INTERNATIONAL STANDARD

ISO 15638-20

First edition
2020-07

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

Part 20:
Weigh-in-motion monitoring

This document is a preview generated by EVS

Reference number
ISO 15638-20:2020(E)

© ISO 2020

This document is a preview generated by EVS

COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **2**
3 Terms and definitions **3**
4 Symbols and abbreviated terms **7**
5 Conformance **9**
6 General overview and framework requirements **9**
6.1 General 9
6.2 Overview of Communication Profile C1 — Remote roadside inspection using a short-range wireless communication interrogator instigating a physical roadside inspection 10
6.2.1 General overview of Communication Profile C1 10
6.3 Overview of Communication Profile 2 — Roadside inspection using a short-range wireless communication interrogator, instigating a download of data to an application service provider 12
6.3.1 General overview of Communication Profile 2 12
6.4 Overview of 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) 13
6.4.1 General overview of Communication Profile C3 13
6.5 Communications requirements 15
6.5.1 General communications requirements 15
6.5.2 Communications profile C1 requirements 15
6.5.3 Communications profile C2 requirements 15
6.5.4 Communications profile C3 requirements 15
7 Requirements for services using generic vehicle data **16**
8 Application services that require data in addition to basic vehicle data **16**
8.1 General 16
8.2 Quality of service requirements 16
8.3 Test requirements 16
8.4 Marking, labelling and packaging 16
9 Common features of regulated TARV application services **16**
9.1 General 16
9.1.1 Communication Profiles C1 and C2 17
9.1.2 Communication Profile C3 18
9.2 Common role of the jurisdiction, approval authority, service provider and user 19
9.3 Common characteristics for instantiations of regulated application services 20
9.4 Common sequence of operations for regulated application services 20
9.5 Quality of service 20
9.6 Information security 20
9.7 Data naming content and quality 21
9.8 Software engineering quality systems 21
9.9 Quality monitoring station 21
9.10 Audits 21
9.11 Data access control policy 21
9.12 Approval of IVSs and service providers 21
10 Weigh-in-motion (WIM) **22**
10.1 TARV WIM service description and scope 22
10.1.1 Generic TARV WIM use case via the application service provider 22

This document is a preview generated by EVS

© ISO 2020 – All rights reserved

10.1.2 Types of weigh-in-motion 22
10.1.3 WIM-O (weigh-in-motion system Onboard) 23
10.1.4 WIM-R (weigh-in-motion system Roadway) 23
10.1.5 Storage of the WIM data on-board the vehicle 23
10.1.6 WIM inspection and Communication Profiles 23
10.1.7 Specific use case of weigh-in-motion inspection by an inspector of the jurisdiction using short range equipment (Communication profiles 1 and 2) 24
10.1.8 Description of TARV WIM regulated application service 24
10.1.9 Description of TARV WIM application service 25
10.2 Concept of operations for TARV WIM 26
10.2.1 General 26
10.2.2 Statement of the goals and objectives of the TARV WIM system 26
10.2.3 Strategies, tactics, policies, and constraints affecting the TARV WIM system 26
10.2.4 Organizations, activities, and interactions among participants and stakeholders of TARV WIM 27
10.2.5 Clear statement of responsibilities and authorities delegated for TARV WIM 27
10.2.6 Equipment required for TARV WIM 30
10.2.7 Operational processes for the TARV WIM system 31
10.2.8 Role of the jurisdiction for TARV WIM 31
10.2.9 Role of the TARV WIM prime service provider 31
10.2.10 Role of the TARV WIM application service provider 31
10.2.11 Role of the TARV WIM user 31
10.2.12 Generic characteristics for all instantiations of the TARV weigh-in-motion (WIM) application service 31
10.3 Sequence of operations for TARV WIM 32
10.3.1 General 32
10.4 TARV WIM service elements 34
10.4.1 TARV WIM service element (SE) 1 — Establish 'weigh-in-motion' regulations, requirements, and approval arrangements 34
10.4.2 TARV WIM SE2 — Request system approval 34
10.4.3 TARV WIM SE3 — User (fleet owner) contracts with prime service provider 34
10.4.4 TARV WIM SE4 — User (fleet owner) equips vehicle with a weigh-in-motion system 34
10.4.5 TARV WIM SE5 — User contracts with application service provider 34
10.4.6 TARV WIM SE6 — Application service provider uploads software into the TARV equipped vehicles of the fleet owner 34
10.4.7 TARV WIM SE7 — Create Data 34
10.4.8 TARV WIM SE8 — Recording of weigh-in-motion data 35
10.4.9 TARV WIM SE10 — 'Interrogated' request for weigh-in-motion data 35
10.4.10 TARV WIM SE9 — Pre-programmed interval sending weigh-in-motion data to application service provider (Communication Profile 3) 37
10.4.11 TARV WIM SE11 — End of session 38
10.5 Generic TARV WIM data naming, content and quality 38
10.6 WIM data content 38
10.7 TARV WIM application service specific provisions for quality of service 38
10.8 TARV WIM application service specific provisions for test requirements 39
10.9 TARV WIM application specific rules for the approval of IVSs and 'Service Providers' 39

Annex A (informative) **WIM communication and transaction profiles** **40**

Annex B (normative) **Communication Profile for 5,8 GHz DSRC communications** **47**

Annex C (informative) **Example application data 'profiles' for 'weigh-in-motion'** **91**

Annex D (informative) **End user considerations for deployment and use of 'weigh-in-motion' systems** **104**

Bibliography **106**

This document is a preview generated by EVS

 © ISO 2020 – All rights reserved

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*.

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.

This document is a preview generated by EVS

© ISO 2020 – All rights reserved

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.

The ISO 15638 series of standards defines and addresses 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 of standards 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 of standards 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.

Consistent with other parts of the ISO 15638 series of standards, this document does not prescribe nor proscribe particular modes of operation. Rather, it provides a number of defined communication and data profiles within which jurisdictions may achieve their objectives for remote weigh-in-motion monitoring within the objectives and constraints of their regulations. This document recognizes that those requirements and constraints will differ between jurisdictions.

This document is a preview generated by EVS

© ISO 2020 – All rights reserved

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

Part 20: Weigh-in-motion monitoring

This document is a preview generated by EVS

1 Scope

This document addresses the provision of 'weigh-in-motion 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 both on-board weighing (WIM-O) systems and in-road "weigh-in-motion" (WIM-R) systems, and provides a profile where the vehicle weight measured is recorded on-board using equipment already installed for "Remote Tachograph Monitoring".

This document provides specifications for common communications and data exchange aspects of the application service weigh-in-motion monitoring (WIM-O and WIM-R) 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 has to provide (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 has to deliver, 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.

The present version of this document provides specifications for the following application profiles:

— **Application Profile A1: Vehicle weight measurement from "On-Board Weighing" systems (WIM-O);**

— **Application Profile A2: Vehicle weight measurement from in-road 'weigh-in-motion' systems where data is transferred to the IVS (WIM-R).**

NOTE 1 Vehicle weight measurement from in-road 'weigh-in-motion' systems where data is linked to a specific vehicle by ANPR or other techniques and sent via landline or cellular communications to a processing centre is also a viable and alternate option, but as it does not include carrying data on-board the vehicle is not a TARV use case.

The present version of this document provides specifications for the following communication profiles:

— **Communication Profile 1: 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;

© ISO 2020 – All rights reserved

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

- **Communication Profile 2: 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 3: 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).

Subsequent versions of this document can support additional communication profiles.

NOTE 2 The ISO 15638 series of standards has been developed for use in the context of regulated commercial freight vehicles (hereinafter referred to as 'regulated vehicles'). There is nothing, however, 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 11898-1, *Road vehicles — Controller area network (CAN) — Part 1: Data link layer and physical signalling*

ISO 15638-1, *Intelligent transport systems — Framework for cooperative telematics applications for regulated vehicles (TARV) — Part 1: Framework and architecture*

ISO 15638-2, *Intelligent transport systems — Framework for cooperative telematics applications for regulated 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*

ISO 15638-9, *Intelligent transport systems — Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV) — Part 9: Remote digital tachograph monitoring*

EN ETSI 300 674-1, *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)*

ARIB STD-T75, *Dedicated Short-Range Communication (Japan)*

This document is a preview generated by EVS

 © ISO 2020 – All rights reserved

TTAS KO-06.0025, Standard of *DSRC* Radio Communication between Road-side Equipment and On-board Equipment in 5.8 GHz band (Korea)

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 12834:2003, *Road transport and traffic telematics — Dedicated Short Range Communication (DSRC) — DSRC application layer*

EN 13372:2012, *Road transport and traffic telematics — Dedicated Short Range Communication (DSRC) — Profiles for RTTT applications*

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™* (3.23) applets, organized as software bundles, that support *application services* (3.3) by keeping the *data pantry* (3.16) provisioned with up to date data

3.2
application profile
characteristics and specification of the information and transaction detail required to meet a set of *user* (3.49) needs which within the common high-level *framework* (3.19) of this document, allows different *jurisdictions* (3.24) to receive different detail of transaction or to specify a particular communications means

3.3
application service
service provided by a *service provider* (3.44) enabled by accessing data from the *IVS* (3.19) of a *regulated vehicle* (3.43) via a wireless communications network

3.4
application service provider
ASP
party that provides an *application service* (3.3)

3.5
app library
separately secure area of memory in *IVS* (3.19) where apps are stored [with different access controls to *data pantry* (3.16)]

3.6
approval
formal affirmation that an applicant has satisfied all of the requirements for appointment as an *application service provider* (3.4) or that an *application service* (3.3) delivers the required service levels

This document is a preview generated by EVS

© ISO 2020 – All rights reserved