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

Part 2: Unified gateway protocol (UGP) requirements and specification for vehicle ITS station gateway (V-ITS-SG) interface

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Systèmes intelligents de transport — Interface véhicule pour la fourniture et le support de services ITS —
Partie 2: Exigences de protocole et spécification pour l'interface passerelle de la station ITS du véhicule

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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

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

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— *Part 1: General information and use case definition*

— *Part 2: Unified gateway protocol (UGP) requirements and specification for vehicle ITS station gateway (V-ITS-SG) interface*

The following parts are under preparation:

— *Part 3: Unified gateway protocol (UGP) server and client API specification*

— *Part 4: Unified gateway protocol (UGP) conformance test specification*

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Introduction

This part of ISO 13185 has been established to define the requirements of a common software interface to a vehicle gateway to easily exchange vehicle information data amongst nomadic and/or mobile device, vehicle gateway, and the vehicle's Electronic Control Units (ECUs).

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

This document defines an ASN.1-based protocol between the nomadic and/or mobile device (ND) and the UGP Server (implemented in the V-ITS-SG) in the vehicle.

To achieve this, it is based on the Open Systems Interconnection (OSI) Basic Reference Model specified in ISO/IEC 7498-1 and ISO/IEC 10731, which structures communication systems into seven layers.

This part of ISO 13185 can be used by vehicle manufacturers for future vehicle design to support the design of vehicle gateways to interface with NDs.

The ND applications need vehicle information data through an in-vehicle interface access method (V-ITS-S with V-ITS-SG).

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 to easily exchange vehicle information data among ND, vehicle V-ITS-SG, and ECUs.

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The protocol implementation in the vehicle gateway features the following:

— the deny of access to the vehicle gateway data by unauthorized on-board and off-board test equipment;

— the deny of access to parts of the vehicle gateway data by unauthorized on-board and off-board test equipment (privacy);

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— the identification of the vehicle gateway and the vehicle it is installed in;

— the list of in-vehicle connected ECUs to the vehicle gateway and their data parameters;

— methods to configure the access to vehicle data.

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

Part 2: Unified gateway protocol (UGP) requirements and specification for vehicle ITS station gateway (V-ITS-SG) interface

1 Scope

This part of ISO 13185 specifies the requirements of an ASN.1-based protocol between a vehicle-ITS-Station Gateway (V-ITS-SG) and a nomadic and/or mobile device (ND) to easily exchange vehicle information data.

The ASN.1-based protocol has been specified to support a wired or wireless connection between the ND and V-ITS-SG.

The Unified Gateway Protocol (UGP) is used between the V-ITS-SG and the ND. UGP supports several features in order to provide

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— authorization (data privacy),

— secured access,

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— V-ITS-SG and in-vehicle ECUs identification,

— real-time vehicle data parameters with identifier and type information in ASN.1 format, and

— enhanced vehicle data parameters with identifier and type information in ASN.1 format.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13185–1, *Intelligent transport systems — Vehicle interface for provisioning and support of ITS services — Part 1: General information and use case definition*

ISO 14229-2, *Road vehicles — Unified diagnostic services (UDS) — Part 2: Session layer services*

3 Terms, definitions, symbols, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13185–1 and the following apply.

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3.1.1
authentication
cryptographic service that provides assurance that the sender of a communication is who they claim to be

Note 1 to entry: Authentication might involve confirming the identity of a person or software program, tracing the origins of an artefact, ensuring that a product is what its packaging and labelling claims to be.

3.1.2
authorization
right granted by an authority

3.1.3
application layer protocol data unit
A_PDU
group of information added or removed by a layer of the OSI model

Note 1 to entry: Each layer in the model uses the PDU to communicate and exchange information, which can only be read by the peer layer on the receiving device and is then handed over to the next upper layer after stripping.

Note 2 to entry: The A_PDU (Application layer Protocol Data Unit) is directly constructed from the A_SDU (Application layer Service Data Unit) and the layer specific control information A_PCI (Application layer Protocol Control Information).

3.1.4
application layer service data unit
A_SDU
unit of data that has been passed down from an OSI layer to a lower layer and that has not yet been encapsulated into a protocol data unit (PDU) by the lower layer

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Note 1 to entry: It is a set of data that is sent by a user of the services of a given layer and is transmitted semantically unchanged to a peer service user. A_SDU is the SDU in the OSI layer 7 (application layer).

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3.1.5
privacy
choice made by the vehicle owner to grant information access (refer to directive 2002/58/EC dated 12 July 2002).

3.1.6
UGP Client
client implementing the UGP services

Note 1 to entry: For example, ND.

3.1.7
UGP Server
server implementing the UGP services

Note 1 to entry: For example, V-ITS-SG.

3.1.8
unified gateway protocol
UGP
application layer protocol to enable a *UGP Client* (3.1.6) to access data from the *UGP Server* (3.1.7)

3.2 Abbreviated terms

API	application programming interface
ASN.1	abstract syntax notation one
A_PDU	application layer protocol data unit

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API	application programming interface
A_SDU	application layer service data unit
BT	bluetooth
C	conditional
C-ITS-S	central-intelligent transport system-station
CRC	cyclic redundancy check
Cvt	convention (M, O, C)
DTC	diagnostic trouble code
ECU	electronic control unit
ITS	intelligent transport systems
HCI	host controller interface
L2CAP	logical link control and adaptation protocol
LC	baseband link controller
LMP	link manager protocol
M	mandatory
ND	nomadic device
O	optional
OBEX	object exchange
PER	packed encoding rules
P-ITS-S	personal- intelligent transport system-station
RFCOMM	radio frequency communication (serial emulation API)
R-ITS-S	roadside- intelligent transport system-station
SDP	service discovery protocol
UDS	unified diagnostic services
UGP	unified gateway protocol
U-PER	unaligned packed encoding rules
VIN	vehicle identification number
V-ITS-SG	vehicle-intelligent transport system-station gateway

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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 for communication services.

These conventions specify the interactions between the service user and the service provider. Information is passed between the service user and the service provider by service primitives, which can convey parameters.

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The distinction between service and protocol is summarized in Figure 1.

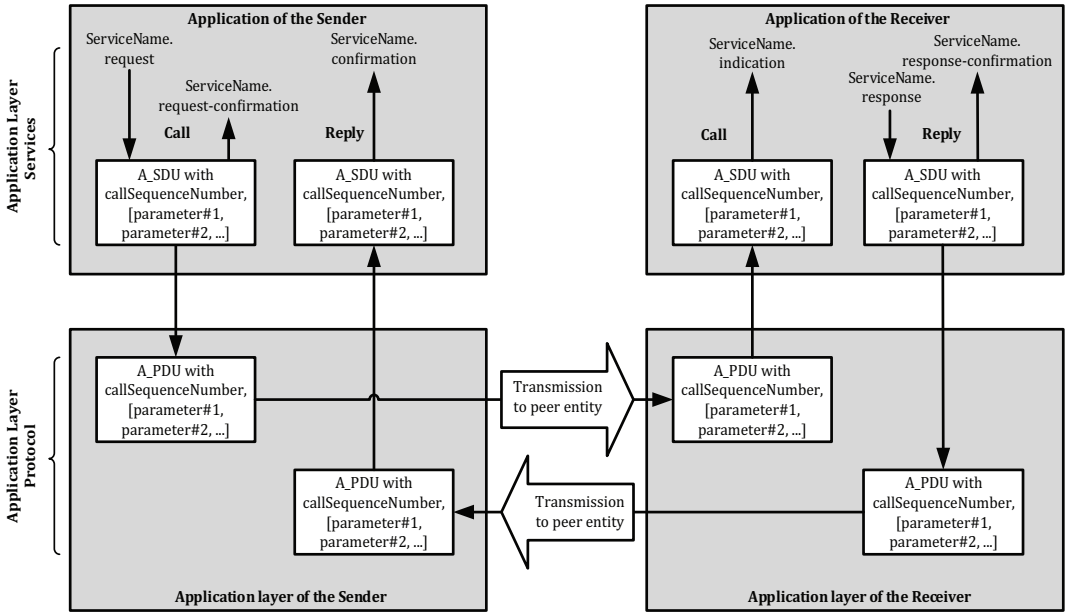

Figure 1 — Services and the protocol

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This part of ISO 13185 defines services using the six service primitives: request, req_confirm, indication, response, rsp_confirm, and confirmation.

The request and indication service primitives always have the same format and parameters. Consequently for all services, the response and confirmation service primitives (except req_confirm and rsp_confirm) always have the same format and parameters. When the service primitives are defined in this part of ISO 13185, only the request and response service primitives are listed.

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5 Document overview

Figure 2 shows the UGP document structure and automotive protocols and interfaces.

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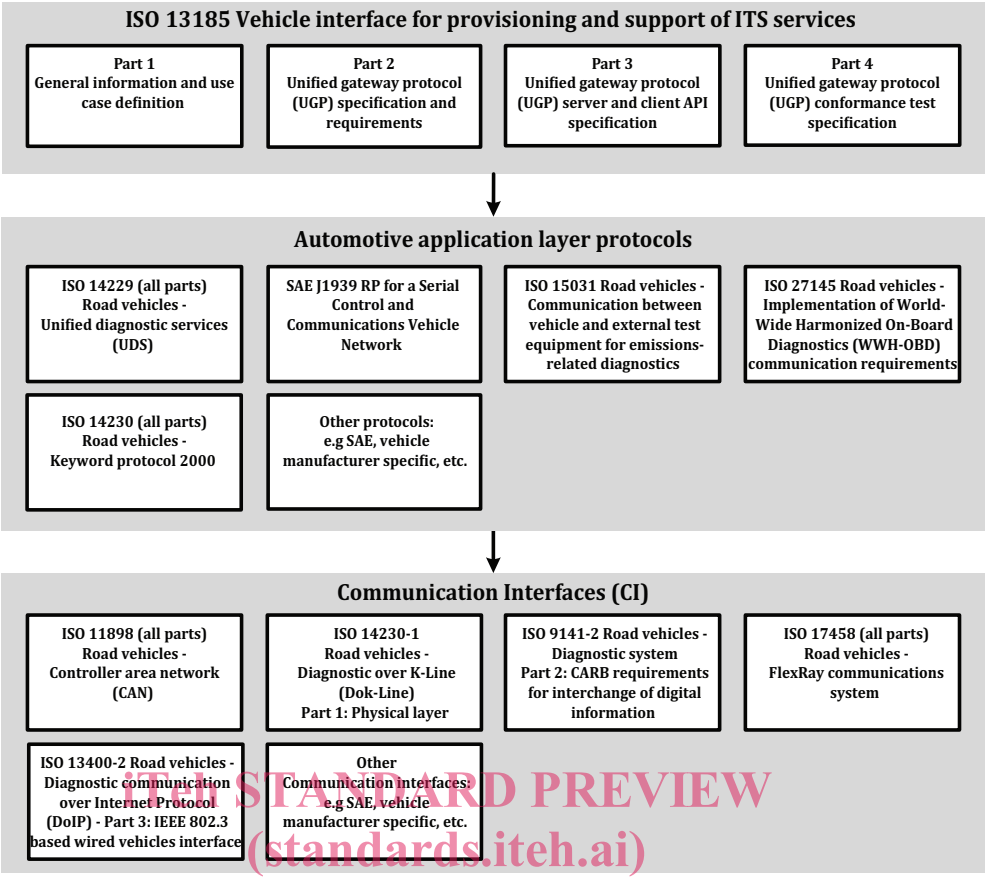

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Figure 2 — UGP document structure and automotive protocols and interfaces

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Figure 3 illustrates the implementation of the UGP and UDS document reference according to OSI model into a V-ITS-SG. Both UGP and UDS use the same session layer services as defined in ISO 14229-2. Non-UDS based protocols use their own session, transport, and network layer services.

Communication services as they apply to the OSI Service Conventions:

— Application layer:
This part of ISO 13185 specifies the requirements of an ASN.1 based UGP independent of underlying data link.

— Session layer:
ISO 14229-2 specifies the session layer services. This part of ISO 13185 uses the same session layer services as ISO 14229-1.

— Transport and Network layer:
Each communication link provides its own set of transport protocols and network layer services.

— Data link and Physical layer:
Each communication link provides its own set of data link and physical layer services.

The OSI layered concept implemented for the ISO 14229 series is the same as the one used for the ISO 13185 series.

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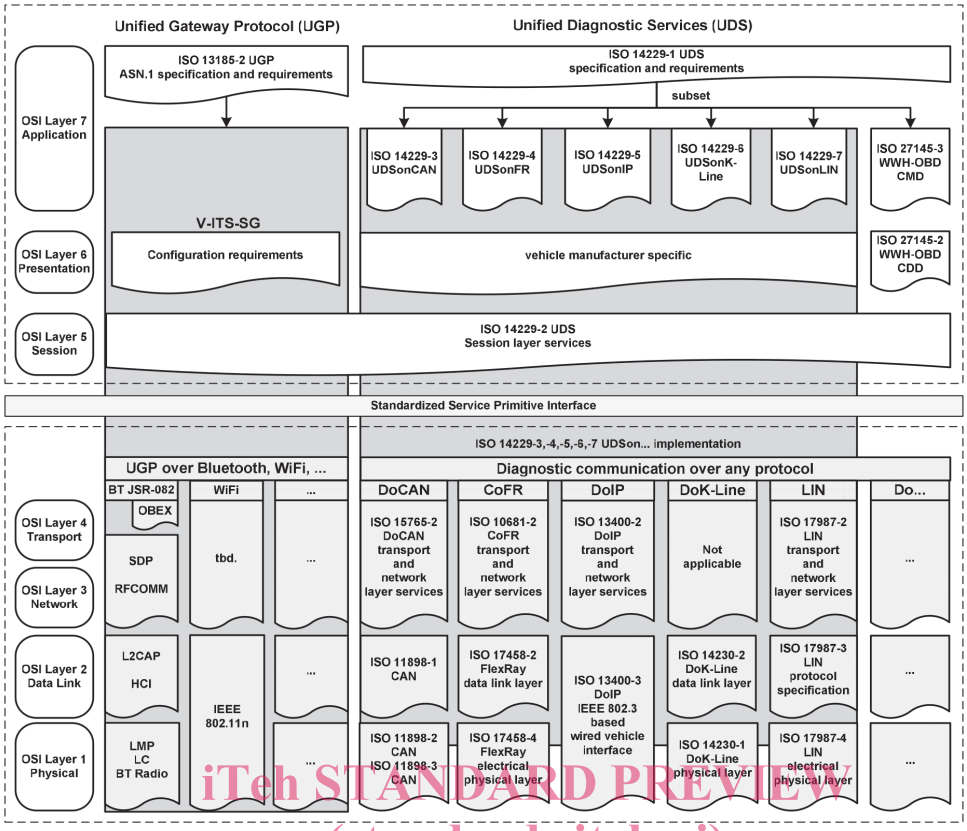

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Figure 3 — Implementation of UGP document reference according to OSI model

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6 UGP application layer services

6.1 General

Figure 4 illustrates the connection between the ND and V-ITS-SG. UGP provides application layer services to exchange the data between the Nomadic Device and the V-ITS-SG.

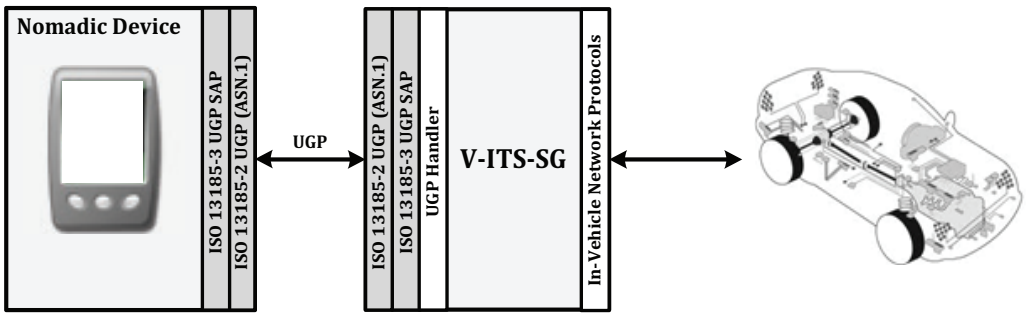

Figure 4 — Connection between ND and V-ITS-SG

6.2 Service primitives

Application layer services are referred to as Unified Gateway Protocol (UGP) services. The application layer services are used in client-server based systems to perform functions such as test, inspection, monitoring or diagnosis of on-board vehicle servers. The UGP Client, referred to as the P-ITS-S, R-ITS-S, or C-ITS-S, uses the application layer UGP services to request data from the UGP Server. The UGP Server uses the application layer services to send response data, provided by the requested UGP service, back

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to the UGP Client. The usage of application layer UGP services is independent from the UGP Client being an off-board or on-board tester. It is possible to have more than one UGP Client connected.

The UGP server and client API provides a number of services that all have the same general structure. For each service, six service primitives are specified:

— a **service request primitive**, used by the client function in the UGP application, to pass data about a requested UGP service to the diagnostics application layer;

— a **service request-confirmation primitive**, used by the client function in the UGP application, to indicate that the data passed in the service request primitive is successfully sent on the V-ITS-SG the nomadic device is connected to;

— a **service indication primitive**, used by the UGP application layer, to pass data to the server function of the server UGP application;

— a **service response primitive**, used by the server function in the V-ITS-SG UGP application, to pass response data provided by the requested UGP service to the UGP application layer;

— a **service response-confirmation primitive**, used by the server function in the V-ITS-SG UGP application, to indicate that the data passed in the service response primitive is successfully sent on the V-ITS-SG the nomadic device received the UGP request on;

— a **service confirmation primitive** used by the UGP application layer to pass data to the client function in the UGP application.

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6.3 Application layer service primitives — Confirmed service

For a given service, the request-confirmation primitive and the response-confirmation primitive always have the same service data unit. The purpose of these service primitives is to indicate the completion of an earlier request or response service primitive invocation.

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The response-confirm primitive is used by the application layer to indicate an internal event, which is significant to the server application, and pass communication results of an associated previous service response to the server function in the V-ITS-SG application.

Figure 5 depicts the application layer service primitives – Confirmed service.

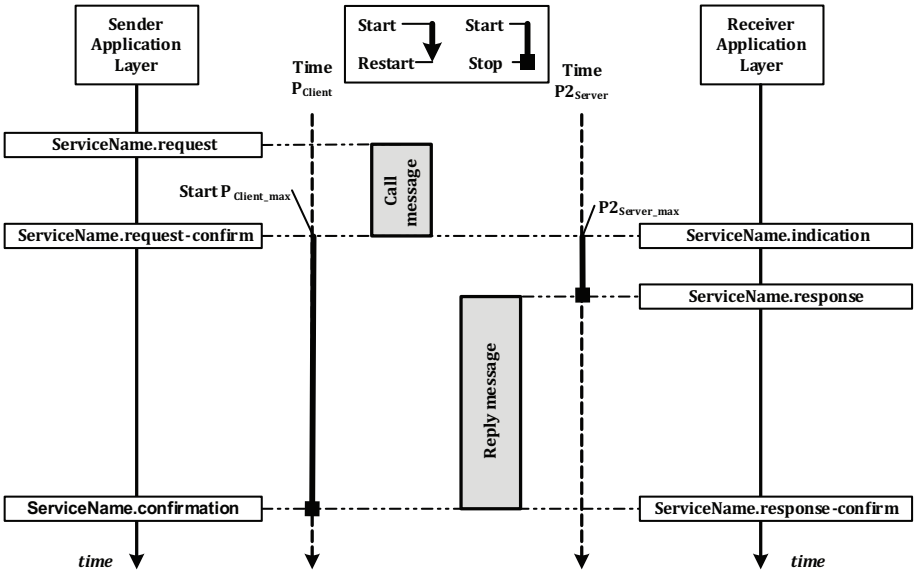

Figure 5 — Application layer service primitives – Confirmed service