Technical Specification

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Intelligent transport systems — Telematics applications for regulated commercial freight vehicles (TARV) using ITS stations —

Part 1: Secure vehicle interface framework and architecture

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

Partie 1: Cadre et architecture de l'interface sécurisée du véhicule

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO 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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 7815 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

Many intelligent transport system (ITS) technologies have been embraced by commercial transport operators and freight owners in the areas of fleet management, safety and security. Telematics applications have also been developed for governmental use. Such regulatory services in use or under consideration vary from region to region, but include electronic on-board recorders, vehicle charging, digital tachograph, on-board mass monitoring, emissions monitoring, vehicle access monitoring, hazardous goods tracking and eCall. Additional applications with a regulatory impact currently under development include fatigue management, speed monitoring and heavy vehicle charging based on mass, location, distance and time.

In this emerging environment of regulatory and commercial applications, between 2008 and 2012, ISO 15638-1 was developed and approved, enabling on-board equipment and back-office systems to be commercially designed in an open market, meeting the common requirements of jurisdictions.

Although the concept of co-operative ITS (C-ITS) was well advanced at this time, its implementation was not. In particular, provisions for achieving the "bounded secure managed domain," required by ISO 21217, were still in their early stages of development. Security (i.e. "cybersecurity") was a significant concern, given that the communications means themselves were not necessarily very secure. Telematics applications for regulated commercial freight vehicles (TARV), designed to work with whatever wireless communications interface are available in the vehicle, offered a solution to this problem: the enquirer would provide a requested destination address and reference for the data. The vehicle response would then be to send the data (along with the requested destination address and reference) directly and only to its landside "application service provider" (ASP), a contracted secure provider. As a trusted party approved by the jurisdiction, the ASP would validate the request and destination address before forwarding the information to that address. TARV was flexible in concept, and could be adapted to different jurisdictional arrangements.

ISO 15638-2 provided a migration path to C-ITS enabled vehicles, but remained devoid of the necessary security parameters, so the passage to data to the jurisdiction remained via the secure and trusted ASP.

In the decade since 2010, with the publication of ISO 21177, the necessary security and data exchange protocols have been finalized to provide a "secure vehicle interface" (SVI) in which two devices can cooperate in a trusted way, i.e. exchange information in secure application sessions with optional explicit bi-directional protection. The devices can thus only access data or request data for which they have the appropriate access credentials. The trust relation between two devices is illustrated in Figure 1.

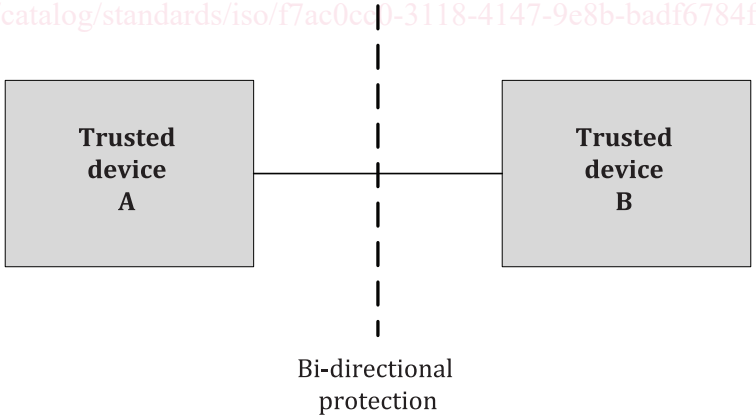

Figure 1 — Interconnection of trusted devices (ISO 21177)

Taking these developments into account, while the ISO 15638 series remains valid and appropriate in many cases, it is also appropriate to provide specifications for the direct transfer of data using a secure vehicle interface. This document provides the specification of the architecture and framework within which such transactions can be undertaken.

Intelligent transport systems — Telematics applications for regulated commercial freight vehicles (TARV) using ITS stations —

Part 1:
Secure vehicle interface framework and architecture

1 Scope

This document specifies the following elements for cooperative telematics applications for regulated commercial freight vehicles directly communicating via a secure vehicle interface:

a) a framework for the provision of cooperative telematics application services for regulated commercial freight vehicles;

b) a description of the concept of operation, regulatory aspects and options and the role models;

c) a conceptual architecture using an on-board platform and wireless communications to a regulator or their agent;

d) references for the key documents on which the architecture is based;

e) the architecture of the facilities layer;

f) a taxonomy of the organization of generic procedures.

This document does not replace, but is complementary to ISO 15638-1. It provides an alternative communication architecture for achieving similar service provision by means of a standardized secure vehicle interface.

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 7815-2, *Intelligent transport systems — Telematics applications for regulated commercial freight vehicles (TARV) using ITS stations — Part 2: Specification of the secure interface*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
application service
service provided by a service provider accessing data from the in-vehicle system (IVS) of a regulated commercial freight vehicle via a wireless communications network

3.2
appoint
assign officially to take responsibility for a role

3.3
architecture
formalized description of the design of the structure of the telematics applications for regulated commercial freight vehicles secure vehicle interface (TARV-SVI) and its framework

3.4
controller area networking bus
CAN bus
network designed for use in automotives

Note 1 to entry: See ISO 11898-1, ISO 11898-2 and ISO 11898-3 for further information.

Note 2 to entry: CAN uses a single terminated twisted pair cable and is multi-master. The maximum signal frequency used is 1 Mbit/s, with a typical length of 40 m at 1 Mbit/s up to 10 km at 5 Kbit/s.

Note 3 to entry: CAN has high reliability with extensive error checking. The typical maximum data rate achievable is 40 KB/s. The maximum latency of a high priority message < 120 µs at 1 Mbit/s.

Note 4 to entry: CAN is unusual in that the entities on the network, called nodes, are not given specific addresses. Instead, it is the messages themselves that have an identifier which also determines the messages' priority. For this reason there is no theoretical limit to the number of nodes, although in practice it is approximately 63.

3.5
certificate authority
<digital> organization which issues digital certificates for use by other parties, specifically in the context of communications security

3.6
commercial application
intelligent transport systems (ITS) application in regulated commercial freight vehicles for commercial (non-regulated) purposes

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

3.7
framework
particular set of beliefs or ideas referred to in order to describe a scenario or solve a problem

3.8
global navigation satellite system
GNSS
several networks of satellites that transmit radio signals containing time and distance data that can be picked up by a receiver, allowing the user to identify the location of its receiver anywhere around the globe

[SOURCE: ISO 15638-1:2012, 4.21, modified — "comprises" has been removed from the beginning of the definition.]

3.9
in-vehicle system
IVS
intelligent transport system (ITS) station and connected equipment on board a vehicle

3.10
jurisdiction
government, road or traffic authority which owns the regulatory applications

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

3.11
map
spatial dataset that defines the road system

3.12
on-board unit
OBU
integrated telematics unit installed on board which provides the specified telematics functionality required for the in-vehicle system (IVS)

3.13
regulated application
regulatory application approval arrangement utilized by jurisdictions for granting certain categories of commercial vehicle rights to operate in regulated circumstances subject to certain conditions

Note 1 to entry: Each jurisdiction may use their own terminology including, but not limited to, "permit", "application", "scheme", "concession", "exemption", "gazettal" and "notice".

3.14
regulated application service
telematics applications for regulated commercial freight vehicles (TARV) application service that is mandated by a regulation imposed by a jurisdiction, or an option supported by a jurisdiction

3.15
regulated commercial freight vehicle
vehicle (often but not always designed to haul commercial freight) that is subject to regulations determined by the jurisdiction 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 vehicle

Note 1 to entry: Jurisdictions can choose to require the provision of information via telematics applications for regulated commercial freight vehicles (TARV) or provide operators with the option to do so.

3.16
specification
explicit and detailed description of the nature and functional requirements and minimum performance of equipment, service or a combination of both

3.17
Unified Modeling Language
UML
graphical language for visualizing, specifying, constructing and documenting the artifacts of a software-intensive system

Note 1 to entry: UML offers a standard way to write a system's blueprints, including conceptual elements such as business processes and system functions as well as concrete elements such as programming language statements, database schemas, and reusable software components, and is standardized as ISO/IEC 19501.

3.19
user
party that makes use of the vehicle

EXAMPLE Driver, transport operator, freight owner, etc.

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

app	application programme
CAN	controller area network
C-ITS	cooperative intelligent transport systems
CONOPS	concept of operations
ExVe	extended vehicle (ISO 20077-1)
GNSS	global navigation satellite system
ITS	intelligent transport system
IVS	in-vehicle system
OBU	on-board unit
OEM	original equipment manufacturer
PKI	public key infrastructure
PKC	public key certificate
RAM	random access memory
TARV	telematics applications for regulated commercial freight vehicles
SCMS	security credential management system
SSP	secure service provider
SVI	secure vehicle interface
UML	Unified Modeling Language (ISO))19501)
V2I	vehicle to infrastructure (communication)
V2V	vehicle to vehicle communication
VRU	vulnerable road user

5 Conformance

This document specifies an adaptation of the TARV general architecture. It contains no specific conformance tests. It is possible that some aspects defined within will have conformance tests defined in other parts of the ISO 7815 series, or in the ISO 15638 series.

Conformance declarations for the various parts of the SVI shall be based on the relevant referenced SVI International Standards.

Conformance to any other International Standard or specification referenced in this document shall be ascertained according to the requirements of the referenced document.

Conformance to this document can therefore be attained by self-declaration of conformance, or submission to a test house to ascertain adherence to the provisions of the clauses of this document.