

DIN EN ISO 20524-2:2022-10 (E)

Erscheinungsdatum: 2022-09-23

Intelligent transport systems - Geographic Data Files (GDF) GDF5.1 - Part 2: Map data used in automated driving systems, Cooperative ITS, and multi-modal transport (ISO 20524-2:2020); English version prEN ISO 20524-2:2022, only on CD-ROM

Contents

Page

Foreword	xi
Introduction	xii
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviated terms, symbols and notation elements	2
4.1 Abbreviated terms	2
4.2 Symbols and notation elements	3
5 Overall conceptual data model	3
5.1 Conceptual data models in GDF	3
5.2 General data model of GDF	4
5.2.1 Feature model	4
5.2.2 Belt concept	6
5.2.3 Graph topology	7
5.2.4 Levels in GDF	13
5.2.5 Height modelling and time modelling	15
5.3 The Attribute model	16
5.4 The Relationship model	18
5.5 Linear referencing	19
5.6 The Feature representation scheme	19
5.7 Time modelling	20
5.8 Data management: organization of Feature data into Layers and Sections	21
6 Feature Catalogue	24
6.1 Generic specifications	24
6.1.1 Features and Feature Themes	24
6.1.2 Feature Class Codes	25
6.1.3 Simple and Complex Features	25
6.1.4 Feature hierarchy	25
6.1.5 Data model for the Feature Catalogue	25
6.1.6 Shareable Feature	26
6.2 Abstract Belt Feature	30
6.2.1 General	30
6.2.2 RoadBelt	33
6.2.3 RoadBeltElement	35
6.2.4 IntersectionBelt	36
6.2.5 RoundaboutBelt	38
6.2.6 LaneBeltElement	38
6.2.7 LaneBeltJoint	41
6.2.8 PotentialEvadingArea	42
6.2.9 BeltRepresentativeLine (BRL)	43
6.2.10 IntersectionConnectionPoint (ICP)	45
6.2.11 LaneConnectionPoint (LCP)	45
6.2.12 BeltOptionalPoint (BOP)	45
6.2.13 BeltPartitionLine	46
6.3 Road Furniture Feature	47
6.3.1 General overview	47
6.3.2 Road Structural Component (RSC)	47

6.3.3	Road Marking-2	48
6.3.4	Safety Fixture	50
6.4	Public Transport Feature	51
6.4.1	General overview	51
6.4.2	Public Transport Feature	53
6.4.3	Public Transport Point	54
6.4.4	Public Transport Point Sequence	54
6.4.5	Public Transport Point Sequence Part	55
6.4.6	Public Transport Point Set	55
6.4.7	Public Transport Point Set Part	56
6.4.8	Public Transport Representative Point	56
6.4.9	Public Transport Zone	56
7	Attribute Catalogue	56
7.1	Generic specifications	56
7.1.1	Attribute Types	56
7.1.2	Attribute Values	57
7.1.3	Attribute Type Name	57
7.1.4	Simple Attributes, Composite Attributes and Sub-Attributes	57
7.1.5	Names in combination with a Language Code	58
7.1.6	Default Attribute Values	58
7.1.7	Default Attribute units for measures	58
7.1.8	Attribute Type Codes	58
7.1.9	User Defined Attributes	58
7.1.10	Attribute mapping to Feature Themes and Relationships	59
7.1.11	The data model for Attributes	64
7.2	Attributes	70
7.2.1	Alignment Portion Type	70
7.2.2	Applied Direction	71
7.2.3	Applied Feature Type	71
7.2.4	Applied Side Line	71
7.2.5	Approximated Curve	71
7.2.6	Belt Overlapping	72
7.2.7	Belt Representative Line Segment Characteristic	72
7.2.8	Road Belt Element Segment Characteristic	72
7.2.9	Circular Curve Measure	73
7.2.10	Clothoid Curve Measure	73
7.2.11	Connection Type	73
7.2.12	Context Of Point	73
7.2.13	Context Of Point Set	74
7.2.14	Context Of Point Sequence	74
7.2.15	Cross-section	74
7.2.16	Design Reference	74
7.2.17	End Elevation Measure	75
7.2.18	Existence Position	75
7.2.19	Flexure Angle	75
7.2.20	Flexure Point	75
7.2.21	Gradient	76
7.2.22	Heading Angle	76
7.2.23	Height Block Characteristics	76
7.2.24	Height Block Information	77
7.2.25	Hierarchical Info	77
7.2.26	Identifier Number	77
7.2.27	Include Bicycle Lane	77
7.2.28	Intersection Category	78
7.2.29	Intersection Type	78
7.2.30	Lane Block ID	78
7.2.31	Lane Block Info	78
7.2.32	Lane Transfer Characteristic	79
7.2.33	Lane Transfer Characteristic Type	79
7.2.34	Lane Number	80
7.2.35	Lane Number Of Referencing	80
7.2.36	Lane Belt Element Segment Characteristic	80
7.2.37	Lane Width Change	81

7.2.38	Line Code.....	81
7.2.39	Line Name.....	82
7.2.40	Line Segment Information.....	82
7.2.41	Linear Portion Measure.....	82
7.2.42	Marking Type.....	82
7.2.43	Maximum Tolerance.....	83
7.2.44	Minimum Tolerance.....	83
7.2.45	Number Of Lanes in Lane Section.....	83
7.2.46	Number Of Lane Section Block Info.....	83
7.2.47	Number Of Slope Measure.....	84
7.2.48	PEA Limitation.....	84
7.2.49	Public Transport Operator.....	84
7.2.50	Road Alignment.....	84
7.2.51	Road-facing Side.....	85
7.2.52	Road Marking Common Attribute.....	85
7.2.53	Road Marking Individual Attribute.....	85
7.2.54	Road Marking Individual Characteristics.....	86
7.2.55	Road Structural Component Common Attribute.....	86
7.2.56	Road Structural Component Individual Attribute.....	86
7.2.57	Road Structural Component Individual Characteristics.....	86
7.2.58	Safety Fixture Common Attribute.....	87
7.2.59	Safety Fixture Individual Attribute.....	87
7.2.60	Safety Fixture Individual Characteristics.....	87
7.2.61	Segment Direction.....	87
7.2.62	Slope Measure.....	88
7.2.63	Sub Feature Class Code (Road Furniture).....	88
7.2.64	Start Elevation Measure.....	88
7.2.65	Traffic Restriction.....	88
7.2.66	Traffic Restriction Item.....	89
7.2.67	Traffic Restriction Type Code.....	89
7.2.68	Traffic Restriction Value.....	89
7.2.69	Transport Mode.....	89
7.2.70	Traverse Point Location.....	90
7.2.71	Transverse Slope.....	90
7.2.72	Type Of BeltRepresentativeLine.....	91
7.2.73	Type Of Public Transport Point.....	91
7.2.74	Type Of Public Transport Point Sequence.....	92
7.2.75	Type Of Public Transport Point Set.....	92
7.2.76	Without Road shoulder.....	93
7.2.77	Zone Description.....	93
7.2.78	Zone Name.....	93

8	Relationship Catalogue.....	93
8.1	Generic specifications.....	93
8.1.1	Feature and their Relationships.....	93
8.1.2	Relationship Types.....	108
8.1.3	Relationship Type Codes.....	108
8.1.4	Arity of a Relationship.....	109
8.1.5	Roles and partners of a Relationship.....	109
8.1.6	Homogeneous Relationships and their constraints.....	109
8.2	Relationship Types.....	110
8.2.1	Belt Representative Line Associated With Intersection Connection Point.....	110
8.2.2	Belt Representative Line Associated With Lane Connection Point.....	111
8.2.3	Belt Representative Line Characteristic.....	111
8.2.4	Road Belt Element Associated With Intersection Belt.....	112
8.2.5	Road Belt Element Ownership Of Belt Representative Line.....	112
8.2.6	Road Belt Element Segment Characteristic.....	113
8.2.7	Intersection Belt Ownership Of Belt Representative Line.....	114
8.2.8	Lane Belt Element Associated With Lane Belt Joint.....	114

8.2.9	Lane Belt Element Ownership Of Belt Representative Line	115
8.2.10	Lane Belt Element Segment Characteristic	115
8.2.11	Lane Belt Joint Associated With Intersection Belt	116
8.2.12	Lane Section	116
8.2.13	Multi Public Transport Point Assignment	117
8.2.14	PEA Ownership Of Belt Representative Line	118
8.2.15	Public Transport Point In Correspondence With Road Element	118
8.2.16	Road Belt Associated With Intersection Belt	119
8.2.17	Road Belt Ownership Of Belt Representative Line	119
8.2.18	Road Furniture Along Road Belt Element	120
8.2.19	Road Furniture Along Belt Representative Line	121
8.2.20	Road Furniture Along Intersection Belt	121
8.2.21	Road Furniture Along Lane Belt Element	122
8.2.22	Road Marking Along Road Belt Element	123
8.2.23	Road Marking Along Belt Representative Line	124
8.2.24	Road Marking Along Intersection Belt	125
8.2.25	Road Marking Along Lane Belt Element	125
8.2.26	Segmented Edge Of PEA Belt	126
8.2.27	Shareable Coverage Area Linked To Shareable Point	127
8.2.28	Shareable Coverage Area Linked To Shareable Point Sequence	127
8.2.29	Shareable Coverage Area Linked To Shareable Point Set	128
8.2.30	Shareable Representative Point Linked To Shareable Point Sequence	128
8.2.31	Shareable Representative Point Linked To Shareable Point Set	129
8.2.32	Structure Along Road Belt Element	129
8.2.33	Structure Along Belt Representative Line	130
9	Feature representation rules	131
9.1	General	131
9.2	Generic specifications	131
9.2.1	Overview	131
9.2.2	Feature Categories	131
9.2.3	Types of topology	132
9.2.4	Levels of representation	132
9.2.5	Layers on level 0	134
9.2.6	Rules for level 0 representation	134
9.3	Abstract Belt Feature	134
9.3.1	Introduction	134
9.3.2	Level 2 representation	134
9.3.3	Level 1 representation	134
9.3.4	Level 0 representation	137
9.4	Road Furniture	137
9.4.1	Level 2 representation	137
9.4.2	Level 1 representation	137
9.4.3	Level 0 representation	137
9.5	Shareable Feature	137
9.5.1	Level 2 representation	137
9.5.2	Level 1 representation	138
9.5.3	Level 0 representation	138
9.6	Public Transport Feature	138
9.6.1	Level 2 representation	138
9.6.2	Level 1 representation	138
9.6.3	Level 0 representation	138
10	Metadata Catalogue	138
11	Logical Data Structures	138
11.1	Introduction	138
11.1.1	Data description language: ESN	138
11.1.2	Sets, elements and ranges	138
11.1.3	Summary of the syntax notation	138

	11.1.4	Useful consequences of the syntax notation.....	139
	11.1.5	Diagrammatic overview of the overall structure.....	139
11.2		Logical GDF Album.....	140
11.3		Datasets.....	141
11.4		Layers.....	141
11.5		Sections.....	141
	11.5.1	Overview.....	141
	11.5.2	SECTION.....	141
	11.5.3	Section Metadata.....	141
	11.5.4	Section Data.....	141
11.6		Time Domain Syntax.....	157
11.7		Update Information.....	157
	11.7.1	Overview.....	157
	11.7.2	UPDATE INFORMATION.....	157
	11.7.3	GEO TOPO UPDATE INFORMATION.....	157
	11.7.4	OBJECT UPDATE INFORMATION.....	157
	11.7.5	Basic Data Types used by Update Information.....	157
11.8		Common Data Types.....	158
	11.8.1	Overview.....	158
	11.8.2	Pre-defined code lists and value lists.....	158
	11.8.3	Geodeticals.....	158
	11.8.4	Units & measures.....	158
	11.8.5	Coordinates.....	158
	11.8.6	Geographics.....	158
	11.8.7	Identifier types.....	158
	11.8.8	Basic types.....	164
12		Media Record Specifications.....	164
12.1		General specifications.....	164
	12.1.1	Introduction.....	164
	12.1.2	Partitioning.....	164
	12.1.3	Logical Record.....	164
	12.1.4	Media Record.....	164
	12.1.5	Continuation Record.....	164
	12.1.6	Null Record.....	164
	12.1.7	Fields of variable and fixed length.....	164
	12.1.8	Repeating Fields.....	164
	12.1.9	Repeating Field Groups.....	165
	12.1.10	Nesting Of Repeating Fields.....	165
	12.1.11	Packing.....	165
	12.1.12	Data Types.....	165
	12.1.13	Character sets.....	165
	12.1.14	Justification.....	165
	12.1.15	Order of Records.....	165
	12.1.16	Order of subrecords.....	165
	12.1.17	Links between data records.....	166
12.2		Field specifications.....	173
	12.2.1	Field Name.....	173
	12.2.2	Record Control Fields.....	173
	12.2.3	Common fields.....	177
	12.2.4	Fields in Global Records.....	180
	12.2.5	Fields in Data Records.....	180
	12.2.6	Fields in Update Information Records.....	182
	12.2.7	Fields Catalogue.....	183
12.3		Additional Constraints for Topological Features.....	197
	12.3.1	Order of multiple Coordinate tuples in Coordinate Records.....	197
	12.3.2	Order of Edges in Line Features, Belt Features, Area Features and Faces.....	198
	12.3.3	Order of Features in Relationship Records.....	198
	12.3.4	Order of Features in Relationship Records.....	198

12.4	Additional Constraints for Non-Explicit Topological Features: Order of Coordinate triplets in Feature Records	198
12.5	Mandatory Records	198
12.6	Record Format Specifications: Global Records	198
12.6.1	Album Header Record [ALHDREC]	198
12.6.2	Dataset Header Record [DSHDREC]	198
12.6.3	Field Definition Record [FIELDDEFREC]	198
12.6.4	Record Definition Record [RECDEFREC]	198
12.6.5	Feature Definition Record [FEATDEFREC]	199
12.6.6	Attribute Definition Record [ATDEFREC]	199
12.6.7	Attribute Value Definition Record [ATTVALREC]	199
12.6.8	Default Attribute Record [DATTVALLREC]	199
12.6.9	Relationship Definition Record [RELDEFREC]	199
12.6.10	Geopolitical Structure Definition Record [GPLSTRDREC]	199
12.6.11	Geopolitical Structure Component Definition Record [GPLCOMDREC]	199
12.6.12	Spatial Domain Record [SPADOREC]	199
12.6.13	Directory Record [DIREC]	199
12.6.14	Abbreviation Record [ABBRREC]	199
12.6.15	Network Specification Record [NWSPECSREC]	199
12.6.16	Source Record [SRCEREC]	199
12.6.17	Geodetical Parameter Records	201
12.6.18	Layer Header Record [LAYHREC]	201
12.6.19	Section Header Record [SECHREC]	201
12.6.20	Comment Record [COMMENTREC]	201
12.6.21	Volume Termination Record [VOLTERMREC]	201
12.7	Record Format Specifications: Data Records	201
12.7.1	2D Coordinate Record [XYREC]	201
12.7.2	3D Coordinate Record [XYZREC]	202
12.7.3	Node Record [NODEREC]	202
12.7.4	Edge Record [EDGEREC]	202
12.7.5	Face Record [FACEREC]	202
12.7.6	Point Feature Record (Explicit Point Topology sub-record) [POFEREC.01]	202
12.7.7	Point Feature Record (Non-explicit Point Topology sub-record) [POFEREC.03]	202
12.7.8	Line Feature Record (Explicit Line Topology sub-record) [LIFEREC.01]	202
12.7.9	Line Feature Record (Non-Explicit Line Topology sub-record) [LIFEREC.03]	202
12.7.10	Belt Feature Record (Full Rendering Belt Topology sub-record) [BEFEREC.01]	202
12.7.11	Belt Feature (Connectivity Rendering Belt Topology sub-record) [BEFEREC.02]	203
12.7.12	Belt Feature (Non-explicit Belt Topology sub-record) [BEFEREC.03]	205
13	XML schema specifications	207
13.1	Introduction	207
13.1.1	Schema design principles	208
13.2	Data content	208
13.3	GDF Part2 XML schema	208
13.4	Schema GDF_Main_Part2.xsd	208
13.4.1	Header	208
13.4.2	GDF Main Part2	208
13.4.3	Full Topology Belt Feature part2	210
13.4.4	Connectivity Topology Belt Feature part2	211
13.4.5	Non-explicit Topology Belt Feature part2	212
13.4.6	Explicit Point Feature part2	213
13.4.7	Non-explicit Point Feature part2	214
13.4.8	Explicit Line Feature part2	214
13.4.9	Non-explicit Line Feature part2	215
13.4.10	Full Topology Area Feature part2	216
13.4.11	Connectivity Topology Area Feature part2	216

13.4.12	Non-explicit Topology Area Feature part2	216
13.4.13	Explicit Topology Complex Feature part2	217
13.4.14	Non-explicit Topology Complex Feature part2	218
13.4.15	Attribute part2	219
13.4.16	Relationship part2	219
13.5	Schema GDF_data_dict_Part2.xsd	220
13.5.1	Header	220
13.5.2	Attribute Type code part2	220
13.5.3	Belt element pointer	220
13.5.4	Belt element type	220
13.5.5	Belt Feature ID	220
13.5.6	Defined Attribute Type code D part2	221
13.5.7	Defined Attribute Type code D Name part2	221
13.5.8	Defined Attribute Type code D Value part2	222
13.5.9	Defined Attribute Type code Data Type Code part2	223
13.5.10	Defined Attribute Type code Definition part2	224
13.5.11	Defined Attribute Type code Definition Reference part2	225
13.5.12	Defined Attribute Code List Part2	226
13.5.13	Defined Feature Category Name part2	234
13.5.14	Defined Feature Category Value part2	234
13.5.15	Defined Feature Code part2	234
13.5.16	Defined Feature Code Name part2	234
13.5.17	Defined Feature Code Value part2	235
13.5.18	Feature Category part2	235
13.5.19	Feature Code part2	235
13.5.20	Record Type part2	236
13.5.21	Record Type Name part2	236
13.5.22	Record Type Value part2	236
13.5.23	Record Type part2 (simple)	236
13.5.24	Record Subtype part2 (simple)	236
13.5.25	Relationship Code part2	236
13.5.26	Relationship Code D part2	236
13.5.27	Relationship Code Name part2	237
13.5.28	Relationship Code Value part2	237
13.5.29	Relationship Code Roles Definition part2	238
13.5.30	Relationship Code Roles Definition part2 Declination	238
13.5.31	Relationship Feature part2	239
13.5.32	Relationship Role Code Lists part2	239
13.6	Schema GDF_userDefined_Part2.xsd	254
13.6.1	Header	254
13.6.2	Attribute Descriptor part2	254
13.6.3	Attribute Content part2	255
13.6.4	User-defined Attribute Type code part2	255
13.6.5	User-defined Attribute Type code Name part2	255
13.6.6	User-defined Attribute Type code Value part2	255
13.6.7	User-defined Feature Codes part2	255
13.6.8	User-defined Feature Code Name part2	255
13.6.9	User-defined Feature Code Value part2	255
13.6.10	User-defined Relationship Code part2	255
13.6.11	User-defined Relationship Code Name part2	256
13.6.12	User-defined Relationship Code Value part2	256
Annex A (normative) Semantic codes for GDF5.1 Part 2		257
Annex B (normative) Syntax for Time Domains of GDF5.1 Part 2		263
Annex C (normative) Sectioning GDF Datasets		287
Annex D (normative) Definition and description of the subtypes of Road Furniture		290

Annex E (normative) Definition and description of the subtypes of Public Transport Point Features	307
Annex F (normative) XML schema specification file for GDF5.1 Part1 and Part2.....	317
Annex G (informative) Examples of XML representation of GDF5.1 Part 2 (this document) in Japan.....	544
Annex H (informative) UML notation	580
Annex I (informative) Examples of BeltProperty concepts.....	586
Bibliography	589