INTERNATIONAL STANDARD

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

Part 17: Consignment and location monitoring

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

Partie 17: Monitorage de livraison et localisation

Reference number
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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 15638-17:2013.

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" approval 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 (VAM)*

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

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

— *Part 11: Driver work records (work and rest hours compliance) (DWR)*

— *Part 12: Vehicle mass monitoring (VMM)*

— *Part 14: Vehicle access control (VAC)*

— *Part 15: Vehicle location monitoring (VLM)*

— *Part 16: Vehicle speed monitoring (VSM)*

— *Part 17: Consignment and location monitoring (CLM)*

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

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

The following documents 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* (4.35) and freight owners, in the areas of fleet management, safety, and security. *Telematics* (4.46) applications have also been developed for governmental use. Such regulatory services in use or being considered vary from *jurisdiction* (4.30) to jurisdiction, but include electronic on-board recorders, digital *tachograph* (4.45), on-board *mass* (4.33) monitoring, "mass" data for regulatory control and management (4.34), vehicle *access* (4.1) methods, hazardous goods (4.26) tracking and *e-call* (4.21). 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* (4.13), it is timely to consider an overall *architecture* (4.9) (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* (4.44) of new applications that build upon the functionality of a generic specification platform. A suite of International Standards deliverables is required to describe and define the *framework* (4.24) 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.

This suite of International Standards addresses and defines the framework for a range of cooperative *telematics* (4.46) applications for *regulated commercial freight vehicles* (4.39) [such as, *access methods* (4.1), driver fatigue management, speed monitoring, on-board mass, "mass" data for regulatory control, and management]. 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* (4.42) oriented approach with provisions for the *approval* (4.6) and *auditing* (4.10) of *service providers*.

This International Standard will

— provide the basis for future development of cooperative telematics-based ITS *service* (4.28) applications for regulated commercial freight vehicles. Many elements to accomplish this are already available. Existing relevant International Standards will be referenced, and the specifications will use existing International Standards (such as CALM) wherever practicable,

— allow for a powerful platform for highly cost-effective delivery of a range of telematics applications for regulated vehicles,

— provide a business architecture based on a (multiple) service provider oriented approach, and

— address legal and regulatory aspects for the approval and *auditing* (4.10) of service providers.

This suite of International Standards deliverables is timely as many governments (Europe, North America, Asia, and Australia/New Zealand) are considering the use of telematics for a range of regulatory purposes. 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 ISO 15638 provides specifications for consignment and location monitoring.

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

NOTE 2 The definition of what comprises a "regulated" service is regarded as an issue for national decision, and can vary from jurisdiction to jurisdiction. This suite of International Standards deliverables does not impose any requirements on nations in respect of which services for regulated vehicles *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 17: Consignment and location monitoring

1 Scope

This part of ISO 15638 addresses the provision of "consignment and location monitoring" and specifies the form and content of such data required to support such systems, and *access methods* (4.1) to that data.

The scope of this part of ISO 15638 is to provide *specifications* (4.44) for common communications and data exchange aspects of the *application service* (4.3) consignment and location monitoring that a *regulator* (4.30) can elect to require or support as an option, including

a) high level definition of the service that a *service provider* (4.42) has to provide, (The service definition describes common service elements; but does not define the detail of how such an *application service* (4.3) 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* (4.27) has to deliver.

The definition of what comprises a "regulated" service is regarded as an issue for National decision, and may vary from *jurisdiction* (4.30) 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 standardised 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" (4.39)]. 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* (4.3) described in this part of ISO 15638 shall be within the regulations imposed by the *jurisdiction* (4.30) 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 (Informative) provides results of these tests. In any conformance assurance process undertaken by candidate systems, where appropriate the results can 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 cooperative telematics applications for regulated vehicles (TARV) — System security requirements (in development)*

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*

ISO 15638-15, *Intelligent transport systems — Framework for cooperative telematics applications for regulated vehicles (TARV) — Part 15: Vehicle location monitoring*

ISO/TS 15638-18, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 18: ADR (Dangerous Goods) transport monitoring (ADR)*

ISO 26683-1, *Intelligent transport systems — Freight land conveyance content identification and communication — Part 1: Context, architecture and referenced standards*

ISO 26683-2, *Intelligent transport systems — Freight land conveyance content identification and communication — Part 2: Application interface profiles*

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 methods
procedures and protocols to provision and retrieve data

4.2
app
small (usually) Java™[2)] applets, organized as software bundles, that support *application services* (4.3) by keeping the *data pantry* (4.18) provisioned with up to date data

4.3
application service
service provided by a *service provider* (4.42) enabled by accessing data from the *IVS* (4.27) of a *regulated vehicle* (4.39) via a wireless communications network

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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.

4.4
application service provider
ASP
party that provides an *application service* (4.3)

4.5
app library
separately secure area of memory in *IVS* (4.27) where apps are stored, with different access controls to *data pantry* (4.18) of the *IVS*

4.6
approval
formal affirmation that an applicant has satisfied all the requirements for appointment as an *application service provider* (4.4) or that an application service delivers the required service levels

4.7
approval agreement
written agreement made between an *approval authority (regulatory)* (4.8) and a *service provider* (4.42)

Note 1 to entry: An *approval authority (regulatory)* (4.8) approval agreement recognizes the fact that a service provider (4.42), having satisfied the approval authority's requirements for appointment as a service provider, is appointed in that capacity, and sets out the legal obligations of the parties with respect to the on-going role of the service provider

4.8
approval authority (regulatory)
organization (usually independent) which conducts *approval* (4.6) and on-going *audit* (4.10) for *service providers* (4.42) on behalf of a *jurisdiction* (4.30)

4.9
architecture
formalized description of the design of the structure of TARV and its *framework* (4.24)

4.10
audit/auditing
review of a party's capacity to meet, or continue to meet, the initial and on-going *approval agreements* (4.7) as a *service provider* (4.42)

4.11
basic vehicle data
data that shall be maintained/provided by all *IVS* (4.27) regardless of *jurisdiction* (4.30)

4.12
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* (4.47) 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* (4.29) to provide wireless support for applications, such that the application is independent of any particular wireless medium

4.13
commercial application(s)
ITS applications in *regulated vehicles* (4.39) for commercial (non-regulated) purposes

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

4.14
consignment
shipment of goods/cargo to a destination

4.15
cooperative ITS
C-ITS
ITS applications for both regulatory and commercial purposes that require the exchange of data between uncontracted parties using multiple *ITS-stations* (4.29) communicating with each other and sharing data with other parties with whom they have no direct contractual relationship to provide one or more *ITS services* (4.28)

4.16
core data
basic vehicle data (4.11) plus any additional data required to provide an implemented *regulated application service* (4.38)

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* (4.27) where data values are stored, with different access controls to *app library* (4.5)

4.19
driver
person driving the *regulated vehicle* 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* (4.27) to an *application service provider* (4.4)

4.21
eCall
specialized instantiation of an *EMS* (4.22) that provides incident messaging and communication with a public service assistance point via priority wireless telephone communications using its emergency call capabilities

4.22
emergency message system
EMS
collection, collation, and transfer of emergency message data from an *in-vehicle system* (4.27) to an *application service provider* (4.4)

4.23
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

4.24
framework
particular set of beliefs, ideas referred to in order to describe a scenario or solve a problem

4.25
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

4.26
hazardous goods/HAZMAT
see *dangerous goods* (4.31)/*Accord européen relatif au transport international des marchandises Dangereuses par Route* (ADR) (4.6)

4.27
in-vehicle system
IVS
ITS-station (4.29) and connected equipment on board a vehicle

4.28
ITS service
communication functionality offered by an *ITS-station* (4.29) to an *ITS-station* application

4.29
ITS-station
ITS-s
entity in a communication network, comprised of application, *facilities* (4.23), networking and access layer components specified in ISO 21217 that operate within a bounded secure management domain

4.30
jurisdiction
regulator
government, road or traffic authority which owns the regulatory applications (4.37)

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

4.31
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* (4.38), or b) *cooperative intelligent transport systems* (4.15)

4.32
map
spatial dataset that defines the road system

4.33
mass
mass of a given heavy vehicle as measured by equipment affixed to the *regulated vehicle* (4.39)

4.34
“mass” information for jurisdictional control and enforcement
MICE/MRC
collection, collation, and transfer of *vehicle mass* (4.33) data from an *in-vehicle system* (4.27) to an appli*cation service provider* (4.4) to enable data provision to *jurisdictions* (4.30) for the control and management of equipped vehicles based on the mass of the *regulated vehicle* (4.39), or use of such data to enable compliance with the provisions of regulations.

4.35
operator
fleet manager of a *regulated vehicle*

4.36
prime service provider
service provider (4.42) who is the first contractor to provide *regulated application services* (4.38) to the *regulated vehicle* (4.39), or a nominated successor on termination of that initial contract; the *prime service provider* (4.36) is also responsible to maintain the installed *IVS* (4.27); if the *IVS* was not installed during the manufacture of the vehicle the *prime service provider* (4.36) is also responsible to install and commission the *IVS* (4.27)

4.37
regulated/regulatory application
application arrangement using TARV utilised by *jurisdictions* (4.30) 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*; can be mandatory or voluntary at the discretion of the *jurisdiction*

4.38
regulated application service
TARV application service to meet the requirements of a regulated application that is mandated by a regulation imposed by a *jurisdiction* (4.30), or is an option supported by a *jurisdiction*

4.39
regulated commercial freight vehicle/regulated vehicle
vehicle that is subject to regulations determined by the *jurisdiction* (4.30) 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 might require the provision of information via *TARV* or provide the option to do so

4.41
remote tachograph monitoring
RTM
collection, collation, and transfer of data from an on-board electronic *tachograph* (4.45) system to an *application service provider* (4.4)

4.42
service provider
party which is approved by an *approval authority (regulatory)* (4.8) as suitable to provide regulated or commercial ITS *application services* (4.3)

4.43
session
wireless communication exchange between the *ITS-station* (4.29) of an IVS (4.27) and the ITS-station of its *application service provider* (4.4) to achieve data update, data provision, upload apps, or otherwise manage the provision of the *application service* (4.3), or a wireless communication provision of data to the *ITS-station* of an *IVS* (4.27) from any other *ITS-station*

4.44
specification
explicit and detailed description of the nature and functional requirements and minimum performance of equipment, service, or a combination of both

4.45
tachograph
sender unit mounted to a vehicle gearbox, a tachograph head and a digital driver card, which records the *regulated vehicle* (4.39) speed and the times at which it was driven and aspects of the *driver's* (4.19) activity selected from a choice of modes

4.46
telematics
use of wireless media to obtain and transmit (data) from a distant source

4.47
user
individual or party that enrols in and operates within a regulated or *commercial application* (4.13)*service* (4.3)

EXAMPLE *driver* (4.19), transport *operator* (4.35), freight owner, etc

4.48
vehicle access control
VAC
control of regulated vehicles ingress to and egress from controlled areas and associated penalties and levies

4.49
vehicle access management
VAM
monitoring and management of regulated vehicles approaching or within sensitive and controlled areas

4.50
vehicle location monitoring
VLM
collection, collation, and transfer of vehicle location data from an *in-vehicle system* (4.27) to an *application service provider* (4.4)

4.51
vehicle mass monitoring
VMM
collection, collation, and transfer of vehicle *mass* (4.33) data from an *in-vehicle system* (4.27) to an *application service provider* (4.4)

4.52
vehicle parking facility
VPF
system for booking and *access* (4.1) to and egress from a *vehicle parking facility* (VPF)

4.53
vehicle speed monitoring
VSM
collection, collation, and transfer of vehicle speed data from an *in-vehicle system* (4.27) to an *application service provider* (4.4)

5 Symbols (and abbreviated terms)

AA *approval authority (regulatory)* (4.8)

ADR *Accord Européen relatif au transport international des marchandises Dangereuses par Route* (4.6) [*dangerous goods* (4.17)]

app *applet* (JAVA™a application or similar) (4.2)

ASP *application service provider* (4.4)

CALM *communications access for land mobiles* (4.12)

C-ITS *cooperative intelligent transport systems* (4.15)

DLR driving licence reader

Dr *driver* (4.19)

GNSS *global navigation satellite system* (4.25)

ID identity

IP Internet protocol

ITS-S *ITS station* (4.29)

IVS *in-vehicle system* (4.27)

J *jurisdiction* (4.30)

Java™[a] object oriented open source operating language developed by SUN systems

LDT *local data tree* (4.31)

Op *operator* 4.35)

PSP *prime service provider* (4.36)

RFID radio frequency identification device

SE service element

TARV *telematics* (4.46) applications for *regulated vehicles* (4.39)

UTC coordinated universal time

WORM write once read many times

[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 provided a *framework* (4.24) and *architecture* (4.9) for TARV. It provided a general description of the roles of the actors in *TARV* and their relationships.

To understand clearly the *TARV* framework, *architecture* (4.9) and detail and *specification* (4.44) 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 with ISO 15638-5.

In order to be compliant with this part of ISO 15638, the generic conditions for this application service shall comply with 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* (4.38) shall be as defined in ISO 15638-6.

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

8.1 General

Application services should 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* (4.30) as part of its *specification* (4.44) for any particular *regulated application service* (4.38). However, where a specified *regulated application service* (4.38) 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* (4.30) as part of its *specification* (4.44) for any particular *regulated application service* (4.38), and issued as a formal test requirements *specification* (4.44) document. However, where a specified *regulated application service* (4.38) 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. And 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 can 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* (4.30) 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* (4.38) are as designed by the application service system to meet the requirements of a particular *jurisdiction* (4.30) 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* (4.31) and *core data* (4.16) are described in ISO 15638-6, Clause 8.

In order to minimize demand on the *IVS* (4.27) (which it is assumed will be performing multiple *application services* (4.3) 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* (4.38).

The *TARV* approach is for the on-board *app* (4.2) 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* (4.4) *(ASP),* 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 is supplied to a different on-board file in the *data pantry* (4.18).

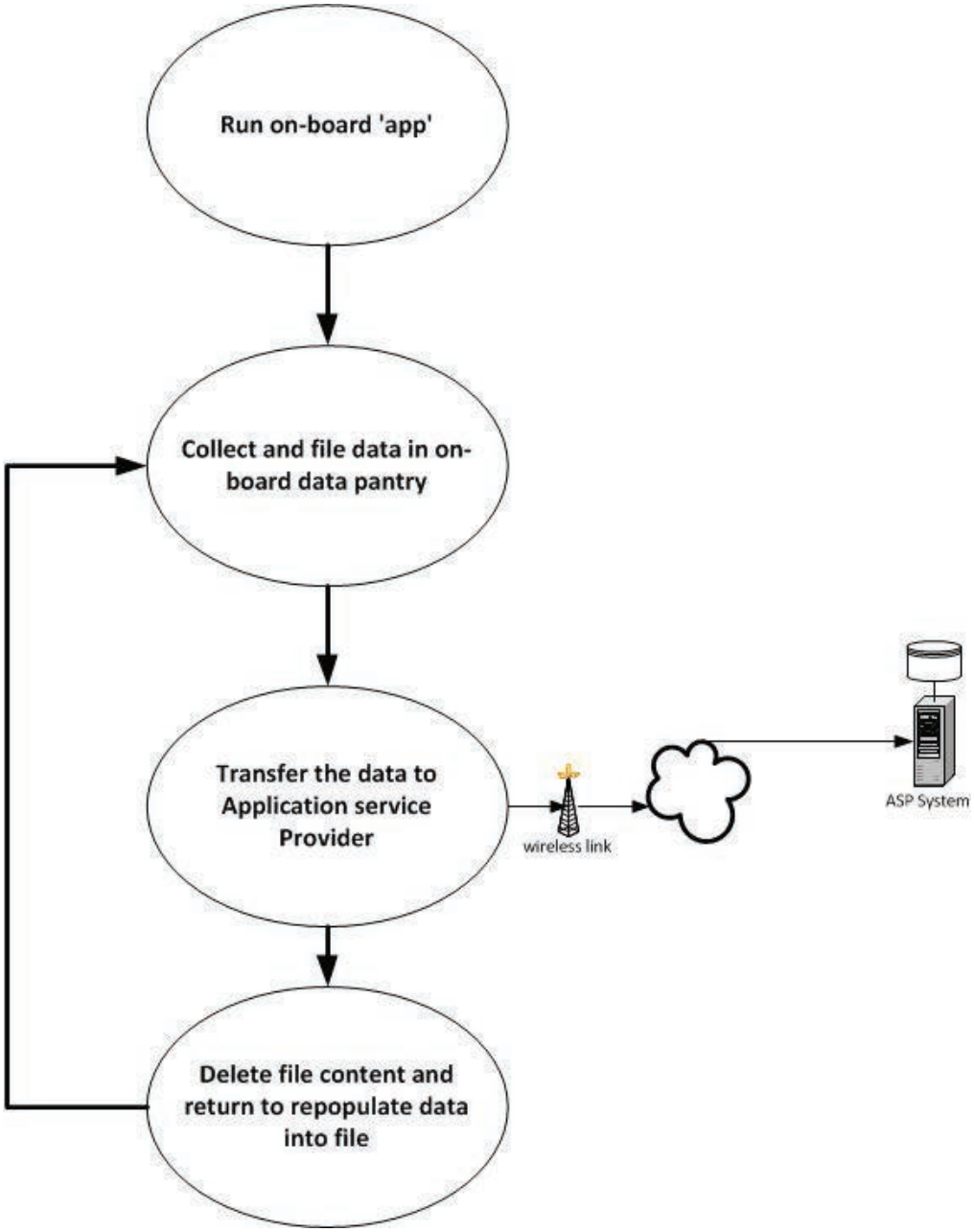

Figure 1 — TARV-regulated application service on-board procedure

At a common generic functional level for this application service, the process can be seen as shown in Figure 2 below, 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* (4.3) 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 consignment and location monitoring *application service* (4.3) 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* (4.4), 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* (4.6) of *IVSs* and *service providers* (4.42) shall be as specified in ISO 15638-3 (*TARV* –Operating requirements, approval procedures, and enforcement provisions for the providers of regulated services). Detailed provisions for specific *regulated applications* (4.37) shall be as specified by the regime of the *jurisdiction* (4.30).

10 TARV vehicle consignment and location monitoring (CLM)

10.1 TARV CLM service description and scope

10.1.1 TARV CLM monitoring use case

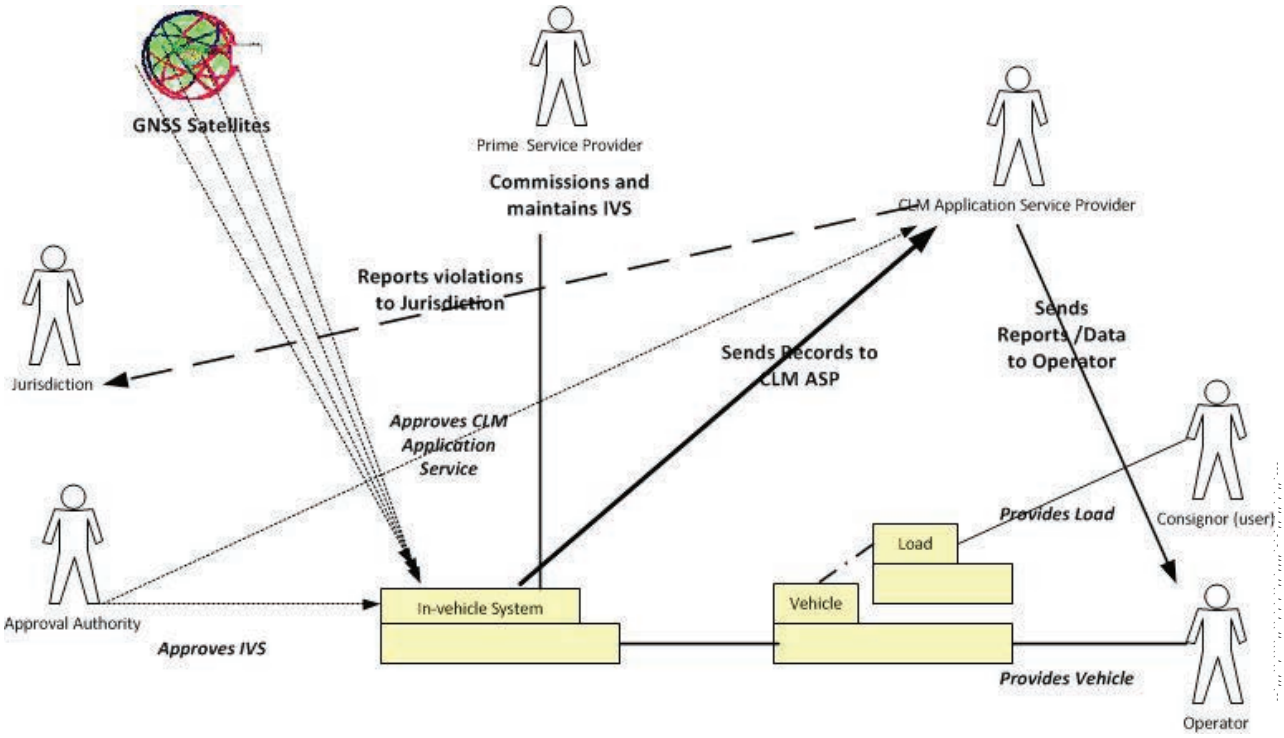

Figure 2 — Vehicle consignment and location monitoring (TARV CLM) use case

Figure 2 provides an illustration of a *TARV* vehicle *consignment* (4.14) and location monitoring (4.27) system. This *application service* (4.3) is described in 10.1.2 and 10.1.3 below.

10.1.2 Description of TARV CLM regulated application service

The *TARV* vehicle *consignment and location monitoring* (4.27) system centres on the *IVS* (4.27) and information provided to it from on-board, advising and updating on the *consignment* (4.14) status. Typically, it is appropriate where both the location of the *regulated vehicle* (4.39) and the status of the *consignment* is required. The *IVS* generates vehicle *consignment* data, at loading and unloading stops or periodically while the *regulated vehicle* (4.39) is turned-on and moving, and monitors the location of the *regulated vehicle* during its journey, periodically, as determined by the system. Vehicle location is generated independently by the *IVS*'s *GNSS* (4.25) receiver. The content of data concerning the vehicle *consignment* is generated in accordance with ISO 26683-1 in conformance with one of the "profiles" defined in ISO 26683-2. The functions of the stakeholder "actors" in the vehicle *consignment and location monitoring* (4.27) system are similar to those described earlier for the *vehicle location monitoring* (4.50) application defined in ISO 15638-15.

Figure 2 provides an illustration of a vehicle *consignment and location monitoring* (4.27) system. This application service is described in 10.1.3 and 10.2 below.

10.1.3 Description of TARV "vehicle consignment and location monitoring" (TARV CLM) application service

The *TARV* vehicle *consignment and location monitoring* (*TARV CLM*) *application service* (4.3) can exhibit itself in a number of different forms in different *jurisdictions* (4.30). For some it can be an issue of

mandatory compliance (for example for compliance to planned route of a *regulated vehicle* (4.39), or that the weight or type of *consignment* (4.14) is not in violation of weight or consignment type restrictions), others only providing support data for fleet management/route management systems and for supervision of *drivers* (4.19) by vehicle *operators* (4.35). It might or might not involve compliance actions. Within other *jurisdictions* (4.30) it can just be commercial fleet management issue. The use cases of individual instantiations will vary slightly, for example whether there is or is not a digital *tachograph* (4.45) 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 *consignment and location monitoring* (4.27)", "Vehicle consignment compliance", "HGV consignment location monitoring", etc. being other typical example names for this type of *application service* (4.3).

The exact nature and form of the requirements and reports will vary from instantiation to instantiation, and such detail is not standardised in this part of ISO 15638. As with most *TARV* applications, the principal host application is provided landside by an *application service provider* (4.4) system. The function of the *in-vehicle system* (4.27) is to provide data to service the application using a wireless link between the vehicle and the roadside. This part of ISO 15638 specifies the basic *architecture* (4.9) and information needed to support this type of an app*lication service* (4.3) using *TARV*, so that the *in-vehicle system* (4.27) can satisfy the requirements of any likely instantiation in respect of providing or receiving data as required by *jurisdictions* (4.30), when the *regulated vehicle* (4.39) and *driver* (4.19) are operating within their domain so that an off-board application can provide the full application service to its client system. It can also be used to support a non-jurisdictional *commercial application* (4.13) of a similar nature.

Figure 2 above shows an example use case appropriate where reports are required by the *jurisdiction* (4.30) and where compliance is also monitored such that transgression can result in an offence/prosecution, perhaps the most comprehensive use case example of the *TARV CLM application service* (4.3).

10.2 Concept of operations for TARV CLM

10.2.1 General

Vehicle consignment and *location monitoring* (4.27) is an *application service* (4.3) that has two application contexts.

a) Monitoring the *consignment* (4.14) and location of the *regulated vehicle* (4.39) for regulatory purposes.

b) Monitoring the *consignment* (4.14) and location of the *regulated vehicle* (4.39) for fleet operation management purposes.

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

Monitoring the *regulated vehicle* (4.39) and the movement of a *consignment* (4.14) 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* (4.30). Identification of the *driver* (4.19) is not specified in this application, but if required can be simultaneously provided through the simultaneous operation of the *TARV VLM* application described in ISO 15638-15.

Monitoring the consignment and location of the *regulated vehicle* (4.39) for fleet operation management purposes does not involve the *jurisdiction* (4.30) and is simply the provision of information for fleet management systems.

*Regulated vehicles (*4.39) often have regulatory limitations on route due to their class, weight, configuration, shape, size or load. Journeys can have restrictions in respect of route, weight, type of *consignment* (4.14) etc. Some categories of *regulated vehicle* are only permitted to travel on pre-specified and approved routes, and some routes have weight restrictions or *consignment* (4.14) substance restrictions.

Some *jurisdictions* (4.30), for some circumstances, require a record of the actual route used when carrying specific *consignments* (4.14). Using traditional means, where a regulator 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* (4.39). For issues concerning the *consignment* this involves inspecting the administrative documents accompanying the *consignment*. In the case of violation the *jurisdiction* then issues a violation ticket to the owner of the *regulated vehicle* or the driver according to whom it deems to be responsible for the violation.

TARV vehicle *consignment and location monitoring* (4.27) uses *GNSS* (4.25) systems to establish the *regulated vehicle* position, combined with *consignment* (4.14) information which is provided dynamically by devices attached to the *consignment* or at loading and unloading points (as defined in ISO 26683-2).

Using *TARV* for vehicle *consignment and location monitoring* (4.27) is achieved by installing and running an *app* (4.2) in the on board data library to utilize the *GNSS* (4.25) capability of the on-board *IVS* (4.27) to create a file (named *CLM*) containing relevant data and to provide that data to the application from time to time via wireless communications in accordance with the instructions of the *app,* to meet the requirements of the *application service* (4.3) as defined by the *application service provider* (4.4).

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

10.2.2.1 Monitoring the location of the *regulated vehicle* for regulatory purposes

The objective of this part of ISO 15638, CLM is to provide evidence to prove compliance to the regime of the *jurisdiction* (4.30), in respect of the journey or route combined with *consignment* (4.14) data, or in the event of contravention to provide evidence to support enforcement.

10.2.2.2 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* (4.4).

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

The principle issues are those of acceptance, particularly in the case of enforcement. No *operator* (4.35) is likely to choose to equip his vehicle in order that it increases the probability that his organization and his *drivers* (4.19) can be prosecuted. As with the *TARV VLM* application defined in ISO 15638-15, *TARV CLM* is therefore only likely to be instantiated where the *jurisdiction* (4.30) has persuaded the public to accept that *regulated vehicles* (4.39) are a special class of vehicle where it is in the strong public interest to ensure that they do not violate location/route/*consignment* (4.14) restrictions that are imposed on them, or for commercial purposes not involving the regulator.

In respect of enforcement, the *jurisdiction* (4.30) can have to adapt traffic regulations to accommodate the *TARV* method of collecting data.

In all probability, *TARV CLM* is only likely to be instantiated as one of a series of measures controlling *regulated vehicles* (4.39), or for commercial management purposes.

The *IVS* (4.27) is a device of limited capability, and will be expected to be multi-tasking with other *TARV* "apps" 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 CLM app* (4.2).

Similarly, in order to minimize load on the *IVS* (4.27), matching actual location to planned and permitted routes is a function carried out landside by the *application service* (4.3) in the system of the *application service provider* (4.4) using data supplied by the *IVS*, and in this *application service specification* (4.44) is not a function carried out within the *IVS* (4.27).

This part of ISO 15638 specifies the data needed for these possibilities, but it does not design the *application service* (4.3). That is left to the *jurisdiction* (4.30), the *application service provider* (4.4), and/or *approval authority (regulatory)* (4.8).

A principal differentiating feature of the *TARV CLM* application service is the dynamic provision of *consignment* (4.14) data. Traditionally there is an electronic and paper trail that accompanies every journey, in some cases, for example the transport of *dangerous goods* (4.17) (so called *ADR* goods) this is usually required by the regulations of the *jurisdiction* (4.30). However, there are many situations where more information is required about the *consignment* (4.14). For example, the owner of temperature controlled goods will need to know if the goods have moved outside of the acceptable temperature control limits during the journey. That can be obtained at journeys end by observing some on-board data recorder. But that can leave the recipient of the *consignment* (4.14) without his delivery in the event of unacceptable temperature or pressure variation, and he will then have to wait for another shipment to be sent. These days, some journeys cross continents and take days, so in order to provide a better service to the client the owner of the goods would like to be informed, perhaps immediately, that the temperature or pressure range has surpassed its limits, or know this information in a more timely fashion, in order to better service his customer. Using the *TARV CLM* application, either the *regulated vehicle* (4.39) can send its *TARV CLM* data at regular intervals or when particular thresholds trigger the system to send the data, or on demand from the roadside.

Some *regulators* (4.30) have requirements for tracking and tracing certain *ADR* (dangerous) goods (for example nuclear fuels and waste). For these applications see also ISO 15638-18 which can be more appropriate.

Another example is when the owner might wish to know the current status of multi-drop journeys. Such journeys are in some cases, very vulnerable to what is politely called “wastage” (theft), and knowledge of the actual *consignment* (4.14) at all times through its journey, or at regular intervals, helps to manage this more effectively, identifying when and where any illegal drops are made. It also can be used to provide data for “track and trace” systems. Of course, the accuracy and sophistication of such systems depends on the accuracy and sophistication of the equipment monitoring the consignment.

ISO 26683 (all parts) provides a variety of means for *consignment* (4.14) data to be provided to the *regulated vehicle* (4.39) on-board *TARV* equipment. These means range from dynamic and sophisticated automatic polling of *RFID* tags and/or similar devices attached to units or items of the *consignment* (4.14), and/or from measuring devices in the *regulated vehicle* (4.39) communicating by radio or through wire to the on-board *TARV* equipment, to connection (wired or wireless) between a bar-code reader and the on-board *TARV* equipment used at loading and drop off points. The reader is referred to ISO 26683-1 (Intelligent transport systems — Freight land conveyance content identification and communication (FLC-CIC) part 1: Architecture and list of referenced standards) and ISO 26683-2 (Intelligent transport systems – Freight land conveyance content identification and communication (FLC-CIC) part 2: Application interface profiles) for further information.

The provisions of this part of ISO 15638 provides *specifications* (4.44) to enable each of the options described above, but the choice of options remains with the *jurisdiction* (4.30) and *application service provider* (4.4), and are out of the scope of this part of ISO 15638.

Although this *specification* (4.44) is designed to monitor the whole *consignment* (4.14), it can also be used to monitor just significant items of the *consignment*, or indeed just *consignment*/load alarm features associated with the *consignment* (4.14) (e.g. out of temperature, over-pressured/under-pressured, etc.).

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

It should be noted that an entity can 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 CLM actors, activities and interactions

ACTOR	ROLE	ACTIVITIES	INTERACTIONS
Jurisdiction (J) (4.30)	Sets requirements for mandatory and supported *CLM* (4.27)	Publishes *specifications* (4.44)	ALL
		Obtains regulations	ALL: Establish regime and regulations PSP: Register ASP: Register, receive reports Op: Vehicle registration
		Appoints *Approval Authority* where appropriate	AA: Contract. Instruct. Receive reports
		Monitors reports	
		Instigates enforcement	ALL: Process enforcement
Approval authority (AA) (4.8)	Implements *jurisdiction* policy at equipment and service approval level	Approves *IVS* (4.27), *application service* (4.3) instantiations	PSP: Approve *IVS* *ASP*: Approve *application service*
		Conducts Quality of service maintenance to instruction of *jurisdiction*	
Prime service provider (PSP) (4.36)	Responsibility for *IVS*	Installs and/or commissions *IVS*	AA: Can Apply to approve *IVS*/reader/load sensing equipment Op; Installation
		Maintains *IVS* and reader	Op: Maintain *IVS* and reader
		Equips vehicle and or trailers with load recording equipment	Op: Maintains load recording equipment
Application service provider (ASP) (4.4)	Provides CLM *application services* (4.3)	Develops instantiation of *CLM application service*	AA: Applies for approval of Service
		Contracts with *users* (4.47)	Op: Contracts
		Provides CLM *application service* to *users* and *jurisdiction*	Op: Provides service Dr: Can provide service J: Provides service/reports re violations
Operator (Op) (4.35)	Provides *regulated vehicle* (4.39)	"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*	Drives *regulated vehicle*	Op: To instructions

10.2.5 Clear statement of responsibilities and authorities delegated for TARV CLM

10.2.5.1 The *jurisdiction* (4.30) shall be responsible for the regime and regulations.

10.2.5.2 The *jurisdiction* (4.30) shall employ an *approval authority (regulatory)* (4.8) or otherwise provide its function.

10.2.5.3 The *jurisdiction* (4.30) 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* (4.36) shall install/commission the *IVS* (4.27) and maintain the *IVS*.

10.2.5.5 The *prime service provider* (4.36) shall install/commission driving load reading/monitoring devices (e.g, *RFID* interrogators, bar-code readers, pressure monitoring devices, temperature monitoring devices, etc.).

10.2.5.6 The *application service provider* (4.4) (*ASP*) shall develop *TARV CLM application service* (4.3) or use *TARV CLM* application service provided by *jurisdiction* (4.30).

10.2.5.7 The *application service provider* (4.4) shall obtain any required *approval* (4.6) of its *TARV CLM* service from *approval authority (regulatory)* (4.8).

10.2.5.8 The *application service provider* (4.4) shall contract with *user* (4.47) [normally the *operator* (4.35)].

10.2.5.9 The *application service provider* (4.4) shall be responsible to provide the *application service* (4.3) to the *jurisdiction* (4.30), *operator* (4.35), and *driver* (4.19) as specified in its service offering.

10.2.5.10 The *operator* (4.35) shall be responsible to provide vehicle.

10.2.5.11 The *operator* (4.35) shall be responsible to abide by requirements of regime re TARV CLM.

10.2.5.12 The *operator* (4.35) shall be responsible to pay fees required by the *jurisdiction* (4.30), prime service provider (4.36), and *application service provider* (4.4).

10.2.5.13 The *driver* (4.19) shall be responsible to follow instructions.

10.2.6 Equipment required for TARV CLM

10.2.6.1 TARV IVS

10.2.6.1.1 The system shall be designed to work using *TARV IVS* (4.27) as defined in the ISO 15638 series of standards

10.2.6.1.2 The *prime service provider* (4.36)/*application service provider* (4.4) shall provide to the *approval authority (regulatory)* (4.8), evidence of compliance from an appropriate body to demonstrate the suitability for use in vehicles for the *IVS* (4.27) and all associated components.

10.2.6.1.3 It shall not be possible for collected or stored vehicle *consignment* (4.14) and location monitoring data or vehicle *consignment* and location monitoring in any software or non-volatile memory within the *IVS* (4.27) to be accessible or capable of being manipulated by any person, device or system, other than that authorized by the *application service provider* (4.4).

10.2.6.2 TARV CLM "app"

10.2.6.2.1 The *TARV CLM app* (4.2) running on the *IVS* (4.27) records the *regulated vehicle* (4.39) load at intervals determined by the approved application service system *specification* (4.44) and files that data in its memory of the *IVS*, or on request from the *application service provider* (4.4) via a wireless interface to the *IVS*.

10.2.6.2.2 The *TARV CLM app* (4.2) running on the *IVS* (4.27) can 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* (4.30).

10.2.6.2.3 If the *IVS* (4.27) is equipped with a digital *map* (4.32) of location restrictions, the *IVS* can alert the *driver* (4.19) of any violations.

10.2.6.2.4 At intervals determined by the approved *application service* (4.3) system *specification* (4.44), the *TARV CLM app* (4.2) shall send the *CLM* data held in the memory of the *IVS* (4.27) to the *CLM* system of the *application service provider* (4.4) via its most appropriate wireless communications interface.

10.2.6.2.5 Once the *TARV CLM* system of the *application service provider* (4.4) has acknowledged successful receipt of the data the *CLM* file shall be deleted from the memory of the *IVS* (4.27) unless the *user* (4.47) or *application service provider* requires it for other purposes.

10.2.6.2.6 It shall not be possible for collected or stored vehicle *consignment and location monitoring* (4.27) data or vehicle *consignment and location monitoring* (4.27) in any software or non-volatile memory within the *IVS* (4.27) to be accessible or capable of being manipulated by any person, device or system (including via any self-declaration device), other than that authorized by the *application service provider* (4.4).

10.2.6.3 On-board map

Where an on-board *map* (4.32) is specified to provide part of the *CLM application service* (4.3), it shall be obtained from a recognized provider of *maps* (4.32), and shall have a means of, and system for, regular updating.

10.2.7 Operational processes for the TARV CLM system

As defined in Clause 9.

For detail of the operational processes see 10.3 [sequence of operations for vehicle *consignment and location monitoring* (4.27)] and Figure 3.

10.2.8 Role of the jurisdiction in TARV CLM

As defined in 9.2, 10.2.4, and 10.2.5.

10.2.9 Role of the TARV CLM prime service provider

As defined in 9.2, 10.2.4, and 10.2.5.

10.2.10 Role of the TARV CLM application service provider

As defined in 9.2, 10.2.4, and 10.2.5.

10.2.11 Role of the TARV CLM user

As defined in 9.2, 10.2.4, and 10.2.5.

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

10.2.12.1 A vehicle *consignment and location monitoring* (4.27) *application service* (4.3) is approved; it utilizes a *TARV IVS* (4.27) which communicates to the *prime service provider* (4.36)/*application service provider* (4.4) and can have the ability to insert a means to provide *driver* (4.19) licence details.

10.2.12.2 The *application service provider* (4.4) shall load a "CLM App" into the *IVS* (4.27) of the *operator's* (4.35) vehicles.

10.2.12.3 The "CLM App" shall run whenever the *regulated vehicle* (4.39) is operating.

10.2.12.4 The "CLM App" shall record the data specified herein in the *IVS* (4.27).

10.2.12.5 The *application service provider* (4.4) shall design/install/operate its vehicle consignment and location monitoring (4.27) system as approved by the *approval authority (regulatory)* (4.8).

10.2.12.6 The *IVS* (4.27) shall provide its *TARV CLM* data to the *application service provider* (4.4) using the *TARV IVS* wireless link at least once every 24 h.

10.2.12.7 Every transfer shall include framing data that identifies its sequential order, IVS ID, version number of *IVS* (4.27) and version number of the *CLM app* (4.2).

10.2.12.8 The system shall acknowledge receipt of the data via the *TARV IVS* (4.27) wireless link. Once the data has been acknowledged, it shall be deleted from the *IVS* memory unless the *operator* (4.35) or *ASP* (4.4) chooses to retain it in the *IVS* memory for other openly declared purposes with the assent of the *user* (4.47).

10.2.12.9 The *application service* (4.3) system shall retain and back up the TARV CLM data to the requirements of the *jurisdiction* (4.30).

10.2.12.10 The *application service provider (4.4)* shall provide reports to the *jurisdiction (4.30)* or its agents as specified and required by the *jurisdiction* when approving the product.

10.2.12.11 Electronic records are generated periodically by the *IVS* (4.27) when the regulated vehicle (4.39) is moving. The electronic record contains accurate time and location data as defined herein, and detail of the *consignment* (4.14) supplied in accordance with one of the profiles of ISO 26683-2. These *TARV CLM* records are generated automatically during the "*session* (4.43)" and also stored in the *IVS*.

10.2.12.12 *TARV CLM* records generated by the *IVS* (4.27) are sent to the *application service provider* (4.4). The application service provider transmits the TARV CLM records or reports to the *regulated vehicle* (4.39) *operator* (4.35), and in the event of contravention, to the *jurisdiction* (4.30), in accordance with the regime of the *jurisdiction*.

10.3 Sequence of operations for TARV CLM

10.3.1 General

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

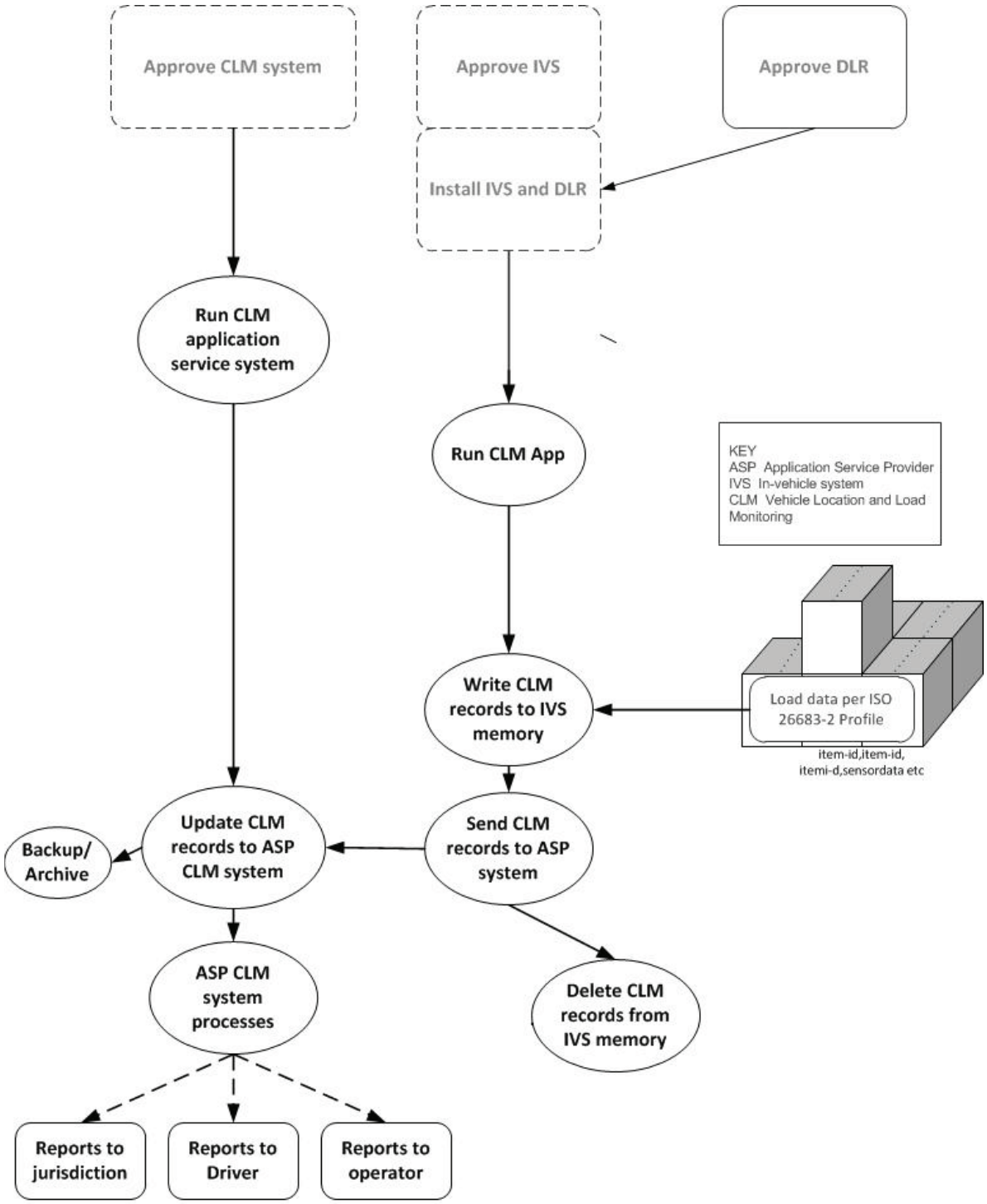

Figure 3 — TARV CLM business process and procedure

10.4 TARV CLM service elements

10.4.1 TARV CLM service element SE1: Establish "vehicle consignment and location monitoring" regulations, requirements, and approval arrangements

The *jurisdiction* (4.30) shall be responsible to define its requirements for its variant of the vehicle *consignment and location monitoring* (4.27) *application service* (4.3), obtain any legislation and/or

regulations, and define the procedure for an *application service provider* (4.4) to gain approval for its instantiation of the *TARV CLM application service* (4.3).

10.4.2 TARV CLM SE2: Request system approval

The *application service provider* (4.4) shall seek approval for its instantiation of the vehicle *consignment and location monitoring* (4.27) application service from the *approval authority (regulatory)* (4.8) in accordance with the regime established by the *jurisdiction* (4.30).

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

It is a prerequisite for any potential vehicle *operator* (4.35) opting or being required to sign up for the *TARV CLM* application service that its *regulated vehicles* (4.39) are *TARV* equipped with a *TARV* compliant *IVS* (4.27) at point of manufacture or installed by a *prime service provider* (4.36), and that there is a maintenance contract with a *prime service provider* (4.36) for that equipment. (See ISO 15638-1 *TARV* framework and architecture).

10.4.4 TARV CLM SE4: User (operator) equips vehicle with a devices to provide consignment information

It is a prerequisite for any potential vehicle *operator* (4.35) opting or being required to sign up for the *TARV CLM* (4.27) application service that its regulated vehicles (4.39) are equipped to provide the *consignment* (4.14) data required by the chosen profile of ISO 26683-2, and that there is a maintenance contract with an approved *service provider* (4.42) for that equipment. (See ISO 26683-1 and ISO 26683-2 for details of equipment requirements). That *service provider* shall be, or shall be considered as an agent of, the *prime service provider* (4.36) in respect of the provisions of this part of ISO 15638.

10.4.5 TARV CLM SE5: User contracts with application service provider

The *user* (4.47) [*operator* (4.35)] shall contract with an *application service provider* (4.4) who offers an approved *TARV CLM* (4.27) *application service* (4.3) to provide the *TARV CLM* application service to nominated vehicles.

10.4.6 TARV CLM SE6: application service provider uploads software into the TARV equipped vehicles of the operator

The service provider shall upload and commission the on-board *TARV CLM app* (4.2) software into the *TARV* equipped vehicles of the *operator* (4.35).

10.4.7 TARV CLM SE7: Time series or application service instigated recording of vehicle consignment

In the event that the system is designed to record the vehicle *consignment* (4.14) at defined time intervals, at the predetermined times, the on-board *CLM app* (4.2) shall create a file, type: `CLM` (Vehicle/Location/Consignment/Monitoring) file [CLM file within this *specification* (4.44)], named

At the appropriate time intervals, or at the instigation of the application service provider (4.4) via a wireless link to the IVS (4.27), the CLM (4.27) app (4.2) in the IVS shall update the `CLM` file with the following data

```
<IVS ID>,

<VehicleLocation>,<ConsignmentData>

<IVS ID>

<end>

<CLM><YYMMDDhhmm><vehicleregistrationnumber>
```

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

NOTE ISO 15638-5, Clause 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, Clause 8.3.12

Consignment (4.14) data shall be in conformance with the selected profile of ISO 26683-2.

At time intervals determined by the on-board *CLM app* (4.2), the *IVS* (4.27) shall send the file to the *TARV CLM application service provider* (4.4) system via a wireless communication supported by the *IVS* and *application service provider* system

On successful receipt of the CLM file, the *application service provider* (4.4) system shall send an ACKnowledgement <CLX> to the *IVS* (4.27). On receipt of the ACKnowledgement <CLX> the *IVS* shall clear the data held within the CLM file and start to repopulate the CLM file with data at the predetermined time intervals.

If an ACKnowledgement is not received within 30 s of sending the data the *CLM app* (4.2) shall attempt to resend the data and shall continue to do so at intervals determined by the *specification* (4.44) of the *TARV CLM* (4.27) *application service* (4.3) approved by the *approval authority (regulatory)* (4.8) until the data has been successfully sent and ACKnowledged.

Once the *application service provider* (4.4) identifies that the journey has been completed, the *application service provider* (4.4) system shall send an ACKnowledgement <CXX> to the *IVS* (4.27), and unless otherwise instructed by the *specification* (4.44) of the application service approved by the *approval authority (regulatory)* (4.8), on receipt of the ACKnowledgement <CXX> the *IVS* shall delete the *CLM* file from its memory. And the *CLM app* (4.2) shall terminate.

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

In the case of time series or application service instigated recording of vehicle *consignment* (4.14), the manner in which the application service uses the information captured and forwarded to it by the *IVS* (4.27) (CLM files) to determine location violations, and the method of reporting to the *jurisdiction* (4.30) and *operator* (4.35) is outside of the scope of this part of ISO 15638 shall be the subject of definition by the *jurisdiction* and/or the *application service provider* (4.4).

10.4.8 TARV CLM SE8: "Interrogated" request for vehicle consignment data

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

10.4.8.2 In the event that the IVS of a vehicle receives a wireless interrogation requesting the CLM 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.

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

10.4.8.4 The IVS shall then close the communication session.

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

10.4.8.6 The IVS shall then send the CLM data file 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.

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

10.4.8.8 On receipt of the acknowledgement <CLX> the IVS closes its communication session.

10.4.8.9 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.

10.5 Generic TARV CLM data naming content and quality.

The process to obtain *basic vehicle data* (4.11) [*TARV LDT* (4.31)] data content shall be as defined in 10.4.7 and 10.4.8 above and in 8.3 of ISO 15638-6, and ISO 15638-5.

The electronic records declared and stored by the *IVS* (4.27) shall be authenticated, have integrity and be secure from interception or corruption.

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

Table 2 — Formal data content of a TARV CLM record

FILE TYPE		Format of file name	Notes/Source
CLM	Mandatory	<CLM> <YYMMDD> <hhmmss> <vehicleregistrationnumber> Example CLM 110316 070603 KV76WRR As: CLM110316 070603KV76WRR	Clause 10.4.7 [Vehicle/Location/ Consignment monitoring file (CLM file)]

Number	Data concept name	Use	Format	Notes/Source
CLM001	IVS ID	Mandatory	AN (9)	IVS identifier as defined in ISO 15638-5
CLM002	Vehicle location	Mandatory	S(serial number) timestamp location Example s0123 110316 x 0A5D3770 0 x 027E2938> 0123	Calculated as specified in ISO 15638-5, Clause 9.2.4.
CLM003	Vehicle consignment	Mandatory	Form as defined in selected profile of ISO 26682-2	Calculated as specified in ISO 26683-2
CLM004	IVS ID	Mandatory	AN (9)	IVS identifier as defined in ISO 15638-5 (to indicate end of load data, as this data will vary from journey to journey)
In the event that data is sent in response to an interrogation requesting data, the following data shall be appended:				

Table 2 *(continued)*

CLM005	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.
CLM006	ReqDes	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 CLM application service specific provisions for quality of service

The integrity of the data are important, and other sensors as well as parameters can 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* (4.30). However, in defining such requirements *jurisdictions* shall wherever possible, use performance based or functionally *specifications* (4.44) 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.

This standard is about moving relevant data from a to b. There will be many factors, not the least the Jurisdiction who have quality requirements regarding the source of data.

Also many sensors and data sources will be for generic multi-application use and it is not appropriate to introduce detailed sensor certification requirements/procedures in this Standard. Such issues will need to be the subject of standards in themselves, and/or the regulations pf jurisdictions.

See also Clause 9 above for general quality of service requirements.

10.7 TARV CLM 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 CLM application specific rules for the approval of IVSs and “service providers”

As 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 (4.3) specified within this part of ISO 15638 and ISO 15638-7 contain neither 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:—[4)], or the requirements of ISO 15638-3, can have additional requirements which can have patent or intellectual property implications. The reader is referred to the regulation regime of the *jurisdiction* (4.30) and its regulations for instantiation in this respect.

4) To be published.

Annex A
(informative)

ASN.1 Modules for ISO 15638-17 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 International 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 International Standard.

A.2 ASN.1 modules for ISO 15638-17 (consignment and load monitoring)

A.2.1 Data concepts defined in ISO 15638-5 and used in this standard (ISO 15638-17)

```
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 ISO 15638-17 (CLM)

```
--Type definition for 15638-17 module
ConsignmentAndLocationMonitoring DEFINITIONS AUTOMATIC TAGS::=
   BEGIN
      IMPORTS Location FROM TARVLocalDataTree;

      CLMData::= SEQUENCE
      {cLM001 IVSID,
       cLM002 Location, -Vehicle location as per TARV LDT
       cLM003 VehicleConsignment,
       cLM004 IVSID,
       cLM005 Uref,
       cLM006 ReqDes
      }

      IVSID::= VisibleString (SIZE (9))
```

```
   VehicleConsignment::= VisibleString
   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) Recipient address sends acknowledgement.

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

g) Sends the datafile to a predetermined destination IPv6 (Internet) address.

h) Recipient address sends acknowledgement.

i) IVS closes the communication on receipt of acknowledgement.

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

k) A number of different datafiles (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.

l) 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

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, Mesh 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 can be simulated.

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

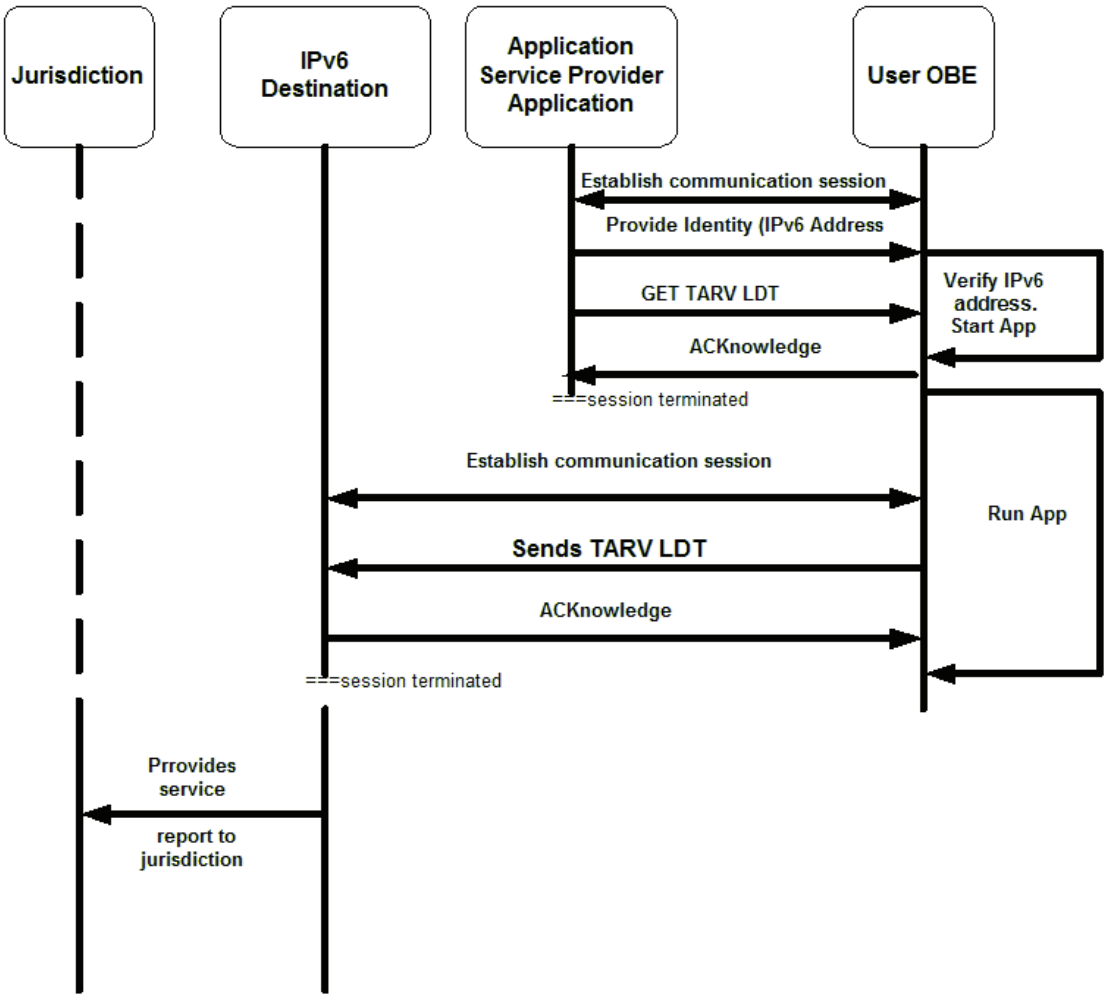

Figure B.1 — Communications sequences to obtain TARV LDT

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” data for regulatory control and management (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 script service: CLM vehicle consignment and location monitoring

TEST 9.1.1: CLM– via 2G. Instigated

STEP 9.1.1.1 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

At the appropriate time intervals, or at the instigation of the application service provider via a wireless link to the IVS, the CLM app in the IVS shall update the CLM file with the following data.

<IVS ID> ,

<VehicleLocation>, <ConsignmentData>

<IVS ID>

<end>

Table B.1 — Formal data content of a TARV CLM record

FILE TYPE		Format of file name	Notes/Source
CLM	Mandatory	<CLM> <YYMMDD> <hhmmss> <vehicle registration number> Example CLM 110316 070603 KV76WRR	Clause 19.4.7 [Vehicle/location/ consignment monitoring file (CLM file)]
Number	**Data concept name**	**Use**	**Format**	**Notes/Source**
CLM001	IVS ID	Mandatory	AN (9)	IVS identifier as defined in ISO 15638-5

Table B.1 *(continued)*

CLM002	Vehicle location	Mandatory	S(serial number) timestamp location Example s0123 110316 x0A5D3770 0x027E2938> 0123	Calculated as specified in ISO 15638-5, Clause 9.2.4.
CLM003	Vehicle consignment	Mandatory	Form as defined in selected profile of ISO 26682-2	Calculated as specified in ISO 26683-2
CLM004	IVS ID	Mandatory	AN (9)	IVS identifier as defined in ISO 15638-5 (to indicate end of consignment data, as this data will vary from journey to journey)

FILENAME: <CLM110316 070603KV76WRR>

FILE CONTENT: <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, apples and pears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesand pears,D0o3M45S >

STEP 9.1.1.2 IVS sends file named <CLM110316 070603KV76WRR>

<D0o3M45S, s0123110316 x0A5D3770 0x027E2938 > 0123, apples and pears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesand pears,D0o3M45S>

STEP 9.1.1.3 Destination address sends ACK <CLM>

STEP 9.1.1.4 IVS receives ACK <CLM>

STEP 9.1.1.5 IVS closes communication session

B.2.1 CTP 9.1.1 Instigated vehicle content location monitoring using 2G

S.U.T. reference	Instigated send of vehicle content location monitoring using 2G
CTP/9.1.1	
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 datafile to the predetermined destination IPv6 (Internet) address. Recipient address sends acknowledgement. IVS closes the communication on receipt of acknowledgement.
CTP origin	CSI
Reference requirement	ISO 15638-17
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, 5,9GHz (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, can be simulated. The destination address is intended to be an IPv6 address, but can 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
9.1.1.1	1	IVS instigates a communication session using selected media (2G) to predetermined destination IP address	Session established
9.1.1.2	2	IVS sends file named <CLM110316 070603KV76WRR> <START> <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, applesandpears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesandpears,D0o3M45S> <END>	File sent and arrives correctly at destination
9.1.1.3	3	Destination address sends ACK <CLX>	
9.1.1.4	4	IVS receives ACK <CLX>	File received and ACK <VMX> sent
9.1.1.5	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 9.1.1	Pass/Fail		Date: 29th 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

B.2.2 CTP 9.1.2 Interrogated vehicle content location monitoring using 2G

S.U.T. reference	Instigated send of vehicle content location monitoring using 2G
CTP/9.1.2	
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. Opens a new communication session using one of (and shall be tested for each of) several wireless media defined below. Sends the datafile to a predetermined destination IPv6 (Internet) address. Recipient address sends acknowledgement. IVS Closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-17
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, 5,9GHz (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, can be simulated. The destination address is intended to be an IPv6 address, but can 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
9.1.2.1	1	Session connected (incoming call)	Call in progress
9.1.2.2	2	Caller sends data request command (GPRS, EDGE, etc.) GET CLM	Data request sent
9.1.2.3	3	IVS acknowledges request by returning ACKnowledgement <C>	ACK <C> received
9.1.2.4	4	IVS closes communication session	Communication session closed
9.1.2.5	5	IVS instigates a communication session using selected media to predetermined destination IP address	Communication session successfully opened
9.1.2.6	6	IVS sends file named <CLM110316 070603KV76WRR> <START> <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, applesandpears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesandpears,D0o3M45S> <END>	File sent and arrives correctly at destination

9.1.2.7	7	Destination address sends ACK <CLX>	
9.1.2.8	8	IVS receives ACK <CLX> File received and ACK <CLX> sent	
	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 9.1.2	Pass/Fail	Date: 29th 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

B.2.3 CTP 9.1.3 Interrogated vehicle content location monitoring using 5,9 GHz and responding using 2G or 3G

S.U.T. reference	Interrogated vehicle content location monitoring using 5,9 GHz and send of vehicle content location monitoring using 2G or 3G
CTP/9.1.3	
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. Opens a new communication session using 2G or 3G. Sends the datafile to a predetermined destination IPv6 (Internet) address. Recipient address sends acknowledgement. IVS Closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-17
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, 5,9GHz (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, can be simulated. The destination address is intended to be an IPv6 address, but can 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
9.1.3.1	1	Session connected (incoming call) using 5.9 Ghz (IEEE 802.11p)	Call in progress
9.1.3.2	2	Caller sends data request command GET CLM	Data request sent
9.1.3.3	3	IVS acknowledges request by returning ACKnowledgement <C>	ACK <C> received
9.1.3.4	4	IVS closes communication session	Communication session closed
9.1.3.5	5	IVS instigates a communication session using 2G or 3G	Communication session successfully opened

9.1.3.6	6	IVS sends file named <CLM110316 070603KV76WRR> <START> <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, applesandpears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesandpears,D0o3M45S> <END>	File sent and arrives correctly at destination
9.1.3.7	8	IVS receives ACK <CLX> File received and ACK <CLX> sent	
	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 9.1.3	Pass/Fail	Date: 29th 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

B.2.4 CTP 9.2.1 Instigated vehicle content location monitoring using 3G

S.U.T. reference	Instigated send of vehicle content location monitoring using 3G
CTP/9.2.1	
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 datafile to the predetermined destination IPv6 (Internet) address. Recipient address sends acknowledgement. IVS closes the communication on receipt of acknowledgement.
CTP origin	CSI
Reference requirement	ISO 15638-17
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, 5,9GHz (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, can be simulated. The destination address is intended to be an IPv6 address, but can 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
9.2.1.1	1	IVS instigates a communication session using selected media (3G) to predetermined destination IP address	Session established
9.2.1.2	2	IVS sends file named <CLM110316 070603KV76WRR> <START> <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, applesandpears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesandpears,D0o3M45S> <END>	File sent and arrives correctly at destination
9.2.1.3	3	Destination address sends ACK <CLX>	
9.2.1.4	4	IVS receives ACK <CLX>	File received and ACK <CLX> sent
9.2.1.5	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 9.2.1	Pass/Fail		Date: 29th 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

B.2.5 CTP 9.2.2 Interrogated at 5,9 GHz and send of vehicle content location monitoring using 3G

S.U.T. reference	Instigated send of vehicle content location monitoring using 3G
CTP/9.2.2	
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. Opens a new communication session using one of (and shall be tested for each of) several wireless media defined below. Sends the datafile to a predetermined destination IPv6 (Internet) address. Recipient address sends acknowledgement. IVS Closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-17
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, 5,9GHz (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, can be simulated. The destination address is intended to be an IPv6 address, but can 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
9.2.2.1	1	Session connected (incoming call) using 5,9 Ghz (IEEE 802.11p)	Call in progress
9.2.2.2	2	Caller sends data request command GET CLM	Data request sent
9.2.2.3	3	IVS acknowledges request by returning ACKnowledgement <C>	ACK <C> received
9.2.2.4	4	IVS closes communication session	Communication session closed
9.2.2.5	5	IVS instigates a communication session using selected media (2G or 3G) to predetermined destination IP address	Communication session successfully opened
9.2.2.5	6	IVS sends file named <CLM110316 070603KV76WRR> <START> <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, applesandpears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesandpears,D0o3M45S> <END>	File sent and arrives correctly at destination

9.2.2.6	7	Destination address sends ACK <CLX>	
9.2.2.7	8	IVS receives ACK <CLX>	File received and ACK <CLX> sent
	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 9.2.2	Pass/Fail	Date: 29th 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

B.2.6 CTP 9.3.1 Instigated Vehicle Content Location Monitoring using 802.11p (WAVE) 5,9 GHz

S.U.T. reference	Instigated send of vehicle content location monitoring using 802.11p (WAVE) 5,9 GHz
CTP/9.3.1	
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 datafile to the predetermined destination IPv6 (Internet) address. Recipient address sends acknowledgement. IVS closes the communication on receipt of acknowledgement.
CTP origin	CSI
Reference requirement	ISO 15638-17
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, 5,9GHz (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, can be simulated. The destination address is intended to be an IPv6 address, but can 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
9.3.1.1	1	IVS instigates a communication session using selected media (5,9G) to predetermined destination IP address	Session established
9.3.1.2	2	IVS sends file named <CLM110316 070603KV76WRR> <START> <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, applesandpears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesandpears,D0o3M45S> <END>	File sent and arrives correctly at destination
9.3.1.3	3	Destination address sends ACK <CLX>	ACK <C> received
9.3.1.4	4	IVS receives ACK <CLX> File received and ACK <CLX> sent	
9.3.1.5	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 9.3.1	Pass/Fail		Date: 29th 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

B.2.7 CTP 9.3.2 Interrogated vehicle content location monitoring using 802.11p (WAVE) 5,9 GHz

S.U.T. reference	Interrogated send of vehicle content location monitoring using 802.11p (WAVE) 5,9 GHz
CTP/9.3.2	
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. Opens a new communication session using one of (and shall be tested for each of) several wireless media defined below. Sends the datafile to a predetermined destination IPv6 (Internet) address. Recipient address sends acknowledgement. IVS Closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-17
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, 5,9GHz (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, can be simulated. The destination address is intended to be an IPv6 address, but can 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
9.3.2.1	1	Session connected (incoming call) using 5,9 Ghz (IEEE 802.11p)	Call in progress
9.3.2.2	2	Caller sends data request command GET CLM	Data request sent
9.3.2.3	3	IVS acknowledges request by returning ACKnowledgement <C>	ACK <C> received
9.3.2.4	4	IVS closes communication session	Communication session closed
9.3.2.5	5	IVS instigates a communication session using 5,9 GHz selected media to predetermined destination IP address	Communication session successfully opened

9.3.2.5	6	IVS sends file named <CLM110316 070603KV76WRR> <START> <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, applesandpears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesandpears,D0o3M45S> <END>	File sent and arrives correctly at destination
9.3.2.6	7	Destination address sends ACK <CLX>	
9.3.2.7	8	IVS receives ACK <CLX> File received and ACK <CLX> sent	
	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 9.3.2	Pass/Fail	Date: 29th 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

B.2.8 CTP 9.4.1 Instigated vehicle content location monitoring using mesh WiFi

S.U.T. reference	Instigated send of vehicle content location monitoring using Mesh WiFi
CTP/9.4.1	
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 datafile to the predetermined destination IPv6 (Internet) address. Recipient address sends acknowledgement. IVS closes the communication on receipt of acknowledgement.
CTP origin	CSI
Reference requirement	ISO 15638-17
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, 5,9GHz (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, can be simulated. The destination address is intended to be an IPv6 address, but can 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
9.4.1.1	1	IVS instigates a communication session using selected media (Mesh WiFi) to predetermined destination IP address	Session established
9.4.1.2	2	IVS sends file named <CLM110316 070603KV76WRR> <START> <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, applesandpears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesandpears,D0o3M45S> <END>	File sent and arrives correctly at destination
9.4.1.3	3	Destination address sends ACK <CLX>	
9.4.1.4	4	IVS receives ACK <CLX> File received and ACK <CLX> sent	
9.4.1.5	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 9.4.1	Pass/Fail	Date: 29th 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

B.2.9 CTP 9.4.2 Interrogated vehicle content location monitoring using Mesh WiFi

S.U.T. reference	5,9 GHz Interrogated and send of vehicle vontent location monitoring using Mesh WiFi
CTP/9.4.2	
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. Opens a new communication session using one of (and shall be tested for each of) several wireless media defined below. Sends the datafile to a predetermined destination IPv6 (Internet) address. Recipient address sends acknowledgement. IVS Closes the communication on receipt of acknowledgement.
CTP origin	CEN
Reference requirement	ISO 15638-17
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, 5,9GHz (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, can be simulated. The destination address is intended to be an IPv6 address, but can 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
9.4.2.1	1	Session connected (incoming call) using 5,9 Ghz (IEEE 802.11p)	Call in progress
9.4.2.2	2	Caller sends data request command (GPRS, EDGE, etc.) GET CLM	Data request sent
9.4.2.3	3	IVS acknowledges request by returning ACKnowledgement <C>	ACK <C> received
9.4.2.4	4	IVS closes communication session	Communication session closed
9.4.2.5	5	IVS instigates a communication session using mesh WiFi selected media to predetermined destination IP address	Communication session successfully opened
9.4.2.5	6	IVS sends file named <CLM110316 070603KV76WRR> <START> <D0o3M45S, s0123110316 x0A5D3770 0x027E2938> 0123, applesandpears,1234567890poiuytrewqasdfghj,poiytrewq0987654321,applesandpears,D0o3M45S> <END>	File sent and arrives correctly at destination

9.4.2.7	7	Destination address sends ACK <CLX>	
9.4.2.8	8	IVS receives ACK <CLX> File received and ACK <CLX> sent	
	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 9.4.2	Pass/Fail	Date: 29th 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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