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

Part 21:

**Monitoring of regulated vehicles using
roadside sensors and data collected
from the vehicle for enforcement and
other purposes**

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

*Partie 21: Surveillance des véhicules réglementés à l'aide de capteurs
routiers et de données collectées dans les véhicules pour l'application
des lois et à d'autres fins*



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Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Abbreviated terms	6
5 Conformance	7
6 General overview and framework	7
7 Requirements for services using generic vehicle data	10
7.1 General.....	10
7.2 Regulated application services using only generic basic vehicle data.....	10
7.3 Regulated application services using both generic vehicle data and additional regulated application specific data.....	11
7.4 Conveyance identifiers.....	11
8 Application services that require data in addition to basic vehicle data	11
8.1 General.....	11
8.2 Concept of operations for identified regulated application services with additional data requirements using roadside sensors.....	11
8.2.1 General.....	11
8.2.2 Statement of the goals and objectives of the system.....	12
8.2.3 Strategies, tactics, policies, and constraints affecting the system.....	12
8.2.4 Organizations, activities, and interactions among participants and stakeholders.....	12
8.2.5 Clear statement of responsibilities and authorities delegated.....	12
8.2.6 User.....	12
8.2.7 Application service provider.....	13
8.2.8 Application service.....	13
8.2.9 Operational processes for the system.....	13
8.2.10 Service requirements definition.....	13
8.3 Sequence of operations for identified regulated application services with additional data requirements.....	13
8.3.1 General sequence of operations.....	13
8.4 Quality of service requirements.....	18
8.5 Test requirements.....	19
8.6 Marking, labelling and packaging.....	19
9 Common features of regulated TARV application services	19
9.1 Generic operational processes for the system.....	19
9.2 Common role of the user.....	21
9.2.1 Role of the driver.....	21
9.2.2 Role of the operator.....	21
9.3 Common characteristics for instantiations of regulated application services.....	21
9.4 Common sequence of operations for regulated application services.....	22
9.5 Quality of service.....	23
9.6 Information security.....	23
9.7 Data naming content and quality.....	23
9.8 Software engineering quality systems.....	23
9.9 Quality monitoring station.....	24
9.10 Audits.....	24
9.11 Data access control policy.....	24
9.12 Approval of IVSs and service provider.....	24
9.13 Approval of road side sensors.....	24

Annex A (informative) Application examples	25
Annex B (informative) Roadside sensors	30
Bibliography	32

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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 on 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 the following URL: www.iso.org/iso/foreword.html.

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

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

Introduction

The ISO 15638 series TARV application standards are based on a triumvirate of vehicle operators with in-vehicle systems, on-board application service providers (3.39) and jurisdictions (3.28). The basic TARV standards focus on the transactions between these parties via ITS-stations (3.25), and do not have measures to detect/avoid tampering/incorrect setting of on-board equipment, and are limited to using data collected from the vehicle for purposes such as control, management and enforcement. In many countries road side sensors (3.37) are already widely used for jurisdiction enforcement and other enhancement purposes. These road side sensors can be used in combination with the TARV framework (3.21) to enhance functionality by eliminating/reducing problems of incorrect setting/tampering etc. and/or complementing/corroborating data obtained from on-board systems. This provides increased capability for jurisdictions and other entities to use existing parts of the ISO 15638 series of standards (which are focussed only on the transaction of data collected from on-board systems), thus potentially providing validation of, or removing weakness in, the accuracy of the data transmitted from the vehicle to an application service provider (3.39), or to provide new management and control measures for regulated commercial freight vehicles. In some cases, new means of management and enforcement may be enabled by using this document.

It, therefore, seems appropriate to include this part of ISO 15638 to the 15638 series of standards to provide the means to use roadside/in-road sensors to validate the accuracy of on-board equipment, and/or complement the data available to application service providers (3.39) and jurisdictions and other entities.

NOTE ISO 15638-9¹⁾ already covers provisions consistent with EC165/2014. This document is complementary to and not competitive to ISO 15638-9, and therefore consistent with EC 165/2014.

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

Part 21:

Monitoring of regulated vehicles using roadside sensors and data collected from the vehicle for enforcement and other purposes

1 Scope

The ISO 15638 series of standards defines the framework (3.21) for online fleet management of regulated commercial freight vehicles utilizing data communication between in-vehicle systems and an application service provider (3.39) via on-board communication unit interfacing with road monitoring infrastructure. This document defines an extension to the existing role model conceptual architecture (3.7) by adding roadside sensors (3.37) to the model for additional data collection path for enhancement of the system.

The objective of this document is to reinforce vehicle monitoring for enforcement and other management purposes of regulated commercial freight vehicle movements. The scope of this document is to

- a) Reinforce vehicle monitoring for enforcement and other purposes,
- b) Provide additional data security by using roadside sensor data links,
- c) Detect/avoid tampering/incorrect setting of onboard sensor equipment,
- d) Provide means of using roadside sensors to validate the accuracy of on-board equipment, and
- e) Enable the combined use of data obtained from the regulated commercial freight vehicle and roadside/in-road sensors to monitor, manage and control the movement of regulated commercial freight vehicles.

In this extended role model architecture (3.7), roadside sensor (including buried in-road sensors) functionality is added to the existing TARV role model. In this extended role model, jurisdictions (3.28) and other entities can reinforce monitoring or other management purpose applications by using a combination of information from both in-vehicle systems and roadside/in-road sensors.

In this document, the framework (3.21) for this modified and improved reinforcement of vehicle monitoring for enforcement and other management purpose applications is defined.

This document is complementary to, and does not replace, any other parts of the ISO 15638 series of standards. This document is beneficial to jurisdiction enforcement and other vehicle monitoring management purpose entities and it provides a means for using roadside sensors to validate the accuracy of on-board equipment and provides additional use cases for TARV service applications.

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 15638-21:2018(E)

ISO 15638 (all parts), *Intelligent transport systems — Framework (3.21) for cooperative telematics (3.43) applications for regulated commercial freight vehicles (TARV)*

ISO/TR 12859:2009, *System architecture — Privacy aspects in ITS standards and systems*

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:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org>

3.1 access methods

procedures and protocols to provision and retrieve data

3.2 app

small (usually) applets, organised as software bundles, that support *application services* (3.3) by keeping the *data pantry* provisioned with up to date data

3.3 application service

service provided by a *service provider* (3.39) enabled by accessing data from the *IVS* (3.23) of a *regulated vehicle* (3.35) via a wireless communications network

3.4 application service provider

party that provides an *application service* (3.3)

3.5 app library

separately secure area of memory in *IVS* (3.23) where apps are stored (with different access controls to *data pantry*)

3.6 application service data file

file held in the data pantry of the *IVS* (3.23) containing data specific to an *application service* (3.3)

3.7 architecture

formalised description of the design of the structure of *TARV* and its *framework* (3.21)

3.8 audit auditing

review of a party's capacity to meet, or continue to meet, the initial and ongoing *certification agreements* as a *service provider* (3.39)

3.9 authentication

function intended to establish and verify a claimed identity

3.10 basic vehicle data

data that shall be maintained/provided by all *IVS* (3.23) (regardless of jurisdiction)

3.11**certification**

formal affirmation that an applicant has satisfied all the requirements for appointment as an *application service provider* (3.39) or that an *application service* (3.3) delivers the required service levels.

3.12**certification authority**

<digital> organization which issues digital certificates for use by other parties (specifically in the context of communications security)

3.13**certification authority**

<regulatory> organisation (usually independent) which conducts *certification* (3.11) and ongoing *audit* (3.8) for *service providers* (3.39) on behalf of a jurisdiction

3.14**commercial application(s)**

ITS applications in *regulated vehicles* (3.35) for commercial (non-regulated) purposes

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

3.15**consignment**

shipment of goods/cargo to a destination

3.16**conveyance**

vehicle or trailer used to transport from one place to another

3.17**cooperative ITS****C-ITS**

ITS applications for both regulatory and commercial purposes that require the exchange of data between uncontracted parties using multiple *ITS-stations* (3.25) communicating with each other and sharing data with other parties with whom they have no direct contractual relationship to provide one or more *ITS services* (3.24)

3.18**data pantry**

secure area of memory in *IVS* (3.23) where data values are stored [with different access controls to *app library* (3.5)]

3.19**driver**

person driving the *regulated vehicle* (3.35) at any specific point in time

3.20**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

3.21**framework**

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

3.22**global navigation satellite system****GNSS**

system that comprises several networks of satellites that transmit radio signals containing time and distance data that can be picked up by a receiver, allowing the *user* (3.45) to identify the location of its receiver anywhere around the globe

3.23
in-vehicle system
IVS

ITS-station (3.25) and connected equipment on board a vehicle

3.24
ITS service
communication functionality offered by an *ITS-station* (3.25) to an *ITS-station* (3.25) application

3.25
ITS-station
ITS-s
entity in a communication network, comprised of application, *facilities* (3.20), networking and access layer components specified in ISO 21217 that operate within a bounded secure management domain

3.26
IVS installer
actor who installs *IVS* (3.23) on behalf of the vehicle manufacturer or the initial prime service provider (3.32)

3.27
IVS maintainer
actor who maintains *IVS* (3.23) on behalf of the *prime service provider* (3.32)

3.28
jurisdiction
government, road or traffic authority which owns the *regulatory applications* (3.33)

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

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3.29
jurisdiction regulator
regulator
agent of the *jurisdiction* (3.28) appointed to regulate and manage TARV within the domain of the *jurisdiction* (3.28); may or may not be the *certification authority (regulatory)* (3.13)

3.30
local data tree
LDT
frequently updated data concept stored in the on-board *data pantry* containing a collection of data values deemed essential for either a) *TARV regulated application service* (3.34), or b) cooperative intelligent transport systems

3.31
operator
fleet manager of a *regulated vehicle* (3.35)

3.32
prime service provider
service provider (3.39) who is the first contractor to provide *regulated application* (3.33) *services* (3.3) to the *regulated vehicle* (3.35), or a nominated successor on termination of that initial contract

Note 1 to entry: The *prime service provider* (3.32) is also responsible to maintain the installed *IVS* (3.23), if the *IVS* (3.23) was not installed during the manufacture of the vehicle the prime service provider is also responsible to install and commission the *IVS* (3.23)

3.33**regulated application
regulatory application**

application arrangement using TARV utilised by *jurisdictions* (3.28) for granting certain categories of commercial vehicles rights to operate in regulated circumstances subject to certain conditions, or to permit a vehicle to operate within the *jurisdiction* (3.28)

Note 1 to entry: It may be mandatory or voluntary at the discretion of the *jurisdiction* (3.28).

3.34**regulated application service**

TARV application service (3.3) that meets the requirements of a regulated application (3.33) that is mandated by a regulation imposed by a *jurisdiction* (3.28), or is an option supported by a *jurisdiction* (3.28)

3.35**regulated vehicle**

vehicle that is subject to regulations determined by the *jurisdiction* (3.28) 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

3.36**regime for open application management****ROAM**

facilities layer for TARV, within the ISO 15638 series of standards, providing an open access, yet secure runtime environment for *TARV* and other applications, including cooperative vehicle applications, on top of the *CALM* communications environment

3.37**roadside sensor**

device installed at or near the roadside or above the road or embedded into the road that either:

- a) collects data concerning the vehicle (e.g. licence plate, vehicle speed, vehicle emission data, etc.) and passes that data to the vehicle *IVS* (3.23),
- b) provides other dynamic data to the vehicle *IVS* (3.23) (e.g. temporary or permanent speed limits or other restrictions or informative data), and
- c) Requests the *IVS* (3.23) to take some action as a result of sensed information

for use in support or execution of a TARV application

3.38**sensor**

device that receives a signal or stimulus and responds to it

3.39**service provider**

party which is certified by a *certification authority (regulatory)* (3.13) as suitable to provide regulated or commercial *ITS application services* (3.3)

3.40**session**

wireless communication exchange between the *ITS-station* (3.25) of an *IVS* (3.23) and the *ITS-station* (3.25) of its *application service provider* (3.39) to achieve data update, data provision, upload *apps* (3.2), or otherwise manage the provision of the *application service* (3.3), or a wireless communication provision of data to the *ITS-station* (3.25) of an *IVS* (3.23) from any other *ITS-station* (3.25)

3.41**specification**

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

3.42

tampering action

action conducted towards *IVS* (3.23) or a service provider's system which is intended to prevent the *IVS* (3.23) or the *service provider's* (3.39) system from functioning correctly

3.43

telematics

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

3.44

Unified Modeling Language

UML

graphical language for visualizing, specifying, constructing, and documenting the artifacts of a software-intensive system which offers a standard way to write a system's blueprints, including conceptual things such as business processes and system functions as well as concrete things such as programming language statements, database schemas, and reusable software components

Note 1 to entry: UML is standardised as ISO/IEC 19501 [Unified Modeling Language (UML)].

3.45

user

individual or party that enrolls in and operates within a regulated or *commercial application* (3.14) *service* (3.3)

EXAMPLE *Driver* (3.19), *transport operator* (3.31), freight owner, etc.

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4 Abbreviated terms

app	applet (JAVA™ application or similar)
ASD file	application service data file (3.6)
ASP	application service provider (3.39)
CALM	communications access for land mobiles
C-ITS	cooperative intelligent transport system
CONOPS	concept of operations
DSRC	dedicated short range communication
GNSS	global navigation satellite system (3.22)
HGV	heavy goods vehicle
HV	heavy vehicle
Hz	Hertz
ID	identity
ITS-S	ITS station (3.25)
IVS	In-vehicle system (3.23)
LDM	local dynamic map
LDT	local data tree (3.30)

RAS	regulated application (3.33) service (3.3)
RHV	regulated heavy vehicle
ROAM	regime for open application management (3.36)
RTM	remote tachograph monitoring
SPaT-MAP	Signal Phase and Timing — Intersection geometry
TARV	telematics (3.43) applications for regulated vehicles (3.35)
UML	Unified Modeling Language (ISO/IEC 19501)
VMS	variable message sign (ISO 14823)
WIM	weigh in motion

5 Conformance

Requirements to demonstrate conformance to any of the general provisions or specific application services (3.3) described in this document shall be within the regulations imposed by the jurisdiction (3.28) where they are instantiated. Conformance requirements to meet the provisions of this document are therefore deemed to be under the control of, and to the specification (3.41) of, the jurisdiction where the application service(s) (3.3) is/are instantiated.

6 General overview and framework

This document provides a framework (3.21) and architecture (3.7) for “extended TARV” which extends the capabilities of TARV to include interaction with/data collection from roadside sensors (3.37). It provides a general description of the roles of the actors in extended TARV and their relationships.

ISO 15638-1 and ISO 15638-6 shall be consulted to understand clearly the extended TARV framework (3.21), architecture (3.7) and detailed specification (3.41) of the roles of the actors involved.

In summary, Figure 1 shows the extended role model conceptual architecture (3.7) showing the key actors and their relationships.