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Inteligentni transportni sistemi - Specifikacije za izmenjavo podatkov DATEX II pri upravljanju prometa in informiranju - 2. del: Navajanje lokacije

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

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Intelligente Verkehrssysteme - DATEX II Datenaustauschspezifikation für Verkehrsmanagement und Verkehrsinformation - Teil 2: Ortsreferenzierung

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Systèmes de transport intelligents - Spécifications DATEX II d'échange de données pour la gestion du trafic et l'information routière - Partie 2: Localisation

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Intelligente Transportsysteme - DATEX II Datenaustausch Spezifikationen für Verkehrsmanagement und Informationen - Teil 2: Positionsreferenz

This Technical Specification (CEN/TS) was approved by CEN on 10 April 2011 for provisional application.

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Foreword

This document (CEN/TS 16157-2:2011) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematcis”, the secretariat of which is held by NEN.

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

This document supersedes ENV 13777:2000, ENV 13106:2000.

As a user of the standard, attention is drawn to the resources of www.datex2.eu. This web site contains related software tools and software resources that aid the implementation of CEN/TS 16157 DATEX II.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This Technical Specification 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. Standardisation 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 standardisation of DATEX II, there is a real basis for common exchange between the actors of the traffic and travel information sector.

This Technical Specification includes the framework and context for exchanges, the modelling approach, data content, data structure and relationships, communications specification.

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This Technical Specification supports a methodology that is extensible.

This Part, Part 2 of this Technical Specification, deals with DATEX II location referencing. It references existing location referencing Standards or Technical Specifications.

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CEN takes no position concerning the evidence, validity and scope of patent rights.

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1 Scope

This Technical Specification (CEN/TS 16157-2) 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, communications specification.

This Technical Specification 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).

This Technical Specification establishes specifications for data exchange between any two instances of the following actors:

— Traffic Information Centres (TICs);

— Traffic Control Centres (TCCs);

— Service Providers (SPs).

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Use of this Technical Specification may be applicable for use by other actors.

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This Technical Specification covers, at least, the following types of informational content:

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— 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 specifies the informational structures, relationships, roles, attributes and associated data types, for the implementation of the location referencing systems used in association with the different publications defined in the Datex II framework. It also defines a DATEX II publication for exchanging predefined locations. This is part of the DATEX II platform independent data model.

2 Conformance

The DATEX II platform independent data model of which the location referencing packages as well as Predefined Locations Publication sub-model are parts, corresponds to the Level A model as defined in CEN/TS 16157-1.

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 CEN/TS 16157-1 and with the following requirements of this sub-model which are expressed in this Part:

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— 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.

3 Normative references

The following referenced documents are indispensable for the application 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.

CEN/TS 16157-1:2011, *Intelligent Transport Systems — DATEX II data exchange specifications for traffic management and information — Part 1: Context and framework*

CEN ISO/TS 18234-6:2006, *Traffic and Travel Information (TTI) — TTI via Transport Protocol Expert Group (TPEG) data-streams — Part 6: Location Referencing application (TPEG-Loc) (ISO/TS 18234-6:2006)*

CEN ISO/TS 24530-2:2006, *Traffic and Travel Information (TTI) — TTI via Transport Protocol Experts Group (TPEG) Extensible Markup Language (XML) — Part 2: tpeg-locML (ISO/TS 24530-2:2006)*

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EN ISO 14819-3:2004, *Traffic and Travel Information (TTI) — TTI messages via traffic message coding — Part 3: Location referencing for ALERT-C (ISO 14819-3:2004)*

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prEN ISO 19148, *Geographic Information — Linear Referencing (ISO/DIS 19148:2009)*

4 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TS 16157-1:2011 and the following apply.

4.1
area
two-dimensional, geographical region on the surface of the Earth

[ISO 17572-1:2008]

4.2
descriptor
characteristic of a geographic object, usually stored in an attribute

EXAMPLE Road names or road numbers.

4.3
destination
specification of the end point of a defined route or itinerary

NOTE This may be either a location on a network or an area location.

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4.4
european terrestrial reference system 89
ETRS89
recommended terrestrial reference system for Europe and coincident with ITRS at the epoch 1989.0

NOTE Unlike ITRS, ETRS is centred on the stable part of the European plate and not subject to change due to continental drift in most of Europe.

4.5
geodetic coordinate
one of the sequences of two (or three) numbers designating the position of a point, expressed in geodetic latitude, geodetic longitude and (in the three-dimensional case) ellipsoidal height

[ISO 19111:2007]

4.6
ILOC descriptor
one of the three descriptors associated to an ILOC reference

4.7
international terrestrial reference system
ITRS
reference system for the earth derived from precise and accurate space geodesy measurements, not restricted to GPS Doppler measurements, which is periodically tracked and revised by the International Earth Rotation Service (I.E.R.S.)

[ISO 17572-1:2008]

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4.8
itinerary
group of one or more physically separate locations arranged as an ordered set that defines a route

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4.9
latitude
geodetic latitude
angle from the equatorial plane to the perpendicular to the Earth through a given point, northwards treated as positive

NOTE adapted from ISO 19111:2007

4.10
linear
having a one-dimensional character

[ISO 17572-1:2008]

4.11
linear referencing
specification of a location relative to a linear element as a measurement along that element

[prEN ISO 19148]

4.12
location
identifiable geographic place

[EN ISO 19112:2005]

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NOTE It is either on a network (as a point or a linear location) or an area. This may be provided in one or more referencing systems.

4.13
location code
tabular address of the pre-stored location details in the location table used by the information provider

[EN ISO 14819-3:2004]

4.14
location reference
reference
data set assigned to a location

NOTE A reference shall define unambiguously and exactly one location in the location referencing system. The reference is the set of data which is passed between different implementations using the same location referencing system to identify the location.

4.15
location referencing system
LRS
referencing system
complete system by which location references are generated, according to a location referencing method, and communicated, including standards, definitions, software, hardware, and databases

[ISO 17572-1:2008]

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4.16
longitude
geodetic longitude
angle from the prime meridian plane to the meridian plane of a given point, eastward treated as positive

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[ISO 19111:2007]

4.17
primary point
point met at the end of a linear road section when it is travelled according to the location direction

NOTE In case of an affected area with an event it generally pinpoints the origin of the event

[EN ISO 14819-3:2004]

4.18
point
zero-dimensional element that specifies a geometric location

[ISO 17572-1:2008]

4.19
predefined location
location using a unique identifier (reference) that is agreed upon in both sender and receiver system to select a location from a set of locations already exchanged

[ISO 17572-1:2008]

4.20
referent
known location from which relative measurement are made along a linear element

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[prEN ISO 19148]

4.21
secondary point
point met first when a linear road section is travelled according to the location direction

5 Symbols and abbreviations

For the purpose of this document, the following abbreviations apply throughout the document unless otherwise specified.

ALERT-C Alert and problem Location for European Road Traffic, version C

GIS Geographic Information System

GPS Global Positioning System

ILOC Intersection Location

NOTE It is the basis of a dynamic referencing system named “ILOC referencing system”, subsequently adopted by TPEG as “TPEG-Loc”.

LR Linear Referencing

LRM Linear Referencing Method

TPEG Transport Protocol Expert Group

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6 UML Notation

The UML notation used in these Technical Specifications shall be as described in ISO/IEC 19501:2005. A short summary explaining the notation used in this Technical Specification is provided in Annex A of CEN/TS 16157-1.

7 The DATEX II location referencing model

7.1 General

Normative Annex A provides the data dictionary i.e. a comprehensive view of the different classes, attributes and association roles for each package. Each subclause corresponds to a package.

The types of attribute and the enumerations specific to this part are defined in normative Annex A.

The XML subschema corresponding to this part of CEN/TS 16157 is provided in normative Annex B.

Informative Annex C provides some explanations about the location referencing methods that are relevant for this part of CEN/TS 16157, some of them being drawn from approved standards like those on linear referencing or on ALERT-C.

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7.1.1 The package “GroupOfLocations”

7.1.1.1 The overall model

The package “GroupOfLocations” supplies classes and attributes to the definition of a location locating a traffic object e.g. a situation record in a situation publication. It is pictured including the relationships between the classes in Figure 1.

This contributes important information in the different publications defined in Part 1 of CEN/TS 16157, bringing information on “where” in each case.

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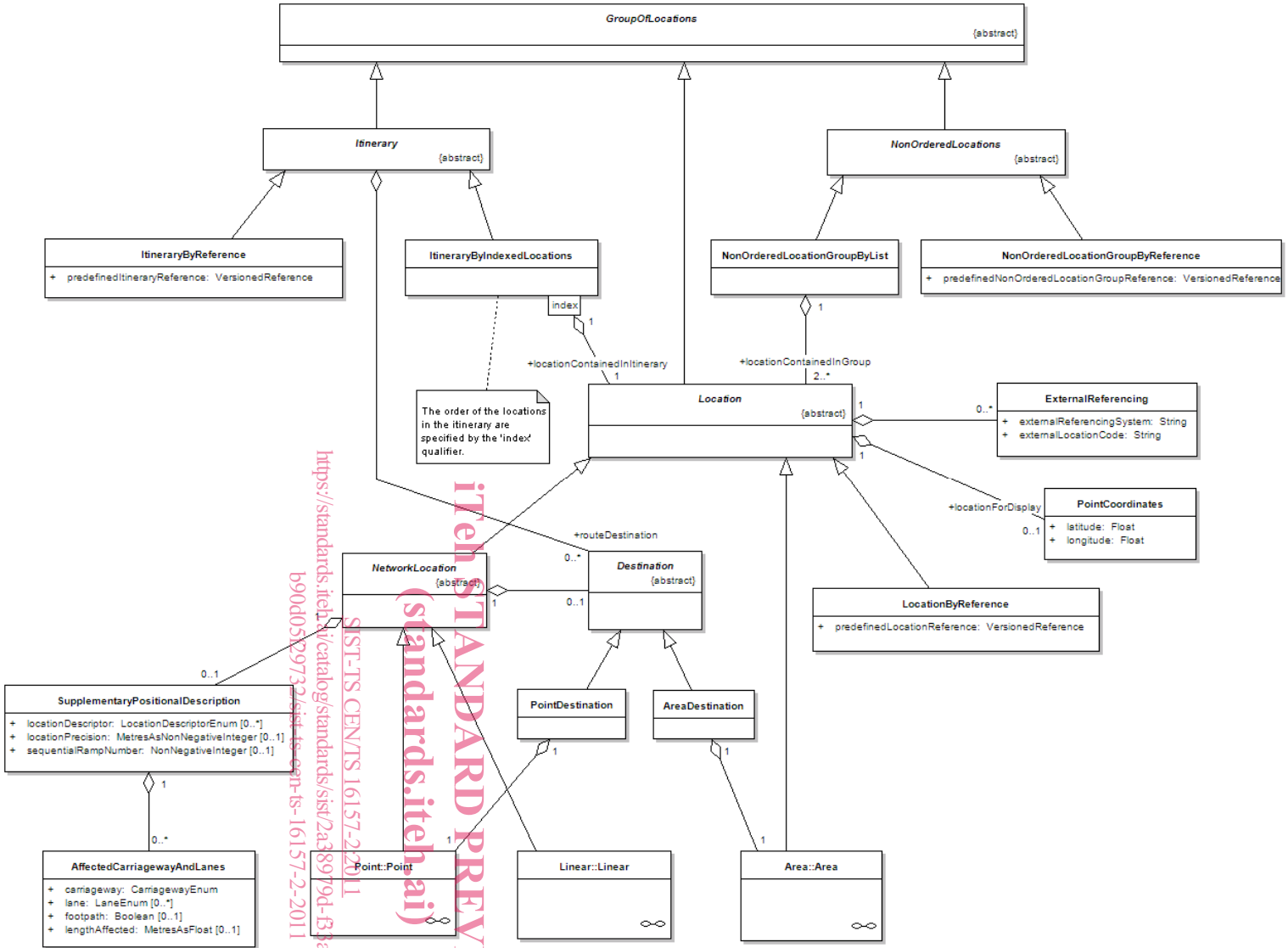

Figure 1 — DATEX II location referencing model

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7.1.1.2 Semantics

The most generic concept, group of locations, is a set of one or several locations and is depicted by the abstract class “GroupOfLocations” that is the main entry point of the corresponding package to carry the corresponding locations.

This group of locations can be either used as a set of locations that can be seen independently one from another and without any order (class “NonOrderedLocations”) or as an itinerary (or route) (class “Itinerary”). In case of an itinerary the different sections defining it have to be defined following a specific order or linkage or a single location (depicted by the class “Location”), which is the atomic locating unit.

Any group of locations (i.e. an itinerary or a group of non ordered locations or single location) can be predefined i.e. previously defined, identified and exchanged and then be used through its reference (respectively class “ItineraryByReference”, class “NonOrderedGroupOfLocationsByReference” and class “LocationByReference”).

A group of non-ordered locations has at least two locations whereas an itinerary belongs at least one location.

A location can be either:

— a road network element (class “NetworkLocation”),

— an area (class “Area”).

A road network location can be either a linear or a point location (respectively classes “Linear” and “Point”). The possible description of them is realised in the corresponding packages. The area description is realised in the “Area” package.

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In case of an itinerary destination(s) may be added to it through occurrence(s) of the class “Destination”. A destination can be delineated either as a point on the road network (class “PointDestination” defined from the class “Point”) or as an area (class “AreaDestination” defined from the class “Area”).

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To help the location to be displayed on a map, geodetic coordinates (in term of geodetic longitude and geodetic latitude) may be added (class “PointCoordinates”). Geodetic coordinates are defined according to the European Terrestrial Reference System of 1989 (ETRS89) which was coincident with the International Terrestrial Reference System (ITRS) in 1989. This is the European implementation of ITRS, but unlike ITRS it is fixed to the stable part of the Eurasian Plate. The coordinates and maps in Europe based on ETRS89 are not subject to change due to the continental drift. ETRS89 is the EU-recommended frame of reference for geodetic data in Europe.

External references may be added to locations if there is a need to add a reference to an external/other referencing system (class “ExternalReferencing”). The given reference code provided shall be accompanied with the name of the external referencing system in use. For example, this feature may be used to extend the present model according to CEN/TS 16157-1.

7.1.1.3 Semantics of supplementary positional information

Supplementary positional information may be added to a road network element for describing the transversal position of the element to be located on the road (class “SupplementaryPositionalDescription”). Therefore, it is possible to globally define the sequential ramp number the minimum accuracy (in metres) which may qualify the corresponding location or to textually qualify this location (e.g. “on bridge”).

Besides it may be completed by transverse positional information (class “AffectedCarriagewayAndLanes”) with the exact carriageway(s), with for each the corresponding lane(s) and the affected length.