications related to signalized intersections~~

~~ETSI/TS 102 894-2:2018, Intelligent Transport Systems (ITS); Users and applications requirements; Part 2: Applications and facilities layer common data dictionary; Release 2~~

~~SAE J2540/2, International Traveler Information Systems (ITIS) Phrase Lists~~

## 3 Terms and definitions

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

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

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

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

### 3.1

#### application data unit

data unit exchanged between ITS station application instances

### 3.2

#### container

group of *data frames* (3.4)(3.4) and *data elements* (3.3)(3.3) semantically belonging together in one place in the *in-vehicle information* (3.8)(3.8) structure

### 3.3

#### data element

##### DE

data type that contains one single datum

[SOURCE: ETSI/TS 102 894-2]

### 3.4

#### data frame

data type that contains more than one *data element* (3.3)(3.3) in a predefined order

[SOURCE: ETSI/TS 102 894-2]

### 3.5

#### detection zone

part of the road network that is passed by a vehicle in approach of the *relevance zone* (3.17)(3.16)

### 3.6

#### digital map database

structured set of digital and alphanumeric data portraying geographic locations and relationships of spatial features

[SOURCE: ISO 17572--1:2015, 2.1.10 2022, 3.9, modified — Note 1 to entry has been ~~deleted~~removed.]

### 3.7

#### driver awareness zone

parts of the road network in which a message is presented to inform drivers about upcoming situations

### 3.8

#### in-vehicle information

information contained in the in-vehicle information data structure that is required by different intelligent transport system services

### 3.9

#### in-vehicle signage

intelligent transport system service that provides static, as well as dynamic, road sign and message sign information to drivers

### 3.10

#### intersection

crossing and/or connection of two or more *roads* (3.14)(3.14)