BS EN 16157-5:2020



BSI Standards Publication

Intelligent transport systems — DATEX II data exchange specifications for traffic management and information

Part 5: Measured and elaborated data publications

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National foreword

This British Standard is the UK implementation of EN 16157-5:2020. It supersedes PD CEN/TS 16157-5:2014, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/278, Intelligent transport systems.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2020
Published by BSI Standards Limited 2020

ISBN 978 0 539 02757 0

ICS 35.240.60

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2020.

Amendments/corrigenda issued since publication

Date	Text affected

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16157-5

August 2020

ICS 35.240.60

Supersedes CEN/TS 16157-5:2014

English Version

Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 5: Measured and elaborated data publications

Systèmes de transport intelligents - Spécifications Datex II d'échange de données pour la gestion du trafic et l'information routière - Partie 5 : Publications de données mesurées et de données calculées

Intelligente Verkehrssysteme - DATEX II Datenaustauschspezifkation für Verkehrsmanagement und Verkehrsinformation - Teil 5: Gemessene und ausgearbeitete Datenveröffentlichungen

This European Standard was approved by CEN on 29 June 2020.

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European foreword

This document (EN 16157-5:2020) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2021, and conflicting national standards shall be withdrawn at the latest by February 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 16157-5:2014.

In comparison with the previous edition, the following technical modifications have been made:

— application of the modelling methodology defined in EN 16157-1,

— correction of bugs,

— addition of requested features,

— removal of redundancy between elaborated and measured data publications.

A list of all parts in the EN 16157 series can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

The EN 16157 series defines a common set of data exchange specifications to support the vision of a seamless interoperable exchange of traffic and travel information across boundaries, including national, urban, interurban, road administrations, infrastructure providers and service providers. Standardization in this context is a vital constituent to ensure interoperability, reduction of risk, reduction of the cost base, promotion of open marketplaces and many social, economic and community benefits to be gained from more informed travellers, network managers and transport operators.

Delivering European Transport Policy in line with the White Paper issued by the European Commission requires co-ordination of traffic management and development of seamless pan European services. With the aim to support sustainable mobility in Europe, the European Commission has been supporting the development of information exchange mainly between the actors of the road traffic management domain for a number of years. In the road sector, DATEX II has been long in fruition, with the European Commission being fundamental to its development through an initial contract and subsequent co-funding through the Euro-Regional projects. With this standardization of DATEX II, there is a real basis for common exchange between the actors of the traffic and travel information sector.

EN 16157 includes the framework and context for exchanges, the modelling approach, data content, data structure and relationships.

It supports a methodology that is extensible.

This document deals with the publication sub-models within the DATEX II model that support the exchange of measured and elaborated information. These publications are intended to support the exchange of information from the organization having the measured data and creating elaborated data to other organisations providing ITS services or onward information exchange. It also includes the exchange of static information about measurement sites.

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1 Scope

This document is the fifth part of the DATEX II European Standard which deals with the publication sub-models within the DATEX II model that support the exchange of measured and elaborated information.

These publications are intended to support the exchange of informational content from the organization having the measured data and creating elaborated data to other organisations providing ITS services or onward information exchange. It also includes the exchange of static information about measurement sites.

This is specified in three sub-models, a DATEX II Measurement Site Table Publication sub-model, a DATEX II Measured Data Publication sub-model and a DATEX II Elaborated Data Publication sub-model.

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.

EN 16157-1:2018, *Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 1: Context and framework*

EN 16157-2, *Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 2: Location referencing*

EN 16157-7:2018, *Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 7: Common data elements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16157-1, EN 16157-7, EN 16157-2, and the following apply.

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/ui

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

3.1
elaborated data
data which is derived/computed from one or more measurements over a period of time

Note 1 to entry: It can be a current value or a forecast value predicted from historical measurements.

3.2
measured data
quantitative data measured against a quantified scale (possibly using standard units of measure)

Note 1 to entry: In comparison to elaborated data, measured data can be considered to represent more directly observed measurements.

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3.3
measurement site
location from where a stream of measured data can be derived

Note 1 to entry: It can be a point, a linear road section or an area. Linear sections may even be specified as itineraries or predefined location sets, e.g. for travel time routes which comprise one or more different roads.

3.4
physical quantity
quantity used for the quantitative description of physical phenomena

3.5
site measurement
measurement data set derived from a specific measurement site

4 Symbols and abbreviations

ANPR	Automatic number plate recognition
PCU	Passenger car unit
SCOOT	Split cycle and offset optimization technique
UML	Unified Modeling Language
XML	eXtensible Markup Language

5 Conformance

This document specifies a DATEX II measurement site table publication, a DATEX II measured data publication and a DATEX II elaborated data publication, except for the elements that relate to location information which are specified in EN 16157-2, and the common elements (i.e. shared between several publications) which are defined in EN 16157-7.

The DATEX II platform independent data model, of which these three publication sub-models are a part, corresponds to the level A model as defined in EN 16157-1.

Conformance with this document shall require platform independent models from which platform specific models are generated to comply with the UML modelling rules defined in EN 16157-1 and with the following requirements of the sub-models which are expressed in this document:

— comply with all stipulated minimum and maximum multiplicity requirements for UML elements and relationships,

— comply with all definitions, types and ordering,

— employ optional elements as specified,

— comply with all expressed constraints.

It should be noted that conformance of a publication service with all the structural requirements stated above does not necessarily ensure that the informational content of that service will be semantically comprehensible.

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6 UML notation

The UML notation used in this document shall be as described in ISO/IEC 19505-1 [1].

NOTE Some introductory guides to UML 2 are provided in the Bibliography of EN 16157-1:2018.

7 The "RoadTrafficData" namespace

This namespace gathers packages and classes related to road traffic data. Figure 1 represents the different packages and classes belonging to the "RoadTrafficData" namespace, which uses the namespace prefix "roa".

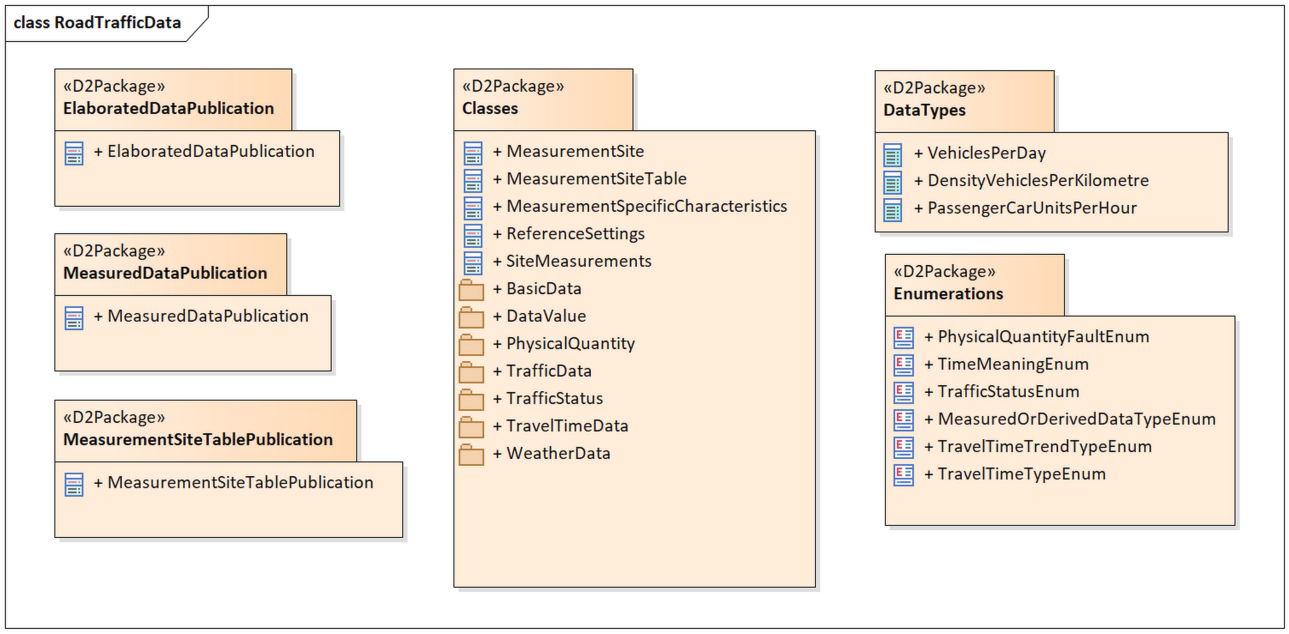


Figure 1 — The "RoadTrafficData" model

The "RoadTrafficData" namespace shall include the following six packages:

— ElaboratedDataPublication,

— MeasuredDataPublication,

— MeasurementSiteTablePublication,

— Classes,

— DataTypes,

— Enumerations.

The two publications "MeasuredDataPublication" and "ElaboratedDataPublication" handle similar data. It is the responsibility of the data producer to choose the publication he/she estimates as the best to fulfil his/her need. As guidance, "ElaboratedDataPublication" should be used where there is no defined measurement site for each calculated value, for example in the case of data derived directly from a probe vehicle.

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The classes, attributes, data types and enumerations that are specific to this document are defined in Annex A.

The XML schema corresponding to this document is provided in Annex B.

8 The measurement site table publication model

8.1 Overview of the measurement site table publication model

The measurement site table publication model comprises a top-level package, "MeasurementSiteTablePublication" which uses some classes from the "Common" package and the "LocationReference" package. The "MeasurementSitePublication" class is a specialization of the "PayloadPublication" class and hence forms the top of the hierarchy of the measurement site table publication sub-model.

The "MeasurementSiteTablePublication" package delineates measurement site tables comprising a number of data sets, each describing the location from where a stream of measured data can be derived. Each location is known as a "measurement site" which can be a point, a linear road section or an area.

Each "MeasurementSiteTablePublication" class instance shall contain one or more tables represented as instances of the "MeasurementSiteTable" class, each table containing a number of measurement sites represented by the "MeasurementSite" class. Each instance of "MeasurementSite" shall be described by one location and specific characteristics through the class "MeasurementSpecificCharacteristics", each instance of which describes a specific measurement such as traffic flow, speed….

8.2 The "MeasurementSiteTablePublication" package

8.2.1 Overview of the "MeasurementSiteTablePublication" package

The "MeasurementSiteTablePublication" package shall comprise a sub-model for defining publishable measurement site tables which comprise records defining the measurement sites. The following Figure 2 represents the sub-model including the relationships between classes.

Each publication may contain one or more tables, allowing logical partitioning of measurement sites information as deemed most appropriate for recipients of measured data information by the supplier (e.g. by road designation or other geographic criteria or by type of measurement site, etc.).

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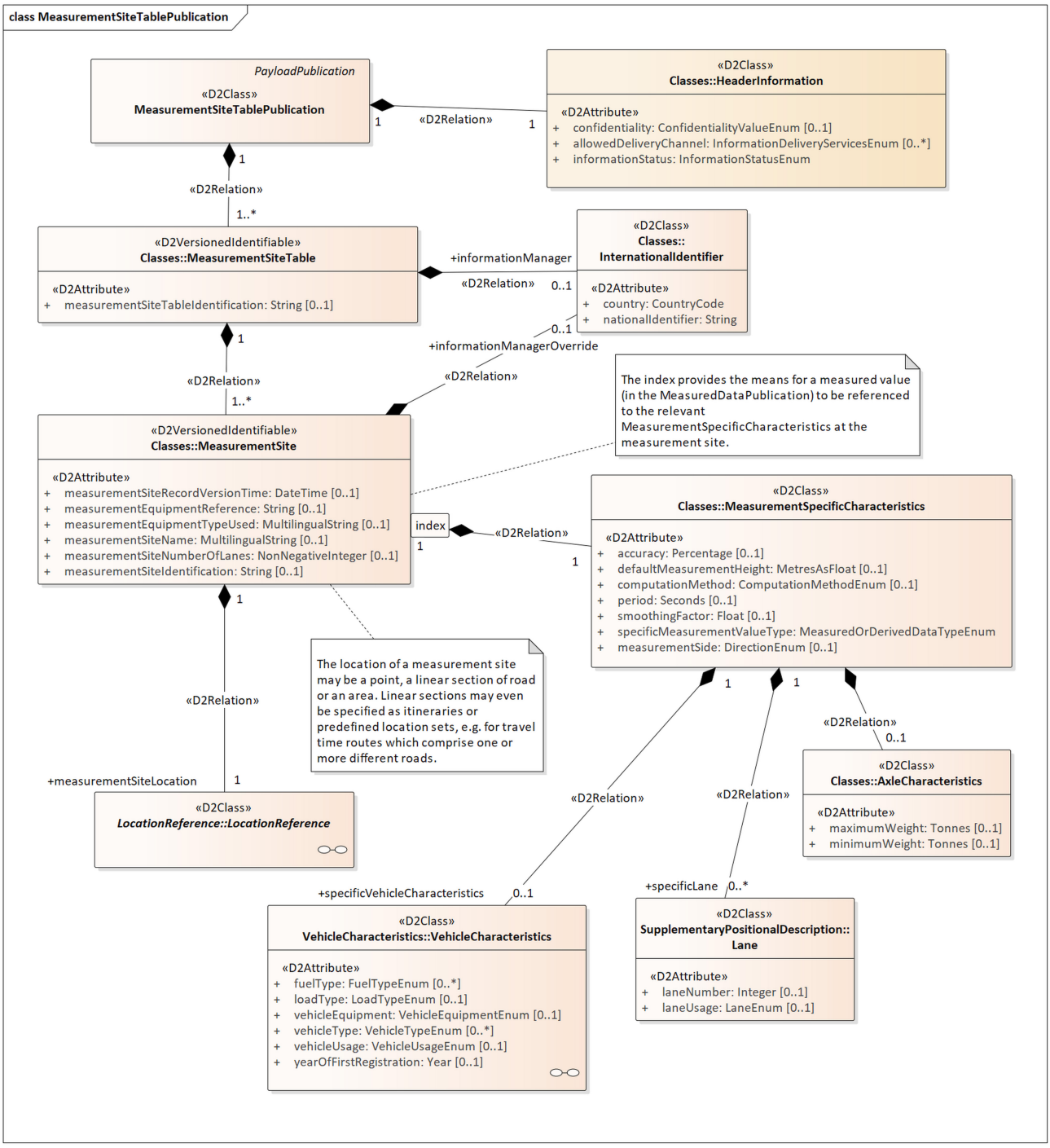


Figure 2 — The "MeasurementSiteTablePublication" package class model

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8.2.2 Semantics of the "MeasurementSiteTablePublication" package

8.2.2.1 "MeasurementSiteTablePublication" class

The "MeasurementSiteTablePublication" class is a specific instantiable case of the "PayloadPublication" class. Each instance of the "MeasurementSiteTablePublication" class may contain any number of separate measurement site tables.

The "MeasurementSiteTablePublication" class is the base class for containing the published measurement site tables.

8.2.2.2 "HeaderInformation" class

Each instance of a "MeasurementSiteTablePublication" shall have associated metadata contained in an instance of the "HeaderInformation" class which allows the supplier of the measurement site table publication to specify how the recipient should handle the information contained in it. This class is defined in EN 16157-7.

8.2.2.3 "MeasurementSiteTable" class

An identifiable versioned instance of the "MeasurementSiteTable" class shall contain any logical collection of measurement sites (class "MeasurementSite").

A "MeasurementSiteTable" class instance may be associated with an operator whose information is described with an "InternationalIdentifier" class.

8.2.2.4 "MeasurementSite" class

An identifiable versioned instance of the "MeasurementSite" class shall contain the characteristics information relating to a specific measurement site.

Each instance shall be located by using an instance of the "LocationReference" class.

Each instance shall have one indexed "MeasurementSpecificCharacteristics" sub-record for containing the characteristics of each measurement individually. The index provides the means for a measured value (in the measured data publication) to be referenced to the corresponding instance of the "MeasurementSpecificCharacteristics" class at the measurement site.

A "MeasurementSite" class instance may be associated with an operator whose information is described with a "InternationalIdentifier" class.

8.2.2.5 "InternationalIdentifier" class

This class belongs to the "Common" package specified in EN 16157-7.

8.2.2.6 "LocationReference" class

Each instance of the "MeasurementSite" class shall be located by an instance of the "LocationReference" class. This class belongs to the "LocationReferencing" package specified in EN 16157-2.

8.2.2.7 "MeasurementSpecificCharacteristics" class

An instance of the "MeasurementSpecificCharacteristics" class contains characteristics which are specific to a measurement type (specified in a known order) at the given measurement site. Each measurement may relate to specific vehicles which are described by the "VehicleCharacteristics" class (see 8.2.2.8), or to a specific lane which is described by the "Lane" class (see 8.2.2.10).

8.2.2.8 "VehicleCharacteristics" class

This class describes the characteristics of a vehicle, e.g. a lorry of gross weight greater than 30 tonnes. It is defined in the "VehicleCharacteristics" package specified in EN 16157-7.

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8.2.2.9 “AxleCharacteristics” class

This class describes the axle characteristics of a vehicle in terms of minimum and maximum weights when it is used for classifying axle flows.

8.2.2.10 “Lane” class

This class describes the characteristics of a lane. It is defined in the “SupplementaryPositionalDescription” package specified in EN 16157-2.

9 The measured data publication model

9.1 Overview of the measured data publication model

The measured data publication model shall comprise a top-level package, “MeasuredDataPublication”. The “MeasuredDataPublication” class shall be inherited from the “PayloadPublication” class and hence shall form the top of the hierarchy in the measured data publication model.

9.2 The “MeasuredDataPublication” package

9.2.1 Overview of the “MeasuredDataPublication” package

The “MeasuredDataPublication” package shall comprise a sub-model for defining a publication containing one or more measurement data sets, each set being composed of a number of values measured at a single measurement site.

It is represented including the relationships between the classes in Figure 3.

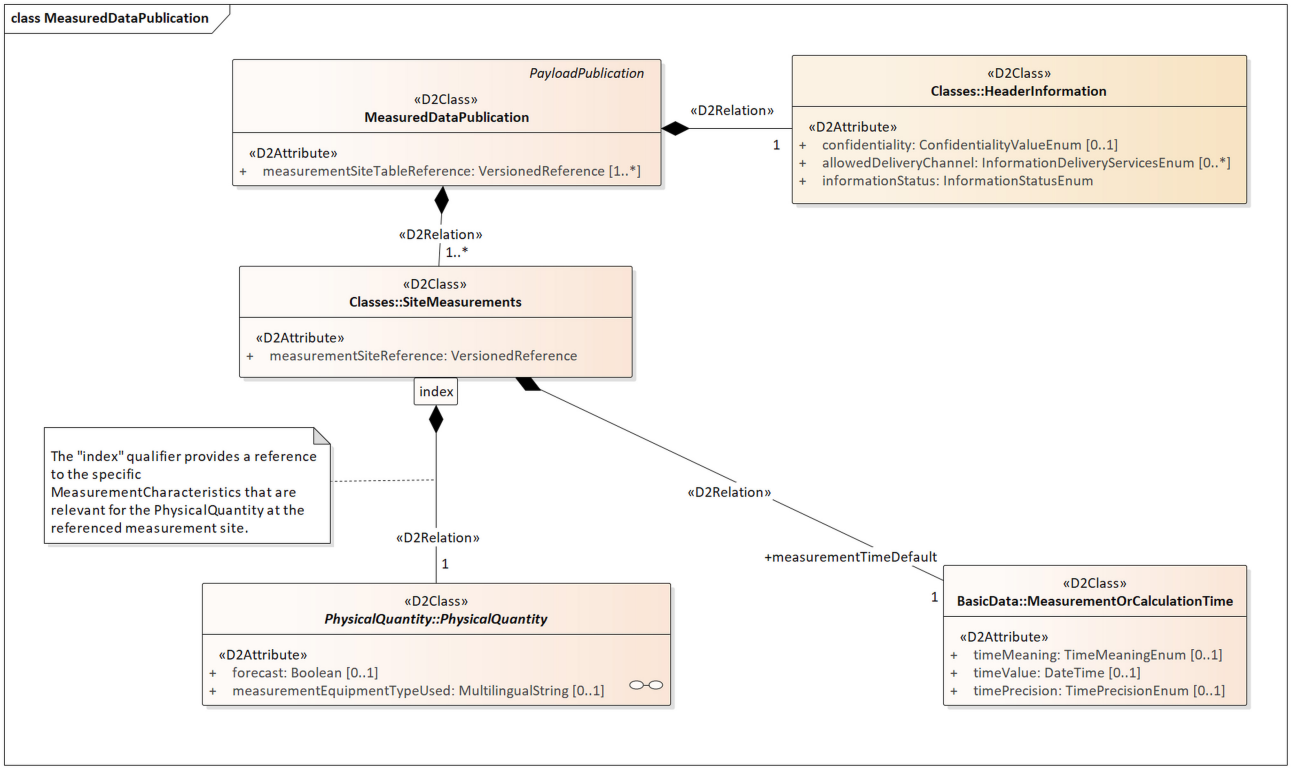


Figure 3 — The “MeasuredDataPublication” package class model

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9.2.2 Semantics of the "MeasuredDataPublication" package

9.2.2.1 "MeasuredDataPublication" class

The "MeasuredDataPublication" class shall be the only entry point of the package and shall be a specific instantiable case of a "PayloadPublication". Each instance of the "MeasuredDataPublication" class shall contain one or more measurement data sets, each set being measured at a single measurement site. The "MeasuredDataPublication" class shall be the base class for containing the published measured data.

9.2.2.2 "HeaderInformation" class

Each instance of a "MeasuredDataPublication" shall have associated metadata contained in an instance of the "HeaderInformation" class, used by the supplier of the publication to specify how the recipient of the "MeasuredDataPublication" class instance should handle the information contained in it. This class is specified in EN 16157-7.

9.2.2.3 "SiteMeasurements" class

The "SiteMeasurements" class shall contain a measurement data set derived from a specific measurement site.

Each measurement site, at a given time, has an indexed set of objects representing physical quantities associated with measurements. The "index" qualifier provides a reference to the specific measurement characteristics that are relevant for the physical quantities at the referenced measurement site.

The "measurementTimeDefault" association end provides 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.

9.2.2.4 "PhysicalQuantity" class

The "PhysicalQuantity" class contains optional characteristics for the specific measured value (indexed to correspond with the defined measurement characteristics at the referenced measurement site) which override the static characteristics defined in the "MeasurementSiteTable" class.

The "PhysicalQuantity" class is described in 11.2.

10 The elaborated data publication model

10.1 Overview of the elaborated data publication model

The elaborated data publication model shall comprise a top-level package, "ElaboratedDataPublication". The "ElaboratedDataPublication" class shall be inherited from the "PayloadPublication" class and hence shall form the top of the hierarchy in the elaborated data publication model.

10.2 The "ElaboratedDataPublication" package

10.2.1 Overview of the "ElaboratedDataPublication" package

The "ElaboratedDataPublication" package shall comprise a sub-model for defining a publication containing one or more physical quantities.

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It is represented including the relationships between the classes in Figure 4.

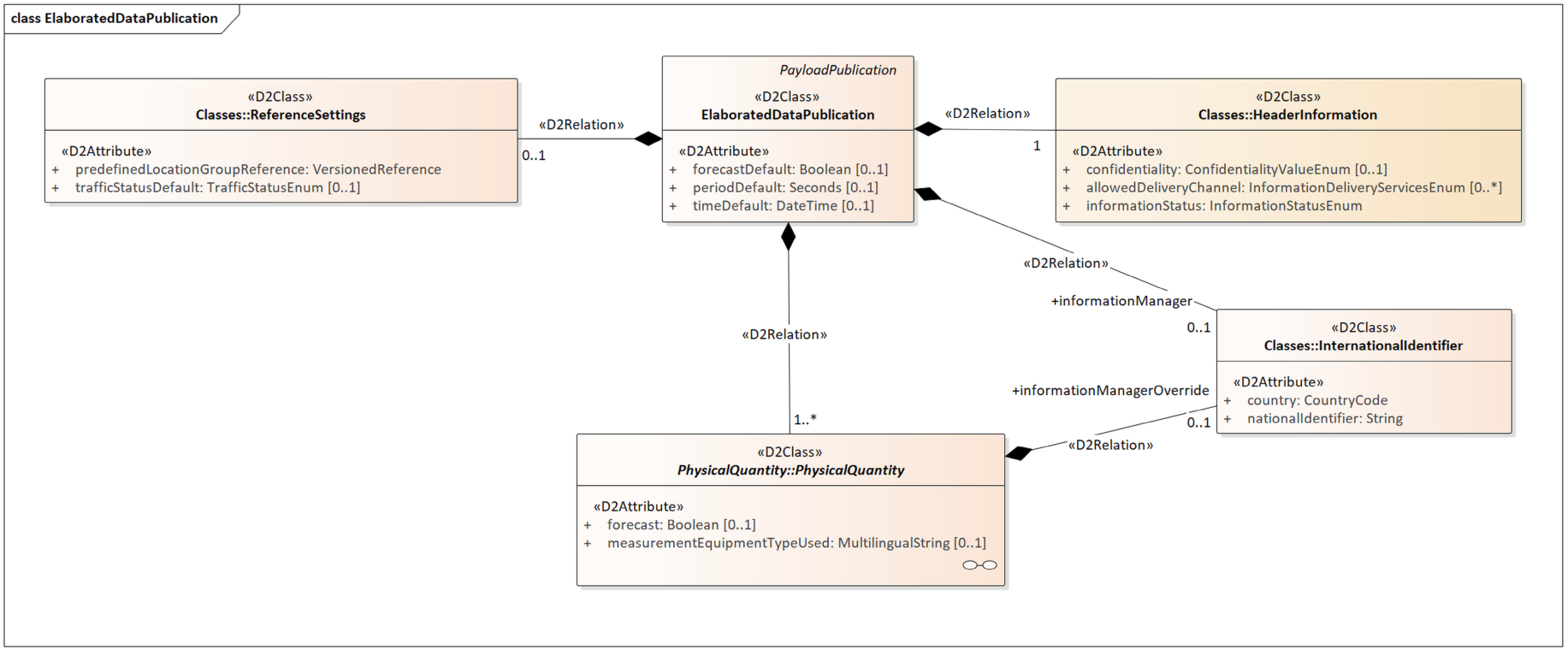


Figure 4 — The "ElaboratedDataPublication" package class model

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10.2.2 Semantics of the "ElaboratedDataPublication" package

10.2.2.1 "ElaboratedDataPublication" class

The "ElaboratedDataPublication" class shall be the only entry point of the package and shall be a specific instantiable case of the "PayloadPublication" class. Each instance of the "ElaboratedDataPublication" class shall contain one or more physical quantities, each set being derived/computed from one or more measurements over a period of time.

The "ElaboratedDataPublication" class shall be the base class for containing the published elaborated data.

10.2.2.2 "HeaderInformation" class

Each instance of a "ElaboratedDataPublication" shall have associated metadata contained in an instance of the "HeaderInformation" class, used by the supplier of the publication to specify how the recipient of the "ElaboratedDataPublication" class instance should handle the information contained in it. This class is specified in EN 16157-7.

10.2.2.3 "ReferenceSettings" class

The "ReferenceSettings" class contains specification of the default value for traffic status on a group of predefined locations on the road network. When a default status value is supplied, it shall apply for all specified locations, except where the publication includes an additional status value for a specified location.

10.2.2.4 "PhysicalQuantity" class

The "PhysicalQuantity" class contains data which are derived/computed from one or more measurements over a period of time. It may be a current value or a forecast value, e.g. predicted from historical measurements.

The "PhysicalQuantity" package and the classes included are described in 11.2.

11 The "Classes" package

11.1 Introduction

This package contains all the packages and classes shared among the different publications of this document.

11.2 The "PhysicalQuantity" package

11.2.1 Overview of the "PhysicalQuantity" package

This package describes data that are either measured or calculated (elaborated) and represent physical quantities.

It is represented including the relationships between the classes in Figure 5.

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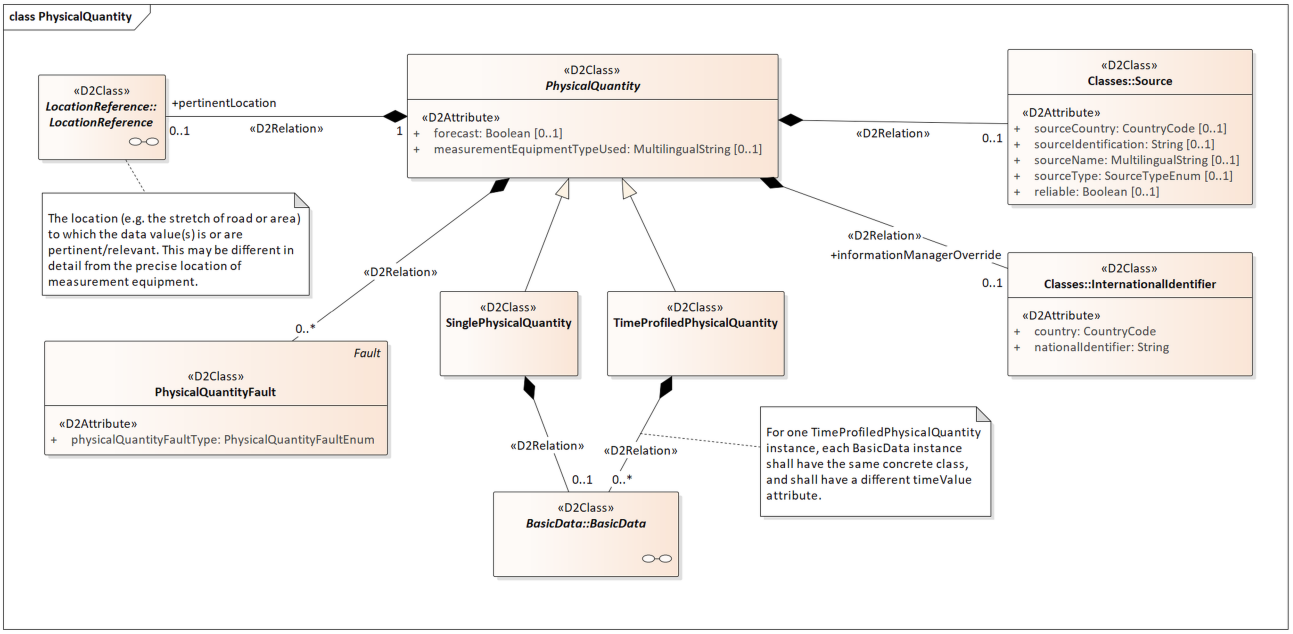


Figure 5 — The PhysicalQuantity package class model

11.2.2 Semantics of the "PhysicalQuantity" package

11.2.2.1 "PhysicalQuantity" class

The "PhysicalQuantity" class is an abstract class, i.e. it shall be specialized in one of the possible two types given in 11.2.2.6.

This quantity data can be forecast or not. The type of equipment used to gather the raw information which the data values are determined from, e.g. 'loop', 'ANPR' (automatic number plate recognition) or 'urban traffic management system' (such as SCOOT), may be identified.

11.2.2.2 "Source" class

Details of the source from which the "PhysicalQuantity" information is obtained, may be described by the "Source" class from the "Common::Classes" package in EN 16157-7.

11.2.2.3 "InternationalIdentifier" class

This class belongs to the "Common" package specified in EN 16157-7.

11.2.2.4 "LocationReference" class

Each physical quantity may have a pertinent location, which is a "LocationReference" (e.g. a stretch of road or an area) relevant for the data value(s). This may be different from the location of the measurement equipment (i.e. the measurement site location).

This class belongs to the "LocationReferencing" package specified in EN 16157-2.

11.2.2.5 "PhysicalQuantityFault" class

The details of a fault which is being reported for the physical quantity data, are described by the "PhysicalQuantityFault" class. For example, the fault can be due to the absence, the intermittence, the unreliability of data.

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11.2.2.6 "SinglePhysicalQuantity" and "TimeProfiledPhysicalQuantity" classes

The physical quantity can be a single physical quantity, which means a measured or calculated physical quantity at a single instant or period in time.

Otherwise, the physical quantity can be a time-profiled physical quantity, which means a set of values for a measured or calculated physical quantity over a set of measurement or calculation times.

Each of these classes can be used for containing the data corresponding to a physical quantity.

For one instance of the "TimeProfiledPhysicalQuantity" class, each instance of the "BasicData" class shall have the same concrete class, and shall have a different "timeValue" attribute.

11.2.2.7 "BasicData" class

The "BasicData" class is the generic class from which the different classes representing measured or calculated data at the same time or at the same period inherit. It is described in 11.3.2 and seq.

11.3 The "BasicData" package

11.3.1 Overview of the "BasicData" package

This package describes data that are either measured or calculated (elaborated).

It is represented including the relationships between the classes in Figure 6.

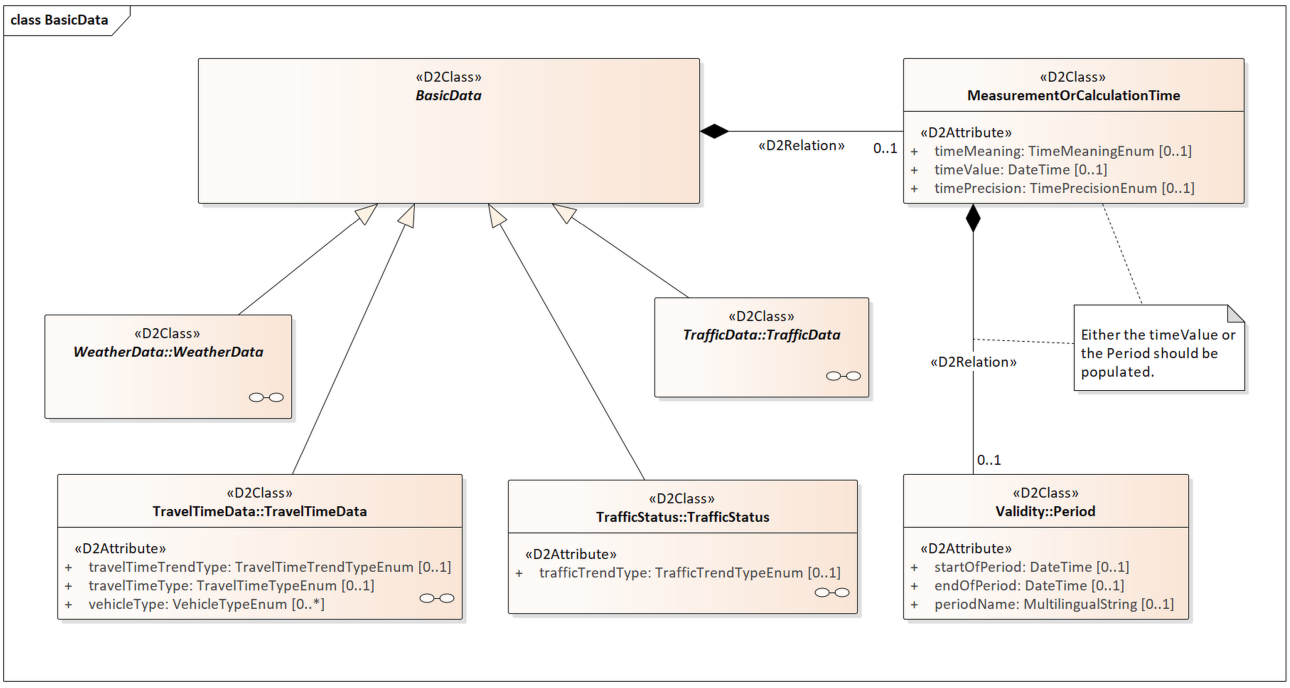


Figure 6 — The "BasicData" package class model

11.3.2 The "BasicData" class

The "BasicData" class is an abstract class, i.e. it shall be specialized in one of the possible types given below:

— Traffic status (see 11.5),

— Travel time data (see 11.6),

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— Traffic data (see 11.7),

— Weather data (see 11.8).

Each basic data type is described in a specific package. It is also associated with a measurement (or calculation) time, optionally associated with a period of time which specifies the dates and times of the measurement periods.

11.3.3 The “MeasurementOrCalculationTime” class

The “MeasurementOrCalculationTime” class describes the time at which a measured or calculated value or a set of values was measured or calculated.

When associated with the “BasicData” class it characterizes the measurement or calculation time which should be considered to override any specified defaults.

Either the “timeValue” attribute of this class or the “Period” class shall be populated (mutual exclusion).

11.4 The “DataValue” package

11.4.1 Overview of the “DataValue” package

This package describes additional data values specifically used in measured or elaborated data publication. It is a complement of the “DataValue” package specified in EN 16157-7.

It is represented including the relationships between the classes in Figure 7.

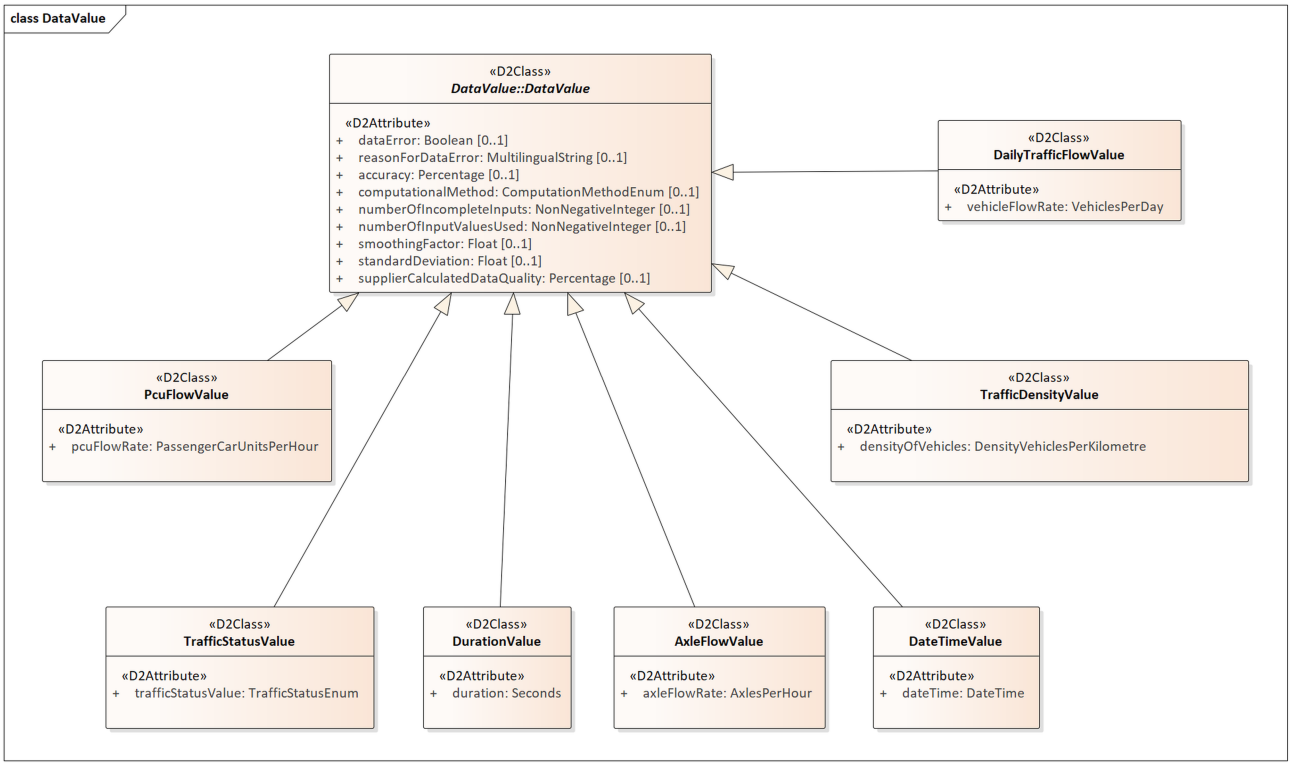


Figure 7 — The “DataValue” package class model

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11.4.2 The “DataValue” class

This class represents a data value of something that can be measured or calculated. It provides metadata to the different inherited data values like e.g. presence of error, measurement accuracy or smoothing factor. It is specified in EN 16157-7.

The measured or calculated values for a “PhysicalQuantity” instance are contained in the “BasicData” class. Concrete “BasicData” subclasses typically associate one or more specific “DataValue” objects. The purpose of the “DataValue” class is to convey additional metadata mainly related to quality. Other kinds of attributes, such as qualifications for the measured values, may be modelled directly in a specific “BasicData” subclass rather than a separate “DataValue”. The design pattern is illustrated in the following Figure 8.

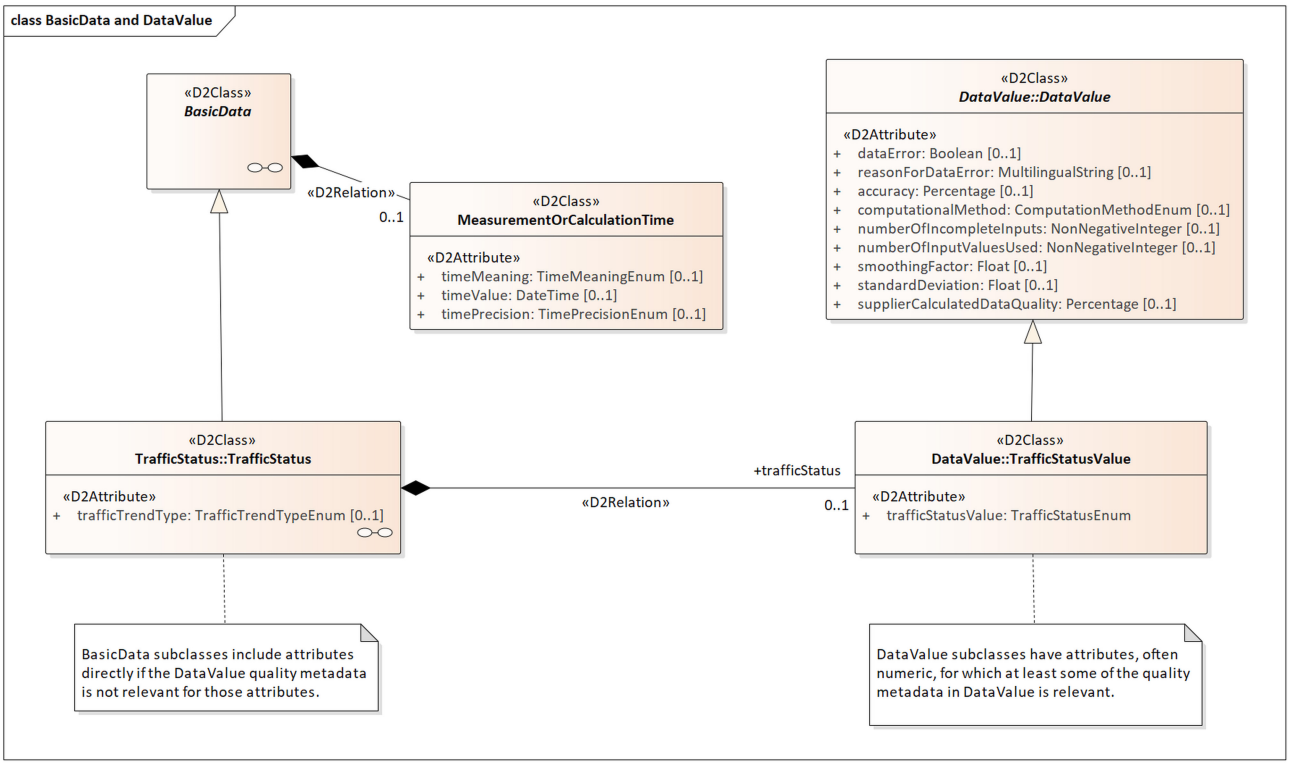


Figure 8 — Relationships between “BasicData” and “DataValue” classes

Any provided metadata value specified in the attributes of this class overrides any specified generic characteristics such as defined for a specific measurement in the measurement site table.

11.4.3 The “PcuFlowValue” class

The “PcuFlowValue” class delineates a measured or calculated value of the flow rate expressed in terms of passenger car units (PCU).

11.4.4 The “TrafficStatusValue” class

The “TrafficStatusValue” class delineates the status value of traffic conditions on the identified section of road in the specified direction.

11.4.5 The “DurationValue” class

The “DurationValue” class delineates a measured or calculated value of a period of time.

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11.4.6 The “AxleFlowValue” class

The “AxleFlowValue” class delineates a measured or calculated value of the flow rate of vehicle axles.

11.4.7 The “DataTimeValue” class

The “DateTimeValue” class delineates a measured or calculated value of an instance in time.

11.4.8 The “TrafficDensityValue” class

The “TrafficDensityValue” class delineates a measured or calculated value of the density of vehicles on a unit stretch of road in a given direction.

11.4.9 The “DailyTrafficFlowValue” class

The “TrafficTrafficFlowValue” class delineates a measured or calculated value of an averaged daily traffic flow (generally for both directions).

11.5 The “TrafficStatus” package

11.5.1 Overview of the “TrafficStatus” package

The “TrafficStatus” package delineates derived/computed traffic status information.

It is represented including the relationships between the classes in Figure 9.

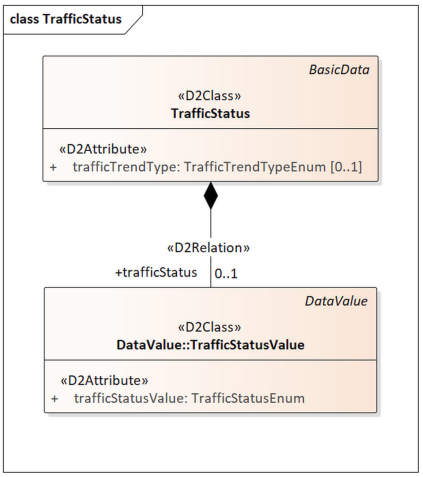


Figure 9 — The “TrafficStatus” package class model

11.5.2 Semantics of the “TrafficStatus” package

The “TrafficStatus” class may be associated with a “TrafficStatusValue” class if the value differs from the default reference value given for the publication.

The “TrafficStatus” class can give a characterization of the trend in the traffic conditions at the specified location and direction (attribute: “trafficTrendType”).

The “trafficStatusValue” attribute is the status value of traffic conditions on the identified section of road in the specified direction.

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11.6 The "TravelTimeData" package

11.6.1 Overview of the "TravelTimeData" package

The "TravelTimeData" package delineates measured or derived travel time information relating to a defined linear stretch of the road network.

It is represented including the relationships between the classes in Figure 10.

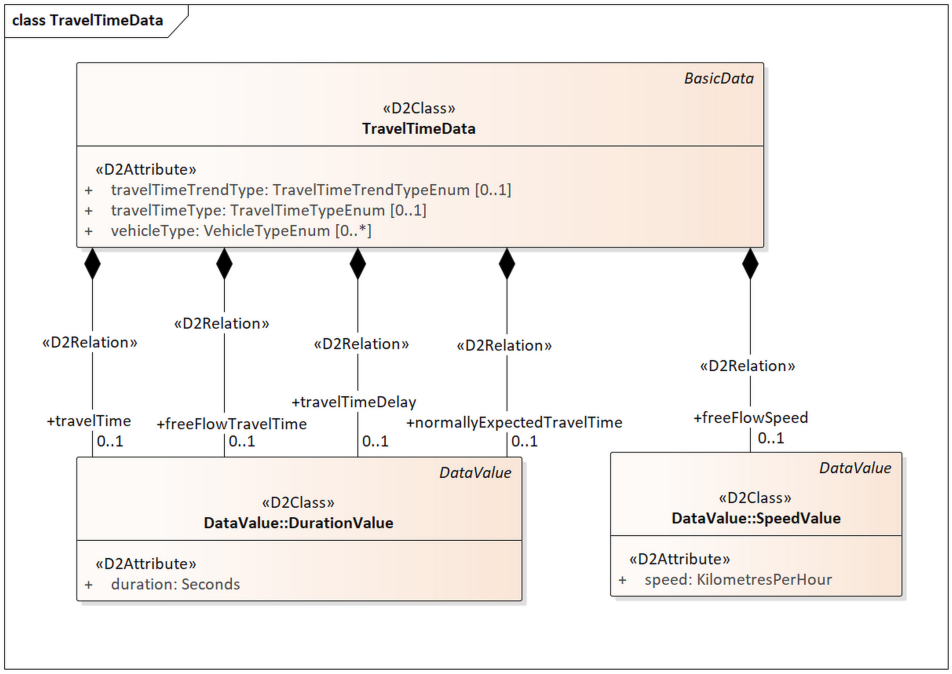


Figure 10 — The "TravelTimeData" package class model

11.6.2 Semantics of the "TravelTimeData" package

The "TravelTimeData" class represents derived/computed travel time information relating to a linear section of the road network. If the "forecast" attribute is set to "True" it means the travel time is a forecast for a vehicle at the start of the specified location; if "forecast" is set to "False" it means the value has been obtained by calculation/measurement at the end of the provided period.

It may be associated with the "DurationValue" class representing durations in seconds (see 11.4.5) through four possible relationships:

— Travel time,

— Free-flow travel time,

— Travel time delay,

— Normally expected travel time;

as well as with the "SpeedValue" class through the free-flow speed relationship. It represents the speed expected under ideal conditions, corresponding to the free-flow travel time.

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11.7 The “TrafficData” package

11.7.1 Overview of the “TrafficData” package

This package represents a collection of information associated with measured or derived values relating to vehicle movements at a specified location.

Traffic data are usually sent as measured data, but may also be sent as elaborated data.

Traffic values may be classified based on vehicle characteristics.

There are five kinds of traffic values:

— Traffic headway,

— Traffic gap,

— Traffic flow,

— Traffic speed,

— Traffic concentration.

There are also individual vehicle measurements which are not intended for “ElaboratedDataPublication”, since the model describes individual data from road infrastructure applicable for elaborated data.

It is represented including the relationships between the classes in Figure 11.

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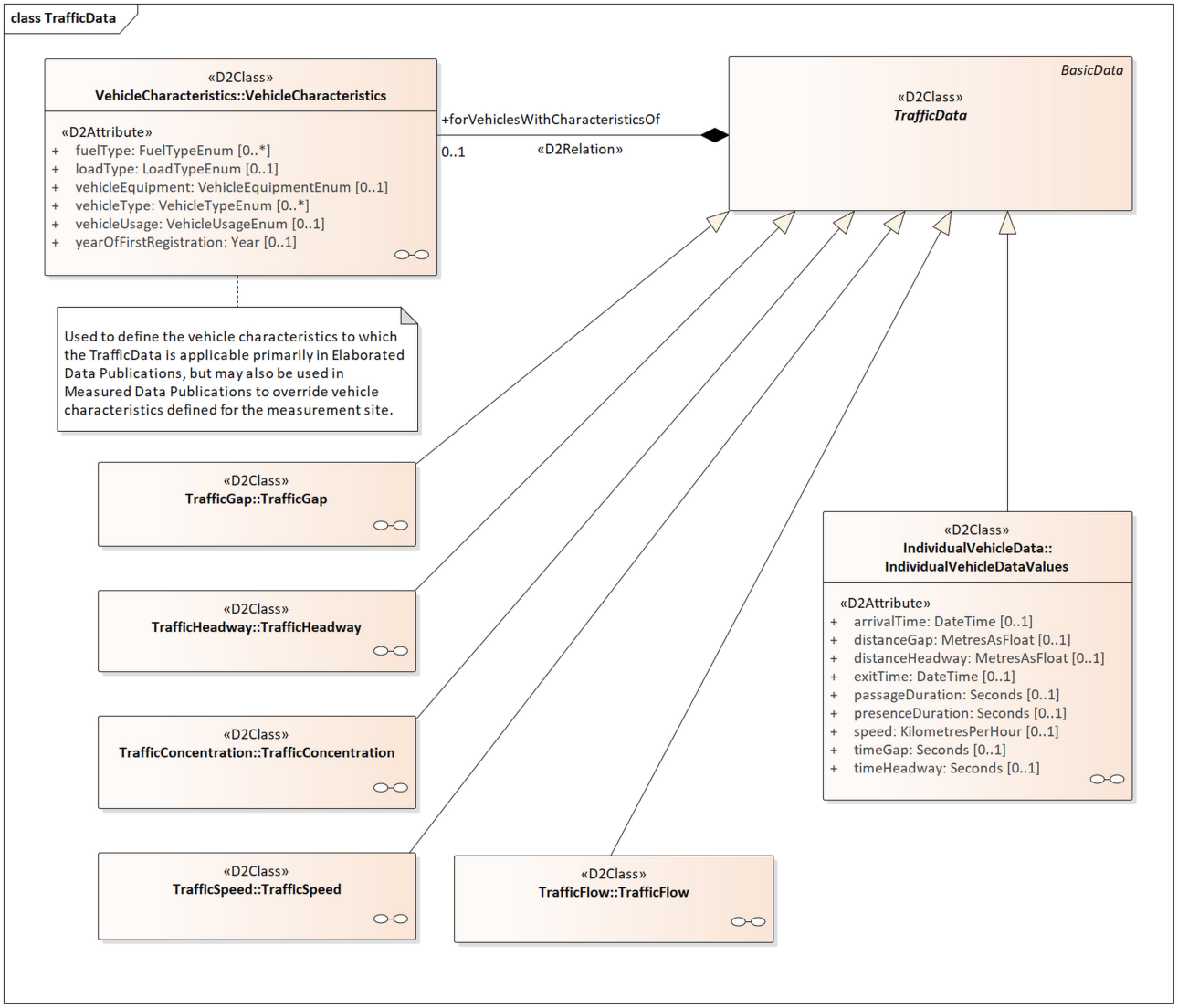


Figure 11 — The "TrafficData" package class model

11.7.2 Semantics of the "TrafficData" package

The abstract "TrafficData" class shall be the only entry point of the package. The "VehicleCharacteristics" class (from the "Common::Classes::VehicleCharacteristics" package - see EN 16157-7) is used to define the vehicle characteristics (e.g. lorry of gross weight greater than 30 tonnes) for which the traffic data value is applicable, primarily in elaborated data publications, but may also be used in measured data publications to override vehicle characteristics defined for the measurement site.

Each kind of traffic value is defined in a specific package.

11.7.3 The "TrafficHeadway" package

11.7.3.1 Overview of the "TrafficHeadway" package

The "TrafficHeadway" package delineates averaged measurements or calculations of traffic headway, i.e. the distance or time interval between vehicles (measured between the front of a vehicle and the front of the vehicle immediately following it). The headway may be expressed as an average distance or an average time.

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It is represented including the relationships between the classes in Figure 12.

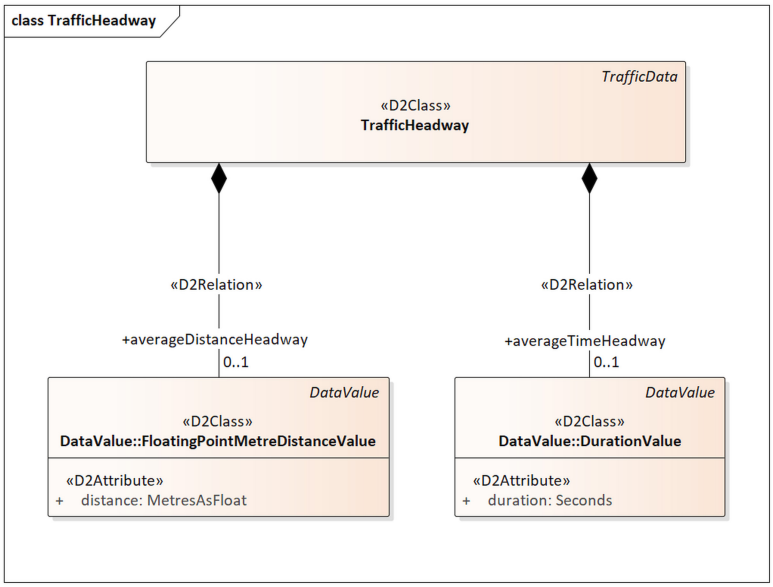


Figure 12 — The "TrafficHeadway" package class model

11.7.3.2 Semantics of the "TrafficHeadway" package

Each type of headway (i.e. in terms of distance or time) shall be associated with a separate class.

11.7.4 The "TrafficGap" package

11.7.4.1 Overview of the "TrafficGap" package

The "TrafficGap" package delineates averaged measurements or calculations of traffic gap, i.e. the distance or time interval between vehicles (measured between the rear of a vehicle and the front of the vehicle immediately following it). The gap may be expressed as an average distance or an average time.

It is represented including the relationships between the classes in Figure 13.

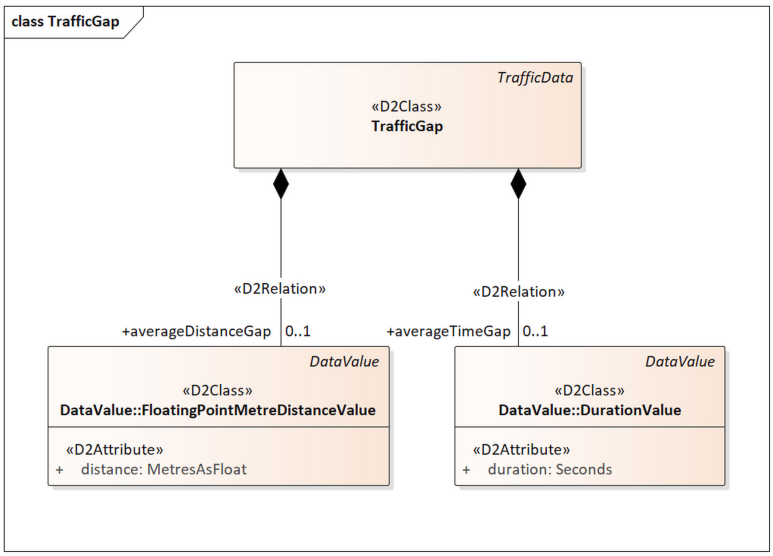


Figure 13 — The "TrafficGap" package class model

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11.7.4.2 Semantics of the “TrafficGap” package

Each type of gap (i.e. in terms of distance or time) shall be associated with a separate class.

11.7.5 The “TrafficFlow” package

11.7.5.1 Overview of the “TrafficFlow” package

This package presents averaged measurements of traffic flow rates.

It is represented including the relationships between the classes in Figure 14.

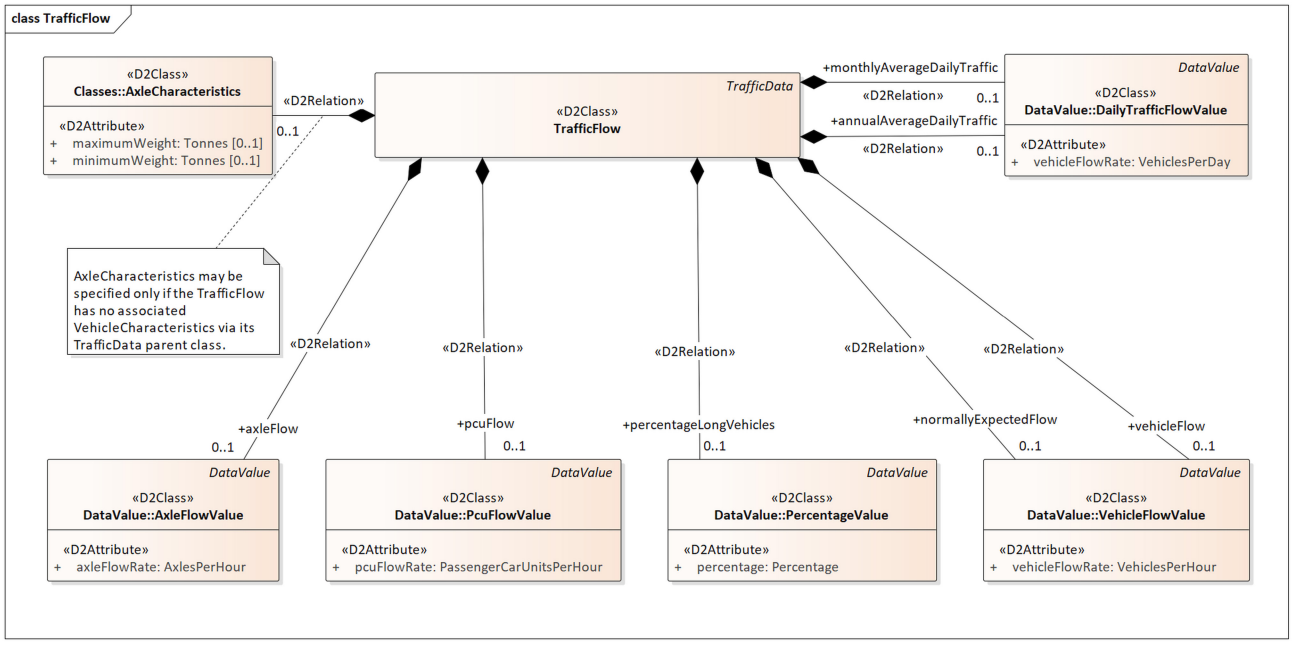


Figure 14 — The “TrafficFlow” package class model

11.7.5.2 Semantics of the “TrafficFlow” class

The “TrafficFlow” class is the top-level container class in this package.

The “TrafficFlow” class may be accompanied with one or several possible kind of traffic flow which is expressed with one specific class. This can be expressed in seven different ways as:

— Axle flow through the “AxleFlowValue” class (see 11.4.6),

— PCU flow through the “PcuFlowValue” class (see 11.4.3),

— Percentage of long vehicles through the “PercentageValue” class (see EN 16157-7:2018, 7.2.2.11),

— Normally expected flow through the “VehicleFlowValue” class (see EN 16157-7:2018, 7.2.2.16),

— Vehicle flow through the “VehicleFlowValue” class (see EN 16157-7:2018, 7.2.2.16),

— Annual average daily traffic (AADT) through the “DailyTrafficFlowValue” class (see 11.4.9),

— Monthly average daily traffic through the “DailyTrafficFlowValue” class (see 11.4.9).

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