Intelligent transport systems — Vehicle interface for provisioning and support of ITS services —

Part 1:
General information and use case definition

Systèmes intelligents de transport — Interface véhicule pour la fourniture et le support de services ITS —

Partie 1: Informations générales et définition des cas d’utilisation
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard (“state of the art”, for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 13185-1 was prepared by Technical Committee ISO/TC 204, Intelligent transport systems.

ISO 13185 consists of the following parts, under the general title Intelligent transport systems — Vehicle interface for provisioning and support of ITS services:

— Part 1: General information and use case definition [Technical Report]
— Part 2: Protocol requirements and specification for vehicle ITS station gateway (V-ITS-SG) interface\(^1\)
— Part 3: Configuration process requirements and specification for vehicle ITS station gateway (V-ITS-SG)\(^2\)

The following document is under development:

— Part 4: Protocol conformance test cases for vehicle ITS station gateway (V-ITS-SG) interface

\(^1\) To be published.
\(^2\) To be published.
Introduction

This part of ISO 13185 specifies the requirements for a common software interface to a vehicle gateway to easily exchange vehicle information data among nomadic and/or mobile device, vehicle gateway and the vehicle’s ECUs.

Applications supporting ITS service provision and multimedia use via nomadic and mobile device need a common access method to vehicle data through an in-vehicle interface as well as the harmonization of existing standards to support a single vehicle data access solution.

This document defines a vehicle data transfer protocol between vehicle gateway also called V-ITS-SG and the nomadic and/or mobile device (ND).

This part of ISO 13185 may be used by vehicle manufacturers for future vehicle design to support the design of ITS/Telematics and as a retrofit equipment for aftersales vehicles.

Applications supporting ITS service provision and multimedia use via ND may be implemented using vehicle information, driver advisory, warning systems and entertainment systems. The following standards are subject to analysis in regard to their applicability to supporting ITS service provision and multimedia use via nomadic and mobile device.

— ISO 15031 defines emissions-related diagnostic data supported by vehicles in all countries requiring OBD compliance.
— ISO 27145 WWH-OBD defines diagnostic data (emissions-related systems, future safety related systems, etc.) to be supported by vehicles in all countries implementing the GTR (Global Technical Regulation) into their local legislation.
— ISO 22900-2 defines the Modular Vehicle Communication Interface (MVCI) D-PDU API to separate the protocol data unit (PDU) from the vehicle specific protocols.
— ISO 22901 defines the Open Diagnostic data eXchange (ODX) format which is a standard for describing diagnostic related ECU data. This International Standard is becoming the vehicle manufacturer’s choice to document vehicle system diagnostic data and protocol information.
— ISO 22902 is a multimedia and telematics standard based on the AMI-C specification and reference documents for automotive industry. The important logical element of the architecture is a vehicle interface.
— ISO 22837 defines the reference architecture for probe vehicle systems and a basic data framework for probe data.
— ISO/TS 29284 defines the standardization of information, communication and control systems in the field of urban and rural surface transportation, including intermodal and multimodal aspects thereof, traveller information, traffic management, public transport, commercial transport, emergency services and commercial services in the ITS field.
— SAE J2534 defines a standardized system for programming of ECUs in a vehicle.
— SAE J2735 defines the support of interoperability among DSRC applications through the use of standardized message sets, data frames and data elements.

This part of ISO 13185 supports ITS applications which are based on ND in vehicles to operate on a common software interface to a V-ITS-SG integrated within the CALM architecture and easily exchange vehicle information data among ND, V-ITS-SG and ECUs.
Intelligent transport systems — Vehicle interface for provisioning and support of ITS services —

Part 1: General information and use case definition

1 Scope

This part of ISO 13185 specifies the communications architecture and generic protocol to provide and maintain ITS services to travellers (including drivers, passengers and pedestrians), using nomadic and portable devices for:

— The mobile device as a mobile router,
— Augmentation of the capabilities of a nomadic device using information from in-vehicle systems,
— Nomadic device acting as a key to personalise the vehicle configuration,
— Using capabilities of a nomadic or mobile device to augment functionality within the vehicle,
— The use of portable nomadic devices within commercial vehicles and public transport,
— Optimising the use of the capabilities in nomadic and mobile devices in the provision of ITS services,
— Harmonization of existing standards to support a single solution access method,
— Applications supporting ITS service provision and multimedia use a common access method to retrieve vehicle data through a vehicle communication interface.

2 Normative references

The following referenced documents are indispensable for the application 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 15031 (all parts), Road vehicles — Communication between vehicle and external equipment for emissions-related diagnostics

ISO/IEC 15118-13), Road vehicles — Vehicle to grid communication interface — Part 1: General information and use-case definition

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

ISO 22837, Vehicle probe data for wide area communications

ISO 22900-2, Road vehicles — Modular vehicle communication interface (MVCI) — Part 2: Diagnostic protocol data unit application programming interface (D-PDU API)

ISO 22901 (all parts), Road vehicles — Open diagnostic data exchange (ODX)

ISO 22902-5, Road vehicles — Automotive multimedia interface — Part 5: Common message set

3) To be published.

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3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15031-2 and the following apply.

**Bluetooth**

BT communication protocol for exchanging data over short distances

**Communications Access for Land Mobiles**

CALM specification of a common architecture, network protocols and communications interface definitions to enable continuous or quasi-continuous communications between vehicles and the infrastructure, or between vehicles, using wireless telecommunications media that are available in any particular location, and have the ability to migrate to a different available media where required

**eco lamp**

lamp that is implemented on the dashboard or nomadic device to guide the driver to drive the vehicle in the most economical way

EXAMPLE A green lamp/symbol will indicate high fuel efficiency driving or travelling at a constant speed while a red lamp/symbol will indicate low fuel efficiency, i.e. strong acceleration, sudden braking.

**event log file**

data record with multiple event data stored with time stamp

**nomadic device**

ND device that provides communications connectivity via equipment such as cellular telephones, mobile wireless broadband (WIMAX, HC-SDMA, etc.), WiFi, etc. and includes short range links, such as Bluetooth, Zigbee, etc. to connect nomadic devices to the motor vehicle communications system network

**Vehicle-Intelligent Transport Systems-Station Gateway**

V-ITS-SG interface device in the vehicle that acts as the vehicle’s mobile gateway between the vehicle’s ECU(s) and the external nomadic device

**V-ITS-SG long term memory**

storage of all data in internal memory which are required to be available after key On/Off cycles

**V-ITS-SG short term memory**

storage of all data in internal memory which shall only be available during this key On/Off cycle

4) To be published.
Vehicle State Of Capabilities Log File
VSOCLogFile
data record with multiple data snapshots including a pre-selected data set providing a vehicle capabilities
status of the vehicle’s electronic system(s)

3.2 Abbreviated terms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>BT</td>
<td>Bluetooth</td>
</tr>
<tr>
<td>CALM</td>
<td>Communications Access for Land Mobiles</td>
</tr>
<tr>
<td>DLL</td>
<td>Dynamic Link Library</td>
</tr>
<tr>
<td>DSRC</td>
<td>Dedicated Short Range Communications</td>
</tr>
<tr>
<td>DTC</td>
<td>Diagnostic Trouble Code</td>
</tr>
<tr>
<td>ECU</td>
<td>Electronic Control Unit</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>ITS-S</td>
<td>Intelligent Transport System-Station</td>
</tr>
<tr>
<td>LL</td>
<td>Logical Link</td>
</tr>
<tr>
<td>N2V</td>
<td>Nomadic and mobile devices to Vehicle</td>
</tr>
<tr>
<td>ND</td>
<td>Nomadic device</td>
</tr>
<tr>
<td>OBE</td>
<td>On-Board Equipment</td>
</tr>
<tr>
<td>PDU</td>
<td>protocol data unit</td>
</tr>
<tr>
<td>RMI</td>
<td>Repair and Maintenance Information</td>
</tr>
<tr>
<td>RSE</td>
<td>Road Side Equipment</td>
</tr>
<tr>
<td>V2N</td>
<td>Vehicle to Nomadic and mobile devices</td>
</tr>
<tr>
<td>VIN</td>
<td>Vehicle Identification Number</td>
</tr>
<tr>
<td>V-ITS-SG</td>
<td>Vehicle-Intelligent Transport System-Station Gateway</td>
</tr>
<tr>
<td>VSOC</td>
<td>Vehicle State Of Capabilities</td>
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</tbody>
</table>

4 Conventions

This part of ISO 13185 is based on the conventions discussed in the OSI Service Conventions (ISO/IEC 10731:1994) as they apply to communication services. The vehicle data transfer protocol is applicable to OSI layers 4, 5, 6 and 7.

5 General information

5.1 Document overview and structure

The ISO 13185 series provides an implementer with all documents and references required to support the implementation of the requirements related to standardized access to automotive Repair and Maintenance Information (RMI) in accordance with the requirements set forth in the EC mandate M/421.

— Part 1: This Technical Report provides an overview of the document set and structure along with the use case definitions and a common set of resources (definitions, references) for use by all subsequent parts.
5.2 Purpose of this Technical Report

The main purpose of this Technical Report is to:

a) Identify the requirements of bidirectional vehicle data transfer,
b) Identify the usability of the existing International Standards for nomadic and mobile devices and existing vehicle communication network access standards,
c) Identify additional work required to develop the common software interface to a vehicle gateway integrated within the CALM architecture by the amendment of the existing interface to D-PDU API in the provision and support of ITS services via nomadic and mobile devices.

5.3 ITS communication architecture components

The ITS communication architecture is a communication system designed for ITS and made of four physically separated subsystem components:

— the vehicle subsystem component: Vehicle ITS Station (Vehicle ITS-S),
— the nomadic and mobile subsystem component: Personal ITS Station (Personal ITS-S),
— the roadside subsystem component: Roadside ITS Station (Roadside ITS-S),
— the central subsystem component: Central ITS Station (Central ITS-S).

Figure 2 illustrates the connection between the Personal and Vehicle ITS Station. The V-ITS-S consists of:

— the V-ITS-S Router supporting the CALM architecture, and
— the V-ITS-S Host and Gateway to the in-vehicle networks.
Each of the four components described in 5.3 and in Figure 3 contains the ITS subsystem components and usually a vehicle gateway connecting the ITS Station to a legacy system. The vehicle requires a vehicle gateway connected to the Vehicle Station and to the vehicle manufacturer’s proprietary vehicle network. These components are inter-linked by a communication network. The communication between the vehicle subsystem component and the mobile subsystem component are performed over a short range wireless or wired communication media.

Figure 3 illustrates the communication system designed for ITS.