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**Inteligentni transportni sistemi - Specifikacije za izmenjavo podatkov DATEX II pri upravljanju prometa in informiranju - 4. del: Objava informacij o znakih s spremenljivim sporočilom (VMS)**

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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35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport
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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 draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 278.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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**prEN 16157-4:2019 (E)****European foreword**

This document (prEN 16157-4:2019) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede CEN/TS 16157-4:2014.

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

- renaming of some major classes (e.g. currently renamed Vms, VmsUnit, VmsUnitStatus, VmsStatus) to improve the understanding and the usage of the modelled information;
- compliance to EN ISO 14823, *Intelligent transport systems – Graphic data dictionary (ISO 14823)*, for description of Pictogram graphical information;
- correction of different bugs.

prEN 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*, the other parts are:

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- *Part 1: Context and framework;* **(standards.iteh.ai)**
- *Part 2: Location referencing;*
- *Part 3: Situation Publication;* [ksIST FprEN 16157-4:2020  
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- *Part 5: Measured and elaborated data publications* [CEN/TS];
- *Part 6: Parking Publications* [CEN/TS];
- *Part 7: Common data elements;*
- *Part 8: Traffic management publications and extensions dedicated to the urban environment* [FprCEN/TS];
- *Part 9: Traffic signal management publications dedicated to the urban environment* [FprCEN/TS].

Other parts will be developed in the future.

## Introduction

This European Standard 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.

This European Standard 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.

The fourth part of this European Standard deals with the publication of variable message sign (VMS) information. It specifies the structures and definitions of information that can be exchanged to convey details of the messages displayed on variable message signs, and the current configuration and characteristics and status of the variable message signs that are currently deployed on the road network.

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**prEN 16157-4:2019 (E)****1 Scope**

This European Standard (EN 16157 series) specifies and defines component facets supporting the exchange and shared use of data and information in the field of traffic and travel.

The component facets include the framework and context for exchanges, the modelling approach, data content, data structure and relationships.

This European Standard is applicable to:

- Traffic and travel information which is of relevance to road networks (non-urban and urban),
- Public transport information that is of direct relevance to the use of a road network (e.g. road link via train or ferry service),
- Traffic and travel information in the case of Cooperative intelligent transport systems (C-ITS).

This European Standard establishes specifications for data exchange between any two instances of the following actors:

- Traffic Information Centres (TICs),
- Traffic Control Centres (TCCs),
- Service Providers (SPs),

Use of this European Standard may be applicable for use by other actors.

This European Standard series covers, at least, the following types of informational content:

- Road traffic event information – planned and unplanned occurrences both on the road network and in the surrounding environment,
- Operator initiated actions,
- Road traffic measurement data, status data, and travel time data,
- Travel information relevant to road users, including weather and environmental information,
- Road traffic management information and instructions relating to use of the road network.

This part of the CEN/TS 16157 series specifies the informational structures, relationships, roles, attributes and associated data types required for publishing variable message sign information within the Datex II framework. 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 part 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.

## 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, *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, *Intelligent transport systems – DATEX II data exchange specifications for traffic management and information – Part 7: Common data elements*

EN ISO 14823, *Intelligent transport systems – Graphic data dictionary (ISO 14823)*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16157-1, 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 <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org>

### 3.1

#### **pictogram**

representation of a graphic symbol displayed on a variable message sign by means of a (usually multi colour capable) matrix or LED display panel

### 3.2

#### **supplementary panel**

additional display panel, either physically separate or integrated with the main display panel which can display information or regulatory instructions which are supplemental to the associated pictogram, comprising either an additional line of text or a pictogram or both

### 3.3

#### **variable message sign**

sign/display panel used for the purpose of displaying one or more messages (comprising any combination of textual, symbol or pictogram information) that can be changed or switched on or off as required

### 3.4

#### **variable message sign unit**

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

**prEN 16157-4:2019 (E)****4 Symbols and abbreviations**

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

IP	Internet Protocol
UML	Unified Modelling Language
URL	Uniform Resource Locator
VMS	Variable Message Sign

**5 Conformance**

This document specifies a DATEX II VMS unit table publication and a DATEX II VMS status publication, except for these elements that relate to location information which are specified in EN 16157-2 or for 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 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.

Conformance with this Part 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 this sub-model which are expressed in this part.

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 EN 16157 (all parts) complies with ISO/IEC 19505-1. A short summary explaining the notation used in this document is provided in EN 16157-1:2018, Annex A.

## 7 The VMS model

### 7.1 Overview of the VMS model

The VMS model shall be immediately subordinate to the “PayloadPublication” package and shall comprise the packages used in the VMS Table Publication and VMS Publication and the Classes and Enumerations specific for these Payload Publication.

Some of the packages and individual classes used within the “VMS Model” package reside in the “D2Namespace” namespaces “Common”, “Location”, “SituationPublication” and because they can be used in different places within this package or by other packages either now or in the future. The named namespaces (D2Namespace) shall be 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 individual classes from the named namespace is only described in detail if their use in the “VMS Publication” affects their semantics.

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

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

### 7.2 The VMS Table Publication 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 normally static characteristics of VMS units and their controlled VMS.

Each “VmsTablePublication” instance shall contain one or more instances of a “VmsUnitTable”, each table containing a number of “VmsUnits” which relate to deployed VMS units. Each “VmsUnit” shall contain one or more “Vms” each of which relates to a specific VMS that is controlled by the VMS unit.

Although the characteristics of VMSs and VMS units modelled in this publication are normally static, sometimes these characteristics change over a period of time. For instance, changes do occur in the location of VMSs 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 characteristics defined in this publication may be overridden by more up-to-date information promulgated in a “VmsPublication”. VMS characteristics information provided in a “VmsPublication” shall always override any characteristics information provided in the records of a “VmsTablePublication”.

### 7.3 The VMS Table Publication package

#### 7.3.1 Overview of the VMS Table Publication package

The “VmsTablePublication” package shall comprise a sub-model for defining information describing the normally static characteristics of VMS units and their VMS (see Figure 1). Each publication may contain one or more tables, allowing logical partitioning of VMS static information as deemed 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 VMS Table class diagram is shown in Figure 1.



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

### 7.3.2.2 “VmsTablePublication” Class

The “VmsTablePublication” class shall be the base class for containing the published VMS unit tables.

### 7.3.2.3 “HeaderInformation” Class

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

### 7.3.2.4 “VmsUnitTable” Class

An identifiable versioned instance of the “VmsUnitTable” class shall contain any logical collection of “VmsUnitRecords”. A supplier may choose to provide a textual identifier for a particular “VmsUnitTable” to clarify the logical collection of “VmsUnit”.

### 7.3.2.5 “VmsUnit” Class

An identifiable versioned instance of the “VmsUnit” class shall contain the characteristics information relating to a specific VMS unit. Each record shall have one or more indexed “Vms” sub-records for containing the characteristics of the individual VMSs that are controlled by the VMS unit. The “vmsIndex” qualifier allows the specific VMS that is controlled by the VMS unit to be specified.

### 7.3.2.6 “Vms” Class

An instance of the “Vms” class shall allow a supplier to identify the normally static characteristics of a VMS. The location of the VMS may be specified via the composition to “vmsLocation” and any location that is managed by the VMS such as a car park or junction may be specified via composition with the “VmsManagedLogicalLocation” class.

The LocationReference class shall be used to identify details of the location where Vms is physically situated or the location in which the Vms is considered to be located for its management, in case this is different from the physical location. The LocationReference class and its components are defined in EN 16157-2.

If a VMS is of a type that has a “painted” background image upon which variable message information is placed, the aggregation “backgroundImageUrl” can be specified where a URL link can provide details of the background image. For “UrlLink” class refer to EN 16157-7.

### 7.3.2.7 “VmsTextDisplayCharacteristics” Class

An instance of the “VmsTextDisplayCharacteristics” class shall allow a supplier to identify the normally static characteristics relating to the textual display area of a VMS.

The characteristics for the text display area optionally include area dimensions (in pixels and metric measurements), font sizes, number of characters and rows, details of text area positioning on the VMS panel and the maximum luminance level.

- **Attribute “textPageSequencingCapable”** may be used to provide an indication of whether the VMS is capable of displaying a number of text pages which are automatically displayed in a defined sequence and at a defined rate.
- **Attribute “legendCodeListIdentifier”** may be used to indentify what list of legends or texts are being used by the VMS. Usually specific deployments of VMS across a road network or part of a

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network will use defined sets of legend or text which are specified by the road authority/operator and are consistent with the display capabilities of the particular VMS. This attribute allows the identity of this list to be promulgated.

### 7.3.2.8 “VmsPictogramDisplayCharacteristics” Class

An instance of the “VmsPictogramDisplayCharacteristics” class shall allow a supplier to identify the normally static characteristics relating to a particular pictogram display area of a VMS. The “pictogramDisplayAreaIndex” qualifier shall be used to indicate which pictogram display area is being referenced.

The characteristics for the pictogram display area include area dimensions (in pixels and metric measurements), details of the positioning of the area on the VMS panel and the maximum luminance level.

- **Attribute “pictogramSequencingCapable”** may be used to provide an indication of whether the VMS is capable of displaying a number of separate pictograms in the particular pictogram display area which are automatically displayed in a defined sequence and at a defined rate.
- **Attribute “pictogramCodeListIdentifier”** may be used to identify what list of pictograms are being used by the VMS. Usually specific deployments of VMS across a road network or part of a network will use defined sets of pictograms which are specified by the road authority/operator and are consistent with the display capabilities of the particular VMS. This attribute allows the identity of this list to be promulgated.

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### 7.3.2.9 “VmsSupplementaryPanelCharacteristics” Class

An instance of the “VmsSupplementaryPanelCharacteristics” class shall allow a supplier to identify the normally static characteristics relating to a supplementary display panel which is associated with a particular pictogram display area on a VMS.

See 7.8.2.9 for further details of this class.

## 7.4 The VMS Publication model

The VMS Publication model shall comprise a top level package, “VmsPublication” and some sub-packages from the “Classes” package.

The “VmsPublication” package shall make use of a subordinate “VmsStatus” package and a “VmsMessage” package that together shall model the details of the status of variable message signs and what is currently displayed on. The “VmsStatus” and “VmsMessage” packages shall reside in the “VmsRelated” package which is within the “Classes” package.

Each “VmsPublication” instance shall contain details of a number of individual deployed VMS unit status, each of which can control one or more VMSs.

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

## 7.5 The VMS Publication package

### 7.5.1 Overview of the VMS Publication package

The “VmsPublication” package shall comprise the sub-model for defining a publication, which identifies the visual and textual content displayed on individual VMSs and the status, and settings of those VMSs, where each VMS is controlled by an associated VMS unit (as shown in Figure 2). The information shall

be published in sets where each set relates to a particular VMS unit, which may control one or more VMSs.

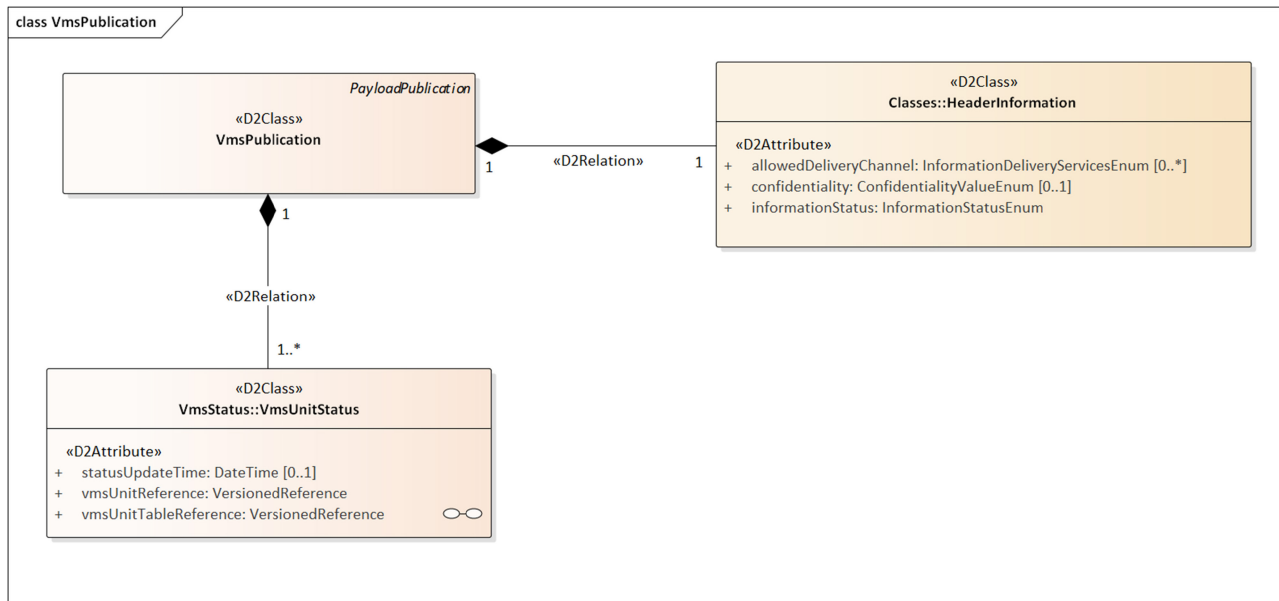


Figure 2 — The “VmsPublication” package class model

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## 7.5.2 Semantics of the VMS Publication package

### 7.5.2.1 “VmsPublication” package semantics - general

The “VmsPublication” class shall be a specific realizable case of a “PayloadPublication”. Each “VmsPublication” may contain any number of separate sets of information, each relating to a set of VMSs which shall be controlled by the same VMS unit.

The information relating to each VMS in the “VmsPublication shall specify the message or the messages that have actually been set on the VMS at a specified time.

NOTE The information in the “VmsPublication” relates to the current state of VMSs deployed on the road, and not to any state information at the control centre, such as “pending” or “queued” or to any prioritized lists of messages which will be displayed at some point in the future.

### 7.5.2.2 “VmsPublication” Class

The “VmsPublication” class shall be the base class for containing the published VMS information.

### 7.5.2.3 “HeaderInformation” Class

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