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Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 4: VMS publication

Intelligente Transportsysteme - DATEX II Datenaustausch Spezifikationen für Verkehrsmanagement und Verkehrsinformation - Teil 4: Veröffentlichungen Variable Verkehrszeichen (VMS)

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**Intelligent transport systems - DATEX II data exchange
specifications for traffic management and information -
Part 4: VMS publication**

Intelligente Verkehrssysteme - DATEX II
Datenaustausch Spezifikation für
Verkehrsmanagement und Information - Teil 4:
Veröffentlichungen Variable Verkehrszeichen (VMS)

This European Standard was approved by CEN on 4 January 2021.

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European foreword

This document (EN 16157-4:2021) 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of an identical text or by endorsement, at the latest by September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

This document supersedes CEN/TS 16157-4:2014.

The major differences introduced in the new edition of this document are:

- renaming of some classes (e.g. currently renamed Vms, VmsController, VmsControllerStatus, VmsStatus) to improve the understanding and the usage of the modelled information;
- merging of VMS characteristics and VMS configuration in a same model to address static and dynamic configuration as well as VmsMessage package restructured enhancing the model flexibility for inclusion of dynamic configured VMS, e.g. “Full-Matrix” VMS;
- Compliance to ISO 14823:2017 - Intelligent transport systems - Graphic data dictionary, for description of Pictogram graphical information;
- correction of several bugs.

This document - EN 16157-4 - is the fourth part of a multi-part standard under the general title *Intelligent transport systems - DATEX II data exchange specifications for traffic management and information*. A list of all parts in the CEN 16157 series can be found on the CEN website.

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.

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

This document 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 the standardization of DATEX II, there is a real basis for common exchange between the actors of the traffic and travel information sector.

This document includes the framework and context for exchanges, the modelling approach, data content, data structure and relationships. This European Standard supports a methodology that is extensible.

This document specifies the informational structures, relationships, roles, attributes and associated data types required for publishing variable message sign information within the DATEX II framework. It specifies the structures and definitions of information that can be exchanged to convey details of the messages displayed on variable message signs, the current configuration, characteristics and status of the variable message signs that are currently deployed on the road network.

This is specified in two publications, a DATEX II VMS Table Publication sub-model and a VMS Publication sub-model, which are part of the DATEX II platform independent model, but this document excludes those elements that relate to:

- location information which are specified in EN 16157-2
- common information elements, which are specified in EN 16157-7
- situation information which are specified in EN 16157-3.

The VMS Table Publication supports the occasional exchange of tables containing generally static reference information about deployed VMS which enable subsequent efficient references to be made to pre-defined static information relating to those VMS.

The VMS Publication supports the exchange of the graphic and textual content of one or several VMS plus any status information on device configuration that aid the comprehension of the informational content. This content is potentially subject to rapid change.

These publications are not intended to support the control or configuration of VMS equipment. Each is part of the DATEX II platform independent model.

1 Scope

This document is the fourth part of the DATEX II European Standard which deals with the publication sub-models within the DATEX II model that support the exchange of variable message sign information.

These publications are intended to support the exchange of status and informational content concerning VMS from the organization controlling the VMS to other organisations providing ITS services or onward information exchange. It is not intended to support the control or configuration of VMS equipment.

This is specified in two sub-models, a DATEX II VMS Table Publication sub-model and a DATEX II VMS 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 16157-2:2019, *Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 2: Location referencing*

EN 16157-3:2018, *Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 3: Situation Publication*

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

EN ISO 14823:2017, *Intelligent transport systems - Graphic data dictionary (ISO 14823:2017)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16157-7:2018, EN 16157-2:2019 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>
- IEC Electropedia: available at <http://www.electropedia.org>

3.1

display area

physically or logically defined area of a VMS used to display a specific type of content -- instead of representing a specific type of content

EXAMPLE A pictogram display area is used for displaying a pictogram representing a road sign.

Note 1 to entry: Such areas can be defined permanently or allocated dynamically as for full-matrix VMS."

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3.2 pictogram
representation of a graphic symbol displayed on a variable message sign by means of a matrix or LED display panel which can display colour graphics

3.3 supplementary panel
display area used to represent additional information to a pictogram

Note 1 to entry: This area can be either physically separate or integrated with the display area used for pictograms.

Note 2 to entry: It can represent a text line, a pictogram or both.

3.4 variable message sign VMS
variable message sign - a display panel used to display one or more messages (text, symbols, pictograms or combinations) that can be changed or switched on or off as required

3.5 variable message sign controller
roadside controller device which can control one or more variable message signs on a single gantry/mounting or on closely associated separate gantries/mountings

3.6 variable message sign message
message displayed on a VMS which can comprise one or more sequentially displayed text pages and/or pictograms with supplementary details

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4 Symbols and abbreviations

GDD	Graphic Data Dictionary
IP	Internet Protocol
LED	Light Emitting Diode
UML	Unified Modelling Language
URL	Uniform Resource Locator

5 Conformance

This document specifies a DATEX II VMS unit table publication and a DATEX II VMS status publication, except for elements that relate to location information which are specified in EN 16157-2, the common elements (i.e. shared between several publications) which are defined in EN 16157-7 and through optional elements as reference and versioned reference with EN 16157-3.

The DATEX II platform independent data model, of which these two 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.

6 UML notation

The UML notation used in this document complies with ISO/IEC 19505-1.

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

7 The “Vms” namespace

The “Vms” namespace gathers all the packages and classes about variable message signs information. Figure 1 pictures the different packages and classes belonging to the “Vms” namespace.

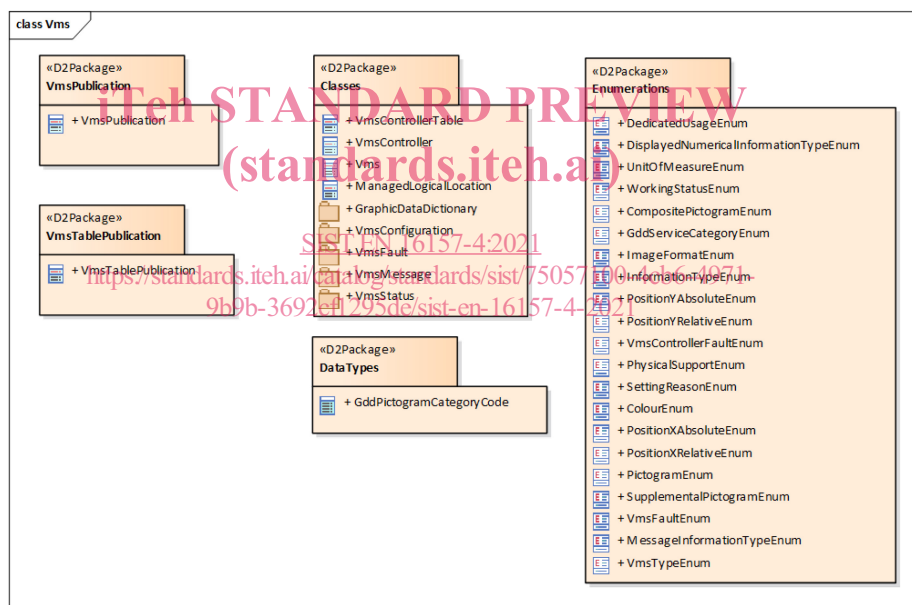


Figure 1 — The “VMS” namespace model

The “Vms” namespace shall include the following 5 packages:

- VmsTablePublication,
- VmsPublication,
- Classes,
- DataTypes,
- Enumerations.

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The “Vms” package shall be immediately subordinate to the “PayloadPublication” package. It shall comprise the packages used in the VMS table publication and VMS publication as well as the “Classes”, “DataTypes” and “Enumerations” packages that are specific to these publications. They belong to the “D2Namespace” namespace “Vms”.

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

The XML subschemas corresponding to this document is provided in the normative Annex B.

Some packages and individual classes used within the “Vms” package reside in the “D2Namespace” namespaces “Common”, “Location”, and “SituationPublication” because they can be used in different places within this package or by other packages. The named namespaces (D2Namespace) are a container for a number of packages and individual reusable classes. Those packages and classes, which are contained in the named namespaces, are identified in the following clauses. The use of these individual classes is only described in detail if their semantics in the VMS publications is altered.

NOTE “Common” namespace classes are defined in EN 16157-7, “Location” namespace classes are defined in EN 16157-2 and “SituationPublication” classes are defined in EN 16157-3.

Namespaces dependencies are shown in Figure 2.

NOTE Vms also has an potential indirect dependency on the Situation namespace through optional elements of type VersionedReference where the target elements are in the Situation namespace, i.e. there could be a dependency in implementing applications that try to access those references. This dependency is avoided if those optional elements are not used.

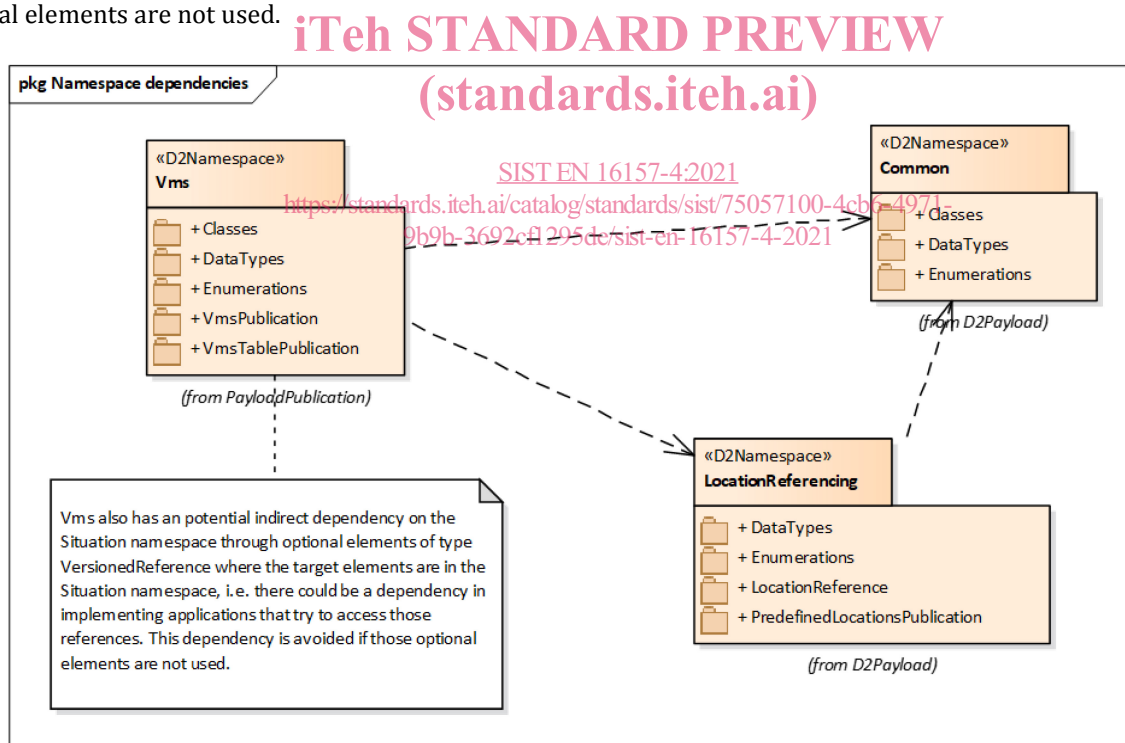


Figure 2 — The “VMS” namespace dependencies

8 The “VmsTablePublication” model

8.1 Overview of the “VmsTablePublication” model

The VMS Table Publication model shall comprise a top-level package, “VmsTablePublication” which utilizes some classes from the “Classes” package.

The “VmsTablePublication” package shall model the usually static characteristics of VMS controllers and their controlled VMS.

Each “VmsTablePublication” class shall contain one or more “VmsControllerTable” class, each table containing a number of “VmsController” class which relate to deployed VMS controllers. These latter describe the deployed VMS controllers. Each “VmsController” shall contain one or more “Vms” objects, each of which relates to a specific VMS that is controlled by the VMS controller.

Although the characteristics of “Vms” and “VmsController” objects modelled in this publication are not updated frequently, sometimes these characteristics may change over time.

Other information updates changes may occur in the location of “VMS” objects when they are of a mobile type or in the number of lines of text if the sign supports variable font sizes. In these cases, some of the configuration information defined in this publication may be overridden by more up-to-date information disseminated in a “VmsPublication”. VMS configuration information provided in a “VmsPublication” shall always override any configuration information provided in the records of a “VmsTablePublication”.

8.2 The “VmsTablePublication” package

8.2.1 Overview of the “VmsTablePublication” package

The “VmsTablePublication” package shall comprise a sub-model for defining information describing the static characteristics of VMS controllers and their VMS (see Figure 3).

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

The corresponding class diagram is shown in Figure 3.

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<https://standards.iteh.ai/catalog/standards/sist/75057100-4cb6-4971-9b9b-3692cfl295de/sist-en-16157-4-2021>

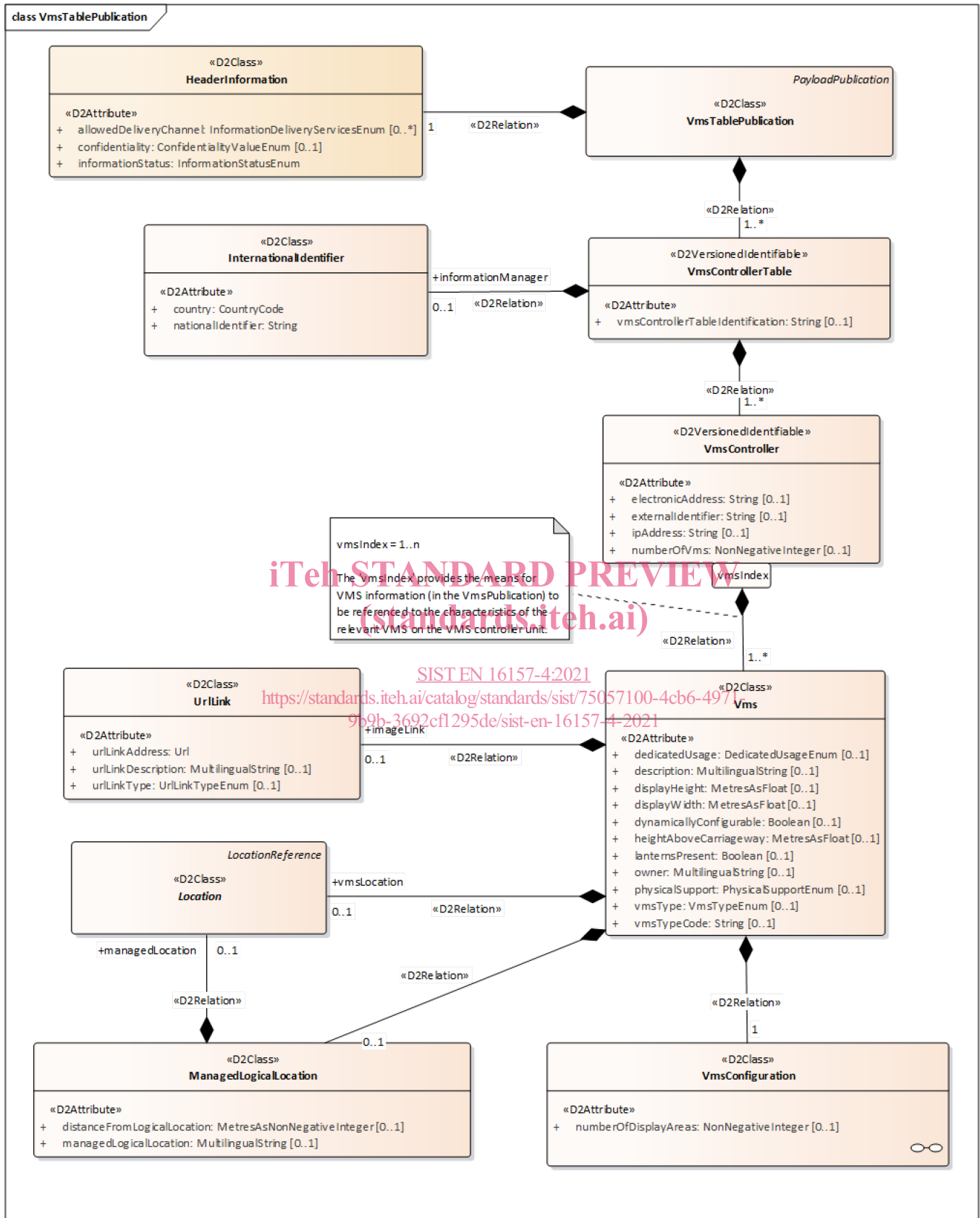


Figure 3 — The “VmsTablePublication” package class model

8.2.2 Semantics of the “VmsTablePublication” package

8.2.2.1 “VmsTablePublication” package semantics - general

The “VmsTablePublication” class shall be a specific realizable class as specialization of “PayloadPublication”. Each “VmsTablePublication” may contain a number of separate VMS controller tables.

The information in the “VmsTablePublication” shall relate to the VMS controllers and their controlled VMS currently deployed on the road, and shall contain the static characteristics of those devices at a specified point in time. However, the characteristics and configuration of any VMS given in the “VmsTablePublication” shall be overridden by any corresponding characteristics and configuration that are given in a “VmsPublication” for the same VMS when those configuration and characteristics may be dynamically managed.

Some of the individual classes used within the “VmsTablePublication” package, principally those for modelling the characteristics of a VMS, also reside in the “VmsConfiguration” package which is within the “Classes” package as they are also used in the “VmsPublication” package.

8.2.2.2 “VmsTablePublication” Class

The “VmsTablePublication” class shall be the top-level class for containing the published VMS controller tables.

8.2.2.3 “HeaderInformation” Class

Each instance of a “VmsTablePublication” shall have associated metadata contained in an instance of the “HeaderInformation” class which shall be used to specify how the recipient should treat the information contained in it. For “HeaderInformation” class refer to EN 16157-7.

8.2.2.4 “InternationalIdentifier” class

<https://standards.iteh.ai/catalog/standards/sist/75057100-4cb6-4971-910b-7692cf280166/sist-16157-4-2021>

An international identifier may be associated to a VMS table to define which organization manages its information. This class belongs to the “Common” package defined in EN 16157-7.

8.2.2.5 “VmsControllerTable” Class

An identifiable versioned instance of the “VmsControllerTable” class shall contain any logical collection of “VmsController”. A supplier may choose to provide a textual identification for a particular “VmsControllerTable” to clarify the logical collection of “VmsController”.

It may be possible to specify the organization which manages the table information by the “informationManager” association to the “InternationalIdentifier” class.

8.2.2.6 “VmsController” Class

An identifiable versioned instance of the “VmsController” class shall contain the characteristics information relating to a specific VMS controller. Each record shall have one or more indexed “Vms” sub-records for containing the characteristics of the individual VMS that are controlled by the VMS controller. The “vmsIndex” qualifier provides a means for a given “VmsStatus” instance (in the VMS publication) to be referenced to the corresponding instance of the “Vms” class at the VMS controller.

8.2.2.7 “Vms” Class

An instance of the “Vms” class shall be used to provide the static characteristics of a VMS. The location of the VMS may be defined via the composition to “vmsLocation”. Any location that is managed by the VMS such as a car park or junction may be defined via a composition with the “VmsManagedLogicalLocation” class.