SLOVENSKI STANDARD
SIST-TS CEN/TS 17380:2019

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Inteligentni transportni sistemi - Mestni ITS - Upravljanje „nadzorovane cone“ za UVAR z uporabo C-ITS

Intelligent transport systems - Urban-ITS - 'Controlled Zone' management for UVARs using C-ITS

Intelligente Verkehrssysteme - Urbane ITS - Urbane ITS - Steuerung in einer "kontrollierten Zone" unter Verwendung von C-ITS

Systèmes de transport intelligents - ITS urbain - Gestion des zones contrôlées à l'aide du système C-ITS

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Intelligent transport systems - Urban-ITS - 'Controlled Zone' management for UVARs using C-ITS

Systèmes de transport intelligents - ITS urbains - Gestion des zones contrôlées à l'aide du système C-ITS

Intelligente Verkehrssysteme - Urbane ITS - Urbane ITS - Steuerung in einer "kontrollierten Zone" unter Verwendung von C-ITS

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European foreword

This document (CEN/TS 17380:2019) 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

This document is part of a set of standards related to Urban ITS (U-ITS). An overview on U-ITS requirements is provided in CEN/TR 17143 [3], which was developed under the European Commission's mandate M/456 [1]. Technologies already developed for Cooperative ITS (C-ITS) under the European Commission's mandate M/453 [2] are applicable for U-ITS.

Management of traffic in a “Controlled Zone” (CZ) is relevant for at least the following reasons:

— Movement of vehicles in cities producing traffic congestion and overcrowding on public transport at peak periods are issues that a jurisdiction may wish to control in order to allow cities to better manage the flow of traffic.

— As cities and urban complexes expand, and there is a significant trend from rural areas to cities around the world, pollution and congestion in these urban areas becomes an ever more significant problem. Traffic, i.e. vehicle movements within the urban complex, is not the only polluter but is considered to be a source of pollution; other causes are e.g. air conditioning, central heating systems, coal and wood burning heating, factories.

A CZ, also referred to as an “Urban Vehicle Access Restriction” (UVAR) zone, is the enactment of a traffic restriction to adhere to a permanent or temporary regulation applicable in a defined area.

It is recognized that different jurisdictions will design and introduce their own CZ paradigms of different method and construct. However, independent of the goal to be achieved or the political objective, the basic technical requirements to manage road traffic in a CZ is similar, and the basic methodologies are the same.

The methodology specified in this document is referred to as geofencing, i.e. the creation of a virtual geographic boundary, which, in a strict sense, is part of “Access Control and Enforcement Systems” (ACES).

1 Scope

This document provides information and specifications enabling management of road traffic in controlled zones applying geofencing. Specifically, this document provides

— a "Controlled Zone Data Dictionary" (CZDD) for management of controlled zones providing an extendible toolkit that regulators can use e.g. to inform potential CZ users, e.g. vehicles, about

  — the CZ area, i.e. the geographical boundaries of the CZ;

  — CZ access conditions including exempts;

  — time windows indicating when these CZ access conditions are applicable, allowing the potential CZ users to select an appropriate routing, either by pre-trip planning or ad hoc re-routing,

  — and illustrations and guidelines on how to use this toolkit.

The toolkit is designed in compliance with the general ITS station and communications architecture specified in ISO 21217, and optionally applicable C-ITS protocols and procedures, e.g. ISO 22418:2018 [8] on "Service Announcement", EN ISO 18750 on the "Local Dynamic Map", and EN ISO 17419 [5] on globally unique identifiers.

Enforcement is out of scope of this document.

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 ISO 18750:2018, Intelligent transport systems — Co-operative ITS — Local dynamic map

ISO 21217:2014, Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture

CEN ISO/TS 21177[1], Intelligent transport systems — ITS station security services for secure session establishment and authentication between trusted devices

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 https://www.iso.org/obp

3.1
controlled zone
area for which access conditions are applicable

[1] Under preparation. Stage at the time of publication: FprCEN ISO/TS 21177

3.2
CZ area
geographical location of a CZ in terms of precisely defined boundaries

Note 1 to entry: In the context of this document, a CZ area not necessarily is a two-dimensional area, but may be a location identified with any kind of location referencing method (linear, two-dimensional, three-dimensional).

3.3
CZ user
physical entity, typically a vehicle, that intends operating in a CZ or is already operated in a CZ

3.4
geofencing
creation of a virtual geographic boundary by applying information and communication technologies such as specified for ITS

3.5
in-vehicle system
ITS-station unit or a navigation device or mobile phone application used in a vehicle being capable to handle the control zone system transactions

4 Symbols and abbreviations

C-ITS	cooperative ITS
CZ	controlled zone
ITS	intelligent transport systems
ITS-SU	ITS station unit
IVI	in-vehicle information
IVS	in-vehicle system NOTE Examples are ITS station units or navigation devices
U-ITS	urban its
UVAR	urban vehicle access restriction

5 'Controlled Zone' management

5.1 General

Central management of traffic flows in a “Controlled Zone” (CZ) is complex, and to date has proven difficult, and may technically involve downloading data to an “In-Vehicle System” (IVS), e.g. an ITS station unit (ITS-SU) specified in ISO 21217 or a navigation device, or may be undertaken by control of traffic signals (for example in a ferry: boarding and customs-controlled zone), or by a combination of both.

Controlling access to urban zones, i.e. applying respective access restrictions, is also referred to as “Urban Vehicle Access Restriction” (UVAR).

At the time of writing this document, the European Commission is developing a Delegated Regulation that, for reasons of safety of life issues, will enable or enforce new vehicles to be equipped with ITS-SUs, from which point ACES geofencing becomes a practical and cost-effective option.

5.2 CZ manager

In order to identify a CZ and to achieve control of it, an authority, i.e. an entity or body or person, has to manage the CZ. Within this document that role is called the “Controlled Zone Manager”. In administrative terms there are many ways this can be instantiated, and that is a matter of local policy, and not determined in this document.

Every CZ created by a CZ manager shall be globally uniquely identified by a CZ identifier. The CZ identifier is designed as a universal object identifier (OID).

NOTE Organisations acting as a CZ manager need an OID assigned to them. Subsequent branches, e.g. used for CZ purposes, are managed by the organization itself. That enables globally unique CZ identifiers without the need for creating a respective registration authority.

The CZ manager is in charge of disseminating information on existence of its CZs and the related CZ access conditions such that potential road users are informed in due time about restrictions to access CZ areas.

5.3 Controlled zone

A CZ is defined as a physical location which has restricted access defined by CZ access conditions, see 5.4, and optional CZ exemptions, see 5.5, including information on timely validity. The location of a CZ, i.e. the CZ area, may be defined quite differently, e.g. being:

— a linear location, e.g. a street identified by the street name;

— a contiguous two-dimensional area, optionally with “holes”;

— a contiguous three-dimensional space, optionally with “holes”;

— a set of non-overlapping contiguous locations / areas / spaces with or without “holes”;

— one or several identified streets or segments thereof;

— a complete city;

— any other reasonable definition.

However, once the definition of a CZ area changes, the previously valid CZ identifier shall become invalid, and a new CZ identifier shall be assigned.

The boundary of a CZ shall be designed such that it is outside of the CZ area.

NOTE 1 The examples used in this document are provided as examples of how CZs can be applied and do not represent accurate representations of current regulations in place at the time of the development of this document.

EXAMPLE The centre of the city of Ulm in Germany is surrounded by streets and segments of streets, see Figure 1. The boundary of the CZ “centre of the city of Ulm” is given by (1) Bahnhofsplatz, (2) segment of Olgastrasse between Bahnhofsplatz and Salzstadelgasse, (3) segment of Salzstadelgasse between Olgastrasse and car park “Salzstadel”, (4) segment of Olgastrasse between Salzstadelgasse and Frauenstrasse, (5) segment of Frauenstrasse between Olgastrasse and Neue Strasse, (6) segment of Neue Strasse between Frauenstrasse and Friedrich-Ebert-Strasse, (7) segment of Friedrich-Ebert-Strasse between Neue Strasse and Bahnhofsplatz. CZ users, disregard of the given CZ access conditions, are allowed to use these streets that define the CZ boundary. This allows also accessing the car parks located at the boundary of this CZ, e.g. from “Olgastraße” following “Salzstadelgasse” up to “Museum der Brotkultur”, below which the car park “Salzstadel” is located.

Figure 1 — Example of CZ "centre of the city of Ulm"

CZs may be

— located adjacent to each other,

— overlapping with other CZs for other control purposes; thus, multiple CZs can exist in the same physical geographical location.

There may be exemptions applicable for explicitly identified CZ users or CZ user groups, i.e. for preferred CZ users; see 5.5.

Figure 2 provides an example of three different and overlapping CZs in a city.

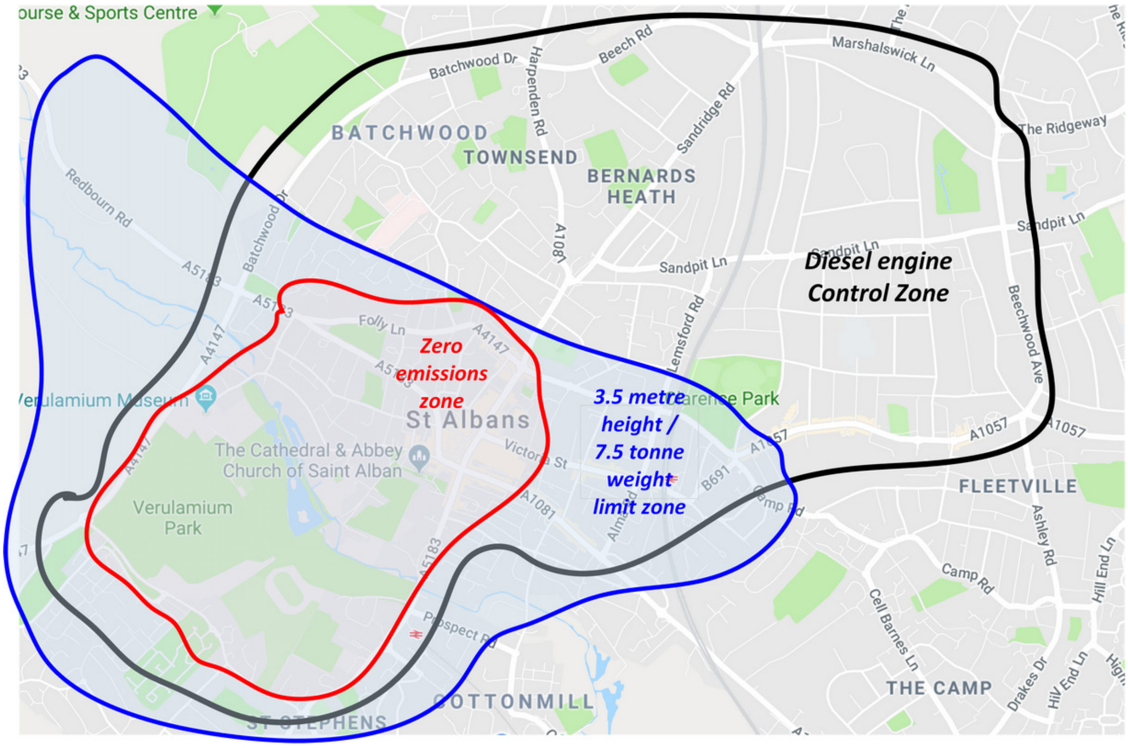

Figure 2 — Co-located control zones

Figure 2 shows a geographical area with three CZs:

— The first, and largest, in this example, is a “diesel engine control zone”, where there is a ban on the use of diesels prior to Euro Class 5, and time-of-day limitations on the use of any diesel.

— The second CZ is a “vehicle size-controlled zone” that covers an area both inside and outside of the “diesel engine control zone” (but not all of the “diesel engine control zone”) and prohibits both tall and heavy or wide vehicle traffic because of narrow roads and low bridges.

— The third CZ is a “zero tailpipe emission zone” in the historic city centre and its main shopping street. It is located entirely within the two other CZs and controls on the single parameter of zero tailpipe emissions.

In this example, Folly Ln and Verulamium Park would be associated with three CZ identifiers so that the route enquiry would work through the three CZ requirements, whilst most of Camp road and part of Victoria street would be associated with two CZ identifiers, and Redbourn Road and most of Prospect Road would be associated only with one CZ identifier as would Harpenden road and most of Sandpit lane.

Note that, in this example, the “diesel engine control zone” covers multiple factors in respect of diesel vehicles. The “vehicle size-controlled zone” covers height, weight, and width restriction in a common zone that is in part within the “diesel engine control zone” and part outside the “diesel engine control zone”. (overlapping CZs).

The CZ user thus has to evaluate up to three sets of CZ access conditions, see 5.3, of up to three CZs. The result will be the granted access conditions.

This document does not impose any design requirements on CZ managers. Thus, CZ managers have the free choice on how to define CZs and the related CZ access conditions, e.g. whether they define a new CZ per CZ access condition, or whether they define several CZ access conditions per CZ, if applicable. With