TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/TR 17297-1

May 2019

ICS 35.240.60

English Version

Intelligent transport systems - Location referencing harmonization for Urban ITS - Part 1: State of the art and guidelines

Intelligente Verkehrssysteme - Ortsreferenzierungsharmonisieung für Urbane ITS - Teil 1: Stand der Technik und Richtlinien

This Technical Report was approved by CEN on 1 April 2019. It has been drawn up by the Technical Committee CEN/TC 278.

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Ref. No. CEN/TR 17297-1:2019 E

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European foreword

This document (CEN/TR 17297-1:2019) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

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Introduction

Location is an ever-present feature of travel-related data and information services. Systems and services are deployed and evolve using a myriad of ways of defining and describing locations. As we move towards more sophisticated ITS services benefits will be accrued in the urban environment by the provision of multimodal offerings to the traveller. This often combines data from the different modes, which in turn will involve the harmonization of location referencing. Further strong trends are emerging with the drive towards greater levels of open data, regulated obligations for access to travel data under various European Union initiatives, and the almost ubiquitous expectation on instant access to travel data by users via the smartphone or other connected devices. Historically, it is appreciated that many of the services will have their bespoke location referencing systems that suit their applications well, and that it would never be successful to oblige city authorities to change their legacy systems, without significant cost, disruption and risk. Therefore, it is preferable to set out a vision towards greater integration, including encouraging cities to consider a standardized location referencing system when they develop or commission new services but support them integrating all systems, both legacy and new.

This document pulls together the many existing referencing systems, classifies them, and then describes them in selected scenarios with use cases, looking at the advantages and disadvantages and the challenges. The primary intended purpose of this document is to act as a kind of “handbook” or “primer” for city engineers and urban administrators who need to combine data from all the transport services that are in the city domain and those transport services that come into the city, to allow a truly multimodal offering, be it traveller information, traffic control, urban logistics, public transport, etc. However this document can be of high interest for every actor dealing with location referencing.

This document has been produced by the CEN/TC 278/WG 17 Project Team 1703 - Location Referencing Harmonization. The project was formed because in the CEN/TC 278/WG 17 PT 1701 report on U-ITS (PD CEN/TR 17143), in which location referencing harmonization was the most supported requirement among the stakeholders consulted. Despite the name of this project, its purpose is not to invent new location referencing systems or to create a “super set” of location references to achieve harmonization; that would not be worthwhile. This document is complemented by a Part 2 that normatively specifies methods for managing the identified challenges, e.g. translating between selected location referencing methods.

Development of this document was based on an outreach to organizations across Europe to identify what is being presently used and to ensure that today's requirements are captured; this document also reflects on emerging application and service requirements and potential foreseeable future needs.

Due to evolving standardization works on indoor location determination and referencing, reference to these are not yet included in this document. Indoor location determination and referencing are likely to be considered in future standards.

At the time of production of this document, referencing to precise road-related location referencing, which is sometimes referred to as lane level referencing, is not yet mature enough to be included.

The audience of this document is those who need to combine data which use different location referencing methods due to their different applications, modes or vendors.

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1 Scope

This document presents:

— a concise tutorial on location referencing methods;

— applicable location referencing specifications, standards and directives;

— an introduction into challenges given by a multiplicity of different location referencing systems.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
data set
set of road and traffic data (provided by the data owner)

[SOURCE: SPA - Coordinated Metadata Catalogue]

3.2
geographic identifier
identifier of a geographic location, e.g. a street name with house number

4 Symbols and abbreviations

AVM	automatic vehicle monitoring
CRS	coordinate reference system
CS	coordinate system
EPSG	European Petroleum Survey Group
ETRS	European terrestrial reference system
EU	European Union
GALILEO	name of the European satellite navigation and time reference system
GIS	geographic information system
GLONASS	Global Navigation Satellite System NOTE 1 Russian: globalnaja nawigazionnaja sputnikowaja sistema. NOTE 2 Name of the satellite navigation and time reference system of the Russian Federation.
GLR	geographic location referencing
GML	geography markup language

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GNSS	global navigation satellite system
GPS	global positioning system NOTE 3 Name of the satellite navigation and time reference system of the United States of America.
INSPIRE	infrastructure for spatial information in Europe NOTE 4 Name of a directive of the EC; aims at creating a European Union spatial data infrastructure.
IOGP	International association of oil and gas producers
ITRS	international terrestrial reference system
ITS	intelligent transport systems
LRM	location referencing method
LRS	location referencing system
OEM	original equipment manufacturer
OGC	open geospatial consortium
TN-ITS	transport networks for ITS
U-ITS	urban ITS
UTM	universe transverse Mercator

5 Overview

The CEN/TC 278 PT1701 final technical report recommended over 100 actions needed to support the coordination of "Intelligent Transport Systems" (ITS) services in the urban environment. The most requested action concerned location referencing and the need to be able to combine both real-time, historic and planned data to provide coordinated multi-modal services in an urban environment.

Nearly all ITS applications need some form of location determination and referencing to put the data or information into a spatial context. Unfortunately, the historical technical evolution of services resulted in existing legacy systems based on different location referencing methods (LRMs), each of them being optimized for the specific purposes. These silo approaches impose challenges to the users, e.g. urban administrators, where data from different silos need to be merged together, or where data from one silo needs to be used in another silo, as direct transformation between location referencing systems (LRSs) are not necessarily possible with sufficient location accuracy.

NOTE The terms LRM and LRS are explained in 6.2. Classes of LRMs are presented in Clause 7.

A way to face these challenges is, first to identify the characteristics of location referencing and then evolve:

a) a conversion strategy for short term usage, and

b) a migration strategy for the long-term usage;

with constant pressure on budgets in urban administrations, this represents a major challenge.

This document presents:

— a tutorial on location referencing covering:

1) basics of location referencing, i.e. LRMs, and the difference to location mapping;

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