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Intelligent transport systems — Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV) —

Part 9: Remote digital tachograph monitoring

Systèmes intelligents de transport — Cadre pour applications télématiques coopératives pour véhicules de fret commercial réglementé (TARV) —

Partie 9: Monitorage du tachygraphe électronique à distance (RTM)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This first edition of ISO 15638-9 cancels and replaces ISO/TS 15638-9:2013, which has been technically revised. The main changes compared to the previous edition are as follows:

— Inclusion of remote inspection using short-range wireless interrogator for enforcement inspection purposes.

A list of all parts in the ISO 15638 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Many ITS technologies have been embraced by commercial transport operators and freight owners in the areas of fleet management, safety and security. On-board applications have also been developed for governmental use. Such regulatory services in use or being considered vary from jurisdiction to jurisdiction, but include electronic on-board recorders, digital tachograph, on-board mass monitoring, 'mass' data for regulatory control and management, weigh-in-motion, vehicle access methods, hazardous goods tracking and eCall. Additional applications with a regulatory impact being developed include fatigue management, speed monitoring and vehicle penalties imposed based on location, distance and time.

In such an emerging environment of regulatory and commercial applications, it is timely to consider an overall architecture (business and functional) that could support these functions from a single platform within a commercial freight vehicle that operates within such regulations. International Standards will allow for a speedy development and specification of new applications that build upon the functionality of a generic specification platform. A series of standards deliverables is required to describe and define the framework and requirements so that the on-board equipment and back office systems can be commercially designed in an open market to meet common requirements of jurisdictions.

The ISO 15638 TARV series addresses and defines the framework for a range of cooperative telematics applications for regulated vehicles (e.g. access methods, driver fatigue management, speed monitoring, on-board mass monitoring, Remote Tachograph Monitoring, ADR management). The overall scope includes the concept of operation, legal and regulatory issues, and the generic cooperative provision of services to regulated vehicles, using an on-board ITS platform. The framework is based on a (multiple) service provider-oriented approach with provisions for the approval and auditing of service providers.

The ISO 15638 series provides both the means to achieve current requirements for telematics applications for regulated vehicles and the basis for future development of cooperative telematics applications for regulated vehicles.

The ISO 15638 series is timely, as many governments (Europe, North America, Asia and Australia/New Zealand) are considering the use of telematics for a range of regulatory purposes.

This document provides specifications for weigh-in-motion and on-board weighing monitoring and supports several defined communication profiles in which this function may be performed.

NOTE 1 The definition of what comprises a 'regulated' vehicle is regarded as an issue for national decision and can vary from jurisdiction to jurisdiction. This series does not impose any requirements on nations in respect of how they define a regulated vehicle.

NOTE 2 The definition of what comprises a 'regulated' service is regarded as an issue for national decision and can vary from jurisdiction to jurisdiction. This series does not impose any requirements on nations in respect of which services for regulated vehicles jurisdictions they will require, or support as an option, but will provide standardized sets of requirements descriptions for identified services to enable consistent and cost-efficient implementations where implemented.

Intelligent transport systems — Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV) —

Part 9: Remote digital tachograph monitoring

1 Scope

This document addresses the provision of 'Remote Digital Tachograph Monitoring' and specifies the form and content of the transmission of such data required to support such systems, and access methods to that data.

This document provides specifications for common communications and data exchange aspects of the application service remote digital tachograph monitoring that a jurisdiction regulator can elect to require or support as an option, including:

a) High level definition of the service that a service provider provides. The service definition describes common service elements but does not define the detail of how such an application service is instantiated, nor the acceptable value ranges of the data concepts defined.

b) Means to realize the service.

c) Application data naming, content and quality that an IVS delivers, including a number of profiles for data (noting that requirements and constraints of what can/cannot be transmitted over the air can vary between jurisdictions).

d) Support for a number of defined communication profiles to enable remote inspection.

This document is not applicable for analogue tachograph equipment/systems.

This document provides specifications for the following communication profiles:

— **Communication Profile C1: Roadside inspection using a short-range wireless communication interrogator instigating a physical roadside inspection (master<>slave)**

  Profile C1a: via a hand aimed or temporary roadside mounted and aimed interrogator

  Profile C1b: via a vehicle mounted and directed interrogator

  Profile C1c: via a permanent or semi-permanent roadside or overhead gantry

— **Communication Profile C2: Roadside inspection using a short-range wireless communication interrogator instigating a download of data to an application service provider via an ITS-station communication (master<>slave + peer<>peer)**

  Profile C2a: via a hand aimed or temporary roadside mounted and aimed interrogator

  Profile C2b: via a vehicle mounted and directed interrogator

  Profile C2c: via a permanent or semi-permanent roadside or overhead gantry

— **Communication Profile C3: Remote inspection addressed via an ITS-station instigating a download of data to an application service provider via a wireless communications interface** (as defined in ISO 15638-2).

It is possible that subsequent versions of this document will support additional communication profiles.

NOTE 1 The definition of what comprises a ‘regulated’ service is regarded as an issue for national decision and can vary from jurisdiction to jurisdiction. This document does not impose any requirements on nations in respect of which services for regulated vehicles jurisdictions will require, or support as an option, but provides standardized sets of requirements descriptions for identified services to enable consistent and cost-efficient implementations where instantiated.

NOTE 2 The ISO 15638 series has been developed for use in the context of regulated commercial freight vehicles (hereinafter referred to as ‘regulated vehicles’). However, there is nothing to prevent a jurisdiction from extending or adapting the scope to include other types of regulated vehicles, as it deems appropriate.

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.

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

ISO 15638-1, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 1: Framework and architecture*

ISO 15638-2, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 2: Common platform parameters using CALM*

ISO 15638-3, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 3: Operating requirements, 'Approval Authority' procedures, and enforcement provisions for the providers of regulated services*

ISO/TS 15638-4, *Intelligent transport systems — Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV) — Part 4: System security requirements*

ISO 15638-5:2013, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 5: Generic vehicle information*

ISO 15638-6:2014, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 6: Regulated applications*

ERC 70-03, *ERC RECOMMENDATION 70-03 Relating To The Use Of Short Range Devices (Srd)*

ETSI EN 300-674-1, V1.2.1:2004-08, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC) transmission equipment (500 kbit/s / 250 kbit/s) operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band; Part 1: General characteristics and test methods for Road Side Units (Interrogator) and On-Board Units (OBU)*

ETSI ES 200-674-1, V2.2.1:2011-02, *Intelligent Transport Systems (ITS); Road Transport and Traffic Telematics (RTTT); Dedicated Short Range Communication (DSRC); Part 1: Technical characteristics and test methods for High Data Rate (HDR) data transmission equipment operating in the 5,8 GHz Industrial, Scientific and Medical (ISM) band*

ETSI TS 102-792, V1.2.1:2015-06, *Intelligent Transport Systems (ITS); Mitigation techniques to avoid interference between European CEN Dedicated Short Rang Communication (CEN DSRC) equipment and Inteligent Transport Systems (ITS) operating in the 5 GHz frequency range*

EN 12253, *Road transport and traffic telematics — Dedicated short-range communication — Physical layer using microwave at 5,8 GHz*

EN 12795, *Road transport and traffic telematics — Dedicated Short Range Communication (DSRC) — DSRC data link layer: medium access and logical link control*

EN 12834, *Road transport and traffic telematics — Dedicated Short Range Communication (DSRC) — DSRC application layer*

EN 13372, *Road transport and traffic telematics (RTTT) — Dedicated short-range communication — Profiles for RTTT applications*

ARIB STD-T75, *Dedicated Short-Range Communication*

TTAS KO-06.0025, Standard of *DSRC* Radio Communication between Road-side Equipment and On-board Equipment in 5,8GHz band

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15638-1 and the following apply.

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

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

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

3.1
app
small (usually) *Java™*[1)] (3.21) applets, organized as software bundles, that support *application services* (3.2) by keeping the *data pantry* (3.14) provisioned with up to date data

3.2
application service
service provided by a *service provider* (3.32) enabled by accessing data from the *IVS* (3.18) of a *regulated vehicle* (3.30) via a wireless communications network

3.3
application service provider
ASP
party that provides an *application service* (3.2)

3.4
app library
separately secure area of memory in *IVS* (3.18) where apps are stored with different access controls to *data pantry* (3.14)

3.5
approval
formal affirmation that an applicant has satisfied all the requirements for appointment as an *application service provider* (3.3) or that an application service delivers the required service levels

3.6
approval agreement
written agreement made between an *approval authority (regulatory)* (3.7) and a *service provider* (3.32)

Note 1 to entry: An *approval authority (regulatory)* (3.7) approval agreement recognizes the fact that a *service provider* (3.32), having satisfied the *approval authority's* requirements for appointment as a *service provider,* is appointed in that capacity, and sets out the legal obligations of the parties with respect to the on-going role of the *service provider*.

1) Java™ is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

3.7
approval authority
<regulatory> organization (usually independent) which conducts *approval* (3.5) and ongoing *audit* (3.9) for *service providers* (3.32) on behalf of a *jurisdiction* (3.22)

3.8
architecture
formalized description of the design of the structure of TARV and its *framework* (3.17)

3.9
audit/auditing
review of a party's capacity to meet, or continue to meet, the initial and ongoing *approval agreements* (3.6) as a *service provider* (3.32)

3.10
basic vehicle data
data that shall be maintained/provided by all *IVS* (3.18) regardless of *jurisdiction* (3.22)

3.11
communications access for land mobiles
CALM
layered solution that enables continuous or quasi continuous communications between vehicles and the infrastructure, or between vehicles, using such (multiple) wireless telecommunications media that are available in any particular location, and which have the ability to migrate to a different available media where required and where media selection is at the discretion of *user* (3.37) determined parameters by using a suite of standards based on ISO 21217 (*CALM* architecture) and ISO 21210 (*CALM* networking)

3.12
commercial application(s)
ITS applications in *regulated vehicles* (3.30) for commercial (non-regulated) purposes

EXAMPLE Asset tracking, vehicle and engine monitoring, cargo security, driver management.

3.13
core data
basic vehicle data (3.10) plus any additional data required to provide an implemented *regulated application service* (3.29)

3.14
data pantry
secure area of memory in *IVS* (3.18) where data values are stored with different access controls to *app library* (3.4)

3.15
driver
person driving the *regulated vehicle* (3.30) at any specific point in time

3.16
facilities
layer that sits on top of the communication stack and helps to provide data interoperability and reuse, and to manage applications and enable dynamic real time loading of new applications

3.17
framework
particular set of beliefs or ideas referred to in order to describe a scenario or solve a problem

3.18
in-vehicle system
IVS
ITS-station (3.19) and connected (TARV/RTM) equipment on board a vehicle known in EFC specific equipment as OBE (on-board equipment) or OBU (on-board unit)

Note 1 to entry: Often known in tachograph specific regulations as VU (vehicle unit).

3.19
interrogator
off-board device which can establish a wireless communications session with the IVS and request the provision of tachograph data which is often a mobile device under the control of an agent of the jurisdiction

3.20
ITS-station
ITS-s
entity in a communication network, comprised of application, *facilities* (3.16), networking and access layer components specified that operate within a bounded secure management domain

Note 1 to entry: For details, see ISO 21217.

3.21
Java™
object oriented open source operating language developed by SUN systems

3.22
jurisdiction
government, road or traffic authority which owns the *regulatory applications* (3.28)

EXAMPLE Country, state, city council, road authority, government department (customs, treasury, transport).

3.23
jurisdiction regulator
agent of the *jurisdiction* (3.22) appointed to regulate and manage TARV within the domain of the *jurisdiction* which may or may not be the *approval authority (regulatory)* (3.7)

3.24
operator
fleet manager of a *regulated vehicle* (3.30)

3.25
physical roadside inspection
physical inspection of the tachograph data of a stopped vehicle by agents of the application service provider (usually police or inspectors appointed by the jurisdiction)

3.26
prime service provider
service provider (3.32) who is the first contractor to provide *regulated application services* (3.29) to the *regulated vehicle* (3.30), or a nominated successor on termination of that initial contract and who is also responsible for maintaining the installed *IVS* (3.18)

Note 1 to entry: If the *IVS* was not installed during the manufacture of the vehicle, the *prime service provider* is also responsible for installing and commissioning the *IVS* (3.18).

3.27
profile
common and consistent elaboration of content and sequence of a set of chosen classes, conforming subsets, options, parameters, and/or data concepts to accomplish a particular function/specification

3.28
regulated application
regulatory application
application arrangement using TARV utilized by *jurisdictions* (3.22) for granting certain categories of commercial vehicles rights to operate in regulated circumstances subject to certain conditions, or indeed to permit a vehicle to operate within the *jurisdiction* and which may be mandatory or voluntary at the discretion of the *jurisdiction*

3.29
regulated application service
TARV *application service* (3.2) to meet the requirements of a regulated application that is mandated by a regulation imposed by a *jurisdiction* (3.22), or is an option supported by a *jurisdiction*

3.30
regulated vehicle
vehicle that is subject to regulations determined by the *jurisdiction* (3.22) as to its use on the road system of the *jurisdiction* in regulated circumstances, subject to certain conditions, and in compliance with specific regulations for that class of regulated vehicle and which at the option of *jurisdictions* may require the provision of information via *TARV* or provide the option to do so

3.31
remote tachograph monitoring
RTM
collection, collation, and transfer of data from an on-board electronic *tachograph* (3.35) system to an *application service provider* (3.3)

3.32
service provider
party which is certified by an approval *authority (regulatory)* (3.7) as suitable to provide regulated or commercial ITS *application services* (3.2)

3.33
session
wireless communication exchange between the *ITS-station* (3.19) of an *IVS* (3.18) and the *ITS-station* of its *application service provider* (3.3) to achieve data update, data provision, upload apps, or otherwise manage the provision of the *application service* (3.2), or a wireless communication provision of data to the *ITS-station* of an *IVS* (3.18) from any other *ITS-station*

3.34
specification
explicit and detailed description of the nature and functional requirements and minimum performance of equipment, service or a combination of both

3.35
tachograph
sender unit usually mounted to a vehicle gearbox, a tachograph head and a digital driver card, which records the *regulated vehicle* (3.30) speed and the times at which it was driven and aspects of the *driver's* (3.15) activity selected from a choice of modes

3.36
telematics
use of wireless media to obtain and transmit (data) from a distant source

3.37
user
individual or party that enrols in and operates within a regulated or *commercial application* (3.12) *service* (3.2)

EXAMPLE *Driver* (3.15), transport *operator* (3.24), freight owner.

4 Symbols and abbreviated terms

ADU	Application Data Unit
APDU	application protocol data unit
App	applet (JAVA™ application or similar)
ASN.1	Abstract Syntax Notation One
ASP	application service provider
BER	Bit Error Rate
BLE	Bluetooth Low Energy
BST	Beacon Service Table
CALM	communications access for land mobiles
CAN	controller area network
CRC	cyclic redundancy check
DSRC	Dedicated Short-Range Communication
EID	Element Identifier
EFC	Electronic Fee Collection
EN	European Norm (Standard)
GNSS	Global Navigation Satellite System
ID	Identity
ITS-s	ITS station
IVS	In-vehicle system
L7	Layer 7 of DSRC (Application Layer Core of DSRC)
LID	logical link control identifier
LLC	logical link control
LPDU	link layer protocol data unit
MAC	Media Access Control (Media Access Layer Core of DSRC)
MA-DATA	MAC sublayer primitive to the LLC sublayer
OBE	On-board equipment (EFC term for IVS)
OBU	On-board unit (EFC term for IV unit)
PrWA	private uplink window allocation
PuWA	public uplink window allocation
RR	response request

RSU	Road-side unit (EFC term for roadside interrogator)
RTM	remote tachograph monitoring
SAP	Service access point
SE	service element
T-APDU	Transfer-Application Protocol Data Unit
TARV	telematics applications for regulated vehicles
VST	vehicle service table
VU	vehicle unit (EU regulatory term for tachograph IVS)
WGS84	World Geodetic System 1984
Ms	Microsecond

5 Conformance

Requirements to demonstrate conformance to any of the general provisions or specific application services described in this document shall take into consideration the data requirements imposed by the jurisdiction where they are instantiated.

Systems claiming conformance with this document may support one or more of Communication Profiles C1, C2 and C3 as defined in Clause 1, but shall support at least one of these options.

Systems that wish to claim conformance with TARV ITS-station<>ITS station communications, shall support at least communication profile C3, together with conformance to ISO 15638 Parts 1 to 6.

Jurisdictions requiring and regulating the use of remotely monitored tachographs are recommended to specifically regulate in the case of the use of Profile C1 and/or Profile C2. It is further recommended (but not required) that jurisdictions whose data requirements require support of Profile C1 for regulatory enforcement purposes also at least encourage the ability to technically support Profiles C2 and C3 in addition (for later potential migration purposes).

6 General overview and framework requirements

6.1 General

This document addresses the provision of 'Remote Digital Tachograph Monitoring' and specifies the form and content of the transmission of such data required to support such systems, and access methods to that data.

This document is appropriate for digital tachograph systems. It is not appropriate for analogue tachograph systems.

ISO 15638-1 provides a framework and architecture for TARV. It provides a general description of the roles of the actors in TARV and their relationships.

For a clear understanding of the TARV framework, architecture and detail and specification of the roles of the actors involved, the reader is referred to ISO 15638-1.

ISO 15638-6 provides the core requirements for all regulated applications. For a clear explanation of the general context into which the provision of this application service is provided, the reader is referred to ISO 15638-6.

The present version of this document provides specifications for the following Communication Profiles:

— **Communication Profile C1: Roadside inspection using a short-range wireless communication interrogator instigating a physical roadside inspection (master<>slave)**

  Profile C1a: via a hand aimed or temporary roadside mounted and aimed interrogator;

  Profile C1b: via a vehicle mounted and directed interrogator;

  Profile C1c: via a permanent or semi-permanent roadside or overhead gantry.

  See 6.2 for overview.

— **Communication Profile C2: Roadside inspection using a short-range wireless communication interrogator, instigating a download of data to an application service provider (master<>slave + peer<>peer)**

  Profile C2a: via a hand aimed or temporary roadside mounted and aimed interrogator;

  Profile C2b: via a vehicle mounted and directed interrogator;

  Profile C2c: via a permanent or semi-permanent roadside or overhead gantry.

  See 6.3 for overview.

— **Communication Profile C3: Remote inspection addressed via an ITS-station instigating a download of data to an application service provider via a wireless communications interface (peer<>peer)** (as defined in ISO 15638-2)

  See 6.4 for overview.

NOTE Within the Member States of the European Union, remote tachograph monitoring is controlled by Regulation 2016/799/EC and its Appendix 14, which was published on 2016-05-26 and entered into force from 2016-06-15. This constrains remote tachograph monitoring in the European Union to the transaction defined in Annex B using 5,8 GHz DSRC. Annex B is consistent with this Regulation. For European regulatory requirements regarding the short-range communications interface see 2016/799/EC Appendix 14.

6.2 Overview of Communication Profile C1 — Remote roadside inspection using a short-range wireless communication interrogator instigating a physical roadside inspection

6.2.1 General overview of Communication Profile C1

This profile covers the use case where an agent of the jurisdiction:

a) Uses a short-range communication interrogator to remotely identify a vehicle which is potentially in violation of the tachograph regulations of the jurisdiction.

b) Once identified, the agent of the jurisdiction controlling the interrogation decides whether the vehicle should be stopped, and if so, instructs colleagues downstream to stop the vehicle and effect a physical download of data from the vehicle, or may pass the data directly to them to enable them to make such decisions.

This scenario is appropriate (but not limited to) situations where local data requirements require the physical ‘arrest’ of a vehicle potentially in violation of regulations and/or where the regulations require a physical download of data made by an agent of the jurisdiction, directly from the ‘arrested’ vehicle in order to support a prosecution, and/or situations where data concerning the driver is prohibited from being sent via wireless communications.

There are three subset profiles of this remote inspection:

