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Intelligent transport systems - Traffic management systems - Status, fault and quality requirements

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English Version

Intelligent transport systems - Traffic management systems - Status, fault and quality requirements

Intelligente Verkehrssysteme - Verkehrsmanagementsysteme - Status-, Fehler- und Qualitätsanforderungen

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European foreword

This document (CEN/TS 17241:2019) 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

General deployment of Intelligent Transport Systems (ITS) in the field of road transport and for interfaces with other modes of transport is demanded by Directive 2010/40/EU [3] of the European Parliament. ITS means “applying information technology and communications technology for improving traffic, especially road traffic”.

Urban Intelligent Transport Systems (U-ITS) is a term indicating the provisioning of ITS services applying ITS technologies in an urban context. Development of standards dedicated to U-ITS is supported by the European Commission's mandate M/546 [2] with technical details identified in the final report [1] of project team PT1701 funded under M/456. U-ITS standards will complement those for cooperative ITS (C-ITS) developed under the European Commission's mandate M/453, see [4]. Thus the basic ITS technologies applied for U-ITS are the same as those applied for C-ITS.

Provisioning of ITS services typically may require communications between ITS station units (ITS-SU) [20]. Diverging requirements for communications and limitations of capabilities of available communication channels led to the concept of Hybrid Communications providing multiple communication protocol stacks with different access technologies for localized communications and networked communications together with the capability of handover, specified in a series of standards, ISO 21217 [20], ISO 21218 [21], EN ISO 17423 [14], ISO 24102-6 [24], ISO 21215 [19], ISO 17515-3 [16], ISO 21210 [18], ISO 29281-1, and others.

A major characteristics of C-ITS is the sharing of data between ITS applications in the same ITS-SU and in different ITS-SUs. A major service domain of C-ITS is the domain of road safety and traffic efficiency, with a certain focus on wireless communications between ITS-SUs installed in vehicles, also referred to as Vehicle ITS-SU (V-ITS-SU), and wireless communications between V-ITS-SUs and ITS-SUs installed at the roadside, also referred to as Roadside ITS-SU (R-ITS-SU).

Major differences between U-ITS and C-ITS are the data and procedures necessary for the provisioning of dedicated urban ITS services, although data and procedures developed for C-ITS might also be beneficially applied in U-ITS.

Whilst C-ITS focused on the road safety domain U-ITS deals with the ITS service domains

Multimodal Information Systems;
Traffic Management;
Urban Logistics;

see [1].

A major goal to be achieved with U-ITS standards is to assist urban administration to implement U-ITS, and by this removing barriers for implementing U-ITS [1]:

1) Awareness of what is available;

2) Location referencing;

3) Vendor lock-in;

4) Standards for “new modes” and “new measures”;

5) Data exchange / data management;

6) Immaturity of some concepts.

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A precise definition of the borderline between U-ITS and ITS for other target domains, e.g. ITS on highways, is impossible. However, this document aims on identifying and specifying ITS issues that are relevant for urban administrations. It is important to understand that ITS issues developed for urban areas also may be applicable outside of urban areas.

Development of standards for U-ITS has to consider automated and autonomous vehicles [1].

This document was developed by project team PT1704 funded by the European Commission under grant agreement SA/CEN/GROW/EFTA/546/2016-08 'Urban ITS - Traffic management systems' (M/546 [2]). The scope of this document results from the High Level Recommendation "17(1 HLRd Traffic Management System status, fault and quality standards" identified in Bibliographical Entry [1]. This document is about quality and performance criteria:

— applied for the operation of traffic management systems,

— considering the effective integration of field and centre

  — devices and

  — services,

— and approaches to evaluate them.

PT1704 acknowledges the help of

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USA

to develop the ASN.1 equivalent code from the XSD code produced by the UML design tool (Enterprise Architect [39]). OSS voluntarily processed the XSD files provided by PT1704 with their *XSD- >* ASN.1 *Translator* tool [38].

Clause 5 is arranged as a text book, introducing and explaining quality and performance criteria, and approaches to their evaluation, for the operation of traffic management systems, including factors affecting the effective integration of field and centre systems and services. Where appropriate, it refers to the data model specified in Clause 6. Normative requirements are avoided in order not to impose requirements on urban administrations on how to perform their work.

Clause 6 specifies a data model for system status and faults of components of traffic management systems using UML and being based on DATEX II. The design is flexible, i.e. supporting communications between central stations, i.e. the original usage of DATEX II, but also communications between a field device and a central station. Further on it introduces the concept of "catalogues" allowing vendors and urban administrators defining their own data sets.

The informative Annex E illustrates the general findings of Clause 5 using a use-case "tunnel project". To a large extent there is a one-to-one mapping of subclauses from Clause 5 with subclauses from Annex E.

The normative Annex A specifies a status and fault dictionary.

The normative Annex B provides an ASN.1 module for the data specified in Annex A.

The normative Annex C provides a contribution to the CEN work item on management of electronic traffic rules (METR).

The normative Annex D provides information about the existence and the content of an electronic attachment to this document.

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1 Scope

This document:

— illustrates quality and performance criteria, and approaches to their evaluation, for the operation of traffic management systems, including factors affecting the effective integration of field and centre systems and services, and

— specifies a data model for system status and faults of components of traffic management systems.

This document provides supporting information in a use case for the use of the quality and performance criteria, considering design, procurement, and performance management.

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 ISO 17419[1], *Intelligent transport systems — Cooperative systems — Globally unique identification (ISO 17419)*

ISO 29281-1, *Intelligent transport systems -- Localized communications -- Part 1: Fast networking & transport layer protocol (FNTP)*

ISO/IEC 8824-1, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation — Part 1*

ISO/IEC 8825-2, *Information technology — ASN.1 encoding rules: Specification of Packed Encoding Rules (PER) — Part 2*

ISO/IEC 8825-5, *Information technology — ASN.1 encoding rules: Mapping W3C XML schema definitions into ASN.1 — Part 5*

ISO/IEC 9834-1, *Information technology — Procedures for the operation of object identifier registration authorities: General procedures and top arcs of the international object identifier tree — Part 1*

3 Terms and definitions

No terms and definitions are listed in this document.

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

[1] The next edition of ISO 17419 will be split into a two-part document.

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