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Intelligent transport systems - Urban ITS - Use of regional traffic standards in a mixed vendor environment

Systèmes de transport intelligents - ITS urbain - Utilisation des normes de trafic régionales dans un environnement mixte

Intelligente Transportsysteme - Urbane Verkehrssysteme - Verwendung regionaler herstellerspezifischer Normen und Spezifikationen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (CEN/TS 17402:2020) 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

The standard deliverables "Mixed Vendor Environment Guide" CEN/TR 17401, "Mixed vendor environments methodologies & translators" CEN/TS 17400, and this document provide a suite of standards designed to achieve successful implementation of "Urban-Intelligent Transport Systems" (U-ITS) in a mixed vendor environment.

This suite of standards supports the family of existent standards, referencing both common communications protocols and data definitions, that, in combinations, enable Urban-ITS (and ITS in general) to function and be managed, and will reference application standards, and their interdependencies and relationships.

Urban authorities use an increasing array of ITS implementations to deliver their services. Historically, urban ITS implementations have tended to be single solutions provided to a clear requirements specification by a single supplier. Increasingly, as ITS opportunities become more complex and varied, they involve the integration of multiple products from different vendors, procured at different times and integrated by the urban authority.

The need for a mixture of systems provided by different manufacturers to so-called "Mixed Vendor Environments" (MVEs) is a growing paradigm, which results primarily from the demand for the introduction of competition in the context of public tenders, and the increasing networking of existing stand-alone solutions to address complex traffic management systems.

The mix of systems of different manufacturers is also, in part, a result from technological changes. Established companies are suddenly in competition with new companies that exploit technological changes and offer exclusively, or at a reasonable price, new or improved functionality for sub-systems.

However, ITS design is often proprietary and, as a consequence, integration and interoperability can be difficult, time-consuming, and expensive, limiting the ability of urban authorities to deploy innovative solutions to transport problems. In some member states of the European Union, national/regional solutions to this problem have been created, and there are also some solutions in specific domains, which have been very beneficial. However, these are not uniform across the EU, compromising the efficiency of the single market.

This document focuses specifically on the area of traffic management systems in an MVE, identifies appropriate standards to use to enable an MVE, and addresses aspects associated with the accommodation of regional traffic standards in such mixed vendor environments, with particular emphasis on the centre/field systems context. This document also provides information regarding MVE provisions in the public transport domain.

This document should be read together with CEN/TR 17401, which provides a 'Guide' giving a high level introduction into the "Concept of Operations" (CONOPS) for MVEs; provides a high-level architectural context explanation of an MVE and its operational requirements, and describes the problems and effects that are associated with vendor lock-in. It also provides a systematic approach for many aspects of U-ITS implementations, and indeed almost all ITS MVE implementations; and provides a methodical guideline with a procedural model, in order to provide assistance to implementers and managers involved with the structure of an MVE and/or with the removal of vendor lock-in.

This document should also be considered together with CEN/TS 17400, which provides the methodologies and translators to avoid vendor lock-in, introducing suitable methodologies for system architecture design, making appropriate use of standards, and specifications to be used when translator systems are adopted.

Over many decades, regional traffic interface standards have evolved and been implemented around Europe. Implemented, they cannot be replaced in the near term. This document is designed to show how they can operate, co-exist and evolve in an MVE over time.

This document also describes the major existing regional traffic standards established in Europe, such as OCIT, UTMC, DVM/IVERA, and the data exchange provisions provided in the DATEX II series of standards, and how these regional traffic standards and DATEX II are used in MVE or to avoid vendor lock-in. This document recognizes that there are other implemented local traffic management standards and is designed to enable them to also seek to achieve an MVE accommodation path.

The organization of the deliverable is based on functionality, and will provide framework overviews, and minimum system requirements for ITS service provision in the context of regional traffic standards MVEs.

1 Scope

This document provides a background to the relevance of standards concerning mixed vendor environments in the context of urban-ITS. It describes key mixed vendor environments interfaces.

It identifies existing open specifications for

— sensor systems;

— traffic control;

— traffic information;

— public transport information;

— distributed C-ITS;

— central systems.

It provides common specifications of

— sensor systems;

— traffic control;

— traffic information;

— public transport information;

— distributed C-ITS;

— central systems.

It describes openly plied proprietary standards and extant communications protocols that can be used in mixed vendor environments in the context of U-ITS.

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 12896 (all parts), *Public transport - Reference data model*

EN 12966, *Road vertical signs - Variable message traffic signs*

EN 13149 (all parts), *Public transport - Road vehicle scheduling and control systems*

EN 15509, *Electronic fee collection - Interoperability application profile for DSRC*

CEN/TS 15531 (all parts), *Public transport - Service interface for real-time information relating to public transport operations*

CEN/TS 16157 (all parts), *Intelligent transport systems - DATEX II data exchange specifications for traffic management and information*

CEN/TS 16614 (all parts), *Public transport - Network and Timetable Exchange (NeTEx)*

EN ISO 17419, *Intelligent transport systems - Cooperative systems - Globally unique identification (ISO 17419:2018)*

EN ISO 18750:2018, *Intelligent transport systems - Co-operative ITS - Local dynamic map (ISO 18750:2018)*

CEN ISO/TS 19321:2015, *Intelligent transport systems — Cooperative ITS — Dictionary of in-vehicle information (IVI) data structures*

CEN/TS 17380, *Intelligent transport systems - Urban-ITS - 'Controlled Zone' management for UVARs using C-ITS*

CEN/TS 17400:2020, *Intelligent Transport Systems – Urban-ITS – Mixed vendor environments methodologies & translators*

CEN/TR 17401:2020, *Intelligent Transport Systems – Urban-ITS – Mixed Vendor Environment Guide*

ISO 14906, *Electronic fee collection — Application interface definition for dedicated short-range communication*

ISO/TS 16460:2018, *Intelligent transport systems — Communications access for land mobiles (CALM) — Communication protocol messages for global usage*

ISO 17572-2, *Intelligent transport systems (ITS) — Location referencing for geographic databases — Part 2: Pre-coded location references (pre-coded profile)*

ISO 17572-3, *Intelligent transport systems (ITS) — Location referencing for geographic databases — Part 3: Dynamic location references (dynamic profile)*

ISO/TS 19091, *Intelligent transport systems — Cooperative ITS — Using V2I and I2V communications for applications related to signalized intersections*

ISO 20684 (all parts), *Intelligent transport systems — Roadside modules SNMP data interface*

ISO/TS 21177, *Intelligent transport systems – ITS-station security services for secure session establishment and authentication between trusted devices*

ISO/TS 21184, *Intelligent transport systems – Management of messages containing information of sensor and control networks specified in data dictionaries*

ISO 21210, *Intelligent transport systems — Communications access for land mobiles (CALM) — IPv6 Networking*

ISO 21215:2018, *Intelligent transport systems — Localized communications — ITS-M5*

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

ISO/TS 21219 (all parts), *Intelligent transport systems — Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2)*

ISO 22418:2018, *Intelligent transport systems — Fast service announcement protocol (FSAP)*

ISO 24532, *Intelligent transport systems — Systems architecture, taxonomy and terminology — Using CORBA (Common Object Request Broker Architecture) in ITS Standards, data registries and data dictionaries*

ISO 29281-1:2018, *Intelligent transport systems — Localized communications — Part 1: Fast networking & transport layer protocol (FNTP)*

ETSI TS 102 687 (2011-07), *Intelligent Transport Systems (ITS); Decentralized Congestion Control Mechanisms for Intelligent Transport Systems operating in the 5 GHz range; Access layer part*

ETSI TS 102 724 (2011-07), *Intelligent Transport Systems (ITS); Harmonized Channel Specifications for Intelligent Transport Systems operating in the 5 GHz frequency band*

ETSI TS 102 792 (2015-06), *Intelligent Transport Systems (ITS); Mitigation techniques to avoid interference between European CEN Dedicated Short Range Communication (CEN DSRC) equipment and Intelligent Transport Systems (ITS) operating in the 5 GHz frequency range*

ETSI TS 103 097 *(2017-10),* Intelligent Transport Systems (ITS); Security; Security header and certificate formats

ETSI EN 302-637-2:2014-09, *Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 2: Specification of Cooperative Awareness Basic Service*

ETSI EN 302-637-3:2014-09, *Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 3: Specifications of Decentralized Environmental Notification Basic Service*

IEEE Std 802.11™, *IEEE Standard for Information technology–Telecommunications and information exchange between systems Local and metropolitan area networks–Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications*

SAE J2735, *Dedicated Short Range Communications (DSRC) Message Set Dictionary*

SAE J2945/1, *On-Board System Requirements for V2V Safety Communications*

ITU-T E.163, *Numbering plan for the international telephone service*

ITU-T E.164 (all parts), *The international public telecommunication numbering plan*

IEC 60870-5-101, *Transmission Protocols - companion standards especially for basic telecontrol tasks*

ISO/IEC 18000, *Information technology — Radio frequency identification for item management*

ISO/IEC 19501:2005, *Information technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2*

IETF RFC 3411, *An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks*

IETF RFC 3412, *Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)*

IETF RFC 3413, *Simple Network Management Protocol (SNMP) Applications*

IETF RFC 3414, *User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)*

IETF RFC 3415, *View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)*

IETF RFC 3416, *Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)*

IETF RFC 3417, *Transport Mappings for the Simple Network Management Protocol (SNMP)*

IETF RFC 3418, *Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)*

NF P 99071-1 *(septembre 2002):* Régulation du trafic routier par feux de circulation - Spécification du dialogue standard des équipements de régulation de trafic - Diaser

RTIGT008, *Radio Link Specification for RTI-driven Traffic Light Priority and Display Clear down*

RTIGT030, *Digital Air Interface Protocol*

RTIGT031, *Centre-to-centre traffic signal priority request protocol*

RTIGT035, *Language and terminology in Real Time Information systems*

RTIGT036, *Additional information on RTI signs*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21217:2014 and the following 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
Demand Responsive Transit
form of transport where vehicles alter their routes based on particular transport demand rather than using a fixed route or timetable; vehicles typically pick-up and drop-off passengers in locations according to passengers needs

3.2
hybrid communications
simultaneous operation of various communication technologies or operation via a choice from more than one available communication medium dependent on application requirements and applicable regional regulations and specifications

3.3
inter-green interlock
functionality within a signal controller that prevents traffic on conflicting paths through a junction from being assigned a green phase simultaneously