

FEDRO Traffic Data Platform (TDP)

DATEX II-Profile

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1. Preliminary Remarks

This document describes the DATEXII data model for the traffic data platform TDP-CH.

Basics

The profile specified here is based on DATEX II version 2.3.

A specification based on DATEX II version 3.0 has not yet been made because the standardization process for CEN / EN 16157 part 5 "MeasuredAndElaboratedDataPublications" has not yet been completed.

This standardization is not expected to be published until early 2021.

DATEX II

DATEX II (standardized in CEN / TS 16157-1 to 7¹) offers a comprehensive data model for traffic and road information ("Level A"). Specific data structures that cannot (yet) be mapped in to the standard model, can be integrated in accordance with standards² using so-called "Level B" extensions.

DATEX II has a very large scope. In order to keep the present specification lean, only the relevant DATEX II attributes of the DATEX II profile are described. The XML schema file (*.xsd) belonging to the profile contains only the elements described here in the document.

¹ Further information on DATEX can be found on www.datex2.eu

² accordance with standards means: DATEX II explicitly provides for such extensions. Systems that "do not know" a level B extension can still process all other information in the data model without any problems.

UML-Modell

The complete DATEX II data model is available as a UML model for navigating in the web browser: http://www.datex2.eu/datex-model/HTML.Version_2.3/index.htm

The model is also available on the DATEX website (after free registration) in the Enterprise Architect format (*.eap). For read only purposes, Enterprise Architect Viewer can be used. The tool can be obtained free of charge from this address:

<http://www.sparxsystems.com.au/bin/EALite.exe>

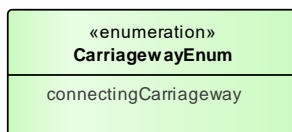
However, the two mentioned versions only contain the so-called DATEX II Level A model, i.e. project-specific level B supplements are not included.

The attached UML model (*.eap) contains the full Level A model including a small extension.

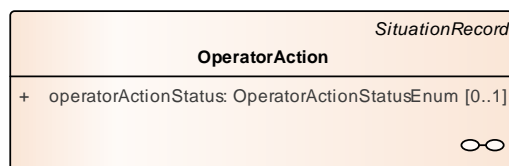
Explanation of symbols for the UML representation

In addition to the conventional UML symbolism, the following (color) semantics are used:

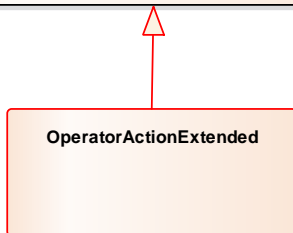
class Legende



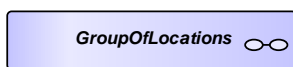
Aufzählung mit
Literal(en)



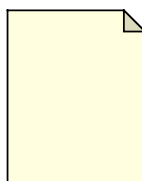
Klasse mit einem
optionalen Attribut



Projektspezifische
Erweiterung (Level B).
Es handelt sich nicht
um eine herkömmliche
Spezialisierung, diese
würde mit einem
schwarzen Pfeil
dargestellt.



Klasse mit einem
zugehörigen größerem
Sub-Modell, welches
aber an anderer Stelle
abgebildet ist.

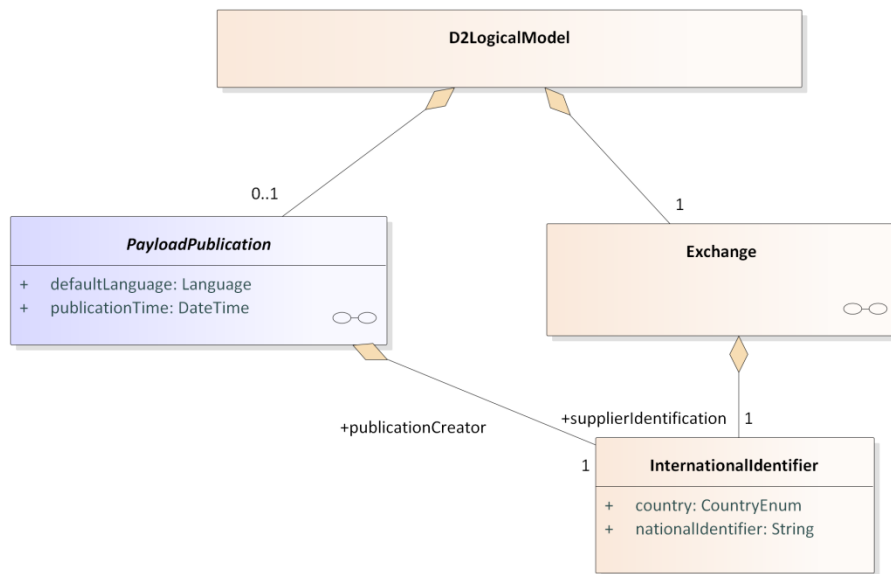


Anmerkung oder
Einschränkung.

2. Data model

2.1.D2LogicalModel/Exchange

class D2LogicalModel



«enumeration»
CountryEnum

at
be
bg
ch
cs
cy
cz
de
dk
ee
es
fi
fo
fr
gb
gg
gi
gr
hr
hu
ie
im
is
it
je
li
lt
lu
lv
ma
mc
mk
mt
nl
no
pl
pt
ro
se
si
sk
sm
tr
va
other

A.1.1.1 "D2LogicalModel" package classes

Class name	Designation	Definition	Stereotype	Abstract
D2LogicalModel	D2 logical model	The DATEX II logical model comprising exchange, content payload and management sub-models.		no
Exchange	Exchange	Details associated with the management of the exchange between the supplier and the client.		no
HeaderInformation	Header information	Management information relating to the data contained within a publication.		no
InternationalIdentifier	International identifier	An identifier/name whose range is specific to the particular country.		no
PayloadPublication	Payload publication	A payload publication of traffic related information or associated management information created at a specific point in time that can be exchanged via a DATEX II interface.		yes

Table 1— Classes of the "D2LogicalModel" package

A.1.1.2 "D2LogicalModel" package association roles

Class name	Role name	Designation	Definition	Multiplicity	Target
Exchange	supplierIdentification	Supplier identification		1..1	InternationalIdentifier
PayloadPublication	publicationCreator	Publication creator		1..1	InternationalIdentifier

Table 2— Associations of the "D2LogicalModel" package

A.1.1.3 "D2LogicalModel" package attributes

Class name	Attribute name	Designation	Definition	Multiplicity	Type
HeaderInformation	confidentiality	Confidentiality	The extent to which the related information may be circulated, according to the recipient type. Recipients must comply with this confidentiality statement.	1..1	ConfidentialityValueEnum
	informationStatus	Information status	The status of the related information (real, test, exercise).	1..1	InformationStatusEnum
InternationalIdentifier	country	Country	ISO 3166-1 two character country code.	1..1	CountryEnum
	nationalIdentifier	National identifier	Identifier or name unique within the specified country.	1..1	String
PayloadPublication	defaultLanguage	Default language	The default language used throughout the payload publication.	1..1	Language
	publicationTime	Publication time	Date/time at which the payload publication was created.	1..1	DateTime

Table 3— Attributes of the "D2LogicalModel" package

HeaderInformation

- **confidentiality**
NoRestriction is used exclusively in productive operation.
InternalUse can also be used for test purposes.
- **informationStatus**
Real will be used exclusively in productive operation.
Other values can be used for test purposes.

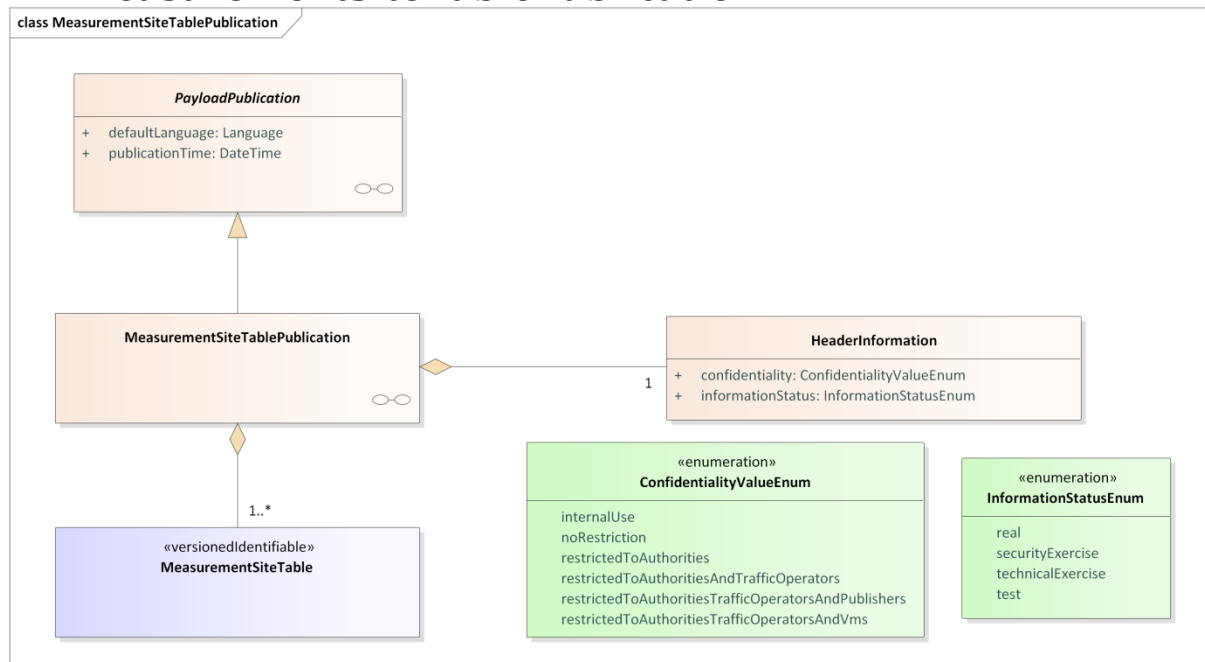
InternationalIdentifier:

- **country**
According to ISO 3166-1, a two-character country code is used. *CH* is the code for Switzerland.
- **nationalIdentifier**
 - FEDRO is responsible at the federal level.
FEDRO is used as coding ("Federal Road Office")
 - At the cantonal level, coding is in accordance with ISO 3166-2
i.e. *ZH* is used as a code for the canton of Zurich

PayloadPublication

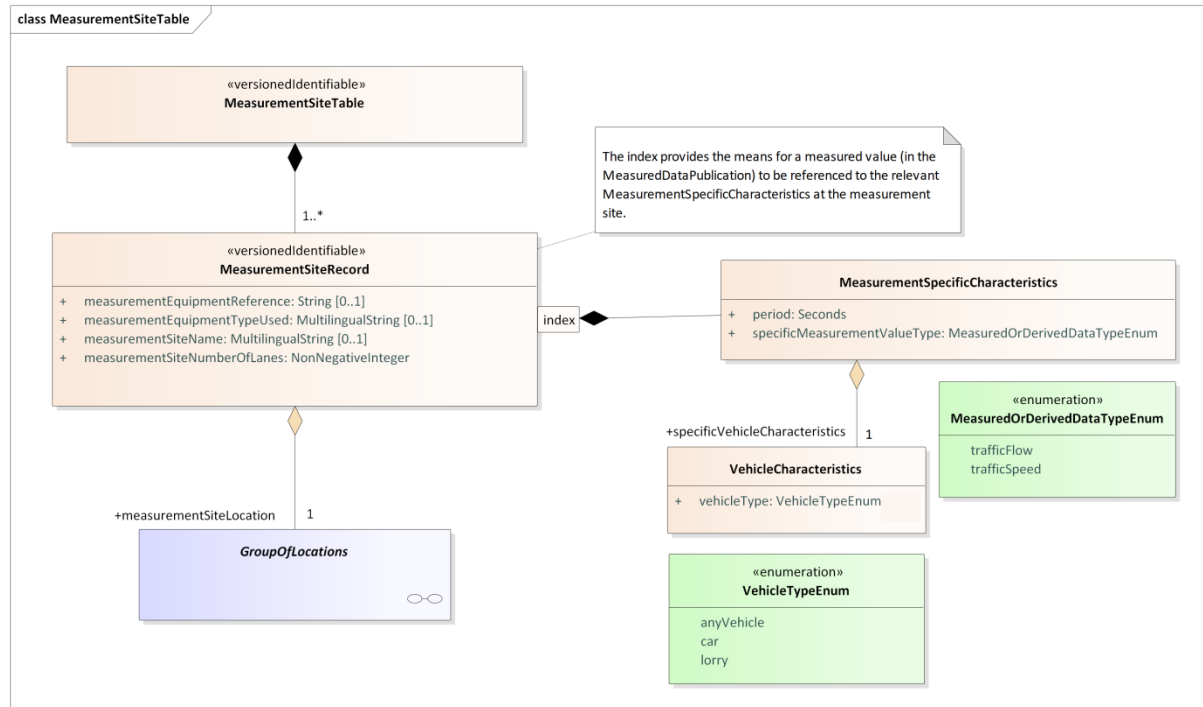
- **defaultLanguage**
Only the coding *en* is used.
- **publicationTime**
Time of creation of the respective publication in the format according to ISO 8601 including the time zone:
Example: *2019-10-08T20:21Z*
UTC is used as time zone for all publications, identified by the letter Z ("Zulu")

2.2. MeasurementSiteTablePublication



For more details of PayloadPublication and Headerinformation see chapter 2.1.

2.2.1. MeasurementSiteTable



A.1.1.4 "MeasurementSiteTablePublication" package classes

Class name	Designation	Definition	Stereotype	Abstract
MeasurementSiteRecord	Measurement site record	An identifiable single measurement site entry/record in the Measurement Site table.	versionedIdentifiable	no
MeasurementSiteTable	Measurement site table	A Measurement Site Table comprising a number of sets of data, each describing the location from where a stream of measured data may be derived. Each location is known as a "measurement site" which can be a point, a linear road section or an area.	versionedIdentifiable	no
MeasurementSiteTablePublication	Measurement site table publication	A publication containing one or more Measurement Site Tables.		no
MeasurementSpecificCharacteristics	Measurement specific characteristics	Characteristics which are specific to an individual measurement type (specified in a known order) at the given measurement site.		no
VehicleCharacteristics	Vehicle characteristics	The characteristics of a vehicle, e.g. lorry of gross weight greater than 30 tonnes.		no

Table 4— Classes of the "MeasurementSiteTablePublication" package

versionedIdentifiable

Both the MeasurementSiteTable and MeasurementSiteRecord classes can be linked with the stereotype versionIdentifiable.

Elements whose components are identified with identifiable or VersionIdentifiable have the attributes id and version and can be identified through these references. DATEX requires uniqueness ("in space and time") of the id and the version and names GUIDs as an example.

The generation or the structure of the ID is irrelevant for the data user; they only use it as a comparison to find related elements.

A previously used id with the same version may only be used if all the content it contains is congruent, e.g. if a "copy" of a MeasurementSiteTable is transmitted. In all other cases, the version number needs to be increased. For different content, another id needs to be chosen.

Elements are referenced using attributes that have the data type Reference or VersionReference.

A.1.1.5 "MeasurementSiteTablePublication" package association roles

Class name	Role name	Designation	Definition	Multiplicity	Target
MeasurementSiteRecord	measurementSiteLocation	Measurement site location		1..1	GroupOfLocations
MeasurementSpecificCharacteristics	specificVehicleCharacteristics	Specific vehicle characteristics		1..1	VehicleCharacteristics

Table 5— Associations of the "MeasurementSiteTablePublication" package

A.1.1.6 "MeasurementSiteTablePublication" package attributes

Class name	Attribute name	Designation	Definition	Multiplicity	Type
MeasurementSiteRecord	measurementEquipmentReference	Measurement equipment reference	The reference given to the measurement equipment at the site.	0..1	String
	measurementEquipmentTypeUsed	Measurement equipment type used	The type of equipment used to gather the raw information from which the data values are determined, e.g. 'loop', 'ANPR' (automatic number plate recognition) or 'urban traffic management system' (such as SCOOT).	0..1	MultilingualString
	measurementSiteName	Measurement site name	Name of a measurement site.	0..1	MultilingualString
	measurementSiteNumberOfLanes	Measurement site number of lanes	The number of lanes over which the measured value is determined.	1..1	NonNegativeInteger
MeasurementSpecificCharacteristics	period	Period	The time elapsed between the beginning and the end of the sampling or measurement period. This item may differ from the unit attribute; e.g. an hourly flow can be estimated from a 5-minute measurement period.	1..1	Seconds
	specificMeasurementValueType	Specific measurement value type	The type of this specific measurement at the measurement site.	1..1	MeasuredOrDerivedDataTypeEnum
VehicleCharacteristics	vehicleType	Vehicle type	Vehicle type.	1..1	VehicleTypeEnum

Table 6— Attributes of the "MeasurementSiteTablePublication" package

MeasurementSiteRecord

- **measurementEquipmentReference**
optional, not used for the time being
- **measurementEquipmentTypeUsed**
optional, not used for the time being
- **measurementSiteName**
optional, not used for the time being
- **measurementSiteNumberOfLanes**
mandatory, always has the value *1*

Reason: A grouping of individual detectors into cross sections was deliberately avoided, since there may be different views depending on the use case.

MeasurementSpecificCharacteristics

- **period**
mandatory, specifies the duration of the aggregation interval of the measurement data and therefore always has the value *60*
- **specificMeasurementValueType**
mandatory, specifies the type of measurement
- **vehicleType**
mandatory, indicates the vehicle class

VehicleCharacteristics

- **vehicleType**
mandatory, indicates the vehicle class

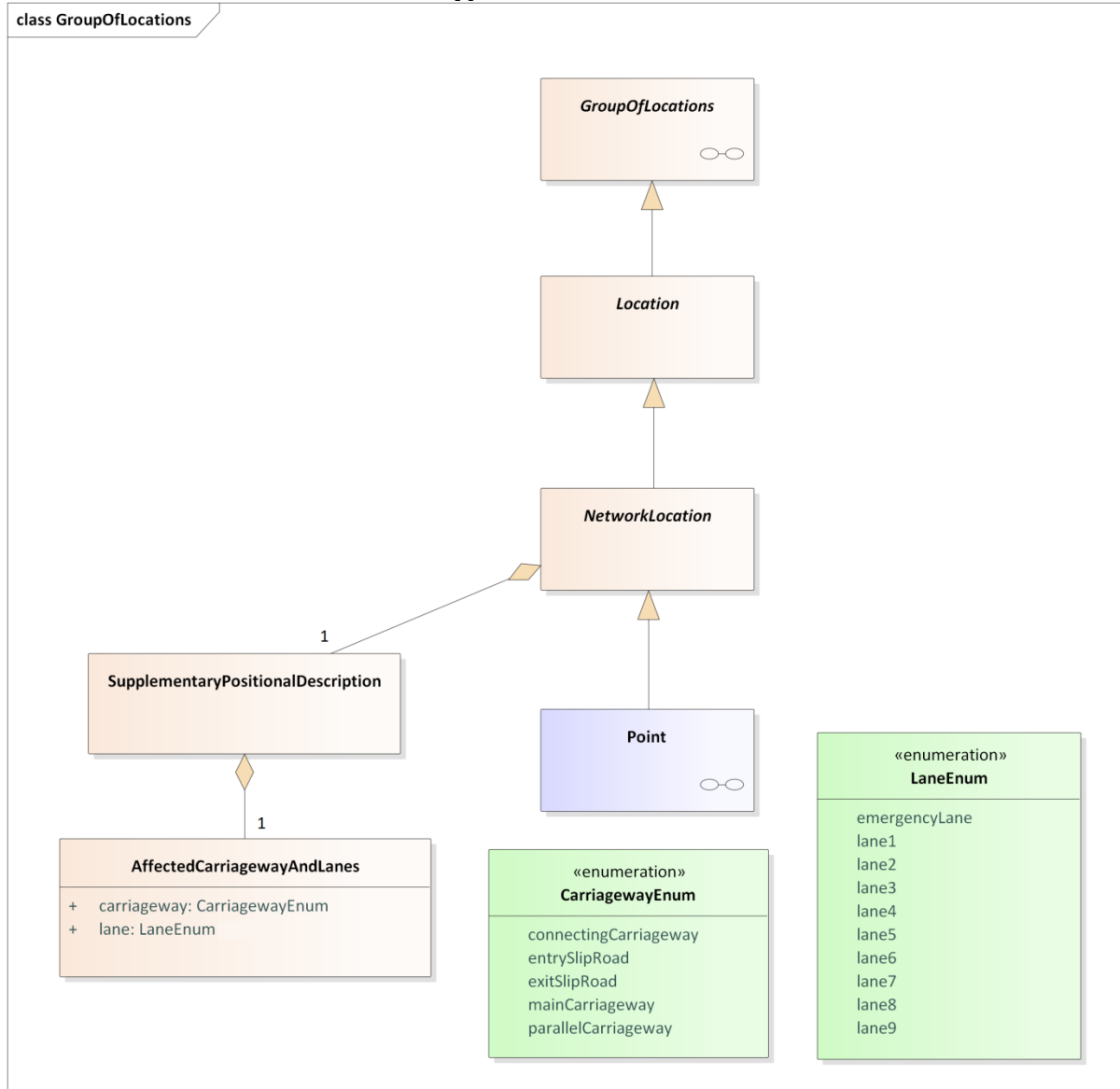
Relation between MeasurementSiteRecord and MeasurementSpecificCharacteristics

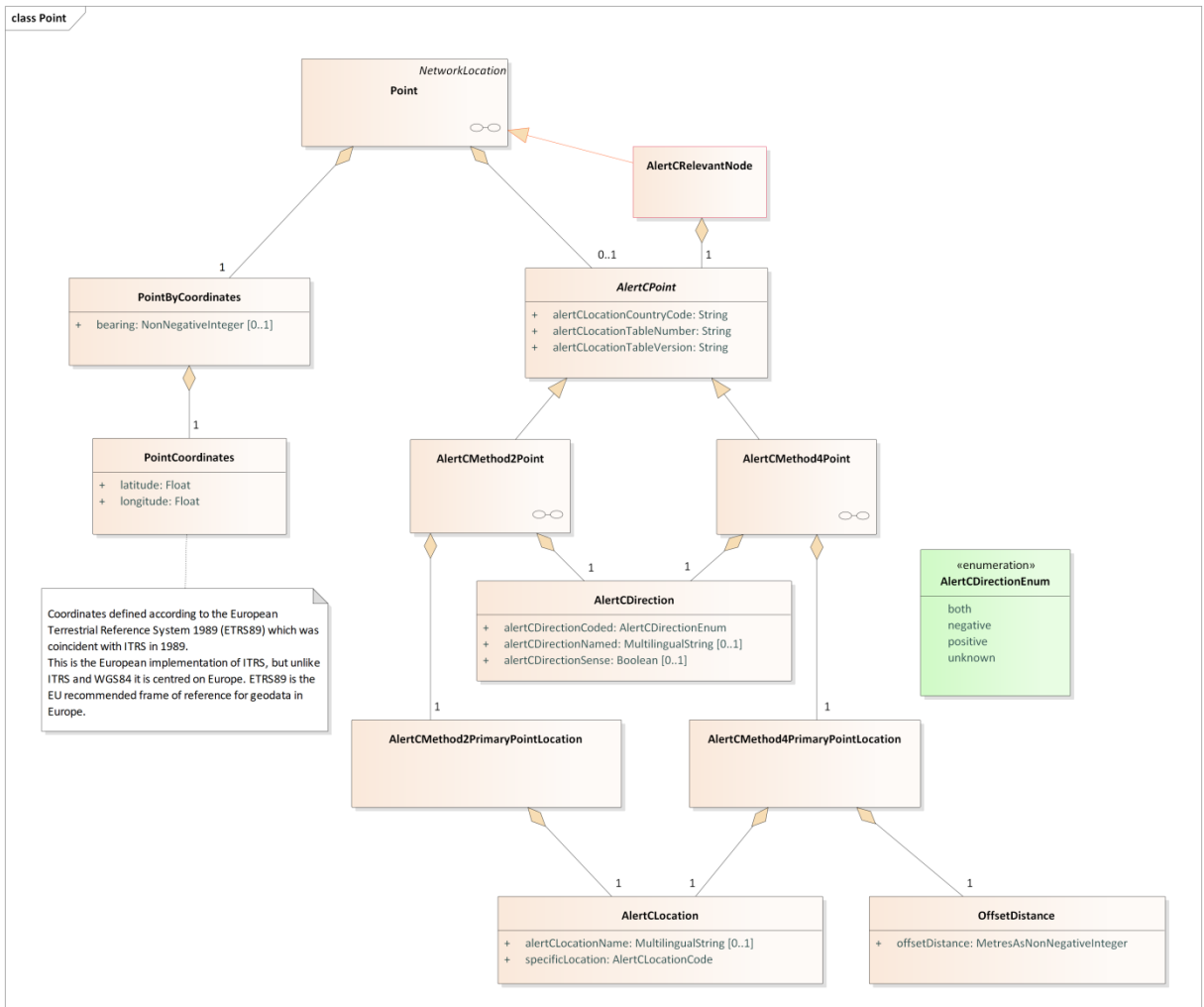
The MeasurementSpecificCharacteristics class is used several times by the MeasurementSiteRecord class, whereby the differentiation is made via the index. This differentiation is based on two different criteria:

- Vehicle class
The index part is coded as a decimal place.
A distinction is made between:
 - Light vehicles (Cars, motorbikes etc.)
All vehicles from class 1 to 7 (SWISS10)
(see guideline on traffic counters ASTRA_13012, Abb. 2.3)
Index group 10 in DATEX II (11, 12)
 - Heavy goods vehicles (Trucks, with and without trailers)
All vehicles from class 8 to 10 (SWISS10)
(see guideline on traffic counters ASTRA_13012, Abb. 2.3)
Index group 20 in DATEX II (21,22)
 - unclassified vehicles
Index group 00 in DATEX II (01,02)
- Measurement type
The index part is coded decimally as a unit position.
A distinction is made between:
 - Traffic flow
Index share: 01
 - Average traffic speed
Index share: 02

The 6 possible combinations are determined by adding the two indexes to each category (3x2).

2.2.2. Location Package





Point

The following point methods are used:

- Coordinates
is used for a purely coordinate-based location reference without reference to other location reference systems
- ALERT-C Methode 2
is used to identify a connection point or a node if the measuring points are not on a "free path"
- ALERT-C Method 4 (with Offsets)
is used according to <http://d2docs.ndwcloud.nu/general/DATEXII-UserGuide-UseOfALERT-C.html>
specificLocation is the next location code in the direction of travel (regardless of its point class) and the offset specifies the positive distance in [m] between the vertical point of the measuring point on the straight line between specificLocation and its immediate predecessor in the ALertC coding sequence for the specificLocation. The offset therefore does not refer to the length of a real road.

Coordinates and AlertC methods can and should be used at the same time.

A second ALERT-C specification can be made via the class AlertCRelevantNode (level B extension).

Method 4 is not used for exits and entrances, since a specific location as a destination cannot usually be determined without any doubt. Only method 2 in the AlertCRelevantNode class is used for such measuring points.

Both methods are generally used for measuring points in the area of the main lanes of junctions and nodes, whereby method 4 is used in the AlertCPoint class and method 2 in the AlertCRelevantNode class.

Generally, only method 4 can be used in the class AlertCPoint for traffic counters on "free routes" (at a significant distance from a junction or a node).

A.1.1.7 "Location" package classes

Class name	Designation	Definition	Stereotype	Abstract
AffectedCarriagewayAndLanes	Affected carriageway and lanes	Supplementary positional information which details carriageway and lane locations. Several instances may exist where the element being described extends over more than one carriageway.		no
AlertCDirection	ALERT-C direction	The direction of traffic flow along the road to which the information relates.		no
AlertCLocation	ALERT-C location	Identification of a specific point, linear or area location in an ALERT-C location table.		no
AlertCMethod2Point	ALERT-C method2 point	A single point on the road network defined by reference to a point in a pre-defined ALERT-C location table and which has an associated direction of traffic flow.		no
AlertCMethod2PrimaryPointLocation	ALERT-C method2 primary point location	The point (called Primary point) which is either a single point or at the downstream end of a linear road section. The point is specified by a reference to a point in a pre-defined ALERT-C location table.		no
AlertCMethod4Point	ALERT-C method4 point	A single point on the road network defined by reference to a point in a pre-defined ALERT-C location table plus an offset distance and which has an associated direction of traffic flow.		no
AlertCMethod4PrimaryPointLocation	ALERT-C method4 primary point location	The point (called Primary point) which is either a single point or at the downstream end of a linear road section. The point is specified by a reference to a point in a pre-defined ALERT-C location table plus a non-negative offset distance.		no
AlertCPoint	ALERT-C point	A single point on the road network defined by reference to a pre-defined ALERT-C location table and which has an associated direction of traffic flow.		yes
AlertCRelevantNode	ALERT-C relevant node	Extension class to provide an additional ALERT-C information on the relevant node.		no

Class name	Designation	Definition	Stereotype	Abstract
GroupOfLocations	Group of locations	One or more physically separate locations. Multiple locations may be related, as in an itinerary (or route), or may be unrelated. It is not for identifying the same physical location using different Location objects for different referencing systems.		yes
Location	Location	The specification of a location either on a network (as a point or a linear location) or as an area. This may be provided in one or more referencing systems.		yes
NetworkLocation	Network location	The specification of a location on a network (as a point or a linear location).		yes
OffsetDistance	Offset distance	The non negative offset distance from the ALERT-C referenced point to the actual point.		no
Point	Point	A single geospatial point.		no
PointByCoordinates	Point by coordinates	A single point defined only by a coordinate set with an optional bearing direction.		no
PointCoordinates	Point coordinates	A pair of coordinates defining the geodetic position of a single point using the European Terrestrial Reference System 1989 (ETRS89).		no
SupplementaryPositionalDescription	Supplementary positional description	A collection of supplementary positional information which improves the precision of the location.		no

Table 7— Classes of the "Location" package

A.1.1.8 "Location" package association roles

There are no defined association roles in the "Location" package.

A.1.1.9 "Location" package attributes

Class name	Attribute name	Designation	Definition	Multiplicity	Type
AffectedCarriagewayAndLanes	carriageway	Carriageway	Indicates the section of carriageway to which the location relates.	1..1	CarriagewayEnum
	lane	Lane	Indicates the specific lane to which the location relates.	1..1	LaneEnum
AlertCDirection	alertCDirectionCoded	ALERT-C direction coded	The direction of traffic flow to which the situation, traffic data or information is related. Positive is in the direction of coding of the road.	1..1	AlertCDirectionEnum
	alertCDirectionNamed	ALERT-C direction named	ALERT-C name of a direction e.g. Brussels -> Lille.	0..1	MultilingualString
	alertCDirectionSense	ALERT-C direction sense	Indicates for circular routes (i.e. valid only for ring roads) the sense in which navigation should be made from the primary location to the secondary location, to avoid ambiguity. TRUE indicates positive RDS direction, i.e. direction of coding of road.	0..1	Boolean
AlertCLocation	alertCLocationName	ALERT-C location name	Name of ALERT-C location.	0..1	MultilingualString
	specificLocation	Specific location	Unique code within the ALERT-C location table which identifies the specific point, linear or area location.	1..1	AlertCLocationCode
AlertCPoint	alertCLocationCountryCode	ALERT-C location country code	EBU country code.	1..1	String

Class name	Attribute name	Designation	Definition	Multiplicity	Type
	alertCLocationTableNumber	ALERT-C location table number	Number allocated to an ALERT-C table in a country. Ref. EN ISO 14819-3 for the allocation of a location table number.	1..1	String
	alertCLocationTableVersion	ALERT-C location table version	Version number associated with an ALERT-C table reference.	1..1	String
OffsetDistance	offsetDistance	Offset distance	The non negative offset distance from the ALERT-C referenced point to the actual point. The ALERT-C locations in the Primary and Secondary locations must always encompass the linear section being specified, thus Offset Distance is towards the other point.	1..1	MetresAsNonNegativeInteger
PointByCoordinates	bearing	Bearing	A bearing at the point measured in degrees (0 - 359). Unless otherwise specified the reference direction corresponding to 0 degrees is North.	0..1	NonNegativeInteger
PointCoordinates	latitude	Latitude	Latitude in decimal degrees using the European Terrestrial Reference System 1989 (ETRS89).	1..1	Float
	longitude	Longitude	Longitude in decimal degrees using the European Terrestrial Reference System 1989 (ETRS89).	1..1	Float

Table 8— Attributes of the "Location" package

AffectedCarriagewayAndLanes

- **carriageway**

mandatory, differentiation between:

- Main lanes
- Parallel lanes
- Connecting ramps
- Exit lanes
- Entry lanes

- **lane**

mandatory, differentiation between:

- Breakdown strips
- lane 1-9

always numbered from right to left in the direction of travel

- 1: normal lane
- 2: first passing lane
- 3: 2nd passing lane
- etc.

AlertCDirection

- **alertCDirectionCoded**

mandatory, indicates the direction according to AlertC

- **alertCDirectionNamed**

optional, should correspond to the AlertC designation

- **alertCDirectionSense**

optional, only to be used at roundabouts

AlertCLocation

- **alertCLocationName**
optional, should correspond to the AlertC name
- **specificLocation**
mandatory, identifies the AlertC location code for the content definition see <http://d2docs.ndwcloud.nu/general/DATEXII-UserGuide-UseOfALERT-C.html>

AlertCPoint

- **alertCLocationCountryCode**
mandatory, according to the version of the AlertC table used
- **alertCLocationTableNumber**
mandatory, according to the version of the AlertC table used
- **alertCLocationTableVersion**
mandatory, according to the version of the AlertC table used

OffsetDistance

- **offsetDistance**

mandatory, but is only used with AlertCPoint4Method for the content definition see <http://d2docs.ndwcloud.nu/general/DATEXII-UserGuide-UseOfALERT-C.html>

PointByCoordinates

- **bearing**

optional, designates the direction of travel as a compass direction in angular degrees with the following equivalence:

- 0: Driving direction north
- 90: Direction of travel east
- etc.

PointCoordinates

DATEX II requires coordinates in the European Terrestrial Reference System 1989 (ETRS89).

Due to the small deviation and pragmatic reasons, WGS84 coordinates are also tolerated. The coordinates given are WGS84 coordinates

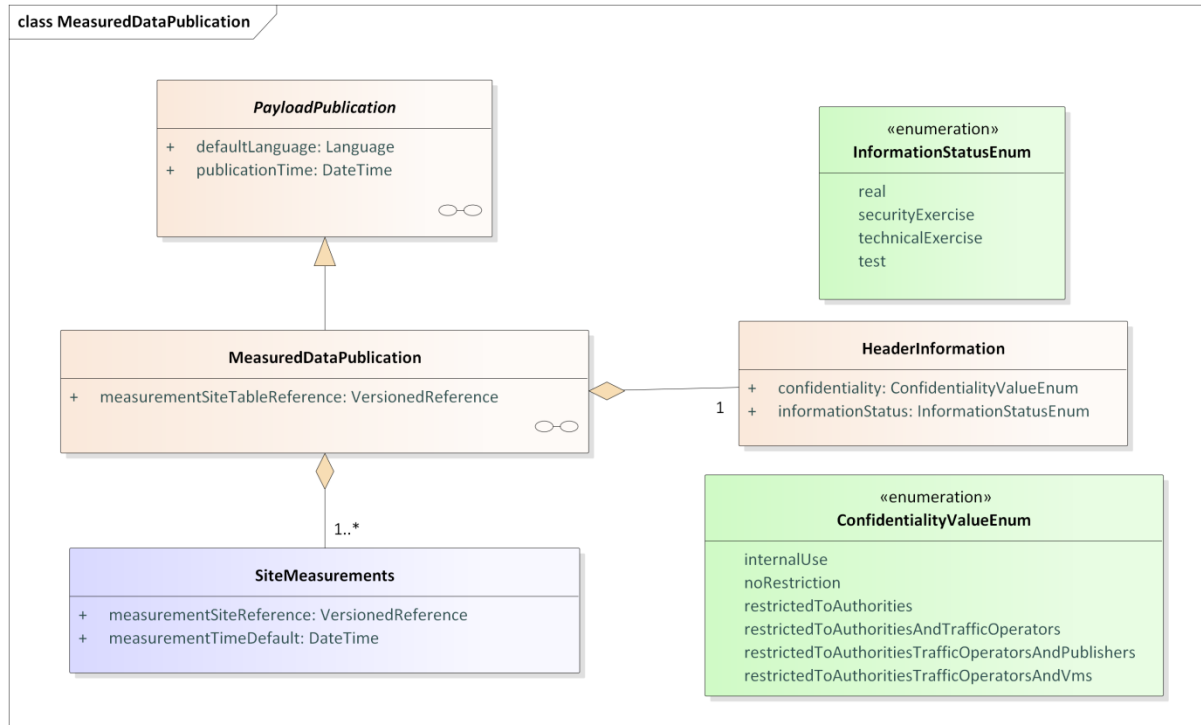
- **latitude**

mandatory, latitude

- **longitude**

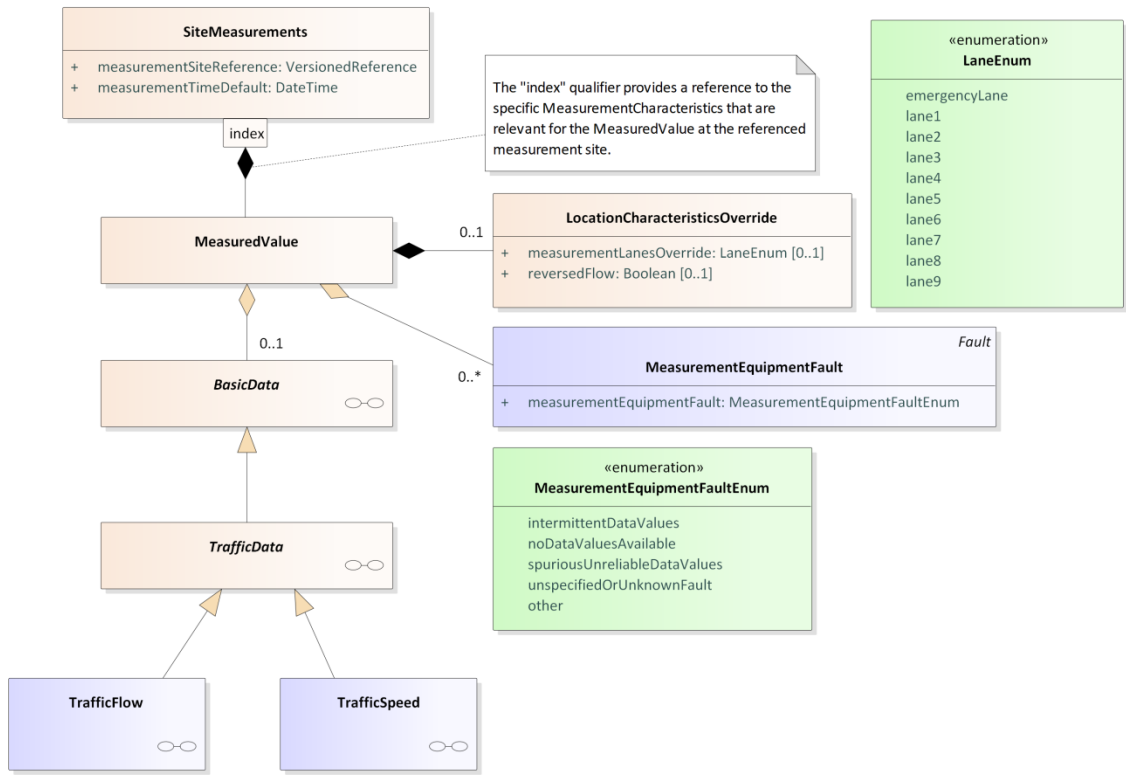
mandatory, longitude

2.3. MeasuredDataPublication

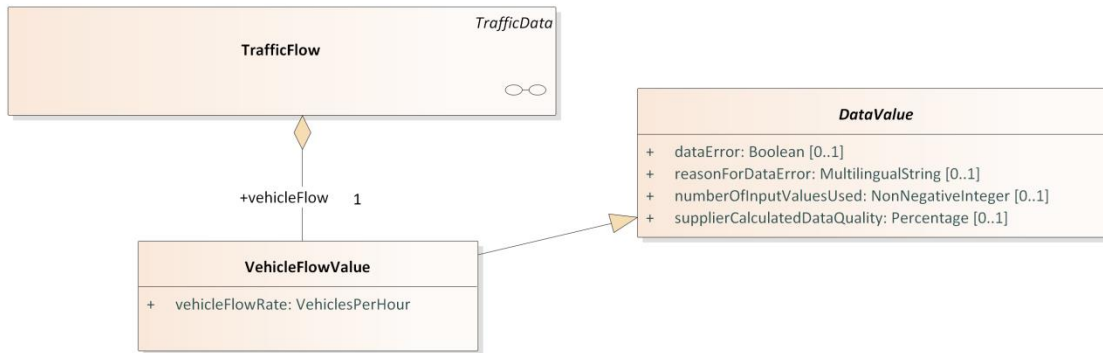


For more details to Payloadpublication and HeaderInformation see Chapter 2.1.

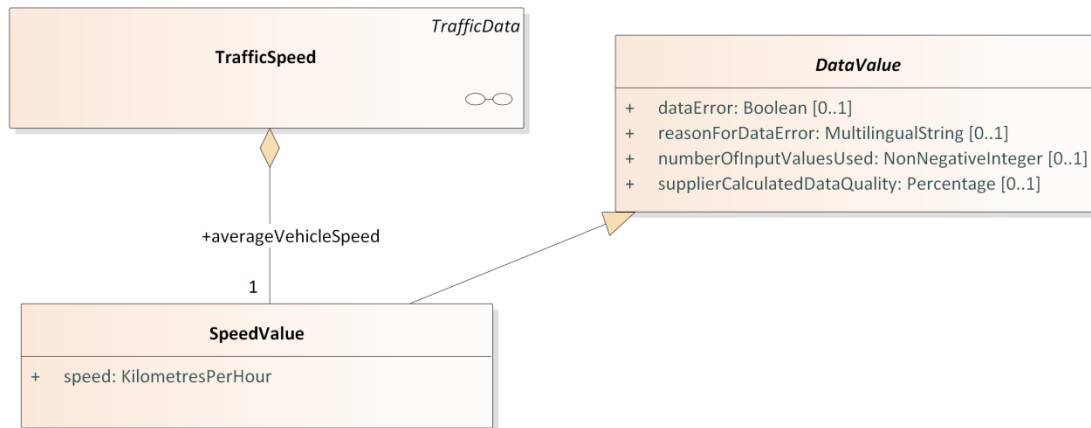
class SiteMeasurements



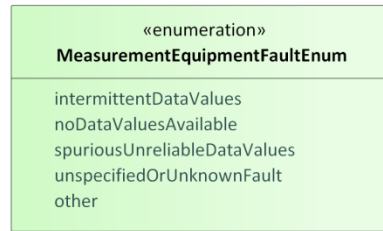
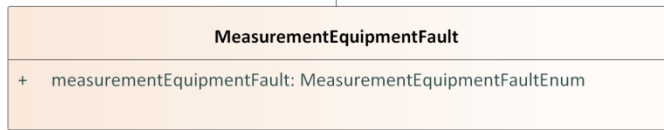
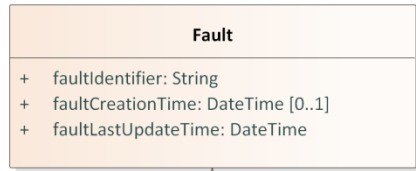
class TrafficFlow



class TrafficSpeed



class Fault



A.1.1.10 "MeasuredDataPublication" package classes

Class name	Designation	Definition	Stereotype	Abstract
BasicData	Basic data	Data that is either measured or calculated (elaborated) at the same time or over the same time period.		yes
DataValue	Data value	A data value of something that can be measured or calculated. Any provided meta-data values specified in the attributes override any specified generic characteristics such as defined for a specific measurement in the MeasurementSiteTable.		yes
Fault	Fault	Information about a fault relating to a specific piece of equipment or process.		no
LocationCharacteristics Override	Location characteristics override	Location characteristics which override values set in the referenced measurement point.		no
MeasuredDataPublication	Measured data publication	A publication containing one or more measurement data sets, each set being measured at a single measurement site.		no
MeasuredValue	Measured value	Contains optional characteristics for the specific measured value (indexed to correspond with the defined characteristics of the measurement at the referenced measurement site) which override the static characteristics defined in the MeasurementSiteTable.		no
MeasurementEquipmentFault	Measurement equipment fault	Details of a fault which is being reported for the related measurement equipment.		no
SiteMeasurements	Site measurements	A measurement data set derived from a specific measurement site.		no
SpeedValue	Speed value	A measured or calculated value of speed.		no
TrafficData	Traffic data	Measured or derived values relating to traffic or individual vehicle movements on a specific section or at a specific point on the road network.		yes
TrafficFlow	Traffic flow	Averaged measurements or calculations of traffic flow rates.		no

Class name	Designation	Definition	Stereotype	Abstract
TrafficSpeed	Traffic speed	Averaged measurements or calculations of traffic speed.		no
VehicleFlowValue	Vehicle flow value	A measured or calculated value of the flow rate of vehicles.		no

Table 9— Classes of the "MeasuredDataPublication" package

A.1.1.11 "MeasuredDataPublication" package association roles

Class name	Role name	Designation	Definition	Multiplicity	Target
TrafficFlow	vehicleFlow	Vehicle flow	An averaged measurement of flow rate defined in terms of the number of vehicles passing the specified measurement site.	1..1	VehicleFlowValue
TrafficSpeed	averageVehicleSpeed	Average vehicle speed	An averaged measurement or calculation of the speed of vehicles at the specified location.	1..1	SpeedValue

Table 10— Associations of the "MeasuredDataPublication" package

A.1.1.12 "MeasuredDataPublication" package attributes

Class name	Attribute name	Designation	Definition	Multiplicity	Type
DataValue	dataError	Data error	Indication of whether the value is deemed to be erroneous by the supplier, (true = erroneous). If not present the data value is assumed to be ok. This may be used when automatic fault detection information relating to sensors is available.	0..1	Boolean
	numberOfInputValues Used	Number of input values used	The number of input values used in the sampling or measurement period to determine the data value.	0..1	NonNegativeInteger
	reasonForDataError	Reason for data error	The reason why the value is deemed to be erroneous by the supplier.	0..1	MultilingualString
	supplierCalculatedData Quality	Supplier calculated data quality	A measure of data quality assigned to the value by the supplier. 100% equates to ideal/perfect quality. The method of calculation is supplier specific and needs to be agreed between supplier and client.	0..1	Percentage
Fault	faultCreationTime	Fault creation time	The date and time at which the fault was originally recorded/reported.	0..1	DateTime
	faultIdentifier	Fault identifier	Unique identifier of the fault.	1..1	String
	faultLastUpdateTime	Fault last update time	The date and time at which the fault information as specified in this instance was last updated.	1..1	DateTime
LocationCharacteristics Override	measurementLanesOverride	Measurement lanes override	Overrides for this single measured value instance the lane(s) defined for the set of measurements.	0..1	LaneEnum

Class name	Attribute name	Designation	Definition	Multiplicity	Type
	reversedFlow	Reversed flow	Indicates that the direction of flow for the measured lane(s) is the reverse of the normal direction of traffic flow. Default is "no", which indicates traffic flow is in the normal sense as defined by the referenced measurement point.	0..1	Boolean
MeasuredDataPublication	measurementSiteTableReference	Measurement site table reference	A reference to a versioned Measurement Site table.	1..1	VersionedReference
MeasurementEquipmentFault	measurementEquipmentFault	Measurement equipment fault	The type of fault which is being reported for the specified measurement equipment.	1..1	MeasurementEquipmentFaultEnum
SiteMeasurements	measurementSiteReference	Measurement site reference	A reference to a versioned measurement site record defined in a Measurement Site table.	1..1	VersionedReference
	measurementTimeDefault	Measurement time default	The time associated with the set of measurements. It may be the time of the beginning, the end or the middle of the measurement period.	1..1	DateTime
SpeedValue	speed	Speed	A value of speed expressed in kilometres per hour.	1..1	KilometresPerHour
VehicleFlowValue	vehicleFlowRate	Vehicle flow rate	A value of vehicle flow rate expressed in vehicles per hour.	1..1	VehiclesPerHour

Table 11— Attributes of the "MeasuredDataPublication" package

DataValue

- **dataError**
optional, indicates the presence of a calculation error in interval aggregation is supplemented by reasonForDataError
- **numberOfInputValuesUsed**
optional, is only used in the TrafficFlow class and indicates the number of single vehicle messages that were used to calculate the mean
- **reasonForDataError**
optional, explains the calculation error indicated by dataError in more detail.
For the definition of the possible values, including values in other languages, see the "Error Handling" chapter in the [Cookbook](#).
- **supplierCalculatedDataQuality**
optional, can be used to display data quality.

Fault

This class only describes errors on the measuring instrument side or errors in the data connection to the measuring instrument. Calculation errors in interval aggregation are described via DataValue.

- **faultCreationTime**
optional, denotes the point in time since which the error has been known.
- **faultIdentifier**
mandatory, indicates the error. For a definition of the possible values and their meanings, see the "Error Handling" chapter in the [Cookbook](#).
- **faultLastUpdateTime**
Mandatory, indicates the time when the error was last reported.

LocationCharacteristicsOverride

- **measurementLanesOverride**
optional, e.g. with known construction site traffic routing are used to identify the "lane" of the diverted traffic flow.
- **reversedFlow**
optional, can be used for identification when two-way traffic detection is reliably detected.

MeasuredDataPublication

- **measurementSiteTableReference**
mandatory, versioned reference to the referenced MeasurementSiteTable

MeasurementEquipmentFault

- **measurementEquipmentFault**
Mandatory, indicates the type of measuring device error or the error in the data connection.
- see also the attributes of the base class Fault above

SiteMeasurements

- **measurementSiteReference**
mandatory, versioned reference to the referenced MeasurementSiteRecord
- **measurementTimeDefault**
mandatory, indicates the start of the aggregation interval

SpeedValue

- **speed**
mandatory, indicates the determined average speed of the corresponding vehicle class

VehicleFlowValue

- **vehicleFlowRate**
mandatory, specifies the determined traffic flow rate of the corresponding vehicle class based on the measurements in the aggregation interval.

2.4. Enumerations

A.2 Data Dictionary of <<enumerations>> for "FEDRO Profile"

This clause contains the definitions of all enumerations which are used in the "FEDRO Profile".

A.2.1 The <<enumeration>> "AlertCDirectionEnum"

The direction of the traffic flow concerned by a situation or traffic data. In ALERT-C the positive (resp. negative) direction corresponds to the positive offset direction within the RDS location table.

Enumerated value name	Designation	Definition
both	Both	Indicates that both directions of traffic flow are affected by the situation or relate to the traffic data.
negative	Negative	The direction of traffic flow concerned by a situation or traffic data. In ALERT-C the negative direction corresponds to the negative offset direction within the RDS location table.
positive	Positive	The direction of traffic flow concerned by a situation or traffic data. In ALERT-C the positive direction corresponds to the positive offset direction within the RDS location table.
unknown	Unknown	Unknown direction.

Table 12— Values contained in the enumeration "AlertCDirectionEnum"

A.2.2 The <<enumeration>> "CarriagewayEnum"

List of descriptors identifying specific carriageway details.

Enumerated value name	Designation	Definition
connectingCarriageway	Connecting carriageway	On the connecting carriageway.
entrySlipRoad	Entry slip road	On the entry slip road.
exitSlipRoad	Exit slip road	On the exit slip road.
mainCarriageway	Main carriageway	On the main carriageway.
parallelCarriageway	Parallel carriageway	On the adjacent parallel carriageway.

Table 13— Values contained in the enumeration "CarriagewayEnum"

A.2.3 The <<enumeration>> "ConfidentialityValueEnum"

Values of confidentiality.

Enumerated value name	Designation	Definition
internalUse	Internal use	For internal use only of the recipient organisation.
noRestriction	No restriction	No restriction on usage.
restrictedToAuthorities	Restricted to authorities	Restricted for use only by authorities.
restrictedToAuthoritiesAndTrafficOperators	Restricted to authorities and traffic operators	Restricted for use only by authorities and traffic operators.
restrictedToAuthoritiesTrafficOperatorsAndPublishers	Restricted to authorities traffic operators and publishers	Restricted for use only by authorities, traffic operators and publishers (service providers).
restrictedToAuthoritiesTrafficOperatorsAndVms	Restricted to authorities traffic operators and VMS	Restricted for use only by authorities, traffic operators, publishers (service providers) and variable message signs.

Table 14— Values contained in the enumeration "ConfidentialityValueEnum"

A.2.4 The <<enumeration>> "CountryEnum"

List of countries.

Enumerated value name	Designation	Definition
ch	ch	Switzerland

Table 15— Values contained in the enumeration "CountryEnum"

A.2.5 The <<enumeration>> "InformationStatusEnum"

Status of the related information (i.e. real, test or exercise).

Enumerated value name	Designation	Definition
real	Real	The information is real. It is not a test or exercise.
securityExercise	Security exercise	The information is part of an exercise which is for testing security.
technicalExercise	Technical exercise	The information is part of an exercise which includes tests of associated technical subsystems.
test	Test	The information is part of a test for checking the exchange of this type of information.

Table 16— Values contained in the enumeration "InformationStatusEnum"

A.2.6 The <<enumeration>> "LaneEnum"

List of descriptors identifying specific lanes.

Enumerated value name	Designation	Definition
emergencyLane	Emergency lane	In the emergency lane.
lane1	Lane1	In the first lane numbered from nearest the hard shoulder to central median.
lane2	Lane2	In the second lane numbered from nearest the hard shoulder to central median.
lane3	Lane3	In the third lane numbered from nearest the hard shoulder to central median.
lane4	Lane4	In the fourth lane numbered from nearest the hard shoulder to central median.
lane5	Lane5	In the fifth lane numbered from nearest the hard shoulder to central median.
lane6	Lane6	In the sixth lane numbered from nearest the hard shoulder to central median.
lane7	Lane7	In the seventh lane numbered from nearest the hard shoulder to central median.
lane8	Lane8	In the eighth lane numbered from nearest the hard shoulder to central median.
lane9	Lane9	In the ninth lane numbered from nearest the hard shoulder to central median.

Table 17— Values contained in the enumeration "LaneEnum"

A.2.7 The <<enumeration>> "MeasuredOrDerivedDataTypeEnum"

Types of measured or derived data.

Enumerated value name	Designation	Definition
trafficFlow	Traffic flow	Measured or derived traffic flow information.
trafficSpeed	Traffic speed	Measured or derived traffic speed information.

Table 18— Values contained in the enumeration "MeasuredOrDerivedDataTypeEnum"

A.2.8 The <<enumeration>> "MeasurementEquipmentFaultEnum"

Types of measurement equipment faults.

Enumerated value name	Designation	Definition
intermittentDataValues	Intermittent data values	Data values are being produced at intermittent intervals which are not consistent with the expected reporting interval.
noDataValuesAvailable	No data values available	No measured data values are currently available.
other	Other	Other than as defined in this enumeration.
spuriousUnreliableDataValues	Spurious unreliable data values	Spurious or unreliable data values are being produced.
unspecifiedOrUnknownFault	Unspecified or unknown fault	An unspecified or unknown fault exists in the measurement equipment.

Table 19— Values contained in the enumeration "MeasurementEquipmentFaultEnum"

A.2.9 The <<enumeration>> "VehicleTypeEnum"

Types of vehicle.

Enumerated value name	Designation	Definition
anyVehicle	Any vehicle	Vehicle of any type.
car	Car	Car.
lorry	Lorry	Lorry of any type.

Table 20— Values contained in the enumeration "VehicleTypeEnum"