INTERNATIONAL STANDARD

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

Part 15: Vehicle location monitoring

Systèmes intelligents de transport — Cadre pour applications télématiques coopératives pour véhicules réglementés (TARV) —

Partie 15: Monitorage de la localisation des véhicules

Reference number
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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

This first edition cancels and replaces ISO/TS 15638-15:2013.

ISO 15638 consists of the following parts, under the general title *Intelligent transport systems — Framework for cooperative telematics applications for regulated vehicles (TARV)*:

— *Part 1: Framework and architecture*

— *Part 2: Common platform parameters using CALM*

— *Part 3: Operating requirements, 'Approval Authority' procedures, and enforcement provisions for the providers of regulated services*

— *Part 5: Generic vehicle information*

— *Part 6: Regulated applications*

— *Part 7: Other applications*

— *Part 8: Vehicle access management and monitoring*

— *Part 9: Remote electronic tachograph monitoring (RTM)*

— *Part 10: Emergency messaging system/eCall (EMS)*

— *Part 11: Driver work records*

— *Part 12: Vehicle mass monitoring*

— *Part 14: Vehicle access control*

— *Part 15: Vehicle location monitoring*

— *Part 16: Vehicle speed monitoring*

— *Part 17: Consignment and location monitoring*

— *Part 18: ADR (Dangerous Goods) transport monitoring (ADR)*

— *Part 19: Vehicle parking facilities (VPF)*

The following parts are under preparation:

— *Part 4: System security requirements*

— *Part 13: 'Mass' information for jurisdictional control and enforcement*

Introduction

Many ITS technologies have been embraced by commercial transport *operators (4.33)* and freight owners, in the areas of fleet management, safety and security. *Telematics (4.44)* applications have also been developed for governmental use. Such regulatory services in use or being considered vary from *jurisdiction (4.28)* to *jurisdiction*, but include electronic on-board recorders, digital *tachograph (4.43)*, on-board *mass (4.31)* monitoring, 'mass' data for regulatory control and *management (4.32)*, vehicle *access (4.1) methods*, *hazardous goods (4.25)* tracking and emergency message service/eCall. Additional applications with a regulatory impact being developed include, fatigue management, speed monitoring and heavy vehicle penalties imposed based on location, distance and time.

In such an emerging environment of regulatory and *commercial applications (4.14)*, it is timely to consider an overall *architecture (4.10)* (business and functional) that could support these functions from a single platform within a commercial freight vehicle that operate within such regulations. International Standards will allow for a speedy development and *specification (4.42)* of new applications that build upon the functionality of a generic specification platform. A suite of standards deliverables is required to describe and define the *framework (4.22)* 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 (4.28)*.

This International Standard addresses and defines the *framework (4.22)* for a range of cooperative *telematics (4.44)* applications for *regulated commercial freight vehicles (4.37)*, such a*s access methods (4.2), driver fatigue management, speed monitoring, on-board mass (4.31) monitoring, 'mass' data for regulatory control and management (4.32)*. The overall scope includes the concept of operation, legal and regulatory issues, and the generic cooperative provision of services to *regulated commercial freight vehicles*, using an on-board ITS platform. The *framework* is based on a (multiple) *service provider (4.40)* oriented approach with provisions for the *approval (4.7)* and *auditing (4.11)* of *service providers*.

This International Standard

— provides the basis for future development of cooperative *telematics (4.44)* applications for *regulated commercial freight vehicles (4.37)*. Many elements to accomplish this are already available. Existing relevant standards will be referenced, and the *specifications (4.42)* will use existing standards (such as *CALM*) wherever practicable,

— allows for a powerful platform for highly cost-effective delivery of a range of *telematics* applications for *regulated commercial freight vehicles (4.37)*,

— provides a business *architecture (4.10)* based on a (multiple) *service provider (4.40)* oriented approach, and

— addresses legal and regulatory aspects for the *approval (4.7)* and *auditing (4.11)* of *service providers.*

This International Standard is timely as many governments (Europe, North America, Asia, and Australia/New Zealand) are considering the use of *telematics (4.44)* for a range of regulatory purposes. Ensuring that a single in-vehicle platform can deliver a range of services to both government and industry through open standards and competitive markets is a strategic objective.

This part of the ISO 15638 provides *specifications (4.42)* for vehicle location monitoring.

NOTE 1 The definition of what comprises a 'regulated' vehicle is regarded as an issue for national decision and might vary from *jurisdiction (4.28)* to *jurisdiction*. This International Standard does not impose any requirements on nations in respect of how they define a *regulated vehicle (4.37)*.

NOTE 2 The definition of what comprises a 'regulated' service is regarded as an issue for national decision and might vary from *jurisdiction (4.28)* to *jurisdiction*. This International Standard does not impose any requirements on nations in respect of which services for *regulated vehicles (4.37) jurisdictions* 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 vehicles (TARV) —

Part 15:
Vehicle location monitoring

1 Scope

This part of ISO 15638 addresses the provision of *'vehicle location monitoring'* and specifies the form and content of such data required to support such systems and *access methods (4.2)* to that data.

The scope of this part of ISO 15638 is to provide *specifications (4.42)* for common communications and data exchange aspects of the *application service (4.4)* vehicle location monitoring that a *regulator (4.38)* may elect to require or support as an option, including

a) high-level definition of the service that a *service provider (4.40)* has to provide,

NOTE The service definition describes common service elements; but does not define the detail of how such an *application service (4.4)* is instantiated, not the acceptable value ranges of the data concepts defined.

b) means to realize the service, and

c) application data, naming content, and quality that an *IVS (4.26)* has to deliver.

The definition of what comprises a 'regulated' service is regarded as an issue for national decision, and may vary from *jurisdiction (4.28)* to *jurisdiction*. This International Standard 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.

This International Standard has been developed for use in the context of regulated commercial freight vehicles [hereinafter referred to as 'regulated vehicles' *(4.37)*]. There is nothing however to prevent a jurisdiction extending or adapting the scope to include other types of regulated vehicles, as it deems appropriate.

2 Conformance

Requirements to demonstrate conformance to any of the general provisions or specific *application services (4.4)* described in this part of ISO 15638 shall be within the regulations imposed by the *jurisdiction (4.28)* where they are instantiated. Conformance requirements to meet the provisions of this International Standard are therefore deemed to be under the control of, and to the specification of, the *jurisdiction* where the *application service*(s) is/are instantiated.

The protocols defined in this part of ISO 15638 have been independently tested. Annex B provides results of these tests. In any conformance assurance process undertaken by candidate systems, where appropriate, the results may be used as part of its process of conformance compliance.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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 15638-4:—[1)], *Intelligent transport systems — Framework for collaborative telematics applications for regulated commercial freight vehicles (TARV) — Part 4: System security requirements*

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

ISO 15638-6, *Intelligent transport systems — Framework for collaborative telematics applications for regulated commercial freight vehicles (TARV) — Part 6: Regulated applications*

4 Terms and definitions

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

4.1
access
admittance, entry, permit to use the road network and/or associated infrastructure (bridges, tunnels etc.)

4.2
access methods
procedures and protocols to provision and retrieve data

4.3
app
small (usually) Java™[2)] applets, organized as software bundles, that support *application services (4.4)* by keeping the *data pantry (4.18)* provisioned with up-to-date data

4.4
application service
service provided by a *service provider (4.40)* enabled by accessing data from the *IVS (4.26)* of a *regulated vehicle (4.37)* through a wireless communications network

4.5
application service provider
ASP
party that provides an *application service (4.4)*

1) To be published.

2) This information is given for the convenience of users of this document and does not constitute an endorsement by ISO.

4.6
app library
separately secure area of memory in *IVS* (*4.26*) where apps are stored, with different access controls to *data pantry* (*4.18*)

4.7
approval
formal affirmation that an applicant has satisfied all the requirements for appointment as an *application service provider* (*4.5*) or that an *application service* (*4.4*)delivers the required service levels

4.8
approval agreement
written agreement made between an *approval authority (regulatory)* (*4.9*) and a *service provider* (*4.40*)

Note 1 to entry: An app*roval authority (regulatory)* (*4.9*) approval agreement recognizes the fact that a *service provider* (*4.40*), having satisfied the *approval authority's* requirements for appointment as a **s***ervice 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*.

4.9
approval authority (regulatory)
organization (usually independent) which conducts *approval* (*4.7*) and on-going *audit* (*4.11*) for *service providers* (*4.40*) on behalf of a *jurisdiction* (*4.28*)

4.10
architecture
formalized description of the design of the structure of *TARV* and its *framework* (*4.22*)

4.11
audit
auditing
review of a party's capacity to meet, or continue to meet, the initial and on-going *approval agreements* (*4.8*) as a *service provider* (*4.40*)

4.12
basic vehicle data
data that shall be maintained/provided by all *IVS* (*4.26*), regardless of *jurisdiction* (*4.28*)

4.13
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* (*4.45*) determined parameters by using a suite of International Standards based on ISO 21217 (*CALM* architecture) and ISO 21210 (*CALM* networking), that provide a common platform for a number of standardized media using *ITS-stations* (*4.27*) to provide wireless support for applications, such that the application is independent of any particular wireless medium

4.14
commercial application(s)
ITS applications in *regulated vehicles* (*4.37*) for commercial (non-regulated) purposes

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

4.15
consignment
shipment of goods/cargo to a destination

4.16
core data
basic vehicle data (4.12) plus any additional data required to provide an implemented *regulated application service (4.36)*

4.17
dangerous goods
substances or articles which are potentially hazardous (for example, poisonous to humans, harmful to the environment, explosive, flammable, or radioactive) that require regulatory control when transported

4.18
data pantry
secure area of memory in *IVS (4.26)* where data values are stored, with different access controls to *app library (4.6)*

4.19
driver
person driving the *regulated vehicle (4.37)* at any specific point in time

4.20
driver work records
DWR
collection, collation, and transfer of *driver (4.19)* work and rest hours data from an *in-vehicle system (4.26)* to an *application service provider (4.5)*

4.21
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

4.22
framework
particular set of beliefs, ideas referred to in order to describe a scenario or solve a problem

4.23
global navigation satellite system
GNSS
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 to identify the location of its receiver anywhere around the globe

4.24
global positioning system
GPS
instantiation of *GNSS (4.23)* controlled by the US Department of Defense

4.25
hazardous goods
HAZMAT
see *dangerous goods (4.17)*/*Accord européen relatif au transport international des marchandises Dangereuses par Route* (ADR)

4.26
in-vehicle system
IVS
ITS-station (4.27) and connected equipment on board a vehicle

4.27
ITS-station
ITS-s
entity in a communication network, comprised of application, *facilities (4.21)*, networking, and access layer components specified in ISO 21217 that operate within a bounded secure management domain

4.28
jurisdiction
government, road, or traffic authority which owns the r*egulatory applications (4.35)*

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

4.29
local data tree
LDT
frequently updated data concept stored in the on on-board *data pantry (4.18)* containing a collection of data values deemed essential for either a) *TARV regulated application service (4.36)*, or b) *cooperative intelligent transport systems*

4.30
map
spatial dataset that defines the road system

4.31
mass
mass of a given heavy vehicle as measured by equipment affixed to the *regulated vehicle (4.37)*

4.32
'mass' data for regulatory control and management
MICE
MRC
collection, collation, and transfer of vehicle *mass (4.31)* data from an *in-vehicle system (4.26)* to an *application service provider (4.5)* to enable data provision to *jurisdictions (4.28)* for the control and management of equipped vehicles based on the *mass* of the *regulated vehicle (4.37)*, or use of such data to enable compliance with the provisions of regulations

4.33
operator
fleet manager of a *regulated vehicle (4.37)*

4.34
prime service provider
service provider (4.40) who is the first contractor to provide *regulated application services (4.36)* to the *regulated vehicle (4.37)*, or a nominated successor on termination of that initial contract; the *prime service provider* is also responsible to maintain the installed *IVS (4.26)*; if the *IVS* was not installed during the manufacture of the vehicle the *prime service provider* is also responsible to install and commission the *IVS (4.26)*

4.35
regulated application
regulatory application
application arrangement using TARV utilised by *jurisdictions (4.28)* 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*; may be mandatory or voluntary at the discretion of the *jurisdiction*

4.36
regulated application service
TARV *application service (4.4)* to meet the requirements of a regulated application that is mandated by a regulation imposed by a *jurisdiction (4.28)*, or is an option supported by a *jurisdiction*

4.37
regulated commercial freight vehicle
regulated vehicle
vehicle that is subject to regulations determined by the *jurisdiction (4.28)* 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; at the option of *jurisdictions*; this may require the provision of information through *TARV* or provide the option to do so

4.38
regulator
agent of the *jurisdiction (4.28)* appointed to regulate and manage *TARV* within the domain of the *jurisdiction*; may or may not be the *approval authority (regulatory) (4.9)*

4.39
remote tachograph monitoring
RTM
collection, collation, and transfer of data from an on-board electronic *tachograph (4.43)* system to an *application service provider (4.5)*

4.40
service provider
party which is approved by an approval *authority (regulatory) (4.9)* as suitable to provide regulated or commercial ITS *application services (4.4)*

4.41
session
wireless communication exchange between the *ITS-station (4.27)* of an *IVS (4.26)* and the *ITS-station* of its *application service provider (4.5)* to achieve data update, data provision, upload apps, or otherwise manage the provision of the *application service (4.4),* or a wireless communication provision of data to the *ITS-station* of an *IVS (4.26)* from any other *ITS-station*

4.42
specification
explicit and detailed description of the nature and functional requirements and minimum performance of equipment, service or a combination of both

4.43
tachograph
sender unit mounted to a vehicle gearbox, a tachograph head, and a digital driver card, which records the *regulated vehicle (4.37)* speed and the times at which it was driven and aspects of the *driver's (4.19)* activity selected from a choice of modes

4.44
telematics
use of wireless media to obtain and transmit (data) from a distant source

4.45
user
individual or party that enrols in and operates within a regulated or *commercial application (4.14) service (4.4)*

EXAMPLE *Driver (4.19),* transport *operator (4.33),* freight owner, etc.

4.46
vehicle access control
VAC
control of *regulated vehicles (4.37)* ingress to and egress from controlled areas and associated penalties and levies

4.47
vehicle access management
VAM
monitoring and management of *regulated vehicles (4.37)* approaching or within sensitive and controlled areas

4.48
vehicle location monitoring
VLM
collection, collation, and transfer of vehicle location data from an *in-vehicle system (4.26)* to an *application service provider (4.5)*

4.49
vehicle mass monitoring
VMM
collection, collation, and transfer of vehicle *mass (4.31)* data from an *in-vehicle system (4.26)* to an *application service provider (4.5)*

4.50
vehicle parking facility
VPF
system for booking and *access (4.1)* to and egress from a *vehicle parking facility*

4.51
vehicle speed monitoring
VSM
collection, collation, and transfer of vehicle speed data from an *in-vehicle system (4.26)* to an *application service provider (4.5)*

5 Symbols and abbreviated terms

AA approval authority (regulatory) *(4.9)*

ADR *Accord européen relatif au transport international des marchandises Dangereuses par Route* [*dangerous goods (4.17)*]

app *applet* (Java™[a] application or similar) *(4.3)*

ASP *application service provider (4.5)*

CALM *communications access for land mobiles (4.13)*

C-ITS *cooperative intelligent transport systems*

DLR driving licence reader

Dr *driver (4.19)*

DRD driver records device

DWR *driver work records (4.20)*

eDL electronic *driver (4.19)* licence

GNSS *global navigation satellite system (4.23)*

H&S health and safety

[a] This information is given for the convenience of users of this document and does not constitute an endorsement by ISO.

ID	identity
IP	internet protocol
ITS-S	*ITS station (4.27)*
IVS	*In-vehicle system (4.26)*
J	*jurisdiction (4.19)*
Java™[a]	object-oriented open-source operating language developed by SUN systems
LDT	*local data tree (4.29)*
Op	*operator (4.33)*
PSP	*prime service provider (4.34)*
RFID	radio frequency identification device
SE	service element
TARV	*telematics (4.44)* applications for *regulated vehicles (4.37)*
UTC	coordinated universal time
VLM	*vehicle location monitoring (4.47)*

a This information is given for the convenience of users of this document and does not constitute an endorsement by ISO.

6 General overview and framework requirements

ISO 15638-1 provides a *framework (4.22)* and *architecture (4.10)* for *TARV*. It provides a general description of the roles of the actors in *TARV* and their relationships.

To understand clearly the *TARV* framework, *architecture (4.10)* and detail and *specification (4.42)* 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. To understand clearly the general context in to which the provision of this application service, the reader is referred to ISO 15638-6.

In order to be compliant with this part of ISO 15638, the overall architecture employed shall comply with ISO 15638-1.

In order to be compliant with this part of ISO 15638, the communications employed shall comply with ISO 15638-2.

In order to be compliant with this part of ISO 15638, the operating requirements employed shall comply with ISO 15638-3.

In order to be compliant with this part of ISO 15638, the security employed shall comply with ISO 15638-4:—[3)].

In order to be compliant with this part of ISO 15638, the basic vehicle data shall comply to ISO 15638-5.

In order to be compliant with this part of ISO 15638, the generic conditions for this application service shall comply to ISO 15638-6.

3) To be published.

This International Standard has been developed for use in the context of regulated commercial freight vehicles. There is nothing, however, to prevent a jurisdiction extending or adapting the scope to include other types of regulated vehicles, as it deems appropriate.

7 Requirements for services using generic vehicle data

The means by which the access commands for generic vehicle information specified in ISO 15638-5 can be used to provide all or part of the data required in order to support a *regulated application service (4.36)* shall be as defined in ISO 15638-6.

8 Application services that require data in addition to basic vehicle data

8.1 General

This shall be conducted as defined in ISO 15638-6.

8.2 Quality of service requirements

This part of ISO 15638 contains no general requirements concerning quality of service. Such aspects shall be determined by a *jurisdiction (4.28)* as part of its *specification (4.42)* for any particular *regulated application service (4.36).* However, where a specified *regulated application service (4.36)* has specific quality of service requirements essential to maintain interoperability, these aspects shall be as specified in Clause 10.

8.3 Test requirements

This part of ISO 15638 contains no general requirements concerning test requirements. Such aspects shall be determined by a *jurisdiction (4.28)* as part of its *specification (4.42)* for any particular *regulated application service (4.36),* and issued as a formal test requirements *specification* document. However, where a specified *regulated application service (4.36)* has specific test requirements essential to maintain interoperability, these aspects shall be as specified in Clause 10, relating to this *regulated application service,* or in a separate standards deliverable referenced within that clause. Where multiple *jurisdictions* recognize a benefit to common test procedures for a specific *regulated application service,* this shall be the subject of a separate standards deliverable.

8.4 Marking, labelling, and packaging

This part of ISO 15638 has no specific requirements for marking, labelling, or packaging.

However, where the privacy of an individual may be potentially or actually compromised by any instantiation based on this International Standard, the contracting parties shall make such risk explicitly known to the implementing *jurisdiction (4.28)* and shall abide by the privacy laws and regulations of the implementing *jurisdiction,* and shall mark up or label any contracts specifically and explicitly drawing attention to any loss of privacy and precautions taken to protect privacy. Attention is drawn to ISO/TR 12859 in this respect.

9 Common features of regulated TARV application services

9.1 General

The details of the instantiation of *regulated application service (4.36)* are as designed by the application service system to meet the requirements of a particular *jurisdiction (4.28)* and are not defined herein. ISO 15638-6 specifies the generic roles and responsibilities of actors in the systems, and instantiations that claim compliance with this part of ISO 15638 shall also be compliant with the requirements of ISO 15638-6.

The means by which data are provisioned into the *data pantry (4.18)*, and the means to obtain the *TARV LDT (4.29)* and *core data (4.16)* are described in ISO 15638-6, Clause 8.

In order to minimize demand on the *IVS (4.26)* [which it is assumed will be performing multiple *application services (4.4)* simultaneously, as well as supporting general safety related cooperative vehicle systems], and because national requirements and system offerings will differ, a 'cloud' approach has been taken in defining *TARV regulated application services (4.36)*.

The *TARV* approach is for the on-board *app (4.3)* supporting the application service to collect and collate the relevant data, and at intervals determined by the *app,* or on demand from the *application service provider (ASP) (4.5),* pass that data to the *ASP.* All of the actual application service processing shall occur in the mainframe system of the *ASP* (in the 'cloud').

For further information, see ISO 15638-6, Clause 9.

At a conceptual level, the *TARV* system is therefore essentially simple, as shown in Figure 1. The process is similar to that for CoreData, but data are supplied to a different on-board file in the *data pantry (4.18)*.

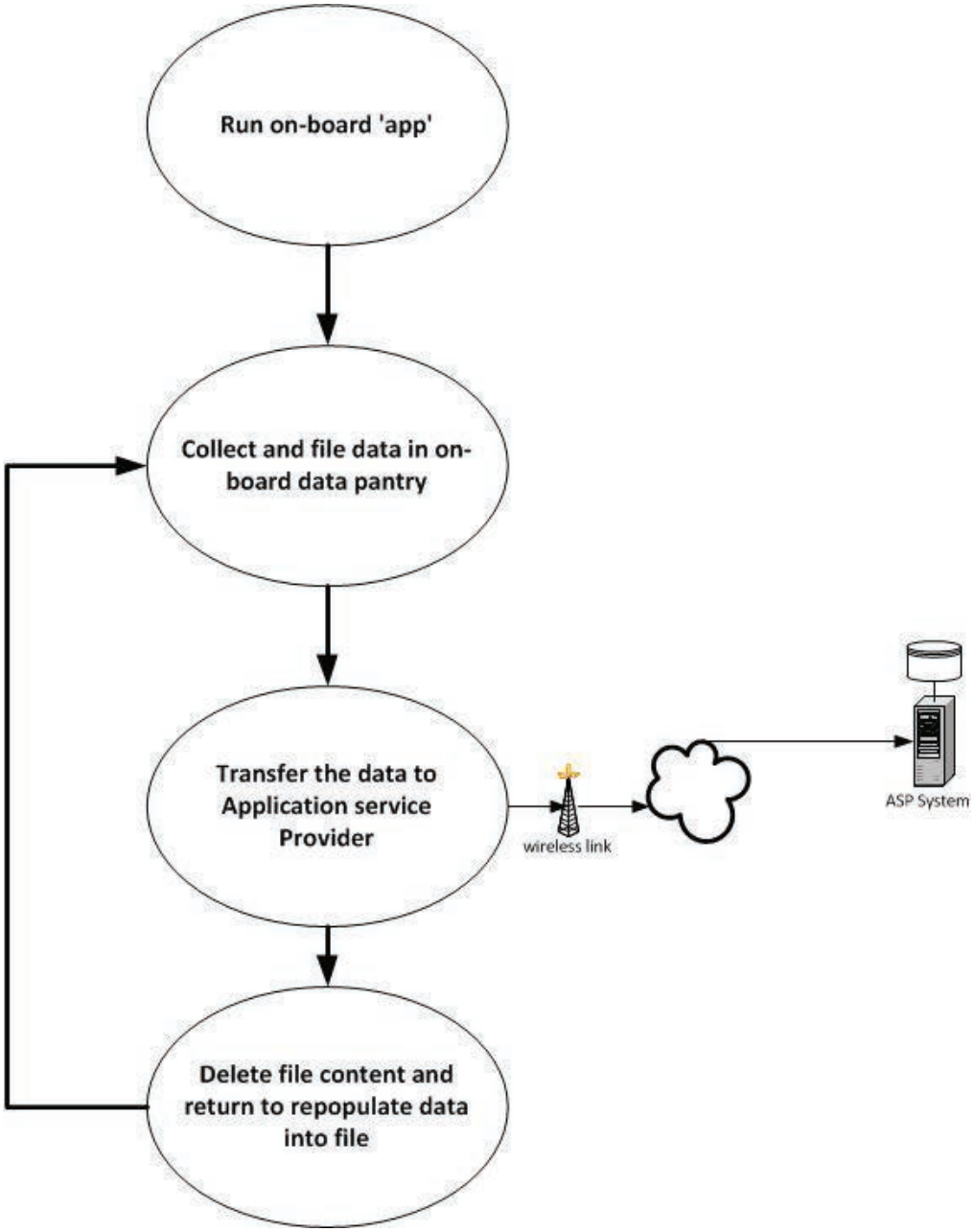

Figure 1 — TARV regulated application service on-board procedure

At a common generic functional level for this application service, the process may be seen as shown in Figure 2, however, the connected equipment might/might not be required in all cases.

9.2 Common role of the jurisdiction, approval authority, service provider, and user

The common role of the jurisdiction, approval authority, application service provider, and user shall be as defined in ISO 15638-6.

9.3 Common characteristics for instantiations of regulated application services

The common characteristics for instantiations of regulated application services shall be as defined in ISO 15638-6.

9.4 Common sequence of operations for regulated application services

The common sequence of operations for regulated application services shall be as defined in ISO 15638-6.

9.5 Quality of service

Generic quality of service provisions for *application services (4.4)* shall be as defined in ISO 15638-6.

9.6 Information security

Information security shall be as defined in ISO 15638-6.

9.7 Data naming content and quality

Data naming and quality shall be as defined in ISO 15638-6.

Variations specific to the vehicle location monitoring *application service (4.4)* shall be as defined below.

9.8 Software engineering quality systems

Software engineering quality systems shall be as defined in ISO 15638-6.

9.9 Quality monitoring station

The availability of quality monitoring stations shall be as defined in ISO 15638-6.

9.10 Audits

Audits shall be as defined in ISO 15638-6.

9.11 Data access control policy

To protect the data and information held by the *application service provider (4.5),* each provider shall adopt a risk based data access control policy for employees of the provider.

9.12 Approval of IVSs and service providers

Generic provisions for the *approval (4.7)* of *IVSs* and *service providers (4.40)* shall be as specified in ISO 15638-3. Detailed provisions for specific *regulated applications (4.35)* shall be as specified by the regime of the *jurisdiction (4.28).*

10 Vehicle location monitoring (VLM)

10.1 TARV VLM service description and scope

10.1.1 TARV VLM use case

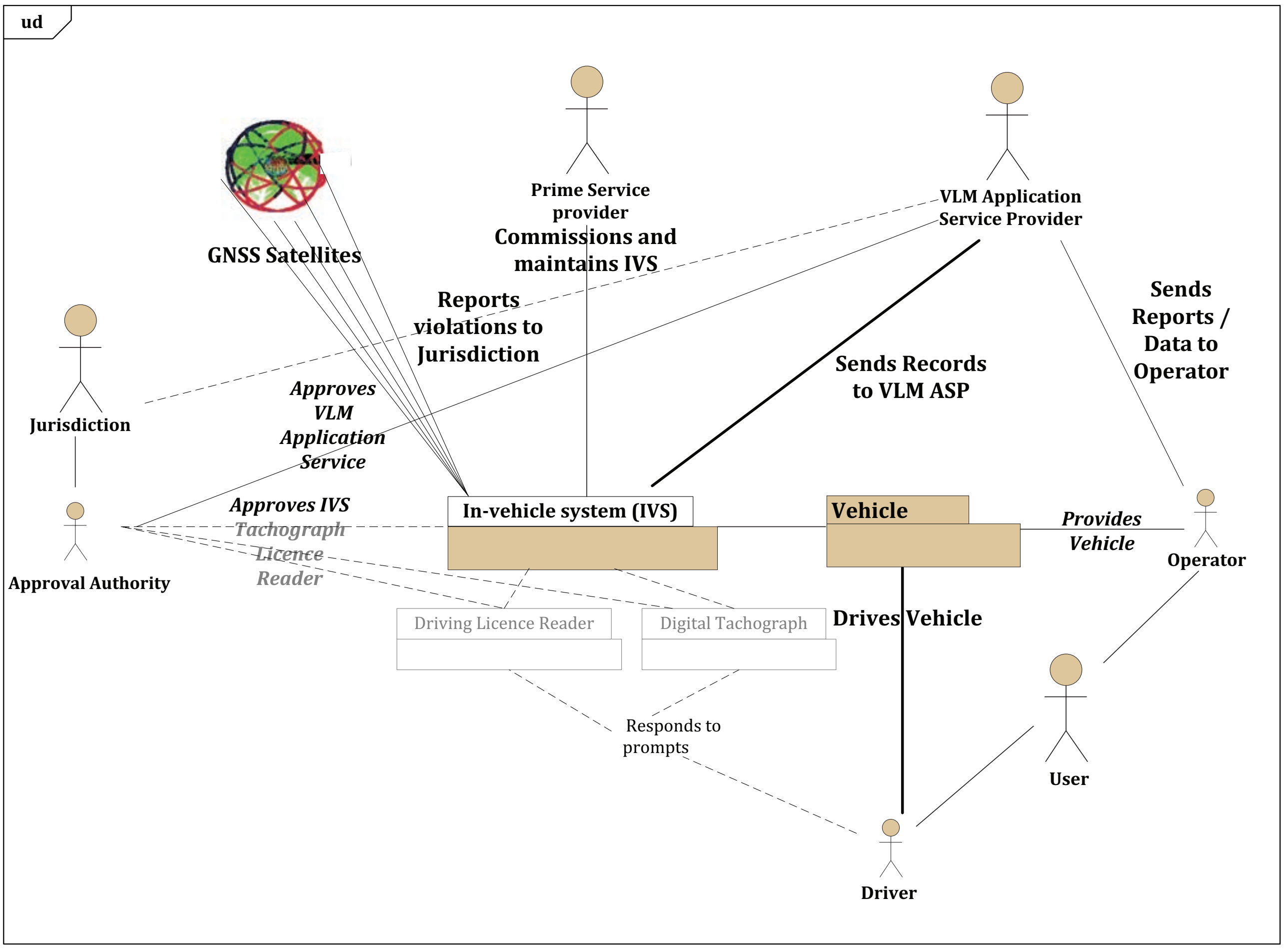

Figure 2 — TARV vehicle location monitoring (TARV VLM) use case

Figure 2 provides an illustration of a *TARV vehicle location monitoring (4.48)* system. This application service is described in 10.1.2 and 10.1.3.

10.1.2 Description of TARV VLM regulated application service

The *TARV vehicle location monitoring (4.48)* system centres on the *IVS (4.26)*. The *IVS* generates vehicle location periodically while the *regulated vehicle (4.37)* is turned-on and moving. Vehicle location is generated independently by the *IVS*'s *GNSS (4.23)* receiver. The functions of the stakeholder 'actors' in the *vehicle location monitoring* system are similar to those described earlier for the *vehicle access management* (4.47) *application service (4.4)* defined in Clause 10.

Figure 2 provides an illustration of a *vehicle location monitoring (4.48)* system. This application service is described in 10.1.3 and 10.2.

10.1.3 Description of TARV 'vehicle location monitoring' (TARV VLM) application service

The *TARV vehicle location monitoring (4.48)* (*TARV VLM*) application service may exhibit itself in a number of different forms in different *jurisdictions (4.28)*. For some, it might be an issue of mandatory compliance [for example, for compliance to planned route of a *regulated vehicle (4.37)*], others only providing support

data for fleet management/route management systems and for supervision of *drivers (4.19)* by vehicle *operators (4.33)*. It might or might not involve compliance actions. Within other *jurisdictions,* it may just be commercial fleet management issue. Individual instantiations use cases will vary slightly, for example, whether there is or is not a digital *tachograph (4.43)* and/or a driving licence reading device, and so, the example shown in Figure 2 is therefore an example, not a requirement. It is likely to be named differently according to its origin and the regulatory environment in which it is instantiated. '*vehicle location monitoring' (4.48)*, 'vehicle location compliance', 'HGV location monitoring', 'route violation enforcement', etc. being other typical example names for this type of *application service (4.4).*

The exact nature and form of the requirements and reports will vary from instantiation to instantiation, and such detail is not standardized in this part of ISO 15638. This part of ISO 15638 specifies the basic *architecture (4.10)* and information needed to support this type of *application service (4.4)* using *TARV*, so that the *in-vehicle system (4.26)* can satisfy the requirements of any likely instantiation by a different *jurisdiction* (4.28)/*application service provider (4.5),* or so that the *regulated vehicle (4.37)* and equipment can support the different requirements of different *jurisdictions* when the *regulated vehicle* and *driver (4.19)* are operating within a foreign domain.

Figure 2 shows an example use case appropriate where reports are required by the *jurisdiction (4.28)* and where compliance is also monitored, such that, transgression may result in an offence/prosecution, perhaps the most comprehensive example of the *TARV VLM application service (4.4).*

10.2 Concept of operations for TARV VLM

10.2.1 General

Vehicle location monitoring (4.48) is an application service that has three options.

a) monitoring the location of the *regulated vehicle (4.37)* for regulatory purposes;

b) monitoring the locations driven by the *driver (4.19)*/*regulated vehicle* combination for regulatory purposes;

c) monitoring the location of the *regulated vehicle (4.37)* for fleet operation management purposes.

The objectives, and therefore the requirements, for each of these three facets differ to some extent.

Monitoring the *regulated vehicle (4.37)* for regulatory purposes provides an automated version of more traditional location enforcement systems which are designed to identify an instance of contravention and provide the evidence of such contravention to the *jurisdiction (4.28).* Identification of the *driver (4.19)* is a subsequent issue in traditional location contravention enforcement systems. *VLM (4.48)* instantiations using *TARV* may follow the traditional methods of identifying the *driver (4.19),* or, as described below, may use on-board identification of the *driver* where driving licence reading devices are available. This facet may also include monitoring the *operator's (4.33)* observance of special arrangements for particular restrictions on particular *consignments (4.15)* and configurations.

Monitoring the locations driven by the driver/vehicle combination for regulatory purposes has similar objectives but with the capability to automatically identify the *driver (4.19)* in control of the *regulated vehicle (4.37)* at the time of the contravention. This instantiation of the *TARV VLM* application service requires that the *IVS (4.26)* of the *regulated vehicle* has the capability to input the authenticated identify of the *driver.* It is therefore most likely to be possible where other systems, such as '*driver work records (4.20)*' (See ISO 15638-11), which require on-board identification of the *driver,* are also within the regime of the *jurisdiction (4.28).*

Monitoring the location of the *regulated vehicle (4.37)* for fleet operation management purposes does not involve the *jurisdiction (4.28)* and is simply the provision of information for fleet management systems.

Regulated vehicles (4.37) often have regulatory limitations concerning their permitted route due to their class, weight, configuration, shape and size, or load. Some categories of *regulated vehicle* are only permitted to travel on pre-specified and approved routes.

Using traditional means, where a *regulator (4.38)* seeks to enforce in the event of a violation, an enforcement officer or fixed camera records the violation, and records the registration number of the *regulated vehicle (4.37)*. The *jurisdiction (4.28)* then issue a violation ticket to the owner of the *regulated vehicle*, but it is the *driver (4.19)* who is normally held responsible for the violation, and so his details are supplied by the owner/ *operator (4.33)* to the *jurisdiction* and the *driver (4.19)* is subsequently prosecuted.

TARV vehicle location monitoring (4.48) uses *GNSS (4.23)* [for example, *GPS (4.24)*] systems to establish the position of the *regulated vehicle (4.37)*.

Using *TARV* for *vehicle location monitoring (4.48)* is achieved by installing and running an *app (4.3)* in the *IVS (4.26)* on-board *app library (4.6)* to utilize the *GNSS (4.23)* capability of the on-board *IVS (4.26)* to create a file (named VLM) containing relevant data and to provide that data to the application from time to time through wireless communications in accordance with the instructions of the *app,* to meet the requirements of the *application service (4.4)* as defined by the *application service provider (4.5).*

10.2.2 Statement of the goals and objectives of the TARV VLM system

10.2.2.1 Monitoring the location of the regulated vehicle for regulatory purposes

The objective of this *application service (4.4)* is to provide evidence to prove compliance to the regime of the *jurisdiction (4.28),* or in the event of contravention to provide evidence to support enforcement. Principal provision of the *application service* is provided by the landside *application service provider (4.5)* system, and the on-board application is a means of feeding data to that landside system, and may on occasions receive data from the landside based *application service* system.

10.2.2.2 Monitoring the locations driven by the driver/vehicle combination for regulatory purposes

The objective of this *application service (4.4)* is to provide evidence to prove compliance to the regime of the *jurisdiction (4.28),* or in the event of contravention to provide evidence to support enforcement, and to identify the *driver (4.19)* at the time of the contravention.

10.2.2.3 Monitoring the location of the regulated vehicle for fleet operation management purposes

The objective is simply to make data available to fleet management systems of the *application service provider (4.5).*

10.2.3 Strategies, tactics, policies, and constraints affecting the TARV VLM system

The principle issues are those of acceptance, particularly in the case of enforcement. No *operator (4.33)* is likely to choose to equip his vehicle in order that it increases the probability that his organization and his *drivers (4.19)* may be prosecuted. *TARV VLM* is therefore only likely to be instantiated where the *jurisdiction (4.28)* has persuaded the public to accept that regulated vehicles are a special class of vehicle where it is in the strong public interest to ensure that they do not violate location/route restrictions that are imposed on them, or for commercial purposes that do not involve the regulator.

In respect of enforcement, the *jurisdiction (4.28)* may have to adapt traffic regulations to accommodate the *TARV* method of collecting data.

In all probability, *TARV VLM* is only likely to be instantiated as one of a series of measures controlling regulated vehicles *(4.37)*.

The issue of identifying the *driver (4.19)* also requires strategic choice which is left to the *jurisdiction (4.28)* and the *application service provider (4.5).* Option (a) in 10.2.1 does not require the *driver* to be identified in the *regulated vehicle (4.37)*. Option (b), and in most cases, option (c), do require identification of the *driver* by the on-board *TARV VLM app (4.3).* The means of providing such identification is not defined in this part of ISO 15638, but may be a smart card drivers licence, *RFID* device, barcode, touch memory or similar device, or data from a digital *tachograph (4.43)*. Most conveniently, if a '*drivers (4.19)*

work records' application service is also in operation as specified in ISO 15638-9, could utilize the *DRD* [*Drivers (4.19)* Records Device] used for that service.

The *IVS (4.26)* is a device of limited capability, and will be expected to be multi-tasking with other *TARV apps (4.3)* and also conducting non-*TARV* cooperative vehicle system *apps* at the same time. It is therefore important that the *IVS* is not overloaded by a complicated *TARV VLM app.*

Similarly, in order to minimize load on the *IVS (4.26)*, matching actual location to planned and permitted routes is a function carried out by the application service in the system of the *application service provider (4.5)* using data supplied by the *IVS*, and in this application the principle provision of the application service is not a function carried out within the *IVS*.

This part of ISO 15638 specifies the data needed for these possibilities, but it does not design the *application service (4.4).* That is left to the *jurisdiction (4.28),* the *application service provider (4.5),* and *approval authority (regulatory) (4.9)*.

The provisions of this part of ISO 15638 provides *specifications (4.42)* for the data exchange required for each of the options described above, but the choice of options remains with the *jurisdiction (4.28)* and *application service provider (4.5),* and are outside the scope of this part of ISO 15638.

10.2.4 Organizations, activities, and interactions among participants and stakeholders for TARV VLM

It should be noted that an entity may perform multiple roles, and in doing so takes on the responsibility to perform the functions described under those roles.

Table 1 provides a list of the actors involved, their activities and interactions.

Table 1 — TARV VLM actors, activities and interactions

Actor	Role	Activities	Interactions
Jurisdiction (J) *(4.28)*	Sets requirements for mandatory and supported *VLM (4.48)*	Publishes *specifications (4.42)*	ALL
		Obtains regulations	ALL: Establish regime and regulations PSP: Register ASP: Register, receive reports Op: Vehicle registration Dr: Licence, employment, *H&S*
		Appoints *approval authority* where appropriate	AA: Contract. Instruct. Receive reports.
		Monitors reports	
		Instigates enforcement	ALL: Process enforcement
Approval authority (AA) *(4.9)*	Implements *jurisdiction* policy at equipment and service approval level	Approves *IVS (4.26)*, *application service (4.4)* instantiations	PSP: Approve IVS ASP: Approve *application service* Dr: Approve licence reader
		Conducts quality of service maintenance to instruction of *jurisdiction*	

Table 1 *(continued)*

Actor	Role	Activities	Interactions
Prime service provider (PSP) *(4.34)*	Responsibility for *IVS*	Installs and/or commissions *IVS*	AA: May apply to approve *IVS /tachograph* (4.43)/ reader Op: Installation
	Responsibility for driving licence reader	Maintains *IVS* and reader	Op: Maintain *IVS* and reader
		May provide driving licence reading device	
Application service provider (ASP) (4.5)	Provides *VLM application services*	Develops instantiation of *VLM application service*	AA: Applies for approval of service
		Contracts with *users (4.45)*	Op: Contracts
		Provides *VLM application service* to *users* and *jurisdiction*	Op: Provides service Dr: May provide service J: Provides service/reports re violations
Operator (4.33) (Op)	Provides *regulated vehicle (4.37)*	'Employs'/contracts *drivers*	Dr: Employs/Contracts
	Uses *regulated vehicle* for commerce and logistics	Operates *regulated vehicle*	J: Registers *regulated vehicle* PSP: Contracts, receives service *ASP*: Contracts, receives service
		Receives reports from *ASP*	
Driver (Dr) *(4.19)*	Drives *regulated vehicle* to instruction of *operator (4.33)*		
		Provides input to IVS, probably through *tachograph/DRD*/licence reader	IVS: Provides data
		Drives *regulated vehicle*	Op: to instructions

10.2.5 Clear statement of responsibilities and authorities delegated for TARV VLM

10.2.5.1 The *jurisdiction (4.28)* shall be responsible for the regime and regulations.

10.2.5.2 The *jurisdiction (4.28)* shall employ an *approval authority (regulatory) (4.9)* or otherwise provide its function.

10.2.5.3 The *jurisdiction (4.28)* shall provide means for enforcement (where required) to meet the requirements of the regime of the *jurisdiction.*

10.2.5.4 The *prime service provider (4.34)* shall install/commission *IVS (4.26)* and maintain *IVS*.

10.2.5.5 The *prime service provider (4.34)* shall install/commission driving licence reading device and maintain ancillary reading devices.

10.2.5.6 The *application service provider (4.5)* (*ASP*) shall develop *VLM* application service or use a *VLM* application service provided by *jurisdiction (4.28).*

10.2.5.7 The *application service provider (4.5)* shall obtain any required *approval (4.7)* of its *VLM* service from *approval authority (regulatory) (4.9)*.

10.2.5.8 The *application service provider (4.5)* shall contract with *user (4.45)* [normally *operator (4.33)*, but in some instantiations, also with driver].

10.2.5.9 The *application service provider (4.5)* shall be responsible to provide application service to *jurisdiction (4.28)*, *operator (4.33)* and *driver (4.19)* as specified in its service offering.

10.2.5.10 The *operator (4.33)* shall be responsible to provide the *regulated vehicle (4.37)*.

10.2.5.11 The *operator (4.33)* shall be responsible to abide by requirements of regime re *VLM*.

10.2.5.12 The *operator (4.33)* shall be responsible to pay fees required by *jurisdiction (4.28)*, *prime service provider (4.34)* and *application service provider (4.5)*.

10.2.5.13 The *driver (4.19)* shall be responsible to follow instructions, including use of driving licence reader.

10.2.6 Equipment required for TARV VLM

10.2.6.1 TARV IVS

10.2.6.1.1 The system shall be designed to work using *TARV IVS (4.26)* as defined in this International Standard.

10.2.6.1.2 If the *TARV VLM* application service requires the *driver (4.19)* to be identified, the required ancillary equipment shall be connected to the *TARV IVS (4.26)* and commissioned, the *IVS* shall be capable of receiving, confirming receipt, of interface connection to any ancillary reading device.

10.2.6.1.3 The *prime service provider (4.34)*/*application service provider (4.5)* shall provide to the *approval authority (regulatory) (4.9)*, evidence of compliance from an appropriate body to demonstrate the suitability for use in vehicles for the *IVS (4.26)* and all associated components.

10.2.6.1.4 It shall not be possible for collected or stored *vehicle location monitoring (4.48)* data or *vehicle location monitoring* in any software or non-volatile memory within the *IVS (4.26)* to be accessible or capable of being manipulated by any person, device or system, other than that authorized by the *application service provider (4.5)*.

10.2.6.2 TARV VLM 'app'

10.2.6.2.1 The *TARV VLM app (4.3)* running on the *IVS (4.26)* records the *regulated vehicle (4.37)* location at intervals determined by the approved application service system *specification (4.42)* and files that data in its memory of the *IVS*, or on request from the *application service provider (4.5)* through a wireless interface to the *IVS*.

10.2.6.2.2 The *TARV VLM app (4.3)* running on the *IVS (4.26)* may automatically provide information to assist the *driver (4.19)* in observance of location restrictions, but is not necessarily required to do so unless this is a requirement of the *jurisdiction (4.28)*.

10.2.6.2.3 If the *IVS (4.26)* is equipped with a digital *map (4.30)* of location restrictions, the *IVS* shall alert the *driver (4.19)* of any violations.

10.2.6.2.4 At intervals determined by the approved application service system *specification (4.42)*, the *VLM app (4.3)* shall send the *VLM* data held in the memory of the *IVS (4.26)* to the *VLM* system of the *application service provider (4.5)* through its most appropriate wireless communications interface.

10.2.6.2.5 Once the *VLM* system of the *application service provider (4.5)* has acknowledged successful receipt of the data, the *VLM* file shall be deleted from the memory of the *IVS (4.26)* unless the *user (4.45)* or *application service provider* requires it for other purposes.

10.2.6.2.6 It shall not be possible for collected or stored *vehicle location monitoring (4.48)* data or *vehicle location monitoring* in any software or non-volatile memory within the *IVS (4.26)* to be accessible or capable of being manipulated by any person, device or system (including through any self-declaration device), other than that authorized by the *application service provider (4.5).*

10.2.6.3 Driving licence reading device

10.2.1 describes three modes of *vehicle location monitoring (4.48)*.

a) monitoring the location of the *regulated vehicle (4.37)* for regulatory purposes;

b) monitoring the locations driven by the driver/vehicle combination for regulatory purposes;

c) monitoring the location of the *regulated vehicle (4.37)* for fleet operation management purposes.

In the case of a), all that is required automatically within the *VLM* application is identification of the *regulated vehicle (4.37)*, its location, direction of travel, and location. The means of ascertaining the detail of the *driver (4.19)* to prosecute, as with current manual systems, occurs through the administrative process established by the *jurisdiction (4.28)* [most commonly telling the *regulated vehicle* keeper that the *regulated vehicle (4.37)* has committed an offence and requiring declaration of the *driver* details]. In this event, no driving licence reading device is required by the *TARV VLM* application.

Modes (b) and (c) require the identification of the *driver (4.19),* and this is achieved by a driving licence reading device to provide the *driver (4.19)* licence number combined with a *jurisdiction (4.28)*/country ID as an unambiguous solution.

The issue of identifying the *driver (4.19)* also requires strategic choice which is left to the *jurisdiction (4.28)* and the *application service provider (4.5)* (and is not specified in this part of ISO 15638). Option (a) in 10.2.1 does not require the *driver* to be identified in the *regulated vehicle (4.37)*. Option (b), and in most cases option (c) do require identification of the *driver* by the on-board *VLM app (4.3).* The means of providing such identification is not defined in this part of ISO 15638, but may be a smart card drivers licence, *RFID* device, barcode, touch memory, or similar device. Most conveniently, if a 'drivers work records' application service is also in operation as specified in ISO 15638-13:—[4)], could utilize the *DRD* (Drivers Records Device) used for that service.

A vehicle may have two or more *drivers (4.19)* on-board, and so, it is a requirement that the driving licence reading equipment/application service system shall be able to determine who is driving at the time of the violation, but the means to achieve this is not specified in this release of this part of ISO 15638.

10.2.6.4 On-board map

Where an on-board *map (4.30)* is specified to provide part of the *VLM application service (4.4),* it shall be obtained from a recognized provider of *maps*, and shall have a means of, and system for, regular updating.

10.2.7 Operational processes for the TARV VLM system

Operational processes for the TARV VLM system shall be as defined in 9.

4) To be published.

For detail of the operational processes, see 10.3 (sequence of operations for vehicle location monitoring) and Figure 3.

10.2.8 Role of the jurisdiction in TARV VLM

This shall be as defined in 9.2, 10.2.4, and 10.2.5.

10.2.9 Role of the TARV VLM prime service provider

This shall be as defined in 9.2, 10.2.4, and 10.2.5.

10.2.10 Role of the TARV VLM application service provider

This shall be as defined in 9.2, 10.2.4, and 10.2.5.

10.2.11 Role of the TARV VLM user

This shall be as defined in 9.2, 10.2.4, and 10.2.5.

10.2.12 Generic characteristics for all instantiations of the TARV VLM application service

10.2.12.1 A *vehicle location monitoring (4.48)* application service is approved; it utilizes a *TARV IVS (4.26)* which communicates to the *prime service provider (4.34)*/*application service provider (4.5)* and may have the ability to insert a means to provide *driver (4.19)* licence details.

10.2.12.2 The *application service provider (4.5)* shall load a '*VLM* App' into the *IVS (4.26)* of the *operator's (4.33) regulated vehicles (4.37)*.

10.2.12.3 The '*VLM* App' shall run whenever the *regulated vehicle (4.37)* is operating.

10.2.12.4 The '*VLM* App' shall record the data specified herein in the *IVS (4.26).*

10.2.12.5 The *application service provider (4.5)* shall design/install/operate its *vehicle location monitoring (4.48)* system as approved by the *approval authority (regulatory) (4.9)*.

10.2.12.6 The *IVS (4.26)* shall provide its *TARV VLM* data to the *application service provider (4.5)* using the *TARV IVS* wireless link at least once every 24 h.

Every transfer shall include framing data that identifies its sequential order, IVS ID, version number of *IVS (4.26),* and version number of the *TARV VLM app (4.3).*

The system shall acknowledge receipt of the data through the *TARV IVS (4.26)* wireless link. Once the data has been acknowledged, it shall be deleted from the *IVS* memory unless the *operator (4.33)* chooses to retain it in the *IVS* memory for other openly declared purposes with the assent of the user .

10.2.12.7 The application service system shall retain and back up the *TARV VLM* data to the requirements of the *jurisdiction (4.28).*

10.2.12.8 The *application service provider (4.5)* shall provide reports to the *jurisdiction (4.28)* or its agents as specified and required by the *jurisdiction* when approving the product.

Where required by the application service *specification (4.42)* approved by the *approval authority (regulatory) (4.9)*, the *driver (4.19)* provides their identification to the system at commencement of a '*session (4.41)*' using the identification and *authentication* method provided by the *application service provider (4.5)*. When the *regulated vehicle (4.37)* ignition is turned off, the system shall automatically

close the '*session*'. Each time the *regulated vehicle* ignition is turned on, the *driver* shall be required to identify and authenticate himself/herself.

If *drivers (4.19)* change without turning the engine off, the new *driver* shall identify himself/herself by the means provided by the *application service provider (4.5).*

Where required by the application service *specification (4.42)* approved by the *approval authority (regulatory) (4.9)*, the *application service provider (4.5)* provides the *driver (4.19)* (i.e. *driver* specific) with their identification and authentication method for the *IVS (4.26)*. The method of identification and *authentication* may be unique to each *application service provider.*

10.2.12.9 Electronic records are generated periodically by the *IVS (4.26)* when the *regulated vehicle (4.37)* is moving. The electronic record contains accurate time and location data as defined herein. These *TARV VLM* records are generated automatically during the '*session (4.41)*' and also stored in the *IVS*.

10.2.12.10 *TARV VLM* records generated by the *IVS (4.26)* are sent to the *application service provider (4.5).* The *application service provider* transmits the *TARV VLM* records to the *regulated vehicle (4.37) operator (4.33)*, and in the event of contravention, potentially also to the *jurisdiction (4.28),* (in accordance with the regime of the *jurisdiction).*

10.3 Sequence of operations for TARV VLM

The business process and sequence of operations is shown in Figure 3.

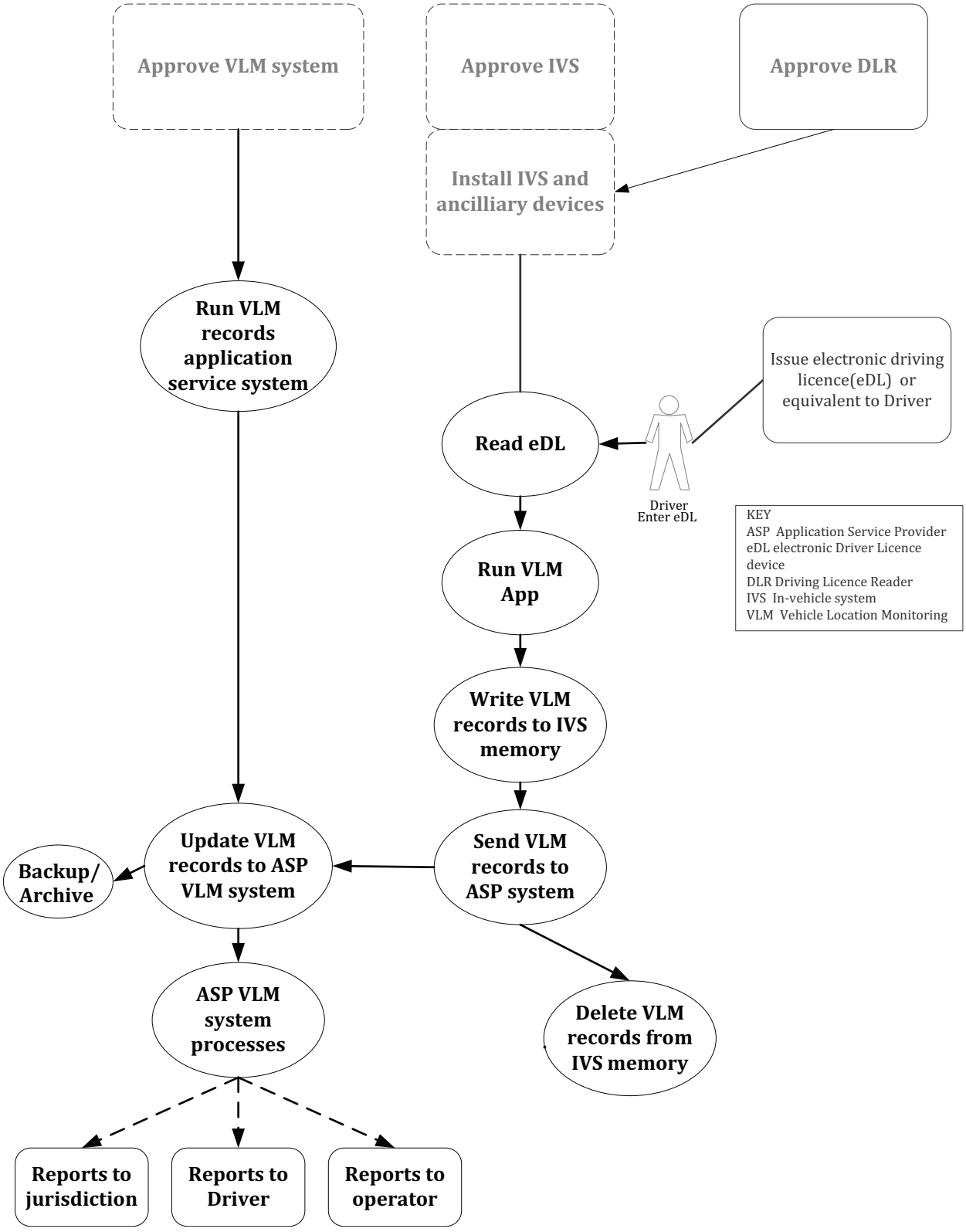

Figure 3 — TARV VLM business process and procedure

10.4 TARV VLM service elements

10.4.1 TARV VLM service element SE1: Establish 'vehicle location monitoring' regulations, requirements, and approval arrangements

The *jurisdiction (4.28)* shall be responsible to define its requirements for its variant of the *vehicle location monitoring (4.48) application service (4.4),* obtain any legislation and/or regulations, and define the procedure for an *application service provider (4.5)* to gain approval for its instantiation of the *TARV VLM application service.*

10.4.2 TARV VLM SE2: Request system approval

The *application service provider (4.5)* shall seek approval for its instantiation of the *vehicle location monitoring (4.48)* application service from the *approval authority (regulatory) (4.9)* in accordance with the regime established by the *jurisdiction (4.28).*

10.4.3 TARV VLM SE3: User (operator) contracts with prime service provider

It is a prerequisite for any potential vehicle *operator (4.33)* opting or being required to sign up for the *TARV VLM (4.48) application service (4.4)* that its regulated vehicles *(4.37)* are *TARV* equipped with a *TARV*-compliant *IVS (4.26)* at point of manufacture or installed by a *prime service provider (4.34)*, and that there is a maintenance contract with a *prime service provider* for that equipment (see ISO 15638-1).

10.4.4 TARV VLM SE4: User (operator) equips vehicle with a device to read the driver licence (DLR)

Where the *TARV VLM* application service shall also identify the *driver (4.19),* it is a prerequisite for any potential vehicle *operator (4.33)* opting or being required to sign up for the *TARV VLM (4.48) application service (4.4)* that its regulated vehicles *(4.37)* are fitted with a driving licence reading device connected to the *IVS (4.26)*. This may be *DRD* if a 'driver work record' system is in operation, an eDriving licence reader, or in *jurisdictions (4.28)* where there is no eDriving licence, a device to read a simulated eDriving licence (*eDL*). It is a requirement for all *TARV VLM* application service systems compliant to this part of ISO 15638 that all drivers (4.19) shall be provided with a compatible device containing their driving licence details, and that in use, this device remains inserted into or connected to the *eDL* while the *driver* is in control of the *regulated vehicle (4.37)*.

10.4.5 TARV VLM SE5: User contracts with application service provider

The *user (4.45)* [*operator (4.33)*] shall contract with an *application service provider (4.5)* who offers an approved *TARV VLM (4.48) application service (4.4)* to provide the *TARV VLM (4.48) application service* to nominated vehicles.

10.4.6 TARV VLM SE6: Application service provider uploads software into the TARV equipped vehicles of the operator

The service provider shall upload and commission the on-board *VLM app (4.3)* software into the *TARV* equipped vehicles of the *operator (4.33)*.

10.4.7 TARV VLM SE7: The driver obtains an electronic drivers licence device (eDL)

Where *driver (4.19)* identification is required by the *TARV VLM (4.48) application service (4.4)* approved by the *approval authority (regulatory) (4.9)*, in order to be able to use a *TARV VLM* system, the *driver* shall obtain a driver records device in accordance with procedures issued by the *jurisdiction (4.28),* or be provided with a device from the *prime service provider (4.34)* through the *operator (4.33)* of the *regulated vehicle (4.37)*, that contains the details of his/her driving licence and can be read by the driving licence reader fitted to the *IVS (4.26)* of the *regulated vehicle*. The procedures specified by the *jurisdiction* shall include procedures to populate the *eDL* or its equivalent (but these procedures and requirements are a choice of the *jurisdiction* and are not specified in this part of ISO 15638).

10.4.8 TARV VLM SE8: Driver use of vehicle routines

When taking control of the *regulated vehicle (4.37)*, the *driver (4.19)* shall introduce (connect) the *eDL* device to the *IVS (4.26)* which shall read and store relevant elements of his/her driving licence details. This act shall cause the on-board *TARV VLM (4.48) app (4.3)* to run.

Where *driver (4.19)* identification is required by the *TARV VLM (4.48) application service (4.4)* approved by the *approval authority (regulatory) (4.9)*, the *eDL* device shall remain inserted or connected to the *DLR* while the *driver (4.19)* is in control of the *regulated vehicle (4.37)* and the *driver* shall eject or disconnect the device when he/she turns the ignition off or hands control of the *regulated vehicle* to any other person whatsoever.

Where *driver (4.19)* identification is required by the *TARV VLM (4.48) application service (4.4)* approved by the *approval authority (regulatory) (4.9)*, when the *driver* turns off the ignition or hands control of the *regulated vehicle (4.37)* to any other person whatsoever, he/she shall remove (i.e. 'eject') his/her *eDL* device from the *regulated vehicle*.

10.4.9 TARV VLM SE9: Time series or application service instigated recording of vehicle location

In the event that the system is designed to record the location of the *regulated vehicle (4.37)* at defined time intervals, when the *eDL* is read, the on-board *VLM app (4.3)* shall create a file, type: VDLM {Vehicle /Driver/Location monitoring file [VDLM file] within this *specification (4.42)*}, named

```
<VDLM><YYMMDDhhmm><vehicleregistrationnumber><driverslicencenumber>
```

At the appropriate time intervals, or at the instigation of the *application service provider (4.5)* through a wireless link to the *IVS (4.26)*, the *VLM app (4.3)* in the *IVS* shall update the VDLM file with the following data:

```
<IVS ID>,
<VehicleLocation>,
<VehicleLocation>,
<VehicleLocation>,
<VehicleLocation>
etc.
<IVS ID>
```

Vehicle location shall be calculated as specified in ISO 15638-5, 9.2.4.

NOTE ISO 15638-5, 9.2.4 definition of location includes location, *UTC* time and direction of travel

Vehicle direction of travel shall be calculated as specified in ISO 15638-5, 8.3.12

At time intervals determined by the on-board *VLM (4.48) app (4.3)*, the *IVS (4.26)* shall send the file to the *TARV VLM application service provider (4.5)* system through a wireless communication supported by the *IVS* and *application service provider* system.

On successful receipt of the VDLM file, the *application service provider (4.5)* system shall send an ACKnowledgement <VLX> to the *IVS (4.26)*. On receipt of the ACKnowledgement <VLX>, the *IVS (4.26)* shall clear the data held within the VDLM file and start to repopulate the VDLM file with data at the predetermined time intervals.

If an ACKnowledgement is not received within 30 s of sending the data, the *VLM (4.48)app (4.3)* shall attempt to resend the data and shall continue to do so at intervals determined by the *specification (4.42)* of the *VLM application service (4.4)* approved by the *approval authority (regulatory) (4.9)*, until the data has been successfully sent and ACKnowledged.

Where appropriate, whenever the *driver (4.19)* removes his *eDL* device, the on-board *app (4.3)* shall append a record <Time> <END> to the VDLM file and the *IVS (4.26)* shall send the file to the *TARV VLM (4.48) application service provider (4.5)* system through a wireless communication supported by the *IVS* and *application service provider* system.

On successful receipt of the VDLM file containing the end data <Time> <END> the *application service provider (4.5)* system shall send an ACKnowledgement <VXX> to the *IVS (4.26)*, and unless otherwise instructed by the *specification (4.42)* of the application service approved by the *approval authority (regulatory) (4.9)*, on receipt of the ACKnowledgement <VXX> the *IVS (4.26)* shall delete the VDLM file from its memory, and the *VLM app (4.3)* shall terminate.

Because of the titling regime defined above, each VDLM file is uniquely identifiable by the host *VLM* application service when it is received.

In the case of time series or application service instigated recording of vehicle location, the manner in which the *application service (4.4)* uses the information captured and forwarded to it by the *IVS (4.26)* (VDLM files) to determine location violations, and the method of reporting to the *jurisdiction (4.28)* and *operator (4.33)* is outside of the scope of this part of ISO 15638 shall be the subject of definition by the *jurisdiction* and the *application service provider (4.5)*.

10.4.10 TARV VLM SE10: 'Interrogated' request for vehicle location data

10.4.10.1 An interrogating ITS-station shall request specific data as determined in ISO 15638-6, 7.1 and 8.1.2.

10.4.10.2 In the event that the IVS of a vehicle receives a wireless interrogation requesting the VLM data, the interrogator shall also provide at the time of the request, a unique 8-byte reference number (URef), and a destination IPv6 address (ReqDest) where it requests the data to be sent.

10.4.10.3 On receipt of the request the IVS shall acknowledge the request with the appropriate ACKnowledgement defined in ISO 15638-6, 8.3.5, <X>, which acknowledges that a request for VLM data has been received.

10.4.10.4 The IVS shall then close the communication session.

10.4.10.5 The IVS shall then open a new communication session using an available and appropriate CALM wireless medium.

10.4.10.6 The IVS shall then send the VLM data file (as defined in 10.4.9) to a predetermined destination IPv6 (internet) address that has previously been stored in the memory of the data pantry by its ASP, together with the URef and ReqDest provided by the interrogator.

10.4.10.7 On successful receipt of the data, the recipient at the predetermined destination IPv6 address shall send an acknowledgement <VLX> to the IVS.

10.4.10.8 On receipt of the acknowledgement <VLX> the IVS shall close its communication session.

10.4.10.9 The ASP shall be responsible to verify that the interrogation is legitimate, appropriate and from an accepted source, and having verified this, shall be responsible to send the data to the interrogator requested IPv6 address. The means and detail of how this is achieved is outside the scope of this part of ISO 15638.

10.4.11 TARV VLM SE11: End of session

At the end of the driving *session (4.41)*, when the *driver (4.19)* removes his *eDL* device, or the ignition of the *regulated vehicle (4.37)* is switched to OFF, on receipt of this information, the *IVS (4.26)* shall ensure whenever possible that the *application service provider (4.5)* system is updated through a wireless connection from the *IVS (4.26)*.

If it is not possible for the *IVS (4.26)* to update the *application service provider (4.5)* system at this point in time, the *IVS* shall update the *application service provider* system at the earliest opportunity [for example, when the *regulated vehicle (4.37)* ignition is next switched on].

10.5 Generic TARV VLM data naming content and quality

The process to obtain *basic vehicle data (4.12)* [*TARV LDT (4.29)*] data content shall be as defined in ISO 15638-6, 8.3 and ISO 15638-5, 8.3.

The electronic records declared and stored by the *IVS (4.26)* shall be authenticated, with integrity, and secured from interception or corruption.

The formal data content of a *TARV VLM* record shall be as shown in Table 2.

Table 2 — Formal data content of a VDLM record

File type		**Format of file name**			**Notes/source**
VLM	Mandatory	<VDLM><YYMMDD><hhmmss><vehicle registration number><*drivers (4.19)* licencenumber> Example VDLM 110316 070603 KV76WRR WILLI502139RK9MA85 As: VDLM110316070603KV76WRRWILLI502139RK9MA85			10.4.9 (Vehicle /Driver/Location monitoring file [VLM file])
Number	**Data concept name**		**Use**	**Format**	**Notes/source**
VLM001	IVS ID		Mandatory	AN (9)	IVS identifier as defined in ISO 15638-5
VLM002	Vehicle location		Mandatory	S(serial number) timestamp location Example s0123 110316 x0A5D3770 0x027E2938 > 0123	Calculated as specified in ISO 15638-5, 9.2.4
VLM005-nn	New Vehicle location		Mandatory	S(serial number) timestamp location Example s0123 110316 x0A5D3770 0x027E2938 > 0123 Repeated as required and collated in VDLM file	Calculated as specified in ISO 15638-5, 9.2.4.
VLM001	IVS ID		Mandatory	AN (9)	IVS identifier as defined in ISO 15638-5, to indicate end of file
In the event that data are sent in response to an interrogation requesting data, the following data shall be appended:					

Table 2 — *(continued)*

Number	Data concept name	Use	Format	Notes/source
VLM003	URef	Mandatory	AN (8)	An 8 byte reference provided by the interrogator requesting the data. The alphanumeric or binary content of which is unspecified by ISO 15638, but is intended to be used by the interrogator to provide a unique reference to its request for data.
VLM004	ReqDest	Mandatory	35 Bytes	Requested Destination IPv6 address for the data to be sent as: scheme://domain:port/path?query_string#fragment_id i.e.: The scheme name (commonly called protocol), followed by:// then, depending on scheme, a domain name (alternatively, IP address): a port number, and / the path of the resource to be fetched or the program to be run. If the scheme name is http, the 'http://' is assumed: e.g: www.example.com/path/to/name https://example.com/47.35868 telnet://192.0.2.16:80/

10.6 TARV VLM service specific provisions for quality of service

The integrity of the data are important, and other sensors as well as parameters may then be required based on the approaches and techniques used to provide assurance of the quality of the data. The generic quality of service provisions that are specified in 10.4 are defined in ISO 15638-6 and ISO 15638-5.

Instantiation specific requirements shall be part of the regulation of the *jurisdiction (4.28).* However, in defining such requirements *jurisdictions* shall wherever possible, use performance based or functionally *specifications (4.42)* in order to avoid locking requirements into technologies that will become obsolete.

NOTE Having prescribed integrity and its parameters into an operational system, it is harder to move to other integrity indicators when new technologies come along.

See also Clause 9 for general quality of service requirements.

10.7 TARV VLM application service specific provisions for test requirements

There are no specific provisions for test requirements specified in this version of this International Standard.

10.8 TARV VLM application specific rules for the approval of IVSs and 'service providers'

This shall be as specified in 9.12.

11 Declaration of patents and intellectual property

This part of ISO 15638 contains no known patents or intellectual property other than that which is implicit in the media standards referenced herein and in ISO 15638-2. While the *CALM* standards themselves are free of patents and intellectual property, *CALM* in many cases relies on the use of public networks and IPR exists in many of the public network media standards. The reader is referred to those standards for the implication of any patents and intellectual property.

Application services (4.4) specified within this part of ISO 15638 and ISO 15638-7 contain no direct patents nor intellectual property other than the copyright of ISO. However, national, regional, or local instantiations of any the applications services defined in this part of ISO 15638 and ISO 15638-7, or of the generic vehicle information defined in ISO 15638-5, the security requirements contained in

ISO 15638-4:—[5], or the requirements of ISO 15638-3, may have additional requirements which may have patent or intellectual property implications. The reader is referred to the regulation regime of the *jurisdiction (4.28)* and its regulations for instantiation in this respect.

5) To be published.

Annex A
(informative)

ASN.1 modules for ISO 15638-15 data concepts

A.1 Use of ASN.1

ISO TC204 requires that data concepts defined in ISO TC204 ITS standards deliverables are elaborated in ASN.1 (ISO 14813-6).

ISO 21217 (ITS-CALM-ITS-station communications architecture) and its associated standards require the exchange of data using ASN.1 PER or UPER.

The following example provides a definition for the data concepts used in this Standard.

A.2 ASN.1 modules for ISO 15638-15 (vehicle location monitoring)

A.2.1 Data concepts defined in ISO 15638-5 and used in this part of ISO 15638

```
TARVLocalDataTree DEFINITIONS AUTOMATIC TAGS::=
   BEGIN
        LDTData::= SEQUENCE
        {dataFormatVersion      DataFormatVersion,
         messageID              MessageIdentifier,
         primeSPID              PrimeServiceProviderIdentifier,
         applicationSPAddress   ApplicationServiceProviderAddress,
         sessionControlData     SessionControlData OPTIONAL,
         vehicleUniqueID        VehicleUniqueIdentifier OPTIONAL,
         vehicleClassID         VehicleClassIdentification OPTIONAL,
         vin                    VIN,
         propulsionStorageType  PropulsionStorageType,
         time                   TimeAndTimestamp DEFAULT 0,
         location               Location,
         direction              DirectionOfTravel,
         ignition               Ignition,
         movementSensors        OtherMovementSensors,
         driverID               DriverIdentification,
         trailerID              TrailerIdentification OPTIONAL,
         loadData               LoadData
         }

        DataFormatVersion::= VisibleString (SIZE (6))

        MessageIdentifier::= INTEGER

        PrimeServiceProviderIdentifier::= VisibleString (PATTERN "\w#4:\w#4:\w#4:\w#4:\
w#4:\w#4:\w#4:\w#4") -IPv6 address in the format xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx

        ApplicationServiceProviderAddress::= CHOICE {
        content   [0] INTEGER (128..16511), -contained in two octets
        extension [1] OCTET STRING(SIZE (2))
        }

        SessionControlData::= VisibleString

        VehicleUniqueIdentifier::= SEQUENCE {
        countryCode       VisibleString,
        alphabetIndicator VisibleString,
        licPlateNumber    NumericString
        }
```

```
        VehicleClassIdentification::= NumericString (SIZE (2))

        VIN::= VisibleString (SIZE (17))

        PropulsionStorageType::= BIT STRING {
        gasoline (0),
        diesel   (1),
        cng      (2),
        lpg      (3),
        electric (4),
        hydrogen (5)
        } -Enter type value with curly bracket at beginning and end, assignment type will
accept word and binary forms of storage type

        TimeAndTimestamp::= INTEGER

        Location::= SEQUENCE {
                              latitude  VisibleString (SIZE (10)),
                              longitude VisibleString (SIZE (10)),
                              altitude  VisibleString (SIZE (4..5)) DEFAULT "0000",
                              noOfSats  VisibleString (PATTERN "Sat\d+"), -Type value
must be in the format "SatN", where N = the number of satellites present
                              trust     INTEGER {
                                              false (0),
                                              true  (1)
                                              } (0 | 1) -accepts true, false, 0 or 1
                              }

        DirectionOfTravel::= INTEGER (0..360) -degrees clockwise

        Ignition::= VisibleString ("Ign 1" | "Ign 0" | "Ign d") -where 1=on, 0=off,
d=disconnected

        OtherMovementSensors::= SEQUENCE
        {sensorOne VisibleString (PATTERN "\d+\s\Mvt\s[m,n,d]"|"000") DEFAULT "000", -Type
value must be in the format "[SensorNumber] Mvt [m/n/d]", where m=movement, n=no movement,
d=disconnected
        sensorTwo  VisibleString (PATTERN "\d+\s\Mvt\s[m,n,d]"|"000") DEFAULT "000"
        }

        DriverIdentification::= SEQUENCE
        {jurisdictionID    VisibleString (PATTERN "\d#6\s\w+\s\w+\s(\w+,)*\s\d#6"), -
Must be in the format "[IssueDate(yymmdd)] [IssuingJurisdiction] [Driver'sName]
[VehicleClasses(comma separated)] [ExpiryDate(yymmdd)]"
        userAuthorisation VisibleString (PATTERN "\d#6\s\w+\s\w+\s(\w+,)*\s\d#6"|"000000")
DEFAULT "000000" -Same format as jurisdictionID
        }

        TrailerIdentification::= VisibleString

        LoadData::= VisibleString
   END
```

A.2.2 Data concepts defined in this part of ISO 15638 (VLM)

```
-Type definition for 15638-15 module
VehicleLocationMonitoring DEFINITIONS AUTOMATIC TAGS::=
   BEGIN
      IMPORTS Location FROM TARVLocalDataTree;

      VLMData::= SEQUENCE
      {vLM001 IVSID,
       vLM002 Location,
       vLM005 NewLocation,
       vLM003 Uref,
       vLM004 ReqDes
      }

      IVSID::= VisibleString (SIZE (9))

      NewLocation::= SEQUENCE {
```

```
                                latitude  VisibleString (SIZE (10)),
                                longitude VisibleString (SIZE (10)),
                                altitude  VisibleString (SIZE (4..5)) DEFAULT "0000",
                                noOfSats  VisibleString (PATTERN "Sat\d+"), -Type value
must be in the format "SatN", where N = the number of satellites present
                                trust     INTEGER {
                                                  false (0),
                                                  true  (1)
                                                  } (0 | 1) -accepts true, false, 0 or 1
                                }
      Uref::= VisibleString (SIZE (8))

      ReqDes::= VisibleString (SIZE (35))

   END
```

Annex B
(informative)

Independent testing of the protocols defined in this part of ISO 15638

B.1 Objectives

To test the validity of TARV standards it is necessary to simulate the TARV transactions. These are of two types:

B.1.1 Instigation

a) The IVS of a vehicle establishes a new communication using one of (and shall be tested for each of) several wireless media defined below.

b) The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address.

c) The vehicle sends the data file to the predetermined destination IPv6 (internet) address.

d) The recipient address sends acknowledgement.

e) The IVS closes the communication on receipt of acknowledgement.

B.1.2 Interrogation

a) The IVS of a vehicle receives a wireless interrogation requesting a packet of data.

b) The IVS of a vehicle is switched on but is not connected.

c) The IVS of a vehicle receives a wireless interrogation requesting a packet of data.

d) On receipt, it acknowledges the request (ACK).

e) It closes the communication.

f) It opens a new communication session using one of (and shall be tested for each of) several wireless media defined below.

g) It sends the data file to a predetermined destination IPv6 (internet) address.

h) The recipient address sends acknowledgement.

i) The IVS closes the communication on receipt of acknowledgement.

These scenarios need to be tested using each of 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11) using the same data

A number of different data files (of different length) and acknowledgements need to be sent, which differ according to the application service. Each of the sequences defined below need to be tested.

In respect of 'interrogation' scenarios the ability to receive the interrogation on one medium (esp. 5,9 GHz) and to instigate the subsequent message using a different medium needs to be tested

B.1.3 Preconditions, assumptions, and simulations

a. The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards).

b. CALM and media choice are assumed, and not S.U.T.

c. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, Mesh WiFi, 5,9 GHz (IEEE 802.11p).

d. The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore, may be simulated.

e. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

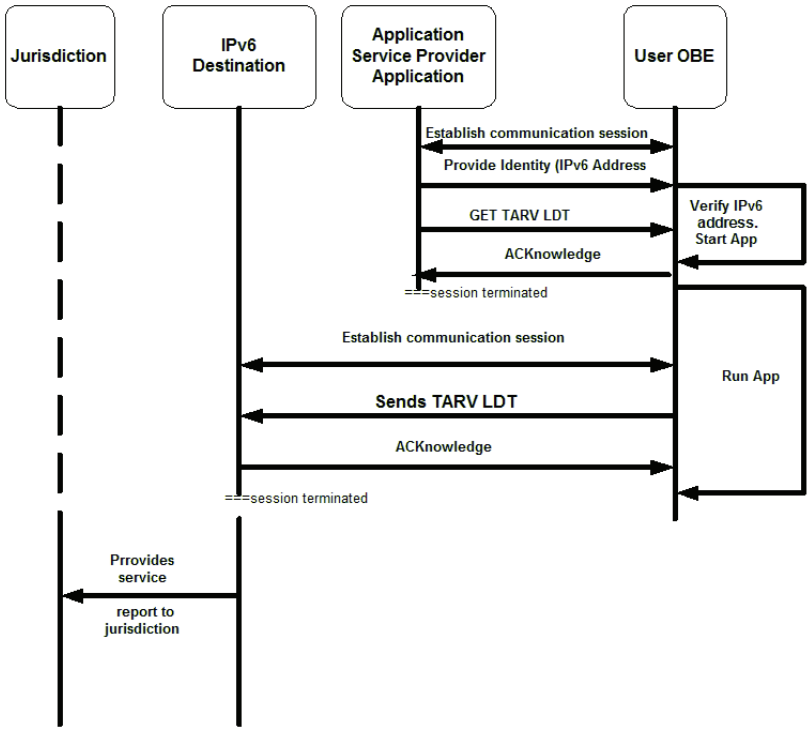

Figure B.1 — Communications sequences to obtain TARV LDT

B.1.4 Application Services where the verity of the communication needs to be physically tested

a) VAM: vehicle access monitoring

b) RTM: remote electronic tachograph monitoring

c) EMS: emergency messaging system

d) DWR: driver work records (work and rest hours compliance)

e) VMM: vehicle mass monitoring

f) MRC: 'mass' information for jurisdictional control and enforcement (no test; data as VMM)

g) VAC: vehicle access control (no test; data as VAM)

h) VLM: vehicle location monitoring

i) VSM: vehicle speed monitoring

j) CLM: consignment and location monitoring

k) ADR: Accord Dangereuses par Route (Dangerous Goods) monitoring

l) VPF: vehicle parking facilities

B.2 Test Sequences

B.2.1 Test script 7

SERVICE: VLM

TEST 7.1.1: VLM– through 2G. Instigated

STEP 7.1.1.1 The IVS instigates a communication session using 2G media to predetermined destination IP address.

AS API IPv6 address

As AS 00000000 00000000 xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx

EXAMPLE PSP 128..16511 1050:0000:0000:0000:0005:0600:300c:326b

Using ',' as a datafield separator

Table B.1 — Formal data content of a VDLM record

File type		**Format of file name**		**Notes/source**
VLM	Mandatory	<VDLM><YYMMDD><hhmmss><vehicle registration number><*drivers (4.19)*> licence number> Example VDLM 110316 070603 KV76WRR WILLI502139RK9MA85 As: VDLM110316070603KV76WRRWILLI502139RK9MA85		10.4.9 [Vehicle /Driver/Location monitoring file (*VLM* file)]
Number	**Data concept name**	**Use**	**Format**	**Notes/source**
*VLM*001	IVS ID	Mandatory	AN (9)	IVS identifier as defined in ISO 15638-5
*VLM*002	Vehicle location	Mandatory	S(serial number) timestamp location Example s0123 110316 x0A5D3770 0x027E2938 > 0123	Calculated as specified in ISO 15638-5, 9.2.4
*VLM*003-nn	New Vehicle location	Mandatory	S(serial number) timestamp location Example s0123 110316 x0A5D3770 0x027E2938 > 0123 Repeated as required and collated in VDLM file	Calculated as specified in ISO 15638-5, 9.2.4
*VLM*001	IVS ID	Mandatory	AN (9)	IVS identifier as defined in ISO 15638-5, to indicate end of file

<IVS ID>,

<VehicleLocation>,

<VehicleLocation>,

<VehicleLocation>,

<VehicleLocation>

etc.

FILENAME: <VDLM110316070603KV76WRRWILLI502139RK9MA85>

FILE CONTENT:

< ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S>

STEP 7.1.1.2 The IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85>.

STEP 7.1.1.3 The destination address sends ACK <VLM>.

STEP 7.1.1.4 The IVS receives ACK <VLM>.

STEP 7.1.1.5 The IVS closes communication session.

B.2.2 Test scripts and results VLM

CTP 7.1.1 Instigated vehicle location monitoring using 2G

S.U.T. reference	Instigated send of vehicle location monitoring using 2G
CTP/7.1.1	
S.U.T. test objective	The IVS of a vehicle establishes a new communication using one of (and shall be tested for each of) several wireless media defined below. The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address. The vehicle sends the data file to the predetermined destination IPv6 (internet) address. The recipient address sends acknowledgement. The IVS closes the communication on receipt of acknowledgement.
CTP origin	CSI
Reference requirement	ISO 15638-15
Initial conditions	The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards). CALM and media choice are assumed and not S.U.T. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore, may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
7.1.1.1	1	IVS instigates a communication session using selected media (2G) to predetermined destination IP address	Session established
7.1.1.2	2	IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85> <START> < ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S> <END>	File sent and arrives correctly at destination
7.1.1.3	3	Destination address sends ACK <VLX>	

7.1.1.4	4	IVS receives ACK <VLX>	File received and ACK <VLX> sent
7.1.1.5	5	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

Test result: CTP 7.1.1	**Pass/fail**	**Date: 28th June 2102**
Signature/initials 	PASS	 k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 7.1.2 Interrogated vehicle location monitoring using 2G

S.U.T. reference	Interrogated send of vehicle location monitoring using 2G
CTP/7.1.2	
S.U.T. test objective	The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected to an active wireless communication session. The IVS of a vehicle receives a 2G wireless interrogation requesting a packet of data. On receipt, it acknowledges the request (ACK). It closes the communication. It opens a new communication session using one of (and shall be tested for each of) several wireless media defined below. It sends the data file to a predetermined destination IPv6 (internet) address. The recipient address sends acknowledgement. The IVS closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-15
Initial conditions	The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards). CALM and media choice are assumed and not S.U.T. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
7.1.2.1	1	Session connected (incoming call)	Call in progress
7.1.2.2	2	Caller sends data request command (GPRS, EDGE etc) GET VLM	Data request sent
7.1.2.3	3	IVS acknowledges request by returning ACKnowledgement <X>	ACK <X> received
7.1.2.4	4	IVS closes communication session	Communication session closed
7.1.2.5	5	IVS instigates a communication session using selected media to predetermined destination IP address	Communication session successfully opened

7.1.2.5	6	IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85> <START> < ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S> <END>	File sent and arrives correctly at destination
7.1.2.6	7	Destination address sends ACK <VLX>	
7.1.2.7	8	IVS receives ACK <VLX>	File received and ACK <VLX> sent
7.1.2.8	9	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

Test result: CTP 7.1.2	**Pass/fail**	**Date: 28th June 2102**
Signature/initials 	PASS	k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 7.1.3 Interrogated vehicle location monitoring using 5,9GHz and responding using 2G or 3G

S.U.T. reference	Interrogated vehicle location monitoring using 5,9 GHz and send of vehicle location monitoring using 2G or 3G
CTP/7.1.3	
S.U.T. test objective	The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected to an active wireless communication session. The IVS of a vehicle receives a 5,9 GHz (IEEE 802.11p) wireless interrogation requesting a packet of data. On receipt, it acknowledges the request (ACK). It closes the communication. It opens a new communication session using 2G or 3G. It sends the data file to a predetermined destination IPv6 (internet) address. The recipient address sends acknowledgement. The IVS closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-15
Initial conditions	The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards). CALM and media choice are assumed and not S.U.T. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
7.1.3.1	1	Session connected (incoming call) using 5,9 GHz (IEEE 802.11p)	Call in progress
7.1.3.2	2	Caller sends data request command GET VLM	Data request sent
7.1.3.3	3	IVS acknowledges request by returning ACKnowledgement <X>	ACK <X> received
7.1.3.4	4	IVS closes communication session	Communication session closed
7.1.3.5	5	IVS instigates a communication session using 2G or 3G	Communication session successfully opened

7.1.3.5	6	IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85> <START> < ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S> <END>	File sent and arrives correctly at destination
7.1.3.6	7	Destination address sends ACK <VLX>	
7.1.3.7	8	IVS receives ACK <VLX>	File received and ACK <VLX> sent
7.1.3.8	9	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

Test result	**Pass/fail**	**Date: 28th June 2102**
Signature/initials 	PASS	innovITS ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 7.2.1 Instigated vehicle location monitoring using 3G

S.U.T. reference	Instigated send of vehicle location monitoring using 3G
CTP/7.2.1	
S.U.T. test objective	The IVS of a vehicle establishes a new communication using one of (and shall be tested for each of) several wireless media defined below. The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address. The vehicle sends the data file to the predetermined destination IPv6 (internet) address. The recipient address sends acknowledgement. The IVS closes the communication on receipt of acknowledgement.
CTP origin	CSI
Reference requirement	ISO 15638-15
Initial conditions	The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards). CALM and media choice are assumed and not S.U.T. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
7.2.1.1	1	IVS instigates a communication session using selected media (3G) to predetermined destination IP address	Session established
7.2.1.2	2	IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85> <START> < ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S> <END>	File sent and arrives correctly at destination
7.2.1.3	3	Destination address sends ACK <VLX>	

7.2.1.4	4	IVS receives ACK <VLX>	File received and ACK <VLX> sent
7.2.1.5	5	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

Test result: CTP 7.2.1	**Pass/fail**	**Date: 28th June 2102**
Signature/initials 	PASS	k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 7.2.2 Interrogated at 5,9 GHz and send of vehicle location monitoring using 3G

S.U.T. reference	5,9 GHz Interrogated and send of vehicle location monitoring using 3G
CTP/7.2.2	
S.U.T. test objective	The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected to an active wireless communication session. The IVS of a vehicle receives a wireless interrogation requesting a packet of data. On receipt, it acknowledges the request (ACK). It closes the communication. It opens a new communication session using one of (and shall be tested for each of) several wireless media defined below. It sends the data file to a predetermined destination IPv6 (internet) address. The recipient address sends acknowledgement. The IVS closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-15
Initial conditions	The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards.) CALM and media choice are assumed and not S.U.T. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
7.2.2.1	1	Session connected (incoming call) using 5,9 GHz (IEEE 802.11p)	Call in progress
7.2.2.2	2	Caller sends data request command GET VLM	Data request sent
7.2.2.3	3	IVS acknowledges request by returning ACKnowledgement <X>	ACK <X> received
7.2.2.4	4	IVS closes communication session	Communication session closed
7.2.2.5	5	IVS instigates a communication session using selected media (2G or 3G) to predetermined destination IP address	Communication session successfully opened

7.2.2.5	6	IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85> <START> < ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S> <END>	File sent and arrives correctly at destination
7.2.2.6	7	Destination address sends ACK <VLX>	
7.2.2.7	8	IVS receives ACK <VLX>	File received and ACK <VLX> sent
7.2.2.8	9	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

Test result: CTP 7.2.2	**Pass/fail**	**Date: 28th June 2102**
Signature/initials 	PASS	 k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 7.3.1 Instigated Vehicle Location Monitoring using 802.11p (WAVE) 5,9 GHz

S.U.T. reference	Instigated vehicle location monitoring using 802.11p (WAVE) 5,9 GHz
CTP/7.3.1	
S.U.T. test objective	The IVS of a vehicle establishes a new communication using one of (and shall be tested for each of) several wireless media defined below. The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address. The vehicle sends the data file to the predetermined destination IPv6 (internet) address. The recipient address sends acknowledgement. The IVS closes the communication on receipt of acknowledgement.
CTP origin	CSI
Reference requirement	ISO 15638-15
Initial conditions	The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards). CALM and media choice are assumed and not S.U.T. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
7.3.1.1	1	IVS instigates a communication session using selected media (5.9G) to predetermined destination IP address	Session established
7.3.1.2	2	IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85> <START> < ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S> <END>	File sent and arrives correctly at destination
7.3.1.3	3	Destination address sends ACK <VLX>	

7.3.1.4	4	IVS receives ACK <VLX>	File received and ACK <VLX> sent
7.3.1.5	5	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

Test result: CTP 7.3.1	**Pass/fail**	**Date: 28th June 2102**
Signature/initials 	PASS	innovITS ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 7.3.2 Interrogated vehicle location monitoring using 802.11p (WAVE) 5,9 GHz

S.U.T. reference	Interrogated send of vehicle location monitoring using 802.11p (WAVE) 5,9 GHz
CTP/7.3.2	
S.U.T. test objective	The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected to an active wireless communication session. The IVS of a vehicle receives a wireless interrogation requesting a packet of data. On receipt, it acknowledges the request (ACK). It closes the communication. It opens a new communication session using one of (and shall be tested for each of) several wireless media defined below. It sends the data file to a predetermined destination IPv6 (internet) address. The recipient address sends acknowledgement. The IVS closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-15
Initial conditions	The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards). CALM and media choice are assumed and not S.U.T. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
7.3.2.1	1	Session connected (incoming call) using 5,9 GHz (IEEE 802.11p)	Call in progress
7.3.2.2	2	Caller sends data request command GET VLM	Data request sent
7.3.2.3	3	IVS acknowledges request by returning ACKnowledgement <X>	ACK <X> received
7.3.2.4	4	IVS closes communication session	Communication session closed
7.3.2.5	5	IVS instigates a communication session using 5,9 GHz selected media to predetermined destination IP address	Communication session successfully opened

7.3.2.5	6	IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85> <START> < ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S> <END>	File sent and arrives correctly at destination
7.3.2.6	7	Destination address sends ACK <VLX>	
7.3.2.7	8	IVS receives ACK <VLX>	File received and ACK <VLX> sent
7.3.2.8	9	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

Test result: CTP 7.3.2	**Pass/fail**	**Date: 28th June 2102**
Signature/initials 	PASS	 k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 7.4.1 Instigated vehicle location monitoring using mesh WiFi

S.U.T. reference	Instigated send of vehicle location monitoring using mesh WiFi
CTP/7.4.1	
S.U.T. test objective	The IVS of a vehicle establishes a new communication using one of (and shall be tested for each of) several wireless media defined below. The IVS of a vehicle internally triggers a requirement to send a packet of data to a predetermined destination IPv6 (internet) address. The vehicle sends the data file to the predetermined destination IPv6 (internet) address. The recipient address sends acknowledgement. The IVS closes the communication on receipt of acknowledgement.
CTP origin	CSI
Reference requirement	ISO 15638-15
Initial conditions	The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards). CALM and media choice are assumed and not S.U.T. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
7.4.1.1	1	IVS instigates a communication session using selected media (Mesh WiFi) to predetermined destination IP address	Session established
7.4.1.2	2	IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85> <START> < ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S> <END>	File sent and arrives correctly at destination
7.4.1.3	3	Destination address sends ACK <VLX>	

7.4.1.4	4	IVS receives ACK <VLX>	File received and ACK <VLX> sent
7.4.1.5	5	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

Test result: CTP 7.4.1	**Pass/fail**	**Date: 28th June 2102**
Signature/initials 	PASS	k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

CTP 7.4.2 Interrogated vehicle location monitoring using mesh WiFi

S.U.T. reference	5,9 GHz Interrogated and send of vehicle location monitoring using mesh WiFi
CTP/7.4.2	
S.U.T. test objective	The IVS of a vehicle receives a wireless interrogation requesting a packet of data. The IVS of a vehicle is switched on but is not connected to an active wireless communication session. The IVS of a vehicle receives a wireless interrogation requesting a packet of data. On receipt, it acknowledges the request (ACK). It closes the communication. It opens a new communication session using one of (and shall be tested for each of) several wireless media defined below. It sends the data file to a predetermined destination IPv6 (internet) address. The recipient address sends acknowledgement. The IVS closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-15
Initial conditions	The S.U.T. concerns only the communication between the IVS and the application service provider address. No other part of the system specifications are to be tested (they appear in the figures below for context, and because there are copied from the base standards). CALM and media choice are assumed and not S.U.T. The vehicle is equipped with wireless communications that enable it to make communications using 2G, 3G, WiFi, 5,9 GHz (IEEE 802.11p). The means to trigger the sending of a message from the vehicle is a function of IVS design, not S.U.T., therefore may be simulated. The destination address is intended to be an IPv6 address, but may be simulated with an IPv4 address as this is an internet issue, not S.U.T.

Stimulus and expected behaviour

Test point		Tester action	Pass condition
7.4.2.1	1	Session connected (incoming call) using 5,9 GHz (IEEE 802.11p)	Call in progress
7.4.2.2	2	Caller sends data request command (GPRS, EDGE etc) GET VLM	Data request sent
7.4.2.3	3	IVS acknowledges request by returning ACKnowledgement <X>	ACK <X> received
7.4.2.4	4	IVS closes communication session	Communication session closed
7.4.2.5	5	IVS instigates a communication session using mesh WiFi selected media to predetermined destination IP address	Communication session successfully opened

7.4.2.5	6	IVS sends file named <VDLM110316070603KV76WRRWILLI502139RK9MA85> <START> < ID0o3M45S, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, s0123,110316 x0A5D3770 0x027E2938 >0123, D0o3M45S> <END>	File sent and arrives correctly at destination
7.4.2.6	7	Destination address sends ACK <VLX>	
7.4.2.7	8	IVS receives ACK <VLX>	File received and ACK <VLX> sent
7.4.2.8	9	IVS closes communication session	Communication session closed
			If ALL individual pass conditions listed in this column above have been met THEN CTP PASS ELSE CTP FAIL

Test result: CTP 7.4.2	**Pass/fail**	**Date: 28th June 2102**
Signature/initials 	PASS	innovITS ADVANCE k4, MIRA, Watling St, Nuneaton, Warwickshire, CV10 0TU, UK Tel: +44 (0)7730 922 810 Web: www.innovits.com/advance

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[14] ISO 15638-13:—[6], *Intelligent transport systems — Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV) — Part 13: 'Mass' information for jurisdictional control and enforcement*

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

[16] ISO 21217, *Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture*

6) To be published.

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