TECHNICAL SPECIFICATION

ISO/TS 15638-6

First edition
2013-08-15

Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) —

Part 6: Regulated applications

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

Partie 6: Applications réglementées

Reference number
ISO/TS 15638-6:2013(E)

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Published in Switzerland

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Forewod

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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. www.iso.org/directives.

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

ISO 15638 consists of the following parts, under the general title *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV)*:

— *Part 1 Framework and architecture*

— *Part 2: Common platform parameters using CALM*

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

— *Part 5: Generic vehicle information*

— *Part 6: Regulated applications* [Technical Specification]

— *Part 7: Other applications*

— *Part 8: Vehicle access monitoring (VAM)* [Technical Specification]

— *Part 9: Remote electronic tachograph monitoring (RTM)* [Technical Specification]

— *Part 10: Emergency messaging system/eCall (EMS)* [Technical Specification]

— *Part 11: Driver work records (work and rest hours compliance) (DWR)* [Technical Specification]

— *Part 12: Vehicle mass monitoring (VMM)* [Technical Specification]

— *Part 14: Vehicle access control (VAC)* [Technical Specification]

— *Part 15: Vehicle location monitoring (VLM)* [Technical Specification]

— *Part 16: Vehicle speed monitoring (VSM)* [Technical Specification]

— *Part 17: Consignment and location monitoring (CLM)* [Technical Specification]

— *Part 18: ADR (Dangerous Goods) transport monitoring (ADR)* [Technical Specification]

— *Part 19: Vehicle parking facilities (VPF)* [Technical Specification]

— The following parts are under preparation:

— *Part 4: System security requirements* [Technical Specification]

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

Introduction

Many ITS technologies have been embraced by commercial transport *operators (4.44)* and freight owners, in the areas of fleet management, safety and security. *Telematics (4.57)* applications have also been developed for governmental use. Such regulatory services in use or being considered vary from *jurisdiction (4.38)* to *jurisdiction*, but include electronic on-board recorders, collection of penalties and levies, digital *tachograph (4.56)*, on-board *mass (4.42)* monitoring, vehicle *access (4.1) methods*, *hazardous goods (4.4)* tracking and e-call *(4.27)*. Additional applications with a regulatory impact being developed include, fatigue management, speed monitoring and measurement of *mass (4.42)*, location, distance and time.

In such an emerging environment of regulatory and *commercial applications (4.18)*, it is timely to consider an overall *architecture (4.12)* (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 (4.55)* of new applications that build upon the functionality of a generic specification platform. A suite of standards documents is required to describe and define the *framework (4.30)* and requirements so that the on board equipment and back office systems can be commercially designed in an open market to meet common requirements of *jurisdictions (4.38)*.

This suite of standards addresses and defines the *framework (4.30)* for a range of cooperative *telematics (4.57)* applications for *regulated commercial freight vehicles (4.49)* (such as *access methods (4.2)*, driver fatigue management, speed monitoring, and on-board *mass (4.42)* monitoring. 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 (4.53)* oriented approach with provisions for the *approval (4.10)* and *auditing (4.13)* of *service providers*.

This suite of standards documents will:

- provide the basis for future development of cooperative *telematics (4.57)* applications for *regulated commercial freight vehicles (4.49)*. Many elements to accomplish this are already available. Existing relevant standards will be referenced, and the *specifications (4.55)* will use existing standards (such as *CALM*) wherever practicable.
- allow for a powerful platform for highly cost-effective delivery of a range of *telematics* applications for *regulated commercial freight vehicles*.
- a business *architecture (4.12)* based on a (multiple) *service provider (4.53)* oriented approach
- address legal and regulatory aspects for the *approval (4.10)* and *auditing (4.13)* of *service providers.*

This suite of standards deliverables is timely as many governments (Europe, North America, Asia and Australia/New Zealand) are considering the use of *telematics (4.57)* for a range of regulatory purposes. Ensuring that a single in-vehicle platform can deliver a range of services to both government and industry through open standards and competitive markets is a strategic objective.

This part of the ISO 15638 family of standards documents provides general *specifications (4.55)* for communications and data exchange aspects of candidate *regulated applications (4.47)* which are specified in ISO 15638 parts 8 et sequential (parts 8 – 19 at the time of developing this part of ISO 15638, but further parts may be added later if a requirement for additional regulated applications to be standardised are identified) , the selection and implementation for all or any of which remain a decision for the implementing *jurisdiction (4.38)*.

NOTE: The definition of what comprises a ‘regulated’ vehicle is regarded as an issue for national decision, and may vary from *jurisdiction (4.38)* to *jurisdiction*. This suite of standards documents does not impose any requirements on nations in respect of how they define a *regulated vehicle (4.49)*.

NOTE: The definition of what comprises a ‘regulated’ service is regarded as an issue for national decision, and may vary from *jurisdiction (4.38)* to *jurisdiction*. This suite of standards documents does not impose any requirements on nations in

respect of which services for *regulated vehicles* *(4.49) jurisdictions* will require, or support as an option, but will provide standardised sets of requirements descriptions for identified services to enable consistent and cost efficient implementations where implemented.

Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) —

Part 6:
Regulated applications

1 Scope

This part of ISO 15638 specifies the common roles and responsibilities of actors providing *regulated application (4.47)* systems which use *TARV* to provide *regulated application services (4.48)* for *regulated commercial freight vehicles (4.49),* and the interoperability of key operational steps and actions required to support all *TARV regulated application service (4.48)* systems.

This part of ISO 15638 specifies the general conditions for data exchanges between an *application service provider (4.7)* and vehicle *IVS (4.32)*, and from other *ITS-stations (4.34)* to the *IVS* of the *regulated commercial freight vehicle (4.49)*, and specifies generic data concepts for identified services, but it does not define the detailed aspects of the *application services (4.6)* or their implementation, application specific aspects being defined in defined in ISO 15638-8 et sequential for each identified application service.

This part of ISO 15638 addresses the general and common requirements for the provision of *regulated application services (4.48)* that require data in addition to, or instead of, *basic vehicle data (4.16)* and *core application data (4.23)* (application specific aspects being defined in defined in ISO 15638-8 et sequential for each identified application service).

ISO 15638 provides common aspects of *specifications (4.55)* for communications and data exchange aspects of identified *application services (4.6)* (as defined in defined in ISO 15638-8 et sequentia) that a *regulator (4.50)* may elect to require or support as an option, including:

a) high level definition of the service that a s*ervice provider (4.53)* has to provide, (The service definition describes common service elements; but does not define the detail of how such an *application service (4.6)* is instantiated, not the acceptable value ranges of the data concepts defined)

b) means to realise the service

c) application data common to all parts as defined in defined in ISO 15638-8 et sequentia, naming content and quality that an *IVS (4.32)* has to deliver.

The definition of what comprises a ‘regulated’ service is regarded as an issue for national decision, and may vary from *jurisdiction (4.38)* to *jurisdiction*. This document does not impose any requirements on nations in respect of which services for *regulated commercial freight 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.

ISO 15638 has been developed for use in the context of regulated commercial freight vehicles [hereinafter referred to as ‘regulated vehicles’ *(4.49)].* 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 (4.6)* described in this part of ISO 15638 shall be within the regulations imposed by the *jurisdiction (4.38)* 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.

3 Normative references

The following referenced 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 14816 — *Road transport and traffic telematics — Automatic vehicle and equipment identification — Numbering and data structure*

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 — *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 4: System security requirements*[1]

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

ISO 15638 -8 — *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 8: Vehicle access monitoring (VAM)*

ISO 15638 -9 — *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 9: Remote electronic tachograph monitoring (RTM)*

ISO 15638 -10 — *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 10: Emergency messaging system/eCall (EMS)*

ISO 15638 -11 — *Intelligent transport systems — Framework for cooperative Telematics Applications for Regulated Vehicles (TARV) — Part 11: Driver work records (work and rest hours compliance) (DWR)*

ISO 15638 -12 — *Intelligent transport systems — Framework for cooperative Telematics Applications for Regulated Vehicles (TARV) — Part 12: Vehicle mass monitoring (VMM)*

ISO 15638 -13 — *Intelligent transport systems — Framework for cooperative Telematics Applications for Regulated Vehicles (TARV) — Part 13: Mass Penalties and Levies (VMC)*[2]

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1 Under preparation.

ISO 15638 -14	*Intelligent transport systems — Framework for cooperative Telematics Applications for Regulated Vehicles (TARV) — Part 14: Vehicle access control (VAC)*
ISO 15638 -15	*Intelligent transport systems — Framework for cooperative Telematics Applications for Regulated Vehicles (TARV) — Part 15: Vehicle location monitoring (VLM)*
ISO 15638 -16	*Intelligent transport systems — Framework for cooperative Telematics Applications for Regulated Vehicles (TARV) — Part 16: Vehicle speed monitoring (VSM)*
ISO 15638 -17	*Intelligent transport systems — Framework for cooperative Telematics Applications for Regulated Vehicles (TARV) — Part 17: Consignment and location monitoring (CLM*
ISO 15638 -18	*Intelligent transport systems — Framework for cooperative Telematics Applications for Regulated Vehicles (TARV) — Part 18: ADR (Dangerous Goods) transport monitoring (ADR)*
ISO 15638 -19	*Intelligent transport systems — Framework for cooperative Telematics Applications for Regulated Vehicles (TARV) — Part 19: Vehicle parking facilities (VPF)*
ISO 17262	*Intelligent transport systems — Automatic vehicle and equipment identification — Numbering and data structures*
ISO 24534-3	*Automatic vehicle and equipment identification — Electronic registration identification (ERI) for vehicles — Part 3: Vehicle data*
ISO TS 26683-1	*Intelligent transport systems — Freight land conveyance content identification and communication (FLC-CIC) — Part 1: Context, architecture and referenced standards*
ISO TS 26683-2	*Intelligent transport systems — Freight land conveyance content identification and communication (FLC-CIC) — 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
admittance, entry, permit to use the road network and/or associated infrastructure (bridges, tunnels etc.)

4.2
access methods
procedures and protocols to provision and retrieve data

4.3
access monitoring
observation and recording of vehicle related data when using the road network and/or associated infrastructure (bridges, tunnels etc.)

4.4
Accord européen relatif au transport international des marchandises Dangereuses par Route
ADR
UNECE regulations and declaration systems for agreements relating to dangerous goods/hazardous goods

4.5
app
small (usually) *Java™ (4.37)* applets, organised as software bundles, that support *application services (4.6)* by keeping the *data pantry (4.24)* provisioned with up-to-date data

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2 Under preparation.

4.6
application service
service provided by a *service provider* *(4.53)* enabled by accessing data from the *IVS* *(4.32)* of a *regulated vehicle* *(4.49)* via a wireless communications network

4.7
application service provider
ASP
party that provides an *application service* *(4.6)*

4.8
app library
separately secure area of memory in *IVS* *(4.32)* where apps are stored [with different access controls to *data pantry* *(4.24)*]

4.9
application service data file
ASD file
file held in the *data pantry* *(4.24)* of the *IVS* *(4.32)* containing data specific to an *application service* *(4.6)*

4.10
approval
formal affirmation that an applicant has satisfied all the requirements for appointment as an *application service provider* *(4.7)* or that an application service delivers the required service levels.

4.11
approval authority (regulatory)
organisation (usually independent) which conducts *approval* *(4.10)* and ongoing *audit* *(4.13)* for *service providers* *(4.53)* on behalf of a *jurisdiction* *(4.38)*

4.12
architecture
formalised description of the design of the structure of *TARV* and its *framework* *(4.30)*

4.13
audit/auditing
review of a party's capacity to meet, or continue to meet, the initial and ongoing *approval agreements* *(4.22)* as a *service provider* *(4.53)*

4.14
auditor
person or organisation approved to *audit* *(4.13)* parts of a *regulated application service* *(4.48)* by a *approval authority (regulatory)* *(4.11)*

4.15
authentication
function intended to establish and verify a claimed identity

4.16
basic vehicle data
data that shall be maintained/provided by all *IVS* *(4.32)* [regardless of *jurisdiction* *(4.38)*]

4.17
CALM communications access for land mobiles
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* *(4.58)* determined parameters by using a suite of standards based on ISO 21217 (*CALM* architecture) and ISO21210 (*CALM* networking) that provide a

common platform for a number of standardised media using *ITS-stations (4.34)* to provide wireless support for applications, such that the application is independent of any particular wireless medium

4.18
commercial application(s)
ITS applications in *regulated vehicles (4.49)* for commercial (non-regulated) purposes

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

4.19
consignment
shipment of goods/cargo to a destination

4.20
consignment and location monitoring
CLM
collection, collation, and transfer of data from an *in-vehicle system (4.32)* to an *application service provider (4.7)* concerning the content of the load being carried and/or its condition and/or location

4.21
conveyance
vehicle or trailer used transport from one place to another

4.22
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 (4.34)* 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 (4.33)*

4.23
core application data/core data
basic vehicle data (4.16) plus any additional data required to provide an implemented *regulated application service (4.48)*

4.24
data pantry
secure area of memory in *IVS (4.32)* where data values are stored [with different access controls to *app library (4.8)*]

4.25
driver
person driving the *regulated vehicle* at any specific point in time

4.26
driver work records
DWR
collection, collation, and transfer of *driver (4.25)* work and rest hours data from an *in-vehicle system (4.32)* to an *application service provider (4.7)*

4.27
eCall
specialised instantiation of an *EMS (4.28)* that provides incident messaging and communication with a public service assistance point via priority wireless telephone communications using its emergency call capabilities

4.28
emergency message system (EMS)
collection, collation, and transfer of emergency message data from an *in-vehicle system (4.32)* to an *application service provider (4.7)*

4.29
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

4.30
framework
particular set of beliefs, ideas referred to in order to describe a scenario or solve a problem

4.31
host management centre
central point for *TARV-ROAM* management of *TARV* applications executing on the *TARV-ROAM* host

NOTE *HMC* enables remote management of vehicle applications by a trusted party.

4.32
in-vehicle system
IVS
ITS-station (4.34) and connected equipment on board a vehicle

4.33
ITS service
communication functionality offered by an *ITS-station (4.34)* to an *ITS-station* application

4.34
ITS-station
ITS-s
entity in a communication network, comprised of application, *facilities (4.29)*, networking and access layer components specified in ISO 21217 that operate within a bounded secure management domain

4.35
IVS installer
actor who installs *IVS (4.32)* on behalf of the vehicle manufacturer or the initial *prime service provider (4.46)*

4.36
IVS maintainer
actor who maintains *IVS (4.32)* on behalf of the *prime service provider (4.46)*

4.37
Java™
object oriented open source operating language developed by SUN systems

4.38
jurisdiction
government, road or traffic authority which owns the r*egulatory applications (4.47)*

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

4.39
jurisdiction regulator
agent of the *jurisdiction (4.38)* appointed to regulate and manage *TARV* within the domain of the *jurisdiction*; may or may not be the *approval authority (regulatory) (4.11)*

4.40
local data tree
LDT
frequently updated data concept stored in the on on-board *data pantry (4.24)* containing a collection of data values deemed essential for either a) *TARV regulated application service (4.48)*, or b) *cooperative intelligent transport systems (4.22)*

4.41
map
spatial dataset that defines the road system

4.42
mass
mass of a given heavy vehicle as measured by equipment affixed to the *regulated vehicle* *(4.49)*

4.43
'mass' data for regulatory control and management
MRC
collection, collation, and transfer of vehicle *mass* *(4.42)* data from an *in-vehicle system* *(4.32)* to an *application service provider* *(4.7)* to enable data provision to *jurisdictions* *(4.38)* for the control and management of equipped vehicles based on the *mass* of the *regulated vehicle* *(4.49),* or use of such data to enable compliance with the provisions of regulations.

4.44
operator
fleet manager of a *regulated vehicle*

4.45
OSGi™
open services gateway initiative

4.46
prime service provider
service provider *(4.53)* who is the first contractor to provide *regulated application services* *(4.48)* to the *regulated vehicle* *(4.49),* or a nominated successor on termination of that initial contract

NOTE The *prime service provider* *(4.46)*' is also responsible to maintain the installed *IVS* *(4.32)*; if the *IVS* was not installed during the manufacture of the vehicle the *prime service provider* *(4.46)* is also responsible to install and commission the *IVS* *(4.32).*

4.47
regulated/regulatory application
application arrangement using TARV utilised by *jurisdictions* *(4.38)* 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.*

NOTE This can be mandatory or voluntary at the discretion of the *jurisdiction.*

4.48
regulated application service
TARV application service to meet the requirements of a regulated application that is mandated by a regulation imposed by a *jurisdiction* *(4.38),* or is an option supported by a *jurisdiction*

4.49
regulated commercial freight vehicle/regulated vehicle ***(4.49)***
vehicle that is subject to regulations determined by the *jurisdiction* *(4.38)* 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

NOTE At the option of *jurisdictions*; this may require the provision of information via *TARV* or provide the option to do so.

4.50
regulator
see jurisdiction regulator *(4.39)*

4.51
regime for open application management
ROAM
facilities (4.29) layer for *TARV*, within the ISO 15638 suite of standards documents, providing an open access, yet secure runtime environment for *TARV* and other applications, including cooperative vehicle applications, on top of the *CALM* communications environment

4.52
remote tachograph monitoring
RTM
collection, collation, and transfer of data from an on-board electronic *tachograph (4.56)* system to an *application service provider (4.7)*

4.53
service provider
party which is approved by a approval *authority (regulatory) (4.11)* as suitable to provide regulated or commercial ITS *application services (4.6)*

4.54
session
wireless communication exchange between the *ITS-station (4.34)* of an *IVS (4.32)* and the *ITS-station* of its *application service provider (4.7)* to achieve data update, data provision, upload apps, or otherwise manage the provision of the *application service (4.6),* or a wireless communication provision of data to the *ITS-station* of an *IVS (4.32)* from any other *ITS-station*

4.55
specification
explicit and detailed description of the nature and functional requirements and minimum performance of equipment, service or a combination of both

4.56
tachograph
sender unit mounted to a vehicle gearbox, a tachograph head and a digital driver card, which records the *regulated vehicle (4.49)* speed and the times at which it was driven and aspects of the *driver's (4.25)* activity selected from a choice of modes

4.57
telematics
use of wireless media to obtain and transmit (data) from a distant source

4.58
user
individual or party that enrols in and operates within a regulated or *commercial application (4.18) service (4.6)*

EXAMPLE *Driver (4.25),* transport *operator (4.44),* freight owner, etc.

4.59
vehicle access control
VAC
control of *regulated vehicle*s ingress to and egress from controlled areas, and related systems

4.60
vehicle access management
VAM
monitoring and management of *regulated vehicle*s approaching or within sensitive and controlled areas

4.61
vehicle location monitoring
VLM
collection, collation, and transfer of vehicle location data from an *in-vehicle system (4.32)* to an *application service provider (4.7)*

4.62
vehicle parking facility
VPF
parking facility for regulated and other commercial vehicles that meets the requirements of the local *jurisdiction (4.38)* in its ability and associated administration and management esp. often to provide safe and secure parking for regulated and other commercial vehicles

4.63
vehicle mass monitoring
VMM
collection, collation, and transfer of vehicle *mass (4.42)* data from an *in-vehicle system (4.32)* to an *application service provider (4.7)*

4.64
vehicle secure parking
VPF
system for booking and *access (4.1)* to and egress from a *secure parking facility (SPF) (4.62)*

4.65
vehicle speed monitoring
VSM
collection, collation, and transfer of vehicle speed data from an *in-vehicle system (4.32)* to an *application service provider (4.7)*

5 Symbols (and abbreviated terms)

ADR
Accord européen relatif au transport international des marchandises Dangereuses par Route (4.4) (*dangerous goods*)

app
applet (JAVA™ application or similar) *(4.5)*

AS
application service

ASD file
application service data file *(4.9)*

ASP
application service provider (4.7)

CALM
communications access for land mobiles (4.17)

CAN
controller area network (4.20)

C-ITS
cooperative intelligent transport systems (4.22)

CLM
consignment and location monitoring (4.20)

CONOPS
concept of operations

DRD
driver records device

DWR
driver work records *(4.26)*

EMS
emergency message system *(4.28)*

HMC
host management centre *(4.31)*

ID
identity

IP
internet protocol

ISMS
information security management system

ITS-S
ITS station *(4.34)*

IVS
In-vehicle system *(4.32)*

LDT
local data tree *(4.40)*

MRC
'Mass' data for regulatory control and management *(4.43)*

OID
object identifier

QMS
quality monitoring station

RAS
regulated application service *(4.48)*

RFID
radio frequency identification device

ROAM
regime for open application management *(4.51)*

RTM
remote tachograph monitoring *(4.52)*

SE
service element

TARV
telematics *(4.57)* applications for *regulated vehicles* *(4.49)*

UNECE
United Nations Economic Commission for Europe

VAC
vehicle access control (4.59)

VAM
vehicle access management (4.60)

VLM
vehicle location monitoring (4.61)

VMM
vehicle mass monitoring (4.63)

VSM
vehicle speed monitoring (4.65)

VPF
vehicle secure parking (4.64)

6 General overview and framework

ISO TS 15638-1 provided a *framework (4.30)* and *architecture (4.12)* 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 (4.12)* and detail and *specification (4.55)* of the roles of the actors involved, the reader is referred to ISO TS 15638-1.

In summary, Figure 1 shows the role model conceptual *architecture (4.12)* showing the key actors and their relationships.

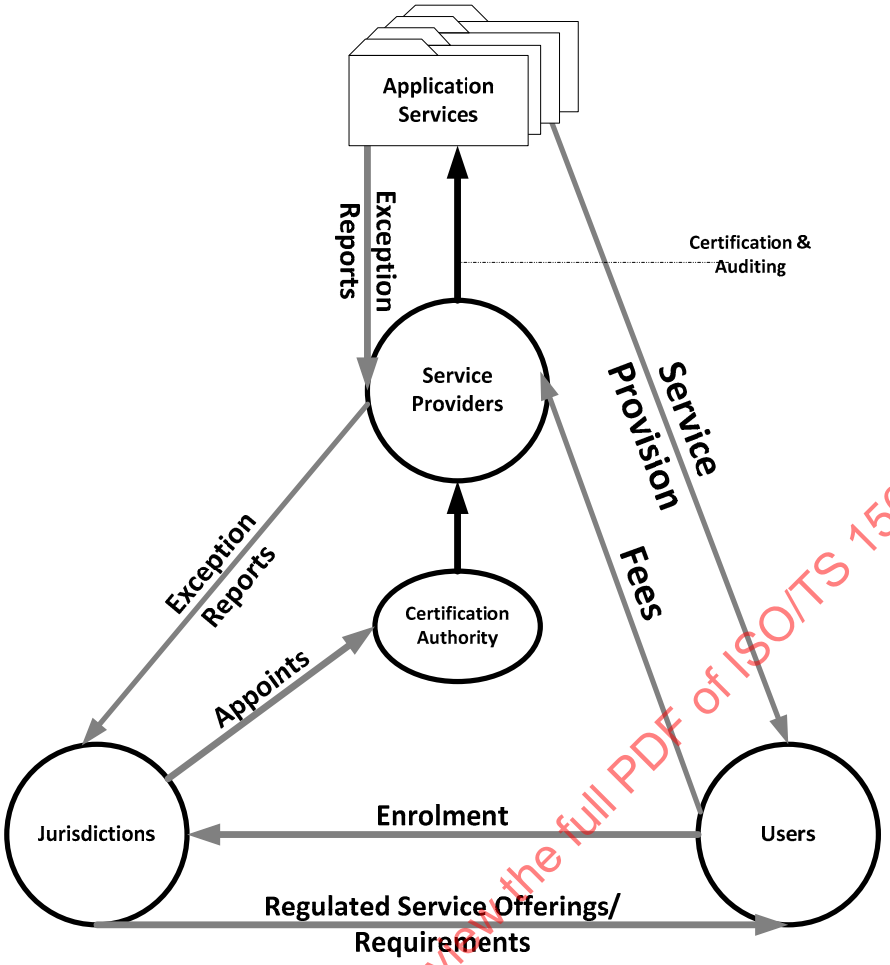

Figure 1 — Role model conceptual architecture
(Source: ISO 15638-1)

ISO 15638 provides a suite of standards documents addresses and defines the *framework (4.30)* for a range of cooperative *telematics (4.57)* applications for *regulated vehicles (4.49)* (such as electronic *tachograph (4.56)* monitoring, *Driver work records (4.26)* , emergency messaging/*eCall (4.27)* ; mass monitoring, , HGV *mass (4.42)* monitoring, speed monitoring, *access (4.1)*, *access methods (4.2)*, location monitoring, etc.). The overall scope includes the concept of operation, legal and regulatory issues, and the generic *cooperative ITS (4.22)* service platform. The *framework (4.30)* is based on a (multiple) *service provider (4.53)* oriented approach including provisions for the *approval (4.10)* and *auditing (4.13)* of *service providers*. This part of ISO 15638 is one of a suite of standards documents that provide a standardised approach for *telematics* aspects for regulated vehicles *(4.49)*:

- 15638 -1 *TARV* – Framework and *architecture (4.12)*
- 15638 -2 *TARV* – Common platform parameters using *CALM*
- 15638 -3 *TARV* – Operating requirements, approval procedures, and enforcement provisions for the providers of regulated services
- 15638 -4 *TARV* – System security requirements
- 15638 -5 *TARV* – Generic vehicle information
- 15638 -6 *TARV* – Regulated applications (This part)
- 15638 -7 *TARV* – Other applications

defined in ISO 15638-8 et sequentia specify application specific aspects for identified TARV regulated application services. At the time of developing this part of ISO 15638, the following Parts have been developed for the identified regulated application services, but further Parts may be added later if additional TARV regulated application services are identified:

— ISO 15638 -8 TARV -Vehicle access management and monitoring
— ISO 15638 -9 TARV -Remote electronic tachograph monitoring
— ISO 15638 -10 TARV -Emergency messaging system/eCall
— ISO 15638 -11 TARV -Driver work records
— ISO 15638 -12 TARV -Vehicle mass monitoring
— ISO 15638 -13 TARV -'Mass' data for regulatory control and management
— ISO 15638 -14 TARV -Vehicle access control
— ISO 15638 -15 TARV -Vehicle location monitoring
— ISO 15638 -16 TARV -Vehicle speed monitoring
— ISO 15638 -17 TARV -Consignment and location monitoring
— ISO 15638 -18 TARV -ADR (Dangerous Goods) monitoring
— ISO 15638 -19 TARV -Vehicle parking facilities

This part of ISO 15638 provides common *specifications (4.55)* for the generic telematics and data requirements for candidate *regulated applications (4.47)* for *TARV*, and defines the generic modus of operations.

A *regulated application service (4.48)* shall be a *TARV application service (4.6)* that is mandated by a regulation imposed by a *jurisdiction (4.38)* (government, road or traffic authority which owns the *regulatory applications (4.47)* in which case all vehicles of a class defined by the *jurisdiction* shall support and provide this service; or is an option supported by a *jurisdiction,* in which case it provides a voluntary electronic means of satisfying a requirement of a *jurisdiction.*

A *regulated application service (4.48)* is provided by a *service provider (4.53)*, also called an *application service provider (4.7)* (*ASP*) who is a party which is approved by a approval *authority (regulatory) (4.11)* as suitable to provide regulated or commercial ITS *application services (4.6)*.

NOTE: A *approval authority (regulatory) (4.11)* is an agency of or function within a *jurisdiction regulator (4.39)* who approves that the requirements of the *jurisdiction (4.38)* have been met, and should not be confused with a *approval authority (digital) (4.23)* which is an organization which issues digital certificates for use by other parties (specifically in the context of communications security).

The *service provider (4.53)* provides the *application service (4.6)* to/for a *user (4.58)* who is an individual or party that enrols in and operates within a *regulated application service (4.48)* or *commercial application (4.18)* service in order to meet specific aspects of the requirements of a *jurisdiction (4.38)* for the operation of the *regulated vehicle (4.49)* within that *jurisdiction.*

Examples of a *user (4.58)*'are a transport *operator (4.44)*, *driver (4.25),* freight owner, etc. Most commonly the *user (4.58)* is the transport *operator (4.44)*.

For further information refer to ISO 15638-1.

The *jurisdiction (4.38),* for reasons of efficiency, interoperability, ability to operate within multiple *jurisdictions*, ability to deploy rapidly, and maintenance, may elect to use one of the *regulated application services (4.48)* defined in this part of ISO 15638 to meet defined communications and data aspects of its requirement(s).

Regulated application services (4.48) require clear definition in terms of the requirements laid on the *service provider (4.53)*

The responsibility to make such requirements clearly defined and make such requirements available to the *application service providers (4.7)* shall rest with the *jurisdiction (4.38).*

The service definition for each *application service* *(4.6)* supported by this part of ISO 15638 comprises:

a) A clear description of the generic high level service provided and its inputs, outputs and results, including a given service level

b) Generic data, naming content and quality that an *IVS* *(4.32)* has to deliver

c) Specific data, naming content and quality for the provision of that particular service

d) Generic service elements definition

e) *Access methods* *(4.2)* to provision and retrieve data

f) Provisions for quality of service

g) Provisions for test requirements

h) Provisions for (but not the detailed requirements and arrangements for) the *approval* *(4.10)* of *IVSs* *(4.32)* and s*ervice providers* *(4.53)*.

7 Requirements for services using generic vehicle data

7.1 General

This Clause provides 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* *(4.48),* and defines general requirements to assure data interoperability.

7.1.1 Regulated application services using only generic *basic vehicle data*

Where all of the required data can be obtained via the access commands for generic *basic vehicle data* *(4.16)* specified in ISO 15638-5, the *access methods* *(4.2)* defined in ISO 15638-5 shall be used consistently to obtain the values for the *TARV LDT* *(4.40)* (and *C-ITS* *(4.22)* *LDT* data concepts where required). No further international standardization is required, and *jurisdictions* *(4.38)*, subject to the privacy regulations pertaining within the *jurisdiction,* may develop, operate, and update their regulated, or supported regulated voluntary services according to local design; international interoperability being maintained through the provisions of ISO 15638-5 (*TARV* Generic vehicle information). All vehicles that are equipped to support ISO 15638 shall be able to support such service provision.

ISO 15638-5 Clause 7 defines the following relevant commands:

a) GET *TARV LDT* (*local data tree* *(4.40)*) data

b) GET *C-ITS* *(4.22)* (co-operative vehicle systems) *LDT* data.

See ISO 15638-5 for details of these commands.

7.1.2 Regulated application services using both generic vehicle data and additional regulated application specific data

Where the *regulated application service* *(4.48)* requires both generic vehicle information *and* additional data, the generic vehicle information shall be via the access commands for generic vehicle information specified in ISO 15638-5, the *access methods* *(4.2)* defined in ISO 15638-5 for '`CREATE core data`' and '`GET core data`' shall be used consistently, and additional data and *application service* *(4.6)* requirements shall be provided as specified in the general methods defined in Clause 8 of this part of ISO 15638, and a subsequent clause pertaining to the appropriate *application service specification* *(4.55)* provided in ISO 15638 Parts 8 et sequentia.

ISO 15638-5 Clause 8 defines the following relevant commands:

a) CREATE core data

b) GET core data.

See ISO 15638-5 for detail of these commands.

See Clause 8 (of ISO 15638-5) for the generic sequence of operations for *regulated application services (4.48)* using generic vehicle data and unstandardized additional *regulated application (4.47)* specific data.

7.1.3 'Instigated' and 'Interrogated' data

Data is sent either because its collation and send is 'instigated' by the app for the specific application service that is running in the IVS (for example to defined time cycles, or on the occurrence of an event outside of defined limits (cargo temperature, an alarm etc.),

or it is sent because an interrogating ITS-station has requested the data ('interrogated' data)

7.1.4 Get commands for specific TARV regulated application services

In respect of providing standardised specific data relating to a particular regulated application service (defined in ISO 15638 Part 8 et sequentia) as the result of an interrogation, one common command shall be used to request application specific data specified in any of the regulated application services defined in ISO 15638 parts 8 et sequentia.

The command is

GET *xxx*

where *xxx* is a three or four character code uniquely identifying the application service data requested.The codes are shown in Table 1.

Table 1: Unique 'GET' codes for specific application services defined in ISO 15638-8 - -ISO 15638-19

ISO 15638	Local data tree (LDT)	LDT
ISO 15638	Core Application Data/CoreData (CD)	CD
ISO 15638-8	Vehicle access management and monitoring	VAM
ISO 15638-9	Remote electronic tachograph monitoring	RTM
ISO 15638-10	Emergency messaging system/eCall	EMS
ISO 15638-11	Driver work records	DWR
ISO 15638-12	Vehicle mass monitoring NOTE: there are multiple ACKs used as defined in ISO 15638-12)	VMM VMMA VMMB VMMX
ISO 15638-13	'Mass' data for regulatory control and management	MRC
ISO 15638-14	Vehicle access control	VAC
ISO 15638-15	Vehicle location monitoring	VLM VLX
ISO 15638-16	Vehicle speed monitoring	VDSM VDSI VSMX
ISO 15638-17	Consignment and location monitoring	CLM CLX

ISO 15638-18	ADR (Dangerous Goods) monitoring	ADR
ISO 15638-19	Vehicle parking facilities	VPF

Where multiple possibilities exist, the explanation and definition of which to use is defined in the appropriate part of ISO 15638 for that regulated application service

7.2 Conveyance identifiers

The *regulated vehicle (4.49) conveyance (4.21)* type shall be identified in accordance with ISO 26683-2 (Intelligent transport systems — Freight land conveyance content identification and communication — Part 2: Application interface profiles / ISO 14816 (– Automatic vehicle identification – Numbering and data structure)/ISO 17262 (Intelligent transport systems – Automatic vehicle and equipment identification – Numbering and data structures) / ISO 24534-3 Intelligent transport systems –AVEI Electronic registration identification –Part 3: Vehicle data.

7.3 Consignment data

Any *regulated vehicle (4.49) consignment (4.19)* data shall be identified in accordance with ISO 26683-2 (Intelligent transport systems — Freight land conveyance content identification and communication — Part 2: Application interface profiles /ISO 14816 (– Automatic vehicle identification – Numbering and data structure)/ISO 17262 (Intelligent transport systems – Automatic vehicle and equipment identification – Numbering and data structures) / ISO 24534-3 Intelligent transport systems –AVEI Electronic registration identification –Part 3: Vehicle data.

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

8.1 General

7.1.1 provided means by which two of the access commands specified in ISO 15638-5 can be used to provide all of the data required in order to support a *regulated application service (4.48).*

Where the *regulated application service (4.48)* requires only *basic vehicle data (4.16)*, so long as the *access methods (4.2)* defined in ISO 15638-5 are used consistently, no further international standardization is required, and *jurisdictions (4.38)* may develop, operate, and update their regulated, or supported voluntary services according to local design. International interoperability being maintained through the provisions of ISO 15638-5 (*TARV* Generic vehicle information).

However, a number of *regulated application services (4.48)* have been identified that require additional data in order to perform the *application service (4.6)* and where benefit has been identified for such additional data to be standardised. For detail of the reference to International Standards for these regulated application services see 10.

8.2 Concept of operations for identified regulated application services with additional data requirements

8.2.1 General

This Clause describes the characteristics of a proposed system from the viewpoint of a user *(4.58)* who will employ that system. Its objective is to communicate the quantitative and qualitative system characteristics to all stakeholders.

This Clause defines the general concept of operations for 'standardised' *regulated application services (4.48)* for *TARV*s that require data in addition to that available from the *basic vehicle data (4.16)*, and provides the generic modus operandi for the provision of the *application services (4.6)* defined in the subsequent Clauses of this part of ISO 15638 that relate to provisions for specific *regulated application services*.

A 'concept of operations' (*CONOPS*) generally evolves from a concept and is a description of how a set of capabilities may be employed to achieve desired objectives. In ISO 15638 the concept of operations concerns the standardisation of data concepts to be exchanged and the wireless means of the exchange of that data. To be clear, ISO 15638 does not specify the capabilities nor form of any product/system offering to the market, nor the form of the instantiation of the *application service (4.6)*. Those aspects are defined by the *jurisdiction (4.38)* and the *application service provider (4.7)*.

8.2.2 Statement of the goals and objectives of the system

The overall objective of *TARV regulated application services (4.48)* with additional data requirements – this part of ISO 15638 - is the control of *regulated vehicle*s to meet the requirements of the *jurisdiction (4.38)* within its domain, using *telematics (4.57)*, in circumstances where data is required in addition to that provided by the *basic vehicle data (4.16)* data concept and where the additional data and its methods of transfer can be standardised.

The TARV architecture is based on a triumvirate relationship between the *jurisdiction (4.38)*, *user (4.58)* and an *application service provider* (4.7). In TARV it is assumed that most of the service provision is provided as a result of a contract between the service provider and a user (to meet the requirements of the *jurisdiction*).

In order to minimise the load on the limited capacity of the vehicle IVS (which may be supporting several *application services (4.6)* simultaneously, and may be also simultaneously supporting or providing other *C-ITS (4.22)* services), and in line with much current 'cloud' service provision thinking, the principal *application service* provision takes place between the *application service provider (4.7)* and the user and/or *jurisdiction (4.38)*, landside, 'somewhere in the cloud'. The shape and form of the *application service* is determined by the *application service provider (4.7)* and where and how 'in the cloud' the service is performed, is outside of the scope of ISO 15638. What is important is that while data provisioning takes place on the *regulated vehicle (4.49)*, the actual *application service* is provided somewhere else. The function of the TARV specification to support a particular type of *application service* is to provide relevant data from the *regulated vehicle* to the *application service provider*, and in some circumstances for the *regulated vehicle* IVS to receive data from the *application service provider* or other *ITS-stations (4.34)*.

Thus TARV does not specify the *application service (4.6)* itself (enabling the differing requirements of different *jurisdictions (4.38)* to be met within the Standard, and for different commercial offerings to provide market differentiation), but specifies the key generic data concepts required to enable the service provision and their transfer via a wireless communication to the *application service provider (4.7)*, and the provision of key data to the IVS of the *regulated vehicle (4.49)* from the *application service provider* or another *ITS-station (4.34)*, such as that of a *jurisdiction* or manager of a restricted zone.

It is an underlying concept (described in ISO 15638-1) that these services are provided by agreement with the *user (4.58)*, and using an approved *service provider (4.53)* to meet the requirements of the *jurisdiction (4.38)* via *in-vehicle system (4.32)* (*IVS*) with communications capability between the *regulated vehicle (4.49)* and the *service provider*, and access to relevant data from the *regulated vehicle*.

It is an underlying assumption that the *regulated vehicle (4.49)* is equipped with the means to acquire and provide the data (additional to the '*basic vehicle data (4.16)*)', required by the specific *application service (4.6)*. The generic requirements for additional data for the specified service is defined in the relevant Clause below defining the particular *application service* (defined in ISO 15638-8 et sequentia), as is the functional source of the means of such data provision. However, the actual equipment to be installed in order to provide that data provision functionality is not standardised and is a commercial decision of the *application service provider (4.7),* unless it is specified by the *jurisdiction (4.38).*

That is to say that this part of ISO 15638 determines the nature of the data and how it is to be received/sent by the *IVS (4.32)*, but does not standardise the equipment used to obtain the data.

EXAMPLE Refrigerated trailer temperature. The Standard may define that the temperature was measured and transmitted to the *IVS (4.32)* either on demand or at prescribed intervals and reported to the *IVS* using a defined interface as degrees Celsius or Fahrenheit, and the degrees of precision of that temperature measurement. It would not specify the location nor type of thermometer, only the form and frequency in which the data is made available. However it is possible that a *jurisdiction (4.38)* may additionally specify that the equipment if of a particular type or operates within some parameters that it has specified, but such *specification (4.55)* is outwith this part of ISO 15638.

While this part of ISO 15638 determines the role of a 'approval authority' *(4.11)* function as part of the basic architecture, it is a basic tenet that the *jurisdiction (4.38)* has freedom to determine how its approval requirements are met, and, that function may be instantiated as an independent body, a department of the *jurisdiction*, or self approval if the *jurisdiction* deems this to be appropriate.

8.2.3 Strategies, tactics, policies, and constraints affecting the system

Strategies, tactics, policies and constraints, and indeed, the services that are regulated as mandatory or optionally supported, may vary from *jurisdiction (4.38)* to *jurisdiction.* Such definition is outwith the scope of this part of ISO 15638, which defines only the generic data and protocols to support a 'standard' *application service (4.6),* where such an *application service* is elected by a *jurisdiction* to meet their requirements.

A core strategy of this part of ISO 15638, and a central facet of its security, is to ensure that an *app (4.5)* is only loaded legitimately, and that this prior loaded *app* contains the destination address where the *basic vehicle data (4.16)* or *core data (4.23)* is to be sent. Instigating a '`GETTARVLDT`' or '`GETCoreData`' command therefore only results in that data being sent to the previously determined destination address, and not to a spoof enquirer.

8.2.4 Organisations, activities, and interactions among participants and stakeholders

The classes, attributes and key relationships are described in ISO 15638-1 and in Clause 6 of this part of ISO 15638.

8.2.5 Clear statement of responsibilities and authorities delegated

The responsibilities and authorities are described in ISO 15638-1, in 8.2.7, 8.2.8, and application specific aspects in x.2 of the specific *application service (4.6)* definition Clause of this part of ISO 15638.

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8.2.6 User

The '*user (4.58)*' is most usually the *operator (4.44)* of the *regulated vehicle (4.49),* but in some cases may be the *driver (4.25).* He shall enrol with the *jurisdiction (4.38)* to have his service provided automatically by wireless communications. He shall appoint an approved *service provider (4.53)* to provide the *regulated application service (4.48)* for the *regulated vehicle* (or *driver (4.25)* where appropriate).

It shall be the responsibility of the *operator (4.44)* of the *regulated vehicle (4.49)* to enrol, and to have his vehicle equipped to enable it to provide the service (regardless of whether the *user (4.58)* of the service is the *regulated vehicle (4.49) operator (4.44)* or the *driver (4.25)* of the *regulated vehicle (4.49)*). So long as he uses approved service providers, *IVS installers (4.35)* and *IVS maintainers (4.36)*, the *operator (4.44)* may then assume that the *application service (4.6)* shall be provided in accordance with the legislation/regulations.

The *user (4.58)* shall be responsible to pay any fees for the provision of the service agreed with the *service provider (4.53)* to the *service provider*. The means by which this is achieved is a subject for the commercial marketplace and is outside the scope of this part of ISO 15638.

8.2.7 Application service provider

In the case of the standardised *application services (4.6)* defined below (defined in ISO 15638-8 et sequentia), the *application service provider (4.7)* shall offer to *users (4.58)* to provide the specific *application service*, to the requirements of a *jurisdiction (4.38),* using the TARV standardised data concepts and data exchanges with the *regulated vehicle (4.49)* defined herein (one of defined in ISO 15638-8 et sequentia).

8.2.8 Application service

This shall be a service defined in one standardised *application services (4.6)* defined below (defined in ISO 15638-8 et sequentia) and provided by the *application service provider (4.7)* to the *jurisdiction (4.38)* to meet the requirements of the *jurisdiction.*

8.2.9 Operational processes for the system

The operational processes for the exchange of data over a wireless medium are described at a generic level in 8.3 (Sequence of operations for identified regulated *application services (4.6)* with additional data requirements), in Clause 9 (Common features of regulated TARV services), and at an *application service* specific level in the Clause (defined in ISO 15638-8 et sequentia below) defining the communication and data requirements at a generic level for the particular 'standard' *application service.*

8.2.10 Service requirements definition

A *jurisdiction (4.38)* passes legislation/regulation to require, or support, the provision of a particular *application service (4.6)* using wireless media. The legislation/regulation may require that an *application service* is provided in accordance with one of the standardised *regulated application services (4.48)* defined below (defined in ISO 15638-8 et sequentia). By so doing it significantly improves the probability that a *TARV* equipped vehicle will be able to support the *application service.* This is particularly important when *regulated vehicle*s from a different *jurisdiction* are operating within the territory of a *jurisdiction.*

8.3 Sequence of operations for identified regulated application services with additional data requirements

8.3.1 Framework for operations

The security requirements are such that a common and secure provision for security needs to be provided on all *cooperative ITS (4.22)* systems in order to both maintain security and offer interoperability, common use and reuse of data. These aspects are dealt with in ISO 15638-4 and all instantiations claiming compliance with this part of ISO 15638 shall also comply with ISO 15638-4 (*TARV* system security requirements).

ISO 15638-5 provides the *specifications (4.55)* for generic *basic vehicle data (4.16)* that it is required for all *TARV IVSs (4.32)* to support and make available to *application service providers (4.7)* via a wireless communications link supported by the *IVS (4.32)*, in order to support the provision of regulated and commercial *application services (4.6)*.

Some further data concepts, while not required in all cases for every *TARV* in every *jurisdiction (4.38),* may be required generically for all equipment within a particular *jurisdiction,* or class of *TARV* within a *jurisdiction,* in order for the *jurisdiction* to achieve its regulation of *TARV*s and provide the *regulated application services (4.48)* defined in ISO 15638-8 et sequentia.

The combination of `basic vehicle data (4.16)` and those additional data concepts required within a particular *jurisdiction (4.38)* (or class of *TARV*S*)* are known as `core application data (4.23)` for an *application service (4.6)* within a particular *jurisdiction.* `Basic vehicle data (4.16)` shall therefore be found in all equipped *TARV*s, while `core application data (4.23)` may be required in all equipped *TARV*s (or class of *TARV*S) within a particular *jurisdiction.*

Equipped vehicles operating internationally shall need to carry all of the additional data concepts required by all of the *jurisdictions (4.38)* within which they operate, in order to determine their `core application data (4.23)`. By providing standard definitions for these commonly expected additional data concepts, this will be easy to achieve and provide international interoperability.

The *ROAM (4.51)* (Regime for Open Application Management) *architecture (4.12)* defined in ISO 15638-1 (*TARV* -Framework and architecture) provides the *framework (4.30)* and operational environment for developing and deploying platforms for *TARV* applications within a general *framework (4.30)* of cooperative vehicle *telematics (4.57)* systems, and is designed not only to support *TARV* application systems (defined

herein), but also to support other commercial and safety cooperative systems for commercial vehicles beyond the scope of the *TARV regulated applications (4.47)* (See ISO 15638-7), and general C-ITS systems for all classes of vehicles. It is therefore designed to be compatible and interoperable with other C-ITS standards, and has used the successful results of research programmes and applications in these areas as is source of inspiration.

ROAM (4.51) provides an open execution environment in which *TARV* applications can be developed, delivered, implemented and maintained during the life cycle of both service applications and equipment. *Drivers (4.25)* and fleet *operators (4.44)* shall be able to rely on their integrated *in-vehicle system (4.32)* to allow *TARV*s to operate within the requirements of *jurisdictions (4.38)* within which they drive their vehicles, and gain advantages from direct co-operative management of transport safety and efficiency wherever they drive.

Within the *TARV* environment, *regulated applications (4.47)* are developed by *jurisdictions (4.38)* and deployed by *application service providers (4.7)* to '*Host management centres (4.31)*' (*HMC*). The *host management centre* provides a service gateway that supervises the secure provision of software and services *TARV*s. *HMC*s manage the provisioning of applications to any authorised and subscribed *user (4.58)* via its client system. After it is properly provisioned and installed on the client system it can enact the application. Mechanisms for flexible software deployment and management are provided by JAVA/*OSGi*™ *(4.45)* (open services gateway initiative). See ISO 15638-1, 6.1.3.

8.3.2 ROAM 'App' library and data pantry

A layer below these applications is the provision of data for the *data pantry (4.24)*. This data provisioning is not generated by a single application, but by a number of small task specific 'Facilities *Apps*'- which are generally small *Java*™ *(4.37)* applets (*apps (4.5)*), organised as software bundles, that generally busy themselves keeping the *data pantry (4.24)* provisioned with up to date data. This data provisioning is envisaged to be carried out by the 'Facilities *Apps*', each of which shall service the updating of individual data elements in the *basic vehicle data (4.16)* concept, and for the *core application data (4.23)* concept where a *jurisdiction (4.52)*/ application service *(4.6)* has specified or provided an *app* to do this. The process is defined in ISO 15638- 1 (*TARV* -Framework and *architecture (4.12)*).

A key feature of this 'layering' is the principal that a particular layer can only communicate with the adjacent layer immediately above or below it or to its side. The communication infrastructure is therefore hidden from the application by the middleware, and the 'apps' are separated from the resultant data.

It is crucial also that the *data pantry (4.24)* contains just end data. The *data pantry (4.24)* is accessible to an *app (4.5),* so long as it has authorisation, but the software *app (4.5)* that generated the data is not available to the *app (4.5)* during an online *session (4.54)*.

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This data is calculated by *apps (4.5)* placed by the *application service provider (4.7)* in the on-board data library, and stored as discrete data concept values in the on-board '*data pantry (4.24)*'. The frequency of such updates is determined by the *app*. ISO 15638-5 defines that additional *apps* in the library collate the data into data concepts containing collated data element values, stored as discrete files in the *data pantry (4.24)*. The processes are illustrated in Figure 2.

Figure 2 shows apps being uploaded into the *app library (4.8)*, and the execution environment running the *apps (4.5)* and updating the data concept values in the *data pantry (4.24)*. It shows the *LDT (4.40)* values being updated to the instructions of the appropriate *app*. It then shows a *jurisdiction (4.38) /application service (4.6)* uploading an *app* (which it does via the *application service provider (4.7)* or *prime service provider (4.46))* for its *core data (4.23)*, which then demands that the *core data* concept values be updated. This is done. The *jurisdiction* then requests the *core data* values which are supplied.

An example of an *app (4.5)* demanding the *TARV LDT (4.40)* is then shown, with the *app* in the execution environment stimulating a refresh of the *TARV LDT* values, updating the file in the *data pantry (4.24)* and then supplying them to the *application service provider (4.7)* via the wireless interface..

Finally the example of a safety *app (4.5)* requesting the *C-ITS (4.22)* (cooperative vehicle systems) *LDT* is shown, it is not relevant within this part of ISO 15638, other than to show how this can also be achieved with a similar mechanism.

The overall sequence of service provision for all of the specified standardised *application services (4.6)* defined in defined in ISO 15638-8 et sequentia is similar, and is conformant to the process defined in ISO 15638-1, Clause 12, *TARV-ROAM*.

All *application services (4.6)* defined in defined in ISO 15638-8 et sequentia of this part of ISO 15638 shall operate in the *CALM-ROAM* environment as specified in ISO 15638-1.

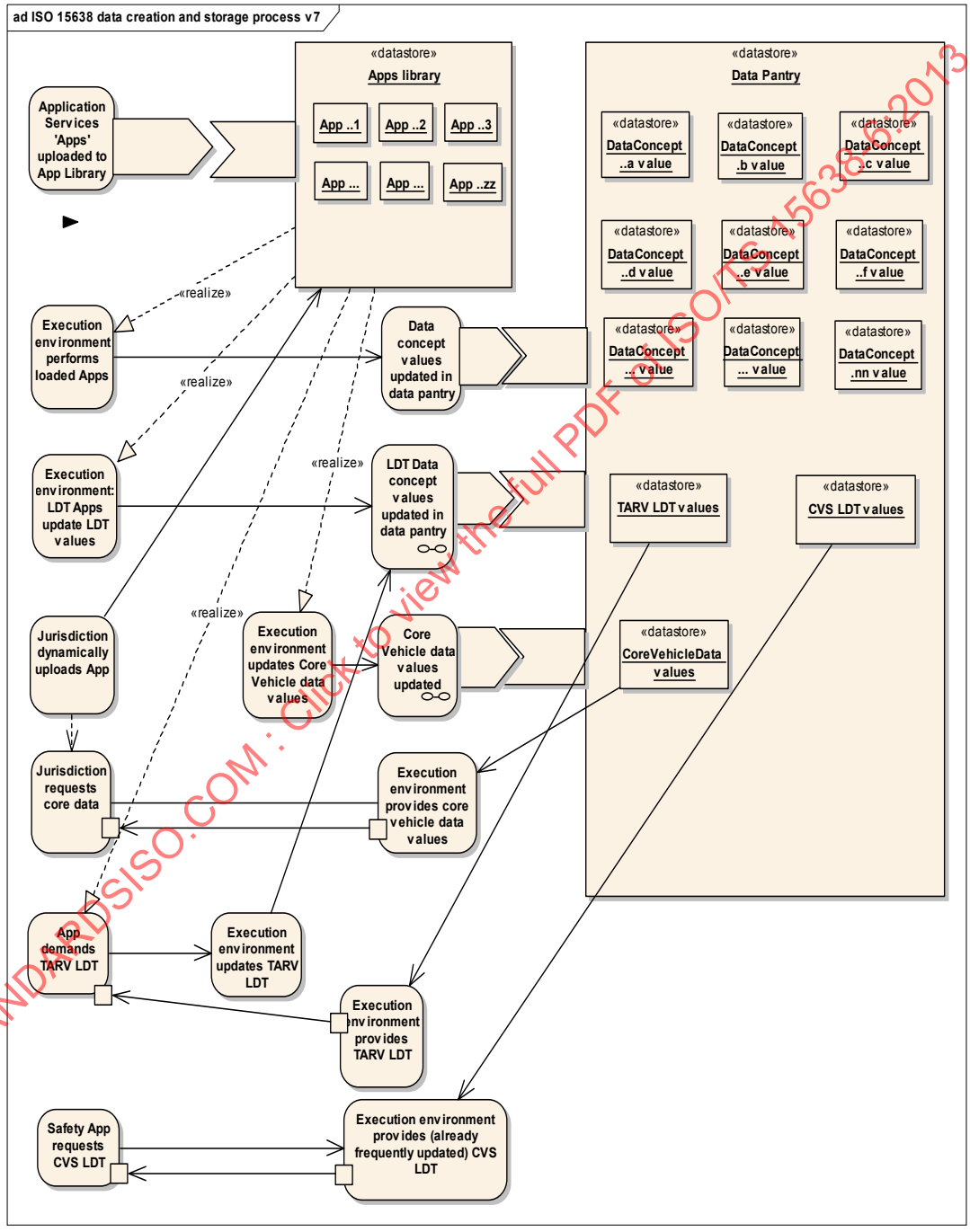

Figure 2 — The ISO 15638 data creation and storage process
(Source ISO 15638-5)

Figure 3 shows the generic environment in which standardised *application services (4.6)* are provided.

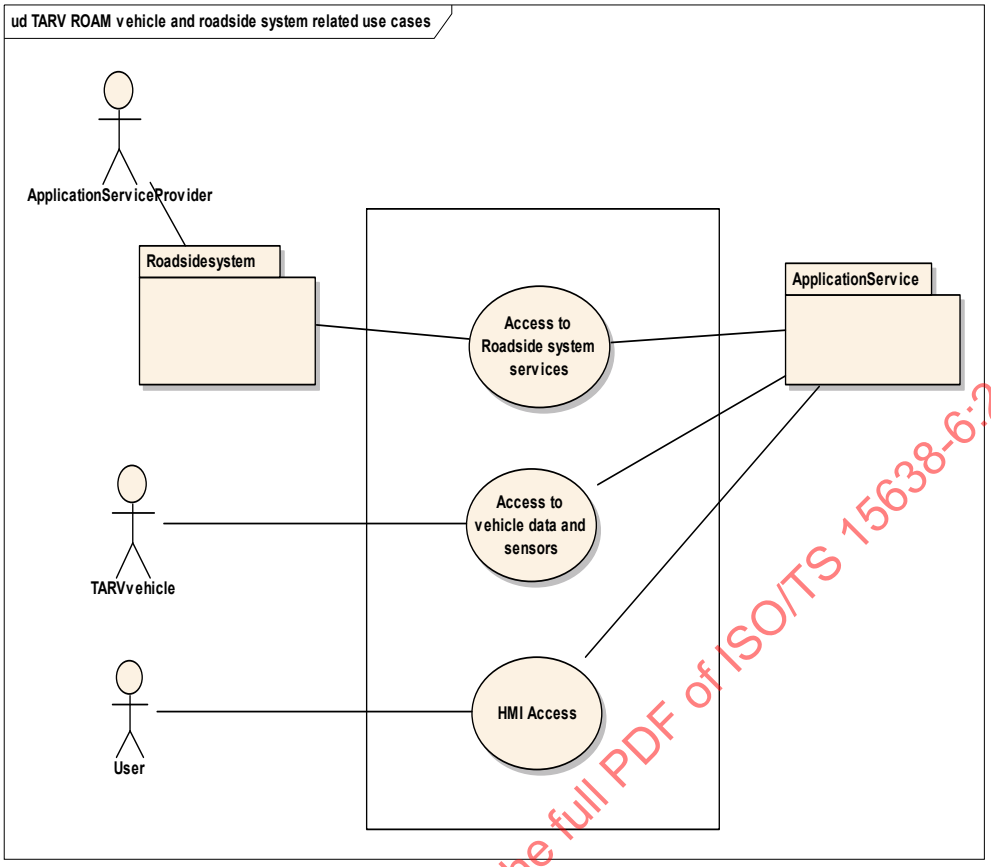

Figure 3— TARV - ROAM vehicle and roadside system related use cases
(Source: ISO 15638-1)

8.3.3 Concurrent multiple 'apps' and 'core data'

It is important to understand that, whereas *basic vehicle data (4.16)* (*TARV LDT (4.40)* always provides current values for the same data concept. *Core data (4.23)* is a transient data concept. It is created by an *app (4.5)* at a point in time, and its content is the content determined by that *app* (subject to the constraints of ISO 15638, various parts and this part of ISO 15638). Although separate commands, the '`CREATE core data`' and '`GET core data`' commands are used together in sequence. The first populates the transient *core data (4.23)* data concept with values, the second sends those values to a previously determined address.

In this manner, this single command services multiple applications that are concurrent in the 'apps' library in a way that simplifies the application system and *app (4.5)* and makes efficient use of the limited memory of the *IVS (4.32)*.(i.e. the single command and file can service multiple 'apps', even if running concurrently).

NOTE in the event that a *service provider (4.53)* issues a '`GETcoredata`' command without preceding it with a `CREATEcoredata` ' command, this would only result in the current values of the *core data (4.23)* data concept being sent to their legitimate predetermined IPv6 address, and not to the instigator of the '`GET core data` ' command.

8.3.4 General sequence of operations

The first step in all *regulated application service (4.48)* provision is that the *jurisdiction (4.38)* shall instruct an *application service provider (4.7)* to provide the *regulated application service (4.48)*. This may be the *application service provider* appointed by the *jurisdiction* (in some cases may even be a functional arm of the *jurisdiction*) or it may be an *application service provider (4.7)* contracted to the *user (4.58)* to meet the requirements of the *jurisdictions* within/through which the *user (4.58)* is operating the *regulated vehicle (4.49)*.

The '*regulated application service (4.48)*' is a software application system comprising two parts.

a) 'Landside' application software system

b) On-board *app (4.5)* to generate the *core data (4.23)* for the system

The landside application software system that provides the *regulated application service (4.48)* may, at the election of the *jurisdiction (4.38),* either be provided by the *jurisdiction* to *application service providers (4.7)*, or the *jurisdiction* may provide its requirements and allow the *application service provider* to develop the software; but shall use one of these two approaches.

The on-board *app (4.5)* may, at the election of the *jurisdiction (4.38),* either be provided by the *jurisdiction* to *application service providers (4.7)*, or the *jurisdiction* may provide its requirements and allow the *application service provider* to develop the software, but shall use one of these two approaches.

In the event that the *jurisdiction (4.38)* provides the *app (4.5),* it has two ways to provision the on-board data library with the *app.* It can provide the *app* to the *application service provider (4.7),* and it is then the responsibility of the *application service provider to* load it onto the *IVS (4.32)* of the *regulated vehicle (4.49)*, or, using *TARV-ROAM* it can dynamically request the *application service provider* to upload the app directly to the *regulated vehicle (4.49)* as it enters the *jurisdiction).*

In domestic situations, the *jurisdiction (4.38)* may prefer to have the *application service provider (4.7)* install the *app (4.5)* to the *regulated vehicle (4.49)*, however, where a vehicle is roaming through different *jurisdictions*, the *jurisdiction* will probably want to dynamically request the *application service provider* to upload the *app* to the *regulated vehicle (4.49)* as it enters the *jurisdiction* and act as the *application service provider,* or have an agent it appoints do so on its behalf, while the regulated vehicle *(4.49)* remains within its domain.

This is possible because of *TARV-ROAM* and is secure because the *application service (4.6)* only has access to the values in the *data pantry (4.24)* of the *IVS (4.32)* which it is authorised to access, and does not have access to other *apps (4.5)* or equipment or data in the *regulated vehicle (4.49)*.

Figure 4 shows the routes that the *application service (4.6)* software is provided to the *application service provider (4.7),* and the two routes that the *app (4.5)* can be provisioned in the *app* library of the *IVS (4.32)*. See ISO 15638-1 Clause 12 for further detail.

NOTE In Figure 4 the abbreviation *RAS* stands for '*regulated application service (4.48)*'.

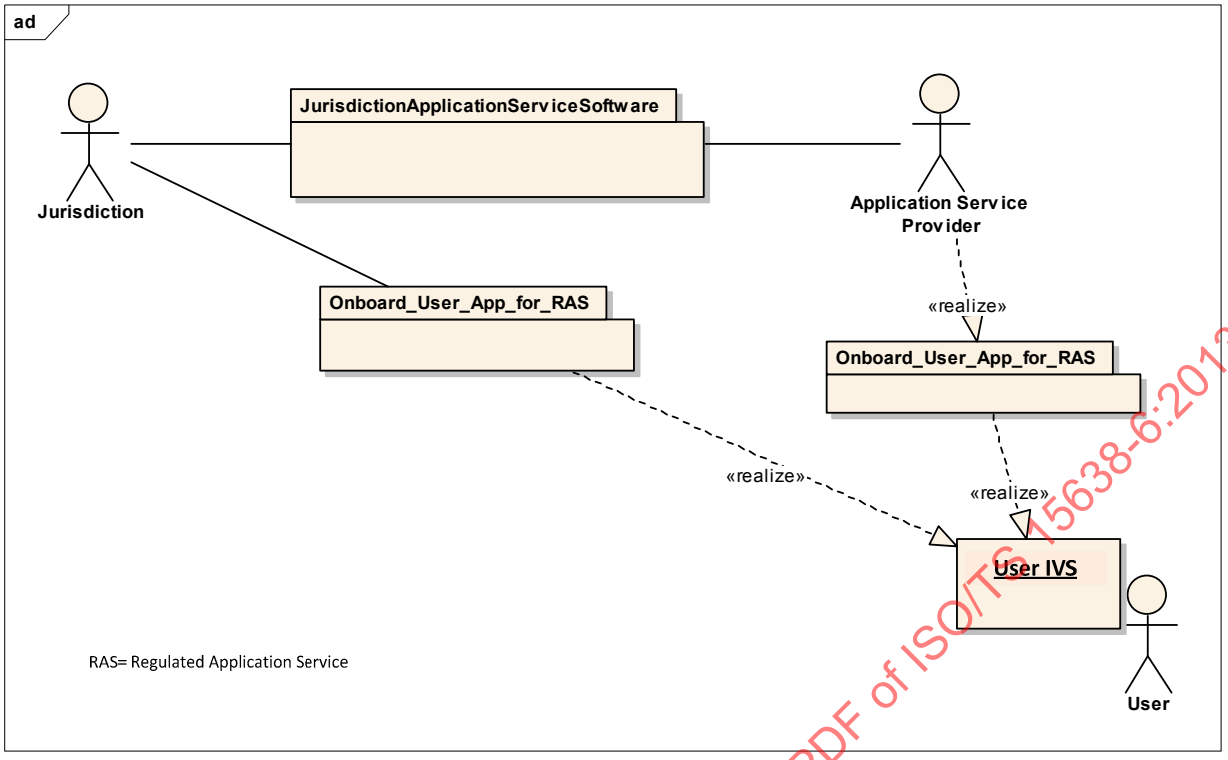

Figure 4 — Provisioning the 'App' into the IVS

The first stage shown in Figure 5 also represents this process as the first step in the sequence of operations.

8.3.4.1 Commands

Providing a regulated *TARV* service is envisaged as one or a series of short transactions, in which, in order to obtain *basic vehicle data* *(4.16)* or *core application data* *(4.23)* one or two (of four) commands is invoked.

- GET *TARV LDT* data
- CREATE core data
- GET core data
- GET xxx (where xxx is an option defined in 7.1)

— The objective is to invoke the shortest possible link with the vehicle to obtain the required data, and then close the communication. If data is required at several geographical points or several points in time, this comprises a series of short *sessions* *(4.54)* (and where required by the *regulated application* *(4.47)* further detail of generic data specification for identified *regulated application services* *(4.48)* is provided in ISO 15638-8 et sequential, which may, or may not, require *basic vehicle data* *(4.16)* or *core application data* *(4.23)* as part of that service provision).

Figure 5 shows the high level conceptual sequence of operations.

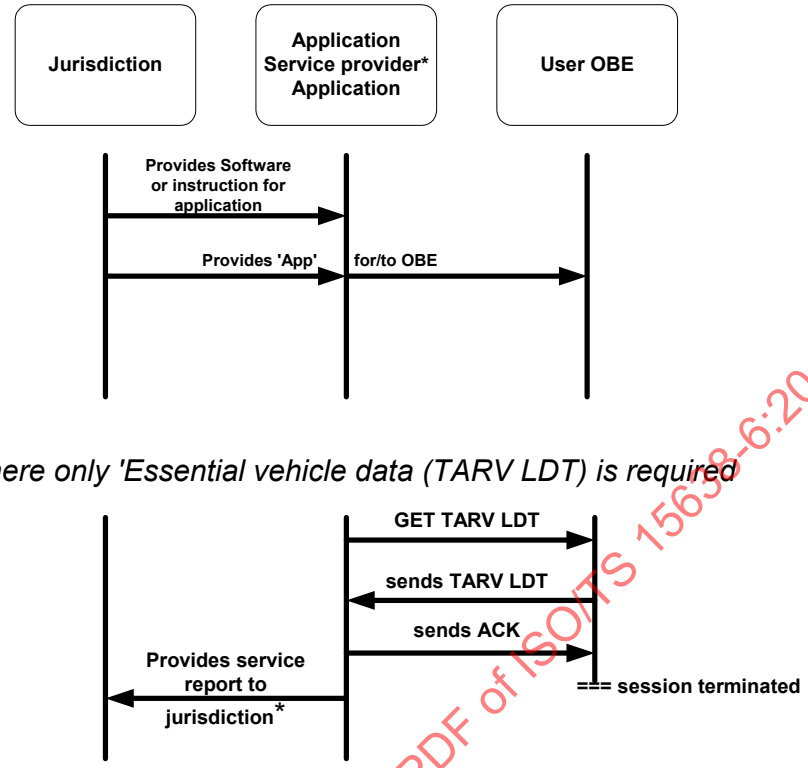

Figure 5 — Sequences to obtain *TARV LDT* and CoreData

— * In some instantiations the *application service provider* *(4.7)* will be the *jurisdiction* *(4.38)* or its agent.

Building the *application service* *(4.6)* results, and providing required information to *jurisdictions* *(4.38)*, is architecturally conceived as a process that is performed by the *application service* *(4.6)* software and hosted in the landside system of the *application service provider* *(4.7)*, and is not transacted while the communication with the *regulated vehicle* *(4.49)* is in progress, nor is the service directly provided by the *IVS* *(4.32)*, except for the transaction 'CREATE' to update the on-board *data pantry* *(4.24)*, or to 'GET' the data.

If further data is subsequently required, or the data obtained is in any way deficient, this is solved by a subsequent communication *session* *(4.54)* with the *regulated vehicle* *(4.49)*.

All further data processing of the application service is effected by the *application service provider* *(4.7)*, landside, using the application provider application service software, not on-board by the *IVS* *(4.32)* (and therefore outside the scope of ISO 15638).

This is designed to minimise the duty on the wireless interface (and with several wireless media charging models, also to minimise its cost), and to maximise on-board security.

The resulting communications sequence is therefore, in realisation, more staccato, as shown in Figures 6 and 7.

8.3.4.2 GET TARV LDT

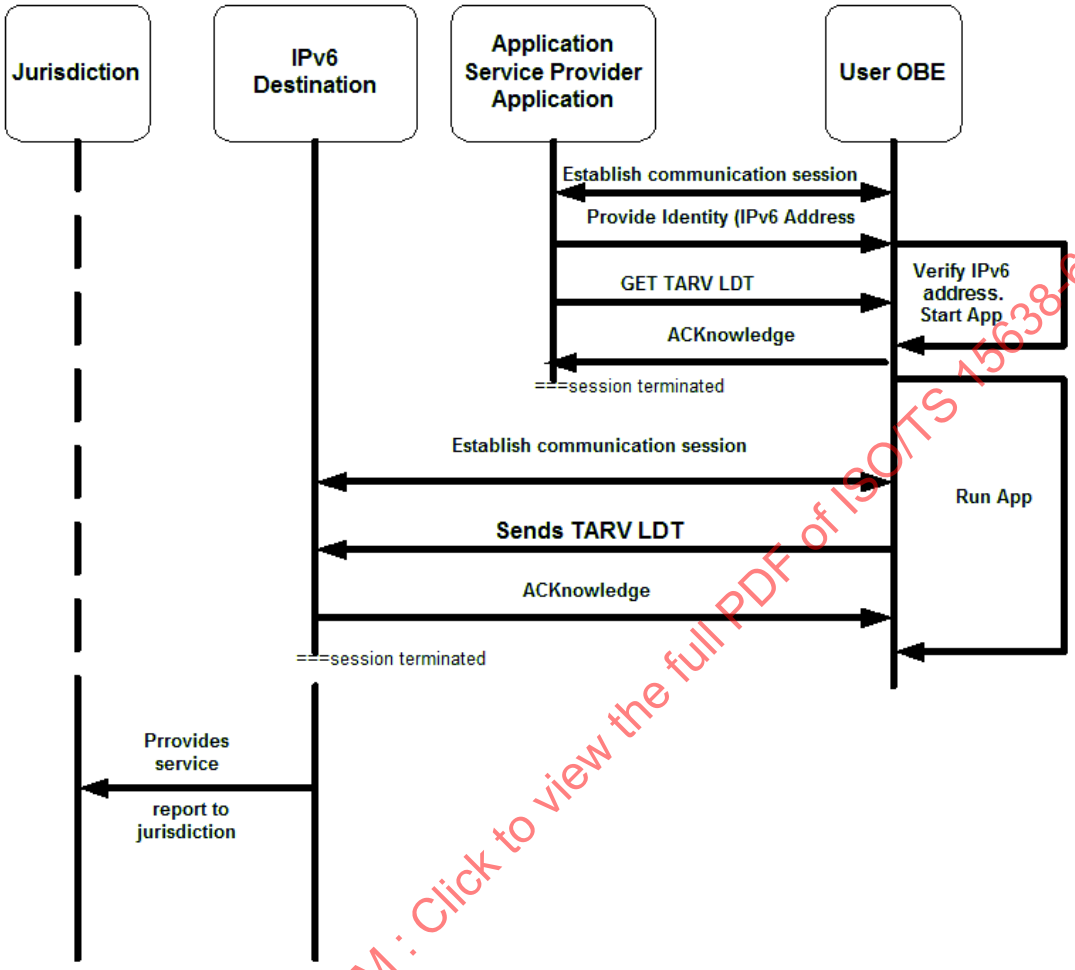

Figure 6 — Communications sequences to obtain TARV LDT

If only the *basic vehicle data (4.16)* is required, the application operating system shall simply establish the communication link in accordance with ISO 15638-2 (*TARV* -Common platform parameters using *CALM*), and shall issue the command 'GET *TARV LDT (4.40)* data' in accordance with ISO 15638-5 (*TARV – Basic vehicle data (4.16)*). The *IVS (4.32)* sends an acknowledgement (see 8.3.5) that the command has been received and the *session (4.54)* is closed. The *IVS* then sends the *TARV LDT* to the predertermined IPv6 address. The receiving IPv6 address sends an ACKnowledgement <LDX>. Once the *IVS (4.32)* receives the ACKnowledgement) <LDX> that *TARV LDT* is successfully received by the destination address, the *session (4.54)* shall be closed. (See Figure 6).

8.3.4.3 CREATE and GET CoreData

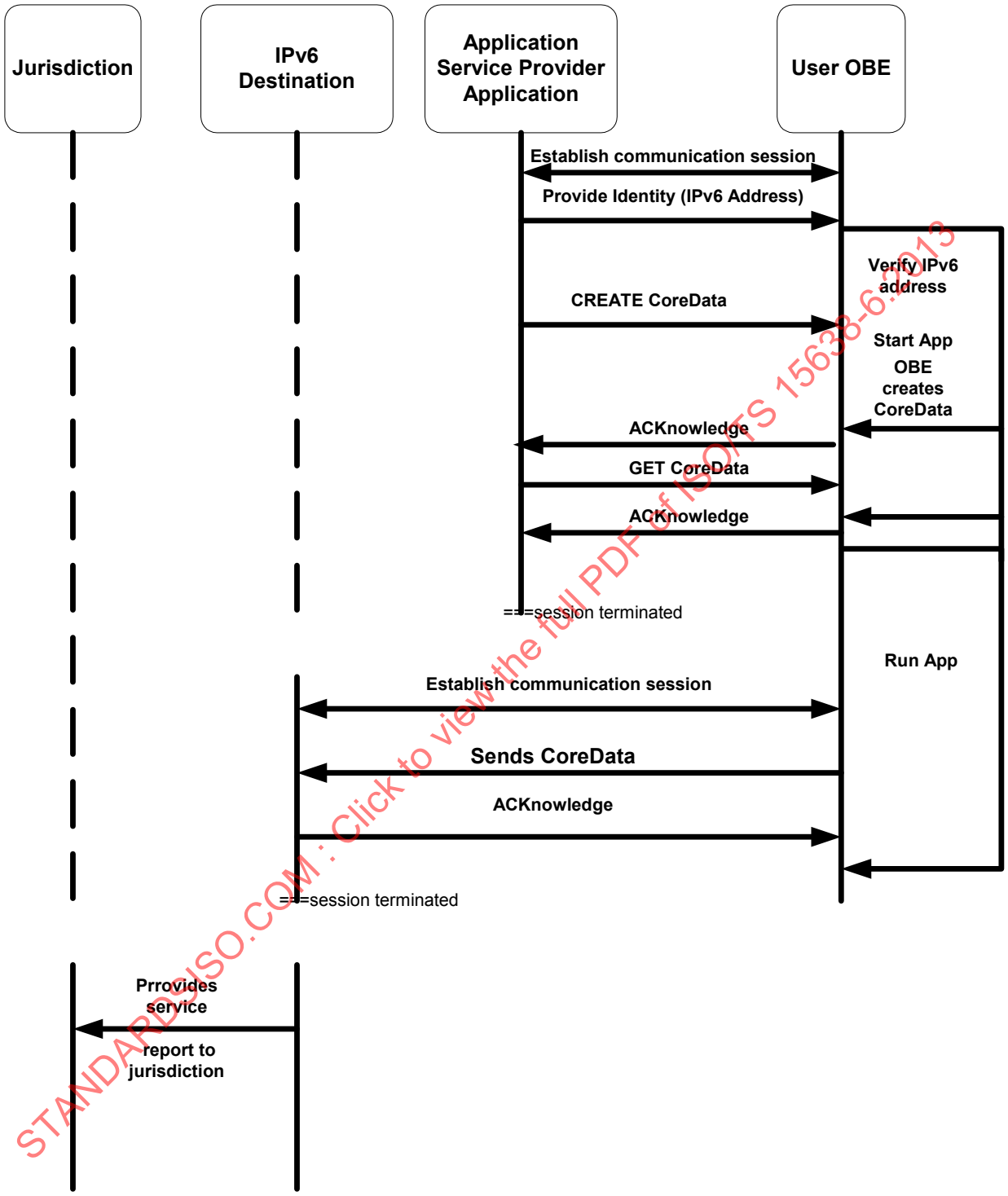

Figure 7 — Communications sequences to obtain CoreData

Most of the *application services* *(4.6)* defined in this part of ISO 15638 require data in addition to the *basic vehicle data* *(4.16)*, and therefore, before the data can be obtained, the *data pantry* *(4.24)* has to be updated. Figure 8 below shows a hypothetical example of CoreData.

NOTE: In the *TARV-ROAM architecture (4.12)* the application system has no direct access to the source of data, only data in the *data pantry (4.24)* that it is authorised to access.

In this event the application operating system shall establish the communication link in accordance with ISO 15638-2 (*TARV* -Common platform parameters using *CALM*), and shall issue the command '`CREATE core data` ', The *IVS (4.32)* then populates the `CoreData` data concept with data as instructed by the on-board *app (4.5)* associated with the *app*. The *IVS* sends an acknowledgement <D>(See 8.3.5) that the command has been received and the *session (4.54)* is closed.

The *IVS (4.32)* then sends the `CoreData` to the predetermined IPv6 address contained in the content of the `CoreData`. The receiving IPv6 address sends an ACKnowledgement <CDX>(See 8.3.5).

NOTE Core data (4.23) includes the TARV LDT (4.40) data.

Once the *IVS (4.32)* receives an acknowledgement (ACK) <CDX> that the '`CoreData`' has been successfully received by the enquirer, the *session (4.54)* shall be closed. (See Figure 7). An example of the construct of '*core data (4.23)* ' is provided in Figure 8.

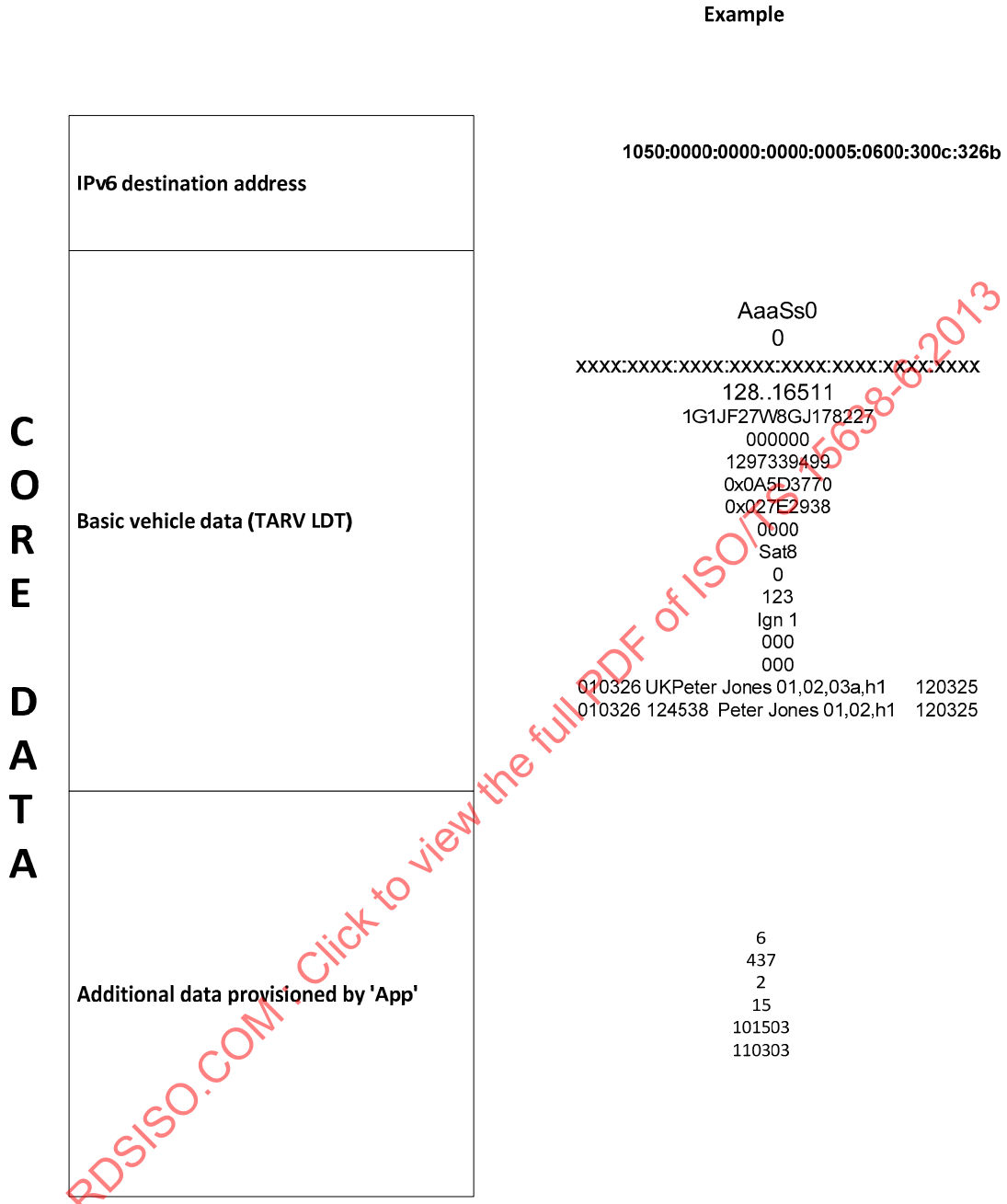

Figure 8 — Core application data

8.3.5 ACKnowledgements

ACKnowledgements (ACK) are made at the application level and are additional to any ACKs passed at the media communication level. ACKs are unique to enable the recipient to confirm that the correct action has been taken by the IVS.

There are two types of ACKnowledgement

a) Acknowledgement (by the IVS) that a request for data has been received. These shall be as defined in Table 1.

The acknowledgement is unique to the application service data being requested, confirming to the interrogator that its request for a specific set of data is acknowledged and that the correct action has been taken by the IVS.

b) Acknowledgement (from the receiving IPv6 address) that the data has been received. These shall be as defined in Table 2.

The acknowledgement is unique to the application service data being requested, confirming to the interrogator that its request for a specific set of data is acknowledged and that the correct action has been taken by the IVS.

Table 2: Acknowledgement by the IVS (to Interrogator) that a request for information has been received

ISO 15638	Local data tree (LDT)	L
ISO 15638	Core Application Data/CoreData (CD)	D
ISO 15638-8	Vehicle access management and monitoring	A
ISO 15638-9	Remote electronic tachograph monitoring	T
ISO 15638-10	Emergency messaging system/eCall	E
ISO 15638-11	Driver work records	W
ISO 15638-12	Vehicle mass monitoring	M
ISO 15638-13	'Mass' data for regulatory control and management	R
ISO 15638-14	Vehicle access control	L or D
ISO 15638-15	Vehicle location monitoring	X
ISO 15638-16	Vehicle speed monitoring	S
ISO 15638-17	Consignment and location monitoring	C
ISO 15638-18	ADR (Dangerous Goods) monitoring	Y
ISO 15638-19	Vehicle parking facilities	P

Table 3: Acknowledgement by the receiving IPv6 destination that a datafile has been received

ISO 15638	Local data tree (LDT)	LDX
ISO 15638	Core Application Data/CoreData (CD)	CDX
ISO 15638-8	Vehicle access management and monitoring	VAX
ISO 15638-9	Remote electronic tachograph monitoring	RTX
ISO 15638-10	Emergency messaging system/eCall	EMX
ISO 15638-11	Driver work records	DWX
ISO 15638-12	Vehicle mass monitoring NOTE: there are multiple ACKs used as defined in ISO 15638-12)	VMX MAX MBX MXX
ISO 15638-13	'Mass' data for regulatory control and management	MRX
ISO 15638-14	Vehicle access control	VCX
ISO 15638-15	Vehicle location monitoring	VLX LXX
ISO 15638-16	Vehicle speed monitoring	VSX VDX

		SMX
ISO 15638-17	Consignment and location monitoring	CLX CXX
ISO 15638-18	ADR (Dangerous Goods) monitoring	ADX
ISO 15638-19	Vehicle parking facilities	VPX

NOTE: These ACK codes mirror the 'GET' codes defined in 7.1.

If a new application service is defined in a new part of ISO 15638, not covered in the above tables in this subClause, That new part of ISO 15638 shall specify a unique one letter ACK for acknowledgement by the IVS (to Interrogator) that a request for information has been received, and shall specify a unique three letter ACK for acknowledgement by the receiving IPv6 destination that a datafile has been received.

8.3.6 Application specific sequences of operations

A sequence of operations is provided for each of the *regulated application service (4.48) specifications (4.55)* in Parts of ISO 15638 referenced in clause10.

8.4 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 (4.38)* as part of its *specification (4.55)* for any particular *regulated application service (4.48).* However, where a specified *regulated application service (4.48)* has specific Q of S requirements essential to maintain interoperability, these aspects shall be defined in the specific Part of ISO 15638 (ISO 15638-8 et sequentia) relating to that *regulated application service.*

8.5 Test requirements

This part of ISO 15638 contains no general requirements concerning test requirements. Such aspects shall be determined by a *jurisdiction (4.38)* as part of its regulation for any particular *regulated application service (4.48),* and issued as a formal test requirements *specification (4.55)* document. However, where a specified *regulated application service (4.48)* has specific test requirements essential to maintain interoperability, these aspects shall be specified in the specific Part of ISO 15638 (ISO 15638-8 et sequentia) relating to that *regulated application service.,* or in a separate standards document referenced within that Clause. And where multiple *jurisdictions* recognise a benefit to common test procedures for a specific *regulated application service,* this shall be the subject of a separate standards document.

8.6 Marking, labelling and packaging

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

However, where the privacy of an individual may be potentially or actually compromised by any instantiation based on the ISO 15638 family of Standards, the contracting parties shall make such risk explicitly known to the implementing *jurisdiction (4.38)* 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

9.2 Generic operational processes for the system

The details of the instantiation of *regulated application service (4.48)* are as designed by the application service system to meet the requirements of a particular *jurisdiction (4.38)* and are not defined herein. This part of ISO 15638 specifies the generic roles and responsibilities of actors in the systems, and the interoperability of key operational steps and actions required to support all *TARV regulated application service* systems, and this Clause addresses the generic provision of *regulated application services* that require data in addition to, or instead of, *basic vehicle data (4.16)* and *core application data (4.23)* , and specifies the generic form and content of such data required to support such systems, and *access methods (4.2)* to that data. Clause 10 references relevant Parts of ISO 15638 where particular data and data exchange requirements for specific identified regulated service provision are further defined..

It shall not be possible for collected or stored *regulated application service (4.48)* data in any software or non volatile memory within the application service system to be accessible or capable of being manipulated by any person, device or system (including via any self-declaration device), other than that authorised by the *application service provider (4.7).*

The means by which data is provisioned into the *data pantry (4.24)*, and the means to obtain the *TARV LDT (4.40)* and *core data (4.23)* are described in Clause 8 above.

Specific *regulated application services (4.48)* (referenced Parts of ISO 15638 defined in Clause 10), shall collect and transfer application specific data. Sometimes this shall be or shall include the *TARV LDT (4.40)* or *core data (4.23)*, in many cases additional application specific data will be required. This data is defined in the specific *regulated application services* (referenced Parts of ISO 15638 defined in Clause 10).

Different *application services (4.6)* may require connection to different application specific equipment – for example a *tachograph (4.56)*, or some form of driving licence reading equipment. However there are common basic processes behind *TARV regulated application services (4.48)*.

In order to minimise demand on the *IVS (4.32)* (which it is assumed will be performing multiple *application services (4.6)* 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 (4.48)*.

The *TARV* approach is for the on-board *app (4.5)* 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 (4.7)(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').

At a conceptual level, The *TARV* system is therefore essentially simple, as shown in Figure 9. The process is similar to that for CoreData, but data is supplied to a different on-board file in the *data pantry (4.24)*.

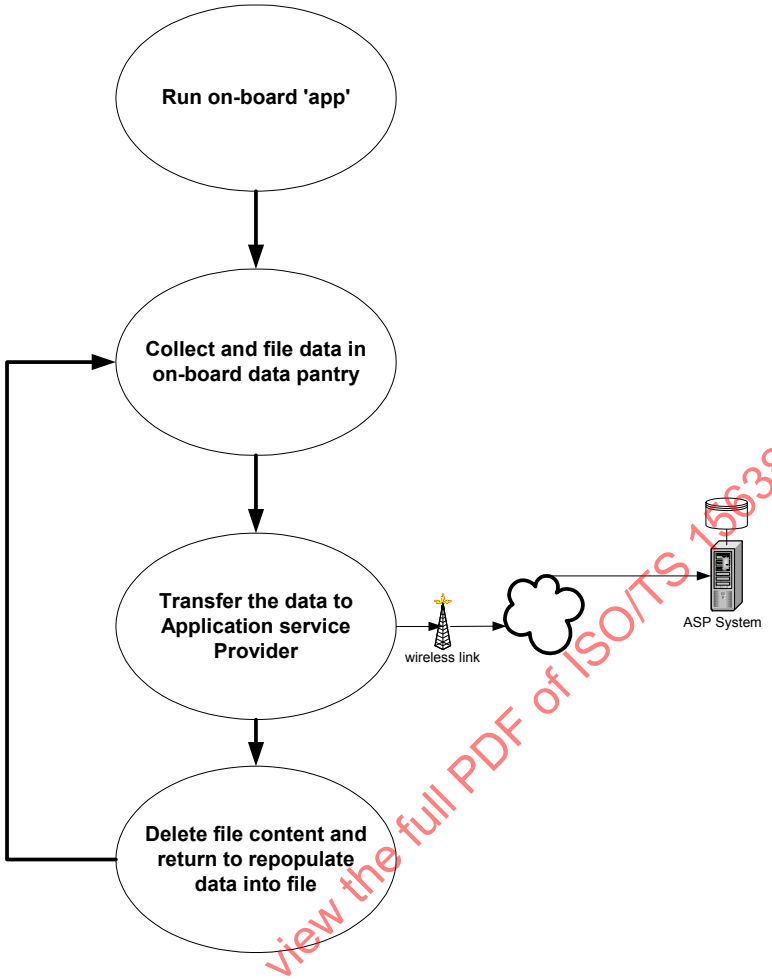

Figure 9 — TARV Regulated application service on-board procedure

At a common generic functional level, the process may be seen as shown in Figure 10 below, however the connected equipment may/may not be required in all cases.

9.3 Common role of the jurisdiction

9.3.1 General

In this environment of specified *regulated application services (4.48)*, the *jurisdiction (4.38)* provides the role of developing the laws and enforcement as determined by the *jurisdiction.*

9.3.2 Common role of the 'agent of the jurisdiction'

An agent of the *jurisdiction (4.38)* is a party appointed by the *jurisdiction* to be responsible for providing one of the aspects under the responsibility of the jurisdiction

9.3.3 Common role of the 'approval authority'

This part of ISO 15638 has been developed on the premise that there will be multiple *application service providers (4.7)* providing *TARV regulated application services (4.48)*. As the *specification (4.55)* is performance-based, except in the case where service provision is made using software provided by the *jurisdiction (4.38),* it is also expected that each *application service provider* will have a unique solution and offering. It is expected that *application service providers (4.7)* will update their offerings from time to time.

The *jurisdiction (4.38)* has to be satisfied that each instance of a specified *regulated application service (4.48)* meets its requirements, provides the data required by this and any other relevant part of ISO 15638, and provides reports to the *specifications (4.55)* that it issues. This is undertaken by a function known within *TARV* as the '*approval authority (regulatory) (4.11)*'. This body may be an independent body appointed by the *jurisdiction,* or may be a department of the *jurisdiction,* depending on the regime imposed by the *jurisdiction.* See ISO 15638-1 (*TARV* framework and architecture) or may be some other instantiation determined by the *jurisdiction* to provide the functionality described herein as the '*approval authority (regulatory)'*. It may even be that the *jurisdiction* elects to derogate the approval process to the service provider in a self-approval environment.

Each new *regulated application service (4.48)* 'product' developed and intended for use by an *application service provider (4.7),* and each 'variation' to an existing approved specified *regulated application service* shall be approved by the *approval authority (regulatory) (4.11)* prior to it being recognised and approved as a specified *regulated application service* system in accordance with the regime of the *jurisdiction (4.38)*.

The responsibility of the *approval authority (regulatory) (4.11)* shall be to technically assess whether the specified *regulated application service (4.48)* systems offered by an *application service provider (4.7)* meets the performance-based *specification (4.55)* (i.e. are initially approved) and continue to meet their purpose after upgrades and changes are made (i.e. ongoing approval) and provide this advice to the *jurisdiction (4.38).* The *approval authority (regulatory)* shall be required to make such assessment consistently across approvals and assist applicants where information or interpretation is required.

The *approval authority (regulatory) (4.11)* may also be engaged by the *jurisdiction (4.38)* to audit the *application service provider's (4.7)* specified *regulated application service (4.48)* systems for operation and provide assurance that the specified *regulated application service* system continues to operate as it was initially approved.

The means by which this *approval authority (regulatory) (4.11)* function is instantiated, its formality, and powers, shall be entirely at the discretion of the *jurisdiction (4.38)*, and some or all functions may, at the discretion of the *jurisdiction,* be derogated to be self-approval processes.

9.4 Common role of the prime service provider

To facilitate the correct installation and monitoring of *TARV IVS (4.32)*, a *prime service provider (4.46)* has been contracted by the *user (4.58)*. See ISO 15638-1 (*TARV* Framework and *architecture (4.12)*). The *prime service provider (4.46)* is the technical expert of their system and shall be responsible for its installation, maintenance and as necessary upgrade, but unless also appointed as an *application service provider (4.7)* for a particular service, is not responsible for the operation of *application service (4.6)* software.

The *prime service provider (4.46)* shall be responsible to ensure that the multiple applications operate properly, and do not adversely impact each other.

It is envisaged that the *IVS (4.32)* operating systems may require updating from time to time to improve functionality, fix software 'bugs' or update the protection from electronic threats such as software viruses and it shall be the responsibility of the *prime service provider (4.46)* to undertake such tasks, possibly in collaboration with *application service providers (4.7).*

The role of the *prime service provider (4.46)* shall be to ensure that the *IVS (4.32)* performs during day to day operation in the same manner as it did when it was approved. The *prime service provider (4.46)* shall put in place a regime to the satisfaction of the *approval authority (regulatory) (4.11)* which shall periodically monitor the *IVS (4.32)* via a number of means including receiving test application service data files generated by the on-board *app (4.5)* for that *application service (4.6).* The *prime service provider (4.46)* shall be responsible to determine the *IVS (4.32)* operational state, perform any necessary enhancements and efficiently deal with malfunctions when they occur.

The *prime service provider (4.46)* shall report any malfunctions to the *driver (4.25)* and *application service provider (4.7)* as appropriate, and as technically possible (for example it may not be possible, during a working *session (4.54)*, to advise the *driver (4.25)* if the *IVS (4.32)* has failed entirely, and such advice would have to be by post event 'offline' means).

The *prime service provider* *(4.46)* shall work closely with the *application service provider* *(4.7)* and vehicle *operator* *(4.44)* to permit and enable the prompt repair and rectification of any malfunction with a *TARV IVS* *(4.32)*.

9.5 Common role of the application service provider

The *application service provider* *(4.7)* is the actor who is responsible for providing and operating the approved *vehicle location monitoring* *(4.61)* system.

The *application service provider* *(4.7)* provides the *application service* *(4.6),* as approved by a *approval authority (regulatory)* *(4.11)* to the parties specified in the regime of the *jurisdiction* *(4.38)* (normally the *operator* *(4.44)*, *jurisdiction* and *driver* *(4.25)*) undertaken under the terms of a contract with the *user* *(4.58)*. The *application service provider* is responsible for receiving, processing and storing the data generated from their clients *IVS* *(4.32)*.

Either the *prime service provider* *(4.46)* or *application service provider* *(4.7)* shall be responsible for providing the *driver* *(4.25)* with an identification and *authentication* *(4.15)* method that works with their *IVS* *(4.32)* in accordance with the agreement between the *prime service provider,* and *application service provider* *(4.7)* in respect of these issues.

The *application service provider* *(4.7)* shall be responsible to ensure that the *regulated application service* *(4.48)* system is correctly installed and performs during day to day operation in the same manner as it did when it was approved. The *application service provider* shall monitor the operation of the *regulated application service* *(4.48)* system and shall report malfunctions to the *driver* *(4.25),* the *prime service provider* *(4.46)*, and if required, to the *jurisdiction* *(4.38).* The *application service provider* shall maintain operational knowledge of the system to determine its operational state, perform any necessary enhancements and deal efficiently with malfunctions if they occur.

Where physical maintenance of the *IVS* *(4.32)* is required, the *application service provider* *(4.7)* shall notify the *prime service provider* *(4.46)* and they shall jointly rectify the problem according to their defined and agreed responsibilities.

It is envisaged that the *regulated application service* *(4.48)* systems may require updating from time to time to improve functionality, update *maps* *(4.41)*, fix software 'bugs' or update the protection for the *regulated application service* systems from electronic threats such as software viruses and it shall be the responsibility of the *application service provider* *(4.7)* to undertake such tasks, possibly in collaboration with the *prime service provider* *(4.46)*.

9.6 Common role of the user

In the case of the most *regulated application services* *(4.48)* the *user* *(4.58)* may be the fleet *operator* *(4.44)* or the *driver* *(4.25),* or both, depending on the specific application service as defined by the regime imposed by the *jurisdiction* *(4.38).* Within this part of ISO 15638 '*operator* *(4.44)*' and '*driver*' are therefore considered as sub-classes of the class '*user* *(4.58)*'.

9.6.1 Role of the driver

The *driver* *(4.25)* shall be responsible, where required by the system, for using the identification and *authentication* *(4.15)* method supplied by the *prime service provider* *(4.46)* / *application service provider* *(4.7)*. The declaration of his/her personnel details such as name, *driver's* *(4.25)* licence number and issuing *jurisdiction* *(4.38)* shall be automatically declared by the method of identification and *authentication* *(4.15)*. However the technical means of provision (electronic driving licence identification device, keyboard, iris recognition, barcode, RFID, DRD, etc.) of this information, shall be a function of system/equipment design (or a requirement of the *jurisdiction)* and is not standardised within this part of ISO 15638

The *driver* *(4.25)* shall be responsible for reporting any system malfunction alerts, or apparent system failures to the *operator* *(4.44)* and/or *application service provider* *(4.7)* as per the instructions provided to them at the