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

Part 25: Overhead clearance monitoring

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

Partie 25: Contrôle du dégagement aérien

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Foreword

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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 document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Regions around the world share a common global target of achieving a safe and sustainable society. However, the number of bridge strike incidents caused by freight vehicles is increasing worldwide. Within this context, monitoring information provisioning to vehicles carrying freights which are higher than a bridge girder bottom is recommended. This can be made possible by building on the framework of ISO 15638-21 (TARV; telematics applications for regulated vehicles). This document defines an unregulated TARV service application framework for overhead clearance monitoring information provisioning.

The principle of overhead clearance monitoring information provisioning is that the service provider provides advance vehicle height clearance information when it is anticipated that clearance between an oncoming bridge girder bottom height and the vehicle's highest point is insufficient. Jurisdictions or road operators can also monitor vehicle height through roadside sensors mounted on the bridge girder low point, and can provide infrastructure information to:

— service providers (provided as in-advance road facility information);

— users (real-time basis through variable message sign; for vehicles with non-on-board units);

— roadside units (for vehicles with on-board units).

When the user provides vehicle height data to a service provider in advance, they receive better information from that service provider.

This document standardizes the conceptual operational framework of safety information provision provided by service providers. The ISO 15638 series is based on a group of vehicle operators with in-vehicle systems, on-board application service providers and jurisdictions. ISO 15638-1 focuses on the transactions between these parties via ITS-stations and roadside sensors. Using this system architecture, additional safety information provision services to freight vehicles can be realized. A new means of safe road transport management and enforcement can be enabled by using this document where a jurisdiction requires such regulated monitoring.

This document is intended to be used for unregulated services, but it can also be used for the deployment of regulated services, if necessary.

This document is intended for public road transport, but it can also be applied to private roads/property, if necessary.

NOTE This document is consistent with the provisions of EC regulation 165/2014.[11]

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

Part 25:
Overhead clearance monitoring

1 Scope

This document specifies a freight vehicle safety information provisioning service application or function. It is intended for use within non-enforcement applications and potentially for regulated application services (RAS), for the road transport safety management purposes of regulated commercial freight vehicle movements.

This document reinforces vehicle safety for non-enforcement purposes and other purposes by providing safety advisory information concerning overhead clearance provisions to freight vehicle drivers or operators transporting heavy goods on freight vehicles.

This document specifies the framework for remote vehicle safety information provision for non-enforcement and for the conceptual operation of other management purpose applications.

This document is intended to be beneficial to entities whose purpose is vehicle safety management. It provides additional use cases for TARV (telematics applications for regulated vehicles) service applications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/TS 15638-4, *Intelligent transport systems — Framework for cooperative telematics applications for regulated commercial freight vehicles (TARV) — Part 4: System security requirements*

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

ISO 15638-7:2013, *Intelligent transport systems — Framework for collaborative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 7: Other applications*

ISO/TS 14812, *Intelligent transport systems — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 14812 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Symbols and abbreviated terms

ASD	application service data
ASP	application service provider
CALM	communications access for land mobiles
C-ITS	cooperative intelligent transport system
CONOPS	concept of operations
GNSS	global navigation satellite system
HMC	host management centre
ID	identity
ITS-S	ITS station
IVS	in-vehicle system
LDM	local dynamic map
LDT	local data tree
QoS	quality of service
RAS	regulated application service
ROAM	regime for open application management
TARV	telematics applications for regulated vehicles
VIN	vehicle identification number

5 Conformance

Requirements necessary for demonstrating conformance to any of the general provisions or specific application services described in this document shall be defined by the service provider.

6 General overview and framework

This document utilizes the framework and architecture for freight vehicle stability monitoring defined in ISO 15638-21. The general conceptual operation description of the roles of the actors in "extended" TARV architecture is defined in ISO 15638-21.

Figure 1 provides a summary of the "extended" role model conceptual architecture, showing the key actors and their relationships as defined in ISO 15638-21.

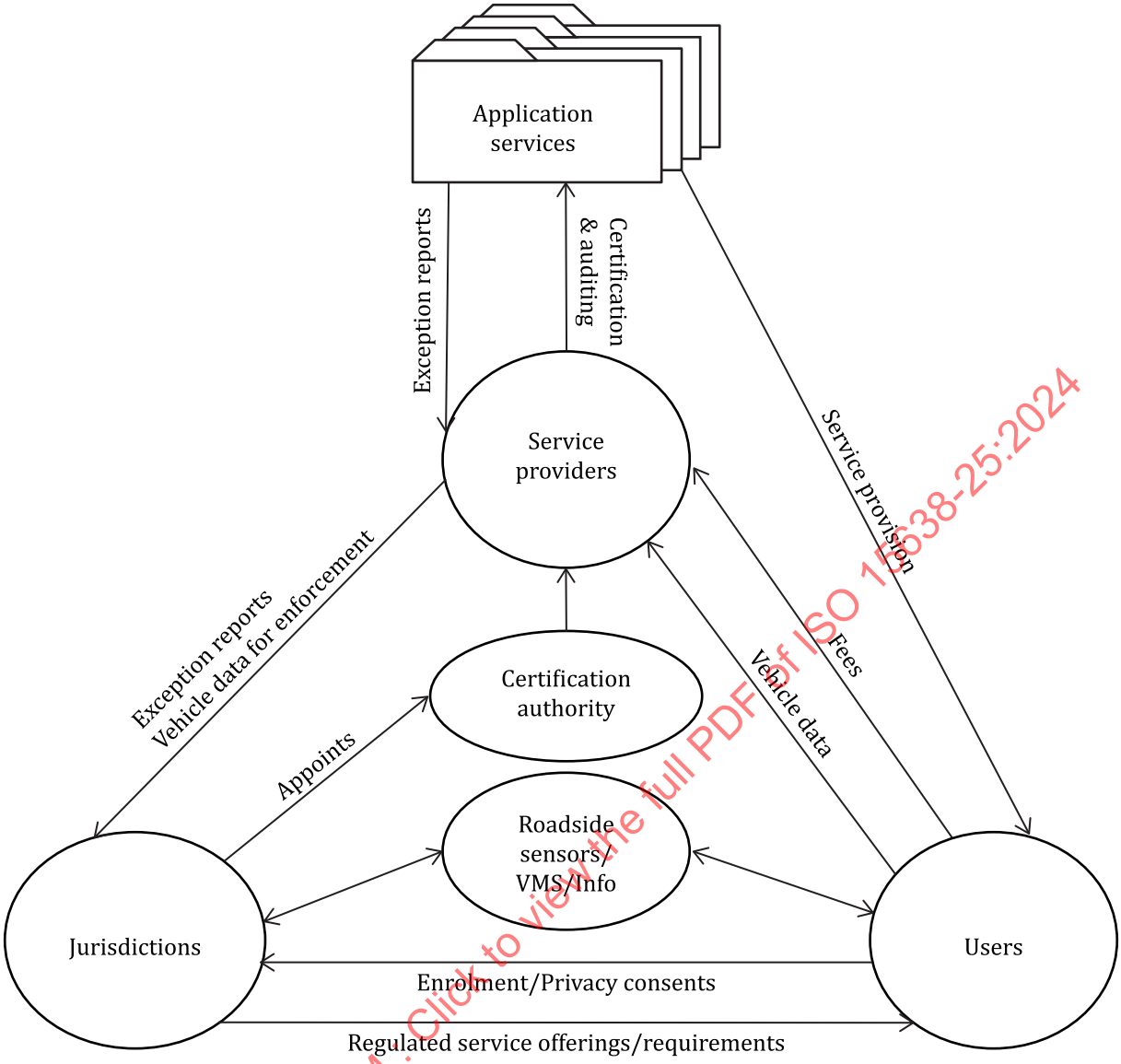

Figure 1 — Extended role model conceptual architecture

The ISO 15638 series addresses and defines the framework for a range of cooperative telematics applications for regulated vehicles (such as electronic tachograph monitoring, driver work records, emergency messaging/eCall, mass monitoring, "mass" information for jurisdictional control and enforcement, speed monitoring, access control, access methods, location monitoring, weigh in motion, freight vehicle stability monitoring, tyre monitoring, overhead clearance, etc.). The overall scope includes the concept of operation, legal and regulatory issues, and the generic cooperative ITS service platform. The framework is based on a (multiple) service provider-oriented approach, including provisions for the certification and auditing of service providers.

This document is intended for an unregulated service provision application for safe road transport by freight vehicles, achieved through the safety information provision of overhead clearance to the vehicle, such as safe driving information provision (including information such as insufficient overhead clearance and recommended detour advice information). Figure 2 shows the architecture from the viewpoint of the provision of an unregulated (commercial) application service, using the common "extended" TARV platform defined in ISO 15638-21.

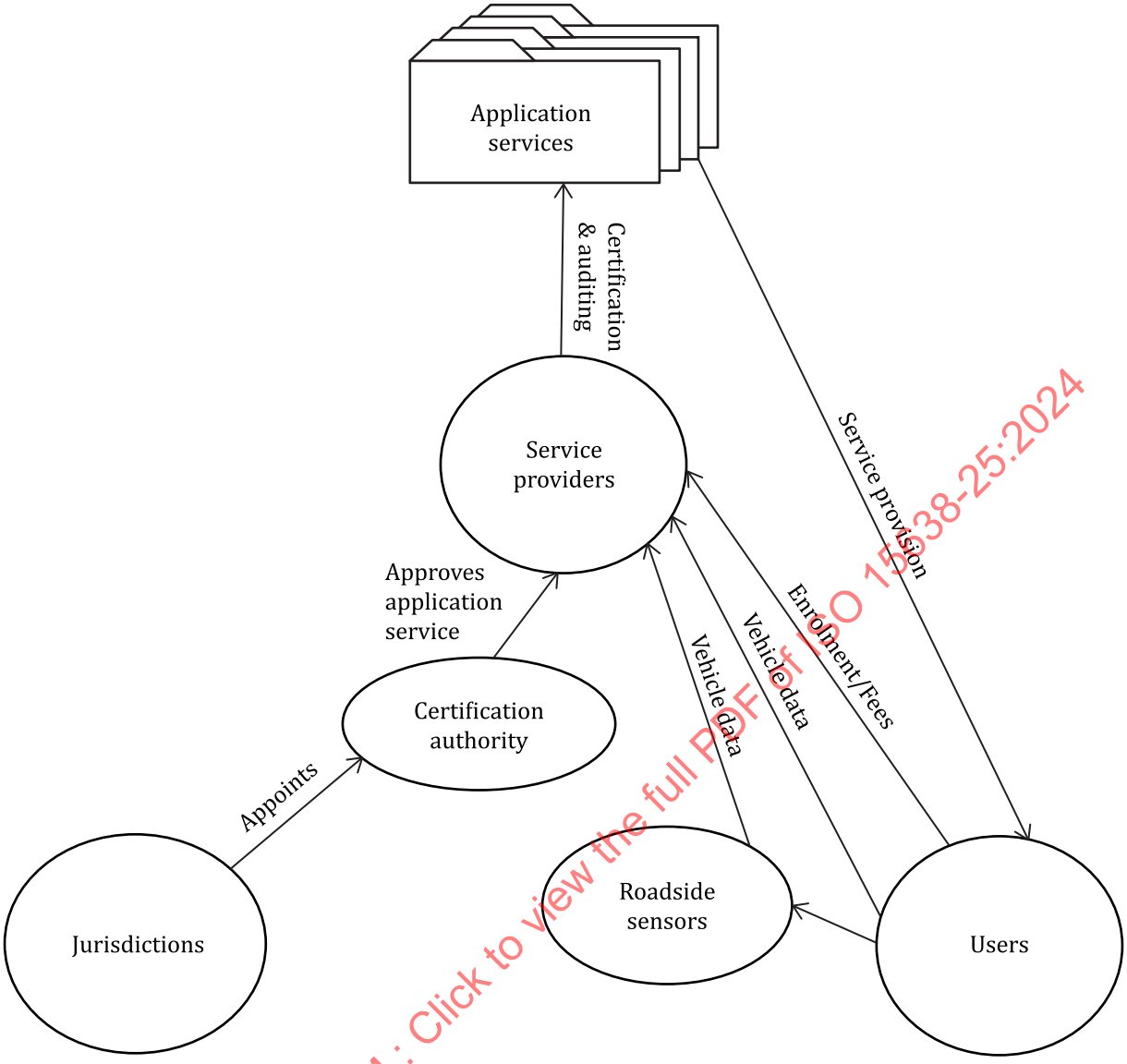

Figure 2 — Role model conceptual architecture — unregulated service provisioning

Freight vehicles are tall and therefore require earlier overhead clearance monitoring than smaller vehicles. In some private vehicle use cases, vehicle height clearance monitoring is also important. To achieve safer freight road transport of freight vehicles, an information provision service providing overhead clearance status well ahead of the freight vehicle is indispensable. The purpose of this document is to realize safe freight vehicle road transport, in particular, increasing vehicle safety by monitoring the overhead clearance to the vehicle transporting freight and container. The proper recommended manoeuvring and detour information given to the vehicle driver or operator is generated at the service provider. The service provider monitors vehicle height and gives safety advisory messages to the driver when necessary. This document enables safe freight vehicle road transport stability realization and efficient freight fleet transport operation of the user vehicles by avoiding accidents or serious incidents on the roadways.

Freight vehicle information can be obtained from various sources, such as roadside embedded sensors and freight vehicle on-board equipped height sensors. The sensor information is sent to the service provider to realize real-time remote monitoring of freight vehicle height. By providing the freight vehicle location (GNSS) data to the service provider, the service provider is able to provide safety driving advice for a specific part of the road, for a specific vehicle.

The service provider provides this application service to or for a user who is an individual or a party that enrols in and operates within an unregulated application service or commercial application service to meet specific aspects of the requirements of a service provider for the operation of the regulated vehicle.

Examples of users are transport operators, drivers, freight owners, etc. Most commonly, the user is a transport operator.

For basic TARV information, see ISO 15638-1.

This document defines the basic conceptual operational requirements for the freight vehicle overhead clearance safety information provision application service.

Where a commercial (unregulated) service can be instantiated using only the generic vehicle data specified in ISO 15638-5, no further standardization is necessary. Where a TARV commercial application is simply instantiated as a commercial application conforming to the requirements of this document, no further standardization is necessary, provided that conformance to the requirements of this document can be demonstrated. Service offerings may vary from service provider to service provider.

7 Basic conceptual operational requirements

7.1 General

The basic conceptual framework is described as shown in Figure 3.

The telematic application generates adequate overhead clearance information to avoid a bridge strike accident. This safety information depends on the road facility characteristic and the vehicle height, including freight.

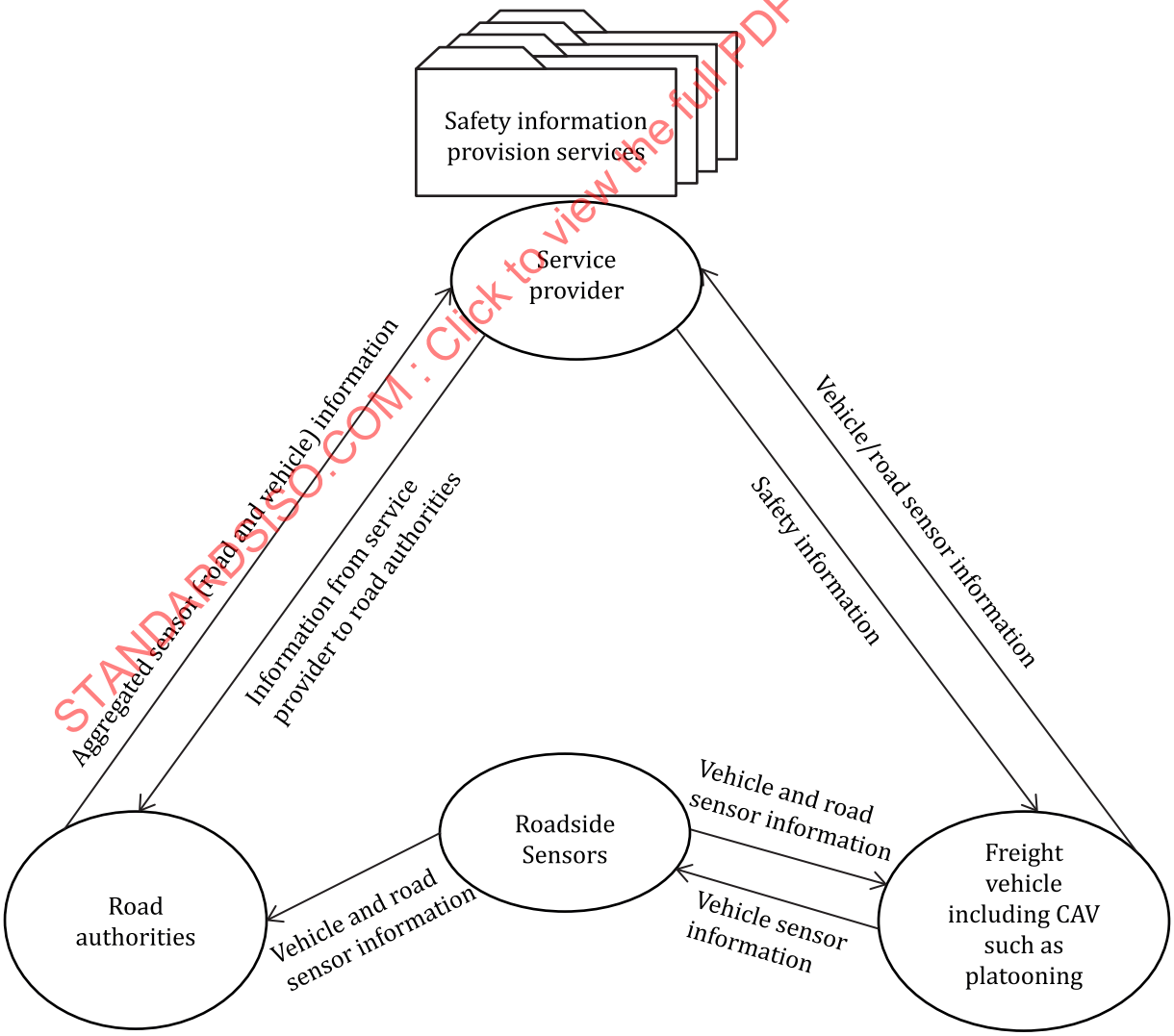

Figure 3 — Basic conceptual framework for vehicle safety information provisioning service

7.2 Basic requirement

The basic requirements are as follows.

a) The vehicle shall be equipped with vehicle height monitoring sensors and such data shall be sent to the service provider through on-board unit ITS communication media connected with the service provider. If the vehicle does not have such sensors, only roadside sensor data are used, and continuous data acquisition is not possible.

NOTE It is necessary for on-board vehicle sensors to be installed in such a way that the laser sensor or LiDAR sensor is mounted on highest point of whole vehicle.

b) The on-board height sensor shall monitor the vehicle height point continuously and shall detect height dynamic status. A roadside sensor shall detect similar status when a freight vehicle passes through roadside sensors.

c) Vehicle location data shall be sent to the service provider so that the service provider is able to track and trace the vehicle on the local dynamic map (LDM). The vehicle location can be utilized to provide adequate overhead clearance advice for that vehicle.

d) The service provider shall obtain LDM data from the map data service provider when such data are required for location-dependant service provision.

e) The service provider shall perform data fusion processes for vehicle overhead clearance monitoring by combining sensor data, location data and LDM data, and road facility (bridges and tunnels) data as necessary.

f) The service provider will provide safety information to the vehicle operator when necessary, for example:

- insufficient overhead clearance alert as on-coming bridge/tunnel is low;
- detour recommendation alert as insufficient overhead clearance of on-coming bridge/tunnel;
- immediate vehicle stop alert as insufficient overhead clearance of on-coming bridge/tunnel;
- vehicle height exceeds safety overhead clearance alert for on-coming bridge/tunnel;
- work zone alert in on-coming bridge/tunnel;
- other safety alert/supports.

NOTE This document defines framework only, and does not define safety message details. Such details are defined by other standards and can take into consideration regional regulations applicable to the freight vehicles.

8 Requirements for services using generic vehicle data

8.1 General

8.1.1 Introduction

The means by which the access commands for generic vehicle information specified in ISO 15638-7 can be used to provide all or part of the data required to support a regulated application service shall be as defined in ISO 15638-7.

This clause provides the means by which the access commands for generic vehicle information as specified in ISO 15638-5 can be used to provide all or part of the data required to support an unregulated application service. It also defines general requirements to ensure data interoperability.

8.1.2 Unregulated application services using only generic basic vehicle data

Where all the required data can be obtained via the access commands for generic essential vehicle information as specified in ISO 15638-5, the access methods defined in ISO 15638-5 shall be used consistently to obtain the values for the TARV LDT and C-ITS LDT data concepts. No further international standardization is required, and jurisdictions, subject to the privacy regulations pertaining within the jurisdiction, can develop, operate and update their services according to local design with international interoperability being maintained through the provisions of ISO 15638-5. Vehicles that are equipped to support the ISO 15638 series are generally able to support such service provision. ISO 15638-5:2013, Clause 7 defines the following relevant commands:

a) GET TARV LDT (local data tree) data;

b) GET C-ITS (co-operative intelligent transport systems) LDT data.

See ISO 15638-5 for details of these commands.

8.1.3 Unregulated application services using both generic vehicle data and additional application-specific data

See ISO 15638-7:2013, 7.1.2 for the generic sequence of operations for unregulated application services using both generic vehicle data and additional application-specific data.

8.2 Conveyance identifiers

The regulated vehicle conveyance type can be identified in accordance with ISO 26683-2, ISO 14816 ISO 17262, and ISO 24534-3.

9 Concept of operations for unregulated application services with additional data requirements including roadside sensors

9.1 General

This clause:

— describes the characteristics of a proposed system from the viewpoint of a user who intends to employ that system, with the objective of communicating the quantitative and qualitative system characteristics to all stakeholders;

— defines the general concept of operations (CONOPS) for commercial/civic provision using the TARV platform, and an application service provider for TARV commercial/civics that require data in addition to that available from the basic vehicle data;

— provides the generic process for the provision of commercial/civic (unregulated) application services defined in the subsequent clauses of this document relating to provisions for unregulated application services.

A 'concept of operations' (CONOPS) generally evolves from a concept and is a description of how a set of capabilities can be employed to achieve desired objectives.

This document enables data from roadside sensors to supplement data collected from within the vehicle.

9.2 Strategies, tactics, policies and constraints affecting the system

The services that are regulated as mandatory or optionally supported can vary from jurisdiction to jurisdiction. It is therefore possible for a service to be mandatory in one jurisdiction, but not required by another jurisdiction, and instead offered as a commercial/civic service within that domain. Provided the requirements are met within the service definition in ISO 15638-6, or require only basic vehicle data, no further standardization is required.

Modern trends in computing have moved away from the insular, standalone solution where the demands for the provision of the service are entirely met by local capability, and instead towards a "cloud" computing conceptual architecture, where the bulk of the data processing and service provision is provided elsewhere within or behind the "cloud", where it can be performed more efficiently and economically, thereby enabling simplification of the terminal equipment. It is a feature of TARV that the actual service provision takes place at and within the systems of the application service provider. The on-board equipment therefore largely serves only to collect and provide data to enable that service provision, and in some cases, to receive a result.

This fundamentally simplifies the capabilities required by the TARV on-board platform: it enables practical instantiation of a similar service using different wireless media, and it enables early implementation and deployment of such systems.

Furthermore, it means that for the commercial/civic application services that are supported by this document, the only points requiring standardization are:

— the data to be collected;

— the organization of these data within the on-board memory to meet the requirements of ISO 15638-1;

— the means and frequency of data collation; and

— (potentially) the download back to the vehicle of the result of the service provision.

A service that requires complex on-board processing, or intensive bidirectional communication, is outside the scope of TARV, although it may use TARV to forward its data to its service provider or receive data from its service provider.

A core strategy of this document is to ensure that an "app" is only loaded legitimately, and that this prior loaded "app" contains the destination address for the core application data. Instigating a "GET TARV LDT" or "GET CoreData" command only results in that data being sent to the previously determined destination address, and not to a spoof enquirer. While this has the advantage of security, and economy of use, it makes TARV a potentially inappropriate means for highly interactive, "online" services (e.g. collision avoidance). However, as TARV uses CALM communications platforms, the same on-board equipment can also be used to support other "cooperative vehicle systems" (C-ITS). See ISO 15638-1, ISO 15638-2, ISO 15638-3 and ISO 15638-5, for example.

9.3 Organizations, activities, and interactions among participants and stakeholders

The classes, attributes and key relationships are described in ISO 15638-1 and ISO 15638-7, with the addition of the ability to collect data from roadside sensors.

9.4 Operational roles and processes for the system

9.4.1 Common role of the prime service provider

To facilitate the correct installation and monitoring of TARV IVS, a prime service provider is contracted by the user (see ISO 15638-1). The prime service provider is the technical expert of their system and shall be responsible for its installation, maintenance and (as necessary) upgrade. However, unless also appointed as an application service provider for a particular service, the prime service provider is not responsible for the operation of application service software.

The prime service provider shall be responsible for ensuring that the multiple applications operate properly, and do not adversely impact each other.

The IVS operating systems can require periodic updating to improve functionality, fix software "bugs", or update the protection from electronic threats such as software viruses. It shall be the responsibility of the prime service provider to undertake such tasks, possibly in collaboration with application service providers.

The role of the prime service provider shall be to ensure that the IVS performs during day-to-day operation in the same manner as it did when it was approved. The prime service provider shall put in place a regime to the satisfaction of the approval authority which shall periodically monitor the IVS via several means

including receiving test data files generated by the on-board ‘app’ for that application service. The prime service provider shall be responsible for determining the IVS operational state, performing any necessary enhancements, and efficiently dealing with malfunctions when they occur.

The prime service provider shall report any malfunctions to the driver and application service provider as appropriate, and as technically possible (for example it can be impossible, during a working session, to advise the driver if the IVS has failed entirely, and such advice would have to be by post-event, "offline" means).

The prime service provider shall work closely with the application service provider and vehicle operator to permit and enable the prompt repair and rectification of any malfunction with a TARV IVS.

9.4.2 Common role of the application service provider

The application service provider is the actor who is responsible for providing and operating the application service system.

The application service provider shall offer to provide to users the specific application service defined in the specification for that application service. This document specifies the format for key provisions of application service provision but does not define any specific application service.

The application service provider is normally envisaged to be a commercial entity, but they can also be a road users association or department of the jurisdiction providing a civic service to road users.

The application service provider shall be responsible for ensuring that the application service 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 application service system and shall report malfunctions to the driver, the prime service provider, and if required, to the jurisdiction. 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 is necessary, the application service provider shall notify the prime service provider and the two actors shall jointly rectify the problem according to their defined responsibilities.

The regulated application service systems can require periodic updating to improve functionality, update maps, fix software "bugs", or update the protection from electronic threats such as software viruses. It shall be the responsibility of the application service provider to undertake such tasks, potentially in collaboration with the prime service provider.

9.4.3 Role of the application service

This is the service defined and offered by an application service provider for an unregulated application service. This is usually expected to be a commercial/civic provision, but it may be provided by or on behalf of the jurisdiction, a not-for-profit body, or road users association providing a civic service to road users. The important characteristic that separates these application services from those defined in ISO 15638-6 is that the service provision has nothing to do with the requirements of a regulation.

9.4.4 Service requirements definition

Definition of service requirements varies from service to service, and in many cases from one application service provider instantiation to another. The application service specification, or a standards deliverable specifying an interoperable service definition, can provide specification according to the provisions of this document. This document provides generic requirements, not application-specific requirements.

9.4.5 Common role of user

In the case of the most unregulated application services, the user may be the driver, or the vehicle operator, or potentially, the vehicle owner, or a combination of all three. Within this document, "operator", "driver" and "owner" are considered as sub-classes of the class "user".

The "user" is usually the operator of the regulated commercial freight, but in some cases, it can be a driver or an owner. The driver enrols to have the service provided automatically by wireless communications. The driver appoints an approved service provider to provide the application service.

The user is responsible for paying any fees for the provision of the service agreed with the service provider 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 document.

9.4.6 Role of driver

Where required by the system, the driver shall be responsible for using the identification and authentication method supplied by the prime service provider/application service provider.

The driver shall be responsible for reporting any system malfunction alerts, or apparent system failures to the operator or application service provider or both, in accordance with the instructions provided to them at the commencement of their contract. The driver is not responsible for IVS or other equipment malfunction or rectification processes beyond these actions.

The driver shall be responsible for any equipment (such as a DRD, smart card, RFID device, barcode) provided to the driver to identify themselves to the IVS when in control of the vehicle. If the driver loses any such device, they shall be responsible for immediately advising the vehicle operator and application service provider.

9.4.7 Role of operator

The operator of the vehicle shall be responsible for advising and requesting action from the application service provider if the driver advises the operator of a potential or actual system malfunction. The operator of the vehicle shall make the vehicle reasonably accessible to the application service provider in order for them to rectify the problem.

9.4.8 Framework for operation

The security requirements are such that a common and secure provision for security needs to be provided on all cooperative ITS systems to maintain security and offer interoperability, common use, and reuse of data. These aspects are dealt with in ISO/TS 15638-4 and all instantiations claiming conformance with this document shall also conform to ISO/TS 15638-4.

ISO 15638-5 provides the specifications for generic basic vehicle data that all TARV IVSs are required to support and make available to application service providers via a wireless communications link supported by the IVS, to support the provision of regulated and commercial/civic application services.

The combination of basic vehicle data and those additional data concepts required within a particular jurisdiction (or class of TARVs) is known as "core application data (CoreData)" for an application service within a particular jurisdiction. "Basic vehicle data" is therefore found in all equipped TARVs, while "core application data (CoreData)" is required in all equipped TARVs (or class of TARVs) within a particular jurisdiction.

The ROAM (regime for open application management) architecture defined in ISO 15638-1 provides the framework and operational environment for developing and deploying platforms for TARV applications within a general framework of cooperative vehicle telematics systems. It is designed not only to support TARV application systems, but also general cooperative vehicle systems for all classes of vehicles. It is therefore designed to be compatible and interoperable with other cooperative vehicle standards and has used the successful results of research programmes and applications in these areas as its source of inspiration.

ROAM 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 and vehicle operators are intended to be able to rely on their integrated in-vehicle system to allow TARVs to operate within the requirements of jurisdictions within which they drive their vehicles and gain advantages from direct cooperative management of transport safety and efficiency wherever they drive.

Within the TARV environment, regulated applications are developed by jurisdictions and deployed by application service providers to "host management centres" (HMCs). The HMC provides a service gateway that supervises the secure provision of software and services to TARVs. The HMC manages the provisioning of applications to any authorized and subscribed user via its client system. After it is properly provisioned and installed on the client system, it can enact the application. See ISO 15638-1:2012, 6.1.3.

9.4.9 ROAM "app" library and data pantry

A layer below the applications described in the previous subclauses is the provision of data for the data pantry. This data provisioning is generated by several small task-specific "facilities applications". These are generally small Java "applets", organized as software bundles. The "facilities applications" each service the updating of individual data elements in the basic vehicle data concept and for the "core application data (CoreData)" concept, where a jurisdiction/application service has specified or provided an "app" to do this. The process is defined in ISO 15638-1.

10 Sequence of operations for identified unregulated application services with additional data requirements

10.1 Overview

10.1.1 General

For the general sequence of operations, the definitions provided in ISO 15638-7:2013, Clause 9, shall apply.

In the case of this document, the "unregulated application service" is a software application system comprising four parts:

a) "landside" application software system;

b) on-board app to generate the core data for the system;

c) data collected from roadside sensors;

d) instruction to provide data (to the application service provider) instigated by a roadside sensor.

The landside application software system that provides the unregulated application service is provided by the application service providers.

During the operation of the vehicle on the highway, data collected at roadside and on-board sensors shall be conveyed to the service provider. When both data from on-board and roadside sensors are available, the service provider can detect or avoid tampering or incorrect setting of on-board equipment. The service provider can also provide means of using roadside sensors to validate the accuracy of on-board equipment.

The roadside sensors shall collect freight vehicle status data. Roadside sensors typically collect:

— vehicle weight, tyre footprint;

— vehicle location data (present and accumulated);

— vehicle ID (privacy information such as VIN/licence plate);

— vehicle driven history (privacy information such as time/location/type of road/motion sensor data);

— vehicle IVS data (engine, digital tachograph and weigh in motion);

— vehicle engine emission data.

There can be circumstances in which an on-board device is present which gives advice to the driver concerning an issue or an unsafe situation. For example, if roadside equipment identifies that freight vehicle stability is decreasing, the driver should be advised. As another example, if the on-board sensor equipment identifies that the vehicle is unbalanced, the driver should be advised. The appropriate safety information is

given to the vehicles by utilizing vehicle location data. The service provider monitors each vehicle location and the surrounding traffic situation (particularly road traffic status far ahead of the vehicle) so that it is possible to provide timely safety advice to the driver. Example use cases are given in Annex A.

10.1.2 Commands

10.1.2.1 Overview

Providing an unregulated TARV service is envisaged as a single transaction, or a series of short transactions, in which, to obtain basic vehicle data or core application data, one or two (of three) commands are invoked:

— GET TARV LDT data;

— CREATE Core Data;

— GET Core Data.

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. Where required by the regulated application, further detail of generic data specification for identified unregulated application services is provided in the definitions in ISO 15638-7. Basic vehicle data or core application data can be required as part of a given service provision.

The communication link between user IVS and application service provider includes the route through roadside sensors.

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

All further data processing of the application service is carried out by the application service provider, landside, using the application provider's application service software (as opposed to on-board by the IVS, which would be outside the scope of the ISO 15638 series).

The intention here is to minimize the duty of the wireless interface (and where several wireless media cost models occur, also to minimize its cost), and to maximize on-board security.

10.1.2.2 GET TARV LDT

Communications sequences to obtain TARV LDT are provided in Figure 4.

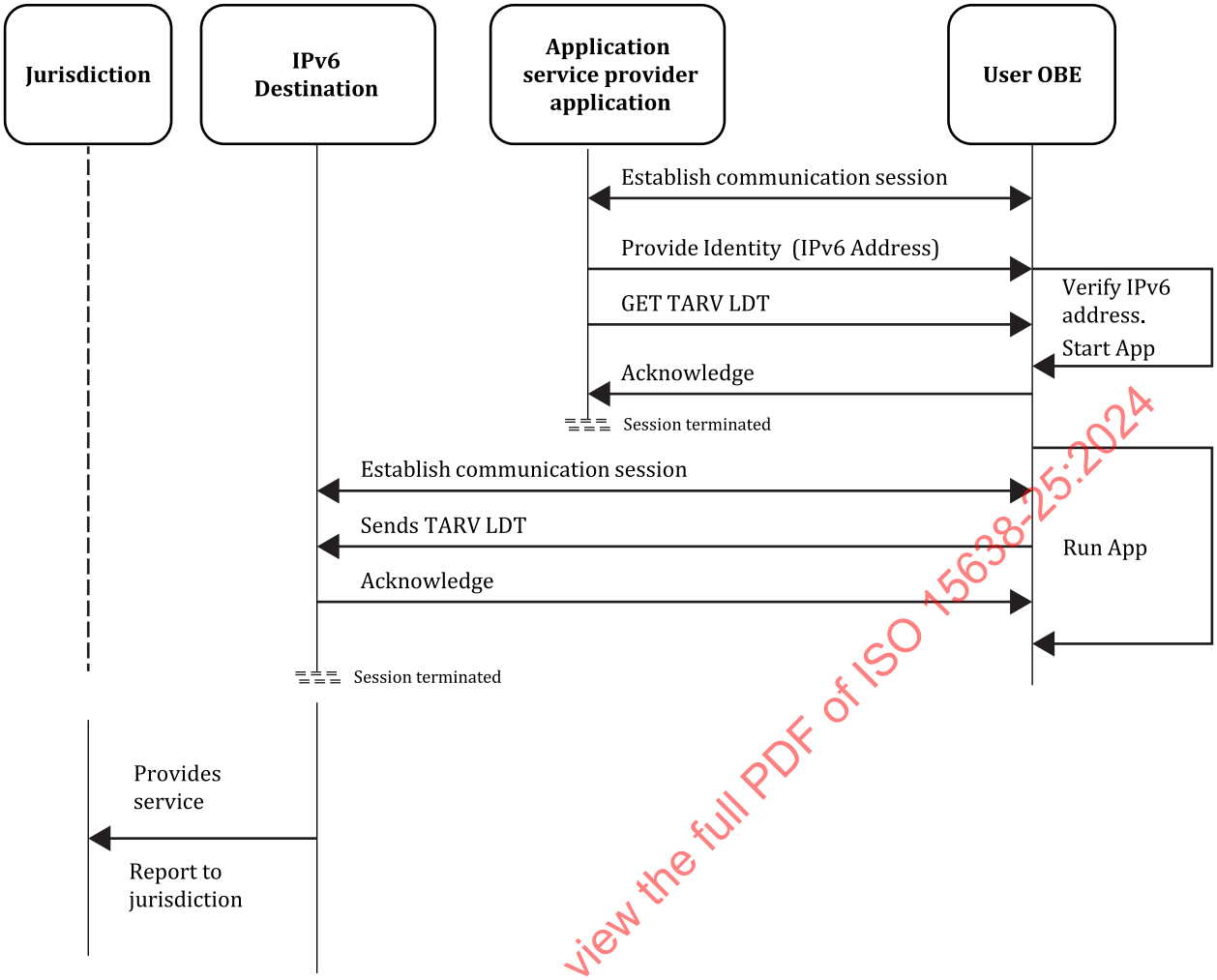

Figure 4 — Communications sequences to obtain TARV LDT

10.1.2.3 CREATE and GET Core Data

Communications sequences to obtain Core Data are provided in Figure 5.

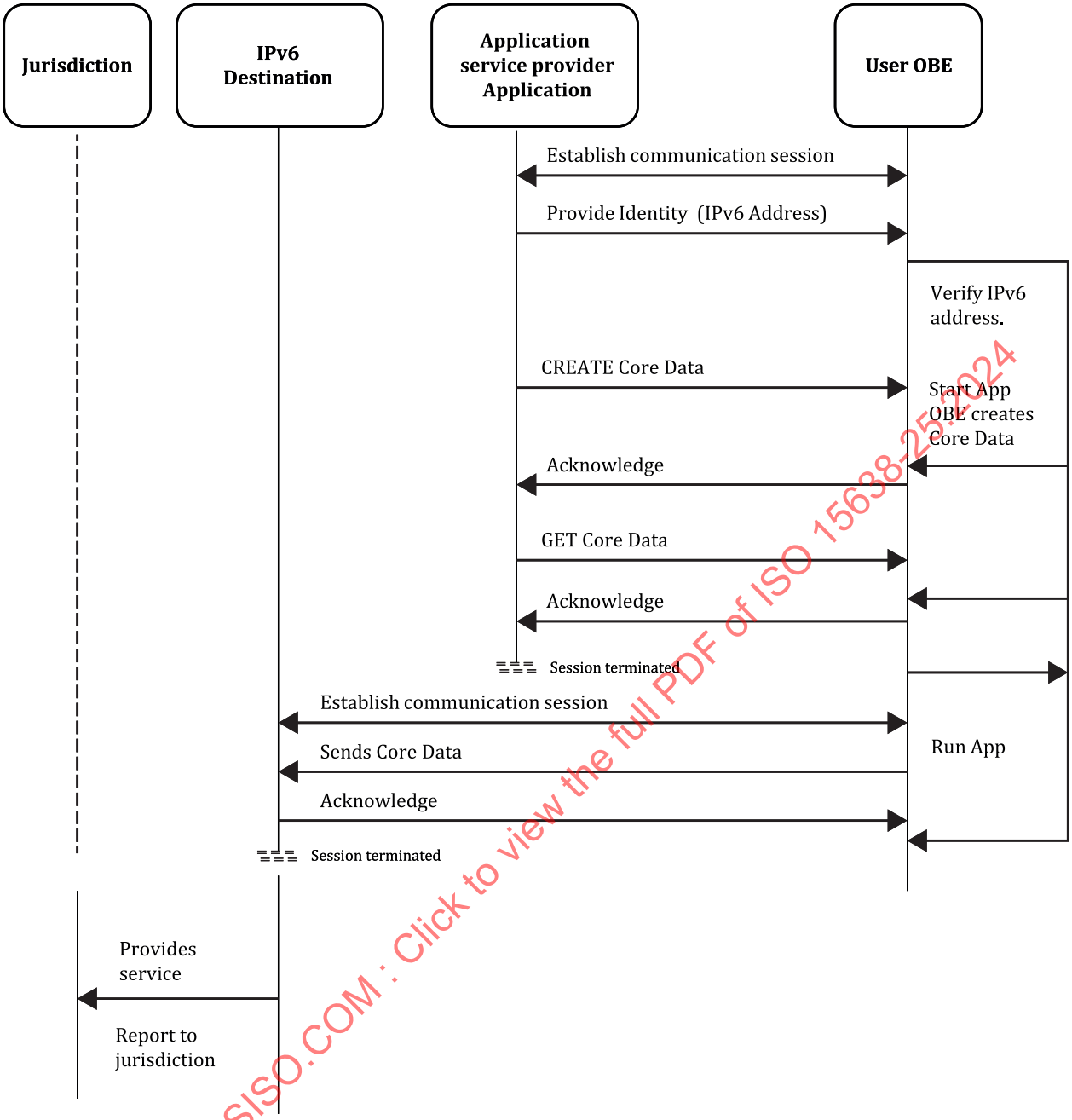

Figure 5 — Communications sequences to obtain Core Data

Most of the application services defined in this document require further data in addition to the basic vehicle data. Therefore, before the data can be obtained, it is necessary to update the data pantry. Figure 6 shows a hypothetical example of CoreData.

NOTE 1 In the TARV-ROAM architecture, the application system has no direct access to the source of data, only to data in the data pantry that it is authorized to access.

In this event, the application operating system shall establish the communication link in accordance with ISO 15638-2 and it shall issue the command "CREATE Core Data". The IVS then populates the Core Data concept with data, as instructed by the on-board app. The on-board app associated with the IVS sends an acknowledgement that the command has been received and the session is closed.

The IVS then sends the Core Data to the predetermined IPv6 address contained in the content of the Core Data. The receiving IPv6 address sends an acknowledgement. Once the IVS receives the acknowledgement that TARV LDT is successfully received by the destination address, the session shall be closed.

NOTE 2 Core data includes the TARV LDT data.

Once the IVS receives an acknowledgement (ACK) that the "CoreData" is successfully received by the enquirer, the session shall be closed. An example of the contents of "CoreData" is provided in Figure 6.

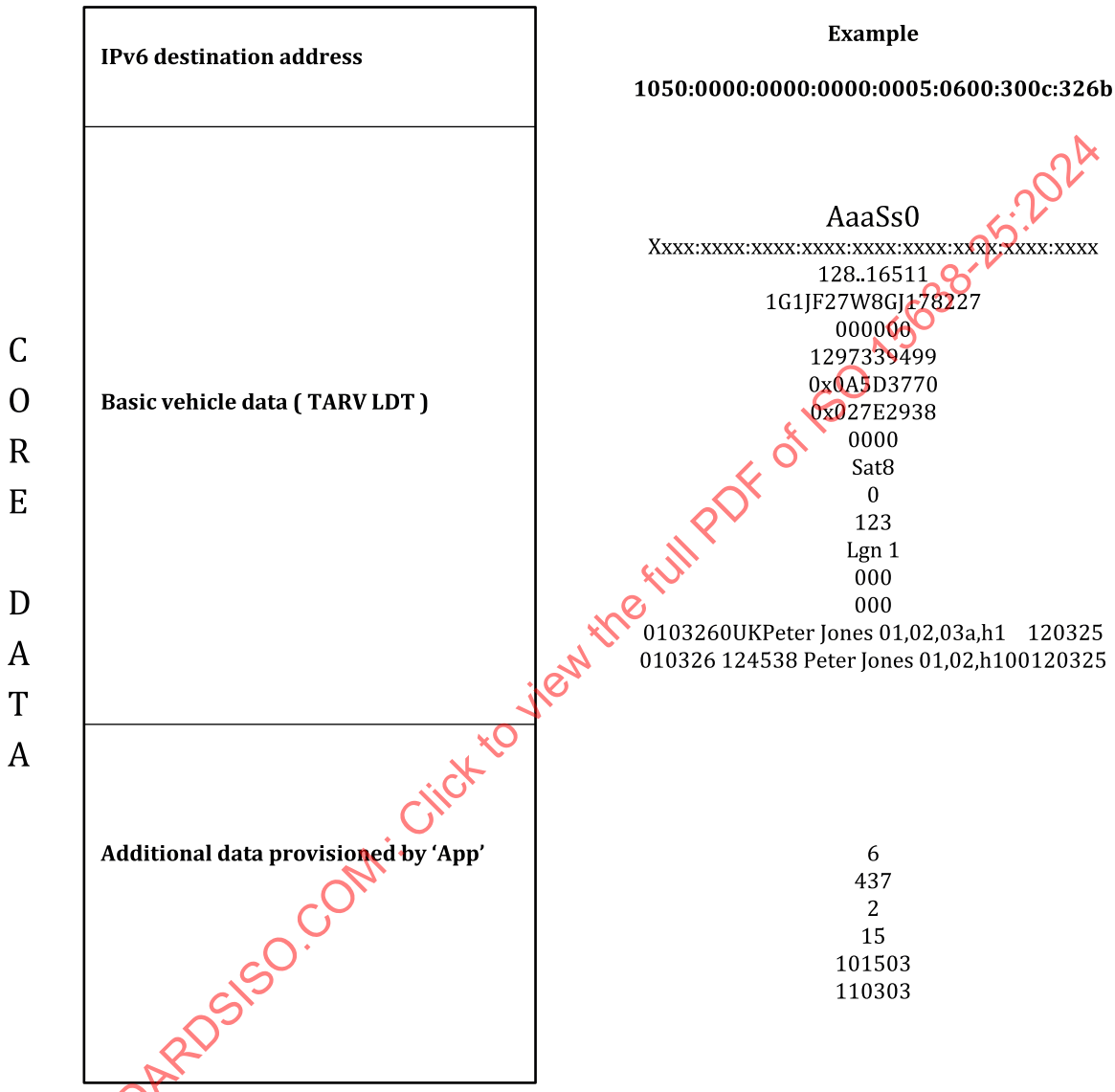

Figure 6 — Core application data

10.2 Quality of service requirements

This document contains no general requirements concerning quality of service (QoS). Such aspects shall be determined by a service provider as part of its specification for any unregulated application service. However, where a specified unregulated application service has specific QoS requirements essential to maintaining interoperability, these aspects shall be specified in the unregulated application service document.

10.3 Test requirements

This document contains no general requirements concerning test requirements. Such aspects shall be determined by a service provider as part of its specification for any unregulated application service and

issued as a formal test requirements specification document. However, where a specified unregulated application service has specific test requirements essential to maintaining interoperability, these aspects shall be specified in the document relating to that unregulated application service, or in a separate standards deliverable referenced within that clause. Where multiple service providers recognize a benefit to common test procedures for a specific unregulated application service, this shall be the subject of a separate document.

10.4 Marking, labelling and packaging

This document has no specific requirements for marking, labelling or packaging.

However, where the privacy of an individual can potentially be compromised by any instantiation based on the ISO 15638 series, the contracting parties shall make such risk explicitly known to the implementing jurisdiction 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.

11 Common features of unregulated TARV application services

11.1 Generic operational processes for the system

The details of the instantiation of the unregulated application service are as designed by the application service system to meet the requirements of a service provider and are not defined herein. This document 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 unregulated application service systems. This clause addresses the generic provision of unregulated application services that require data in addition to, or instead of, basic vehicle data and core application data, and specifies the generic form and content of such data required to support such systems, and access methods to that data.

For detail of the operational processes, Clause 10 and Figure 4, Figure 5 and Figure 6.

Collected data and unregulated application service data stored in any software or non-volatile memory within the application service system shall not be accessible or capable of being manipulated by any person, device or system (including via any self-declaration device), other than that authorized by the application service provider.

The means by which data is provisioned into the data pantry, and the means for obtaining the TARV LDT and Core Data are described in ISO 15638-7.

Specific unregulated application services shall collect and transfer application-specific data. Sometimes this will be or will include the TARV LDT or Core Data. In many cases, additional application-specific data will be required. This data shall be defined in the specific unregulated application services document.

Different application services can require connection to different application-specific equipment. However, there are common basic processes behind TARV unregulated application services.

To minimize demand on the IVS (which is assumed to be performing multiple application services 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 unregulated application services.

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

At a conceptual level, the TARV system is therefore essentially simple, as shown in Figure 7. The process is like that for CoreData, but data is supplied to a different on-board file in the data pantry.

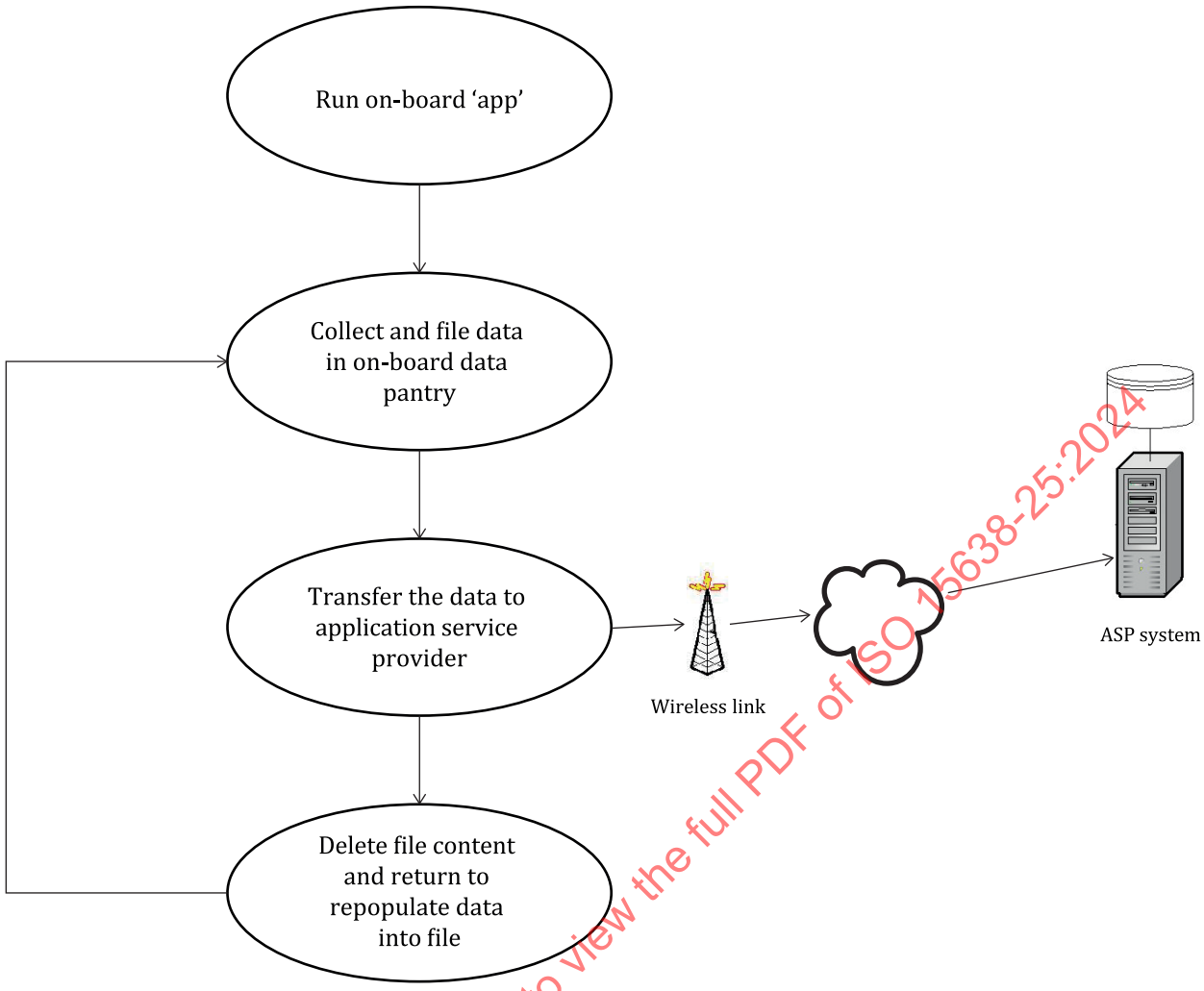

Figure 7 — TARV regulated application service on-board procedure

NOTE The data in the on-board device can be stored for a period as required by any specific purposes.

At a common generic functional level, the connected equipment is required in all cases.

The common role of the jurisdiction, approval authority and application service provider shall be as defined in ISO 15638-7.

Figure 7 considers that data are deleted from the on-board device after being sent to the application service provider system; given the architecture of the application service provider system, there can be multiple service providers interested in both the most recent information and information that has been stored in the on-board device for some extended period (i.e. 24 hours). The system should support the storage of information on the on-board device for a defined period to allow the application service provider service to request either the most current data records or the records for a certain number of previous hours/days, etc.

11.2 Common characteristics for instantiations of unregulated application services

11.2.1 The common characteristics for instantiations of unregulated application services shall be as defined in ISO 15638-7.

Namely, an unregulated application service is approved. It utilizes a TARV IVS which communicates to the prime service provider and application service provider and can insert a means to provide driver licence details, or link to another device such as a digital tachograph.

11.2.2 The application service provider shall load an application for an unregulated application service into the IVS of the operator's vehicles.

11.2.3 The application for the unregulated application service shall run whenever the regulated vehicle is operating, or to the instruction of the application service provider or operator.

11.2.4 The application for the unregulated application service shall record the data specified within the appropriate clauses of this document, in a uniquely named file, according to a naming convention specified) in the data pantry of the IVS. This file is the "application service data file" (ASD file).

11.2.5 The application service provider shall design/install/operate its unregulated system as approved by the certification authority (regulatory), if necessary.

11.2.6 The IVS shall provide the ASD file to the application service provider using the TARV IVS wireless link, on demand from the application service system, or at the instigation of the on-board app for the unregulated application service, or at least once every 24 hours.

Every transfer shall include framing data that identifies its sequential order, IVS ID, version number of IVS and version number of the application for the unregulated application service.

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

11.2.7 The application service system shall retain and back up the ASD file data to the requirements of the system.

Where required by the application service specification approved by the certification authority (regulatory), the driver shall provide their identification to the system at commencement of a session using the identification and authentication method provided by the application service provider. When the regulated vehicle ignition is turned off, the system shall automatically close the session. Each time the regulated vehicle ignition is turned on, the driver shall be required to identify and authenticate themselves.

If drivers change without turning the engine off, the new driver shall identify themselves by the means provided by the application service provider.

Where required by the application service specification approved by the certification authority (regulatory), the application service provider provides the driver (i.e. driver-specific) with their identification and authentication method for the IVS. The method of identification and authentication can be unique to each application service provider.

11.2.8 Electronic records are generated periodically by the IVS when the regulated vehicle is moving. The electronic record contains accurate time and location data as defined herein. These ASD file records are generated automatically during the session and stored in the IVS.

11.2.9 ASD files generated by the IVS are sent to the application service provider. The application service provider transmits reports or data to the regulated vehicle operator in accordance with the system specification.

11.3 Common sequence of operations for unregulated application services

Different regions require their own form of unregulated application service, and application service provider service offerings also vary. The specific details of these application services are not defined within this document. For this document, at a generic level, the "business process" is to collate the required data (as specified by the on-board app) and provide a uniquely named file containing that data to the application service provider system via a wireless interface.