TECHNICAL SPECIFICATION

ISO/TS 17426

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Intelligent transport systems — Cooperative systems — Contextual speeds

Systèmes intelligents de transport — Systèmes coopératifs — Vitesses contextuelles

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Contents

Page

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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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.

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

Introduction

Traditional fixed speed limits have, in general, been set as the maximum mandatory speed that a vehicle or a category of vehicles can travel at. Such speed limits are defined by the competent authority. Some national authorities moderate mandatory speed limits when road or environment conditions change. When road or environmental conditions change, the decision as to the most appropriate speed a driver or rider should travel is, in general, left up to the individual vehicle driver. With the advent of Cooperative Intelligent Transport Systems (ITS), it has become possible to provide better guidance to vehicle drivers on what speed they should travel at when road, traffic, or environmental conditions are less than ideal. This function is known as Contextual Speed Information Service.

Delivering Contextual Speed information to road users can improve road safety, support traffic management, and reduce greenhouse gas emissions.

In a Cooperative ITS environment, Contextual Speeds are context-dependent (e.g. changed due to weather conditions), as well as time-specific and road section-specific speeds. Subject to local regulations, they can be mandatory speed limits or advisory speeds.

All Cooperative ITS Services follow the same abstract structure of detection (of an event) including pre-processing of the detected content, execution of the Service algorithm (processing of detected content) and presentation or utilization of the Service result. Figure 1 summarizes and further illustrates this process.

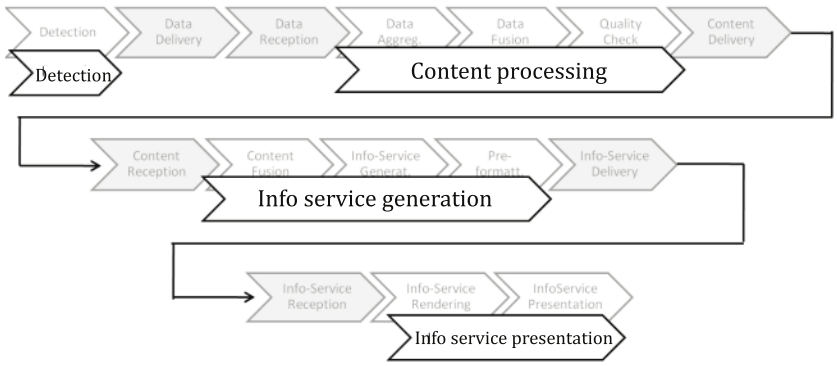


Figure 1 — General Cooperative ITS Service process (from ISO/TS 17427:2014, Figure A.6)

Based on this abstract process description, for any Cooperative ITS Service, a similar process description applies to the Contextual Speed Information Service. Every single step in the process chain can be executed by different actors or stakeholders. Execution of process elements by different stakeholders results in a large number of possible potential scenarios. Additionally, the involvement of stakeholders can be distinguished by spatial geography.

Assuming that there are two main stakeholder groups in Cooperative ITS, namely the Infrastructure and the Vehicle, multiple combinations are possible, as every step can be delivered by a different stakeholder group (see Figure 2).

	CONTENT	SERVICE	PRESENTATION		CONTENT	SERVICE	PRESENTATION
1	Vehicle	Vehicle	Vehicle	5	Infrastructure	Vehicle	Vehicle
2	Vehicle	Vehicle	Infrastructure	6	Infrastructure	Vehicle	Infrastructure
3	Vehicle	Infrastructure	Vehicle	7	Infrastructure	Infrastructure	Vehicle
4	Vehicle	Infrastructure	Infrastructure	8	Infrastructure	Infrastructure	Infrastructure

Figure 2 — Possible scenarios — Simple

The scenarios address different combinations; the basis for every scenario is one specific combination. This Technical Specification addresses the scenario where detection, content pre-processing, and information service generation is the responsibility of the infrastructure stakeholder. The direct presentation of Contextual Speed information on the driver interface of the vehicle is out of the scope of this Technical Specification. This Technical Specification therefore addresses only part of the whole process (Scenario 7).

Within the context of Scenario 7, this Technical Specification addresses Use Case 1 “Provision of mandatory speed limit information into vehicle – for driver awareness purposes” and Use Case 2 “Provision of advisory speed information into vehicle – for driver awareness purposes”.

This does not preclude other Use Cases or deployment models in later Technical Specification(s).

Intelligent transport systems — Cooperative systems — Contextual speeds

1 Scope

This Technical Specification

— specifies the Contextual Speed Information Service, namely the general requirements regarding the provision of the Contextual Speed Information Service, the data flow supporting the service, and the presentation of the service result,

— specifies the requirements to be fulfilled by the Contextual Speed Information Service,

— specifies the ITS Station (ITS-S) application processes of the vehicle ITS station, roadside ITS station, central ITS station, and personal ITS station that are required to instantiate the Contextual Speed Information Service,

— specifies sets of communication requirements and objectives (profiles) using the methods defined in ISO 17423 to select the level of performance (best effort or real-time, etc.), confidence and security (authentication, encryption, etc.) for each Contextual Speed Information Service communication flow between ITS stations,

— selects relevant functions and procedures provided by the ITS station facilities layer (see ISO 17429), and

— specifies messages, messages sets structure, content, and syntax to be used by the Contextual Speed Information Service.

This Technical Specification considers the scenario for the transmission of Contextual Speed information from the infrastructure/roadside to the vehicle, for onward presentation to the vehicle's driver. This scenario foresees that the calculation of Contextual Speed information is performed on the Infrastructure side, not within the vehicle.

Mandatory speed limits or advisory speed recommendations are output of the Contextual Speed Information Service which (in the scenario considered in this Technical Specification) is run by the Road Operator in its Traffic Control Centre or comparable infrastructure (e.g. Roadside ITS Station). To transfer this information to the vehicle (and therefore the driver) over the air (wireless communication), defined messages are required. These messages are specified in this Technical Specification.

When Contextual Speed information arrives in the vehicle, further pre-processing might be necessary before the Contextual Speed information, and, if available, additional explanations on speed limits or recommendations, can be presented to the driver. This Technical Specification specifies the requirements that need to be fulfilled when processing the messages. It does not specify how the vehicle handles the incoming messages.

The production of information supporting this application, its qualification and its relevance are out of the scope of this Technical Specification.

This Technical Specification addresses Use Case 1 "Provision of mandatory speed limit information into vehicle – for driver awareness purposes" and Use Case 2 "Provision of advisory speed information into vehicle – for driver awareness purposes".

2 Conformance

To claim conformance to this Technical Specification, all mandatory requirements shall be fulfilled by the implementation under test.

NOTE 1 Conformance testing may be different for different roles/actors. This Technical Specification identifies the requirements for a number of Protocol Implementation Conformance Statements (PICS) proforma, allowing to claim conformance to defined subsets of ISO/TS 17426 requirements.

NOTE 2 This Technical Specification adopts the ISO/IEC 9646-7 approach for conformance testing specifications (i.e. development of PICS proforma, TSS&TP, ATS, and PIXIT).

3 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 21217, *Intelligent transport systems — Communications access for land mobiles (CALM) — Architecture*

ISO 24102–3, *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 3: Service access points*

ISO 24102–6[1)], *Intelligent transport systems — Communications access for land mobiles (CALM) — ITS station management — Part 6: Path and flow management*

ISO/TS 17419, *Intelligent transport systems — Cooperative systems — Classification and management of ITS applications in a global context*

ISO/TS 17423, *Intelligent transport systems — Cooperative systems — ITS application requirements and objectives for selection of communication profiles*

ISO/TS 17425, *Intelligent transport systems — Cooperative systems — Data exchange specification for in-vehicle presentation of external road and traffic related data*

ISO/TS 17427, *Intelligent transport systems — Cooperative systems — Roles and responsibilities in the context of cooperative ITS based on architecture(s) for cooperative systems*

ISO/TS 17429[2)], *Intelligent transport systems — Cooperative ITS — ITS station facilities for the transfer of information between ITS stations*

ISO/TS 18750, *Intelligent transport systems — Cooperative systems — Definition of a global concept for Local Dynamic Maps*

ISO/TS 19321, *Intelligent transport systems — Cooperative ITS — Dictionary of in-vehicle information (IVI) data structures*

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21217, ISO 24102-3, ISO 24102-6, ISO/TS 17419, ISO/TS 17423, ISO/TS 17425, ISO/TS 17427, ISO/TS 17429 and the following apply.

4.1
advisory speed
speed set by an authority which it considers appropriate to the road, traffic, or environmental conditions being experienced

1) To be published.

2) To be published.

4.2
advisory speed information
set of C-ITS data elements related to an advisory speed

4.3
C-ITS authority data set
set of C-ITS data elements describing policies or regulations

4.4
contextual speed
context-dependent (e.g. weather conditions), as well as time-specific and road section-specific speed

Note 1 to entry: Subject to local regulations, a Contextual Speed may be a mandatory speed limit or an advisory speed.

4.5
contextual speed information
set of C-ITS data elements related to a Contextual Speed

4.6
mandatory speed information
set of C-ITS data elements related to a *mandatory speed limit* (4.7)

4.7
mandatory speed limit
legally defined, maximum or minimum, speed limit for specific types or classes of vehicles or all vehicles on a defined section of road

4.8
relevance zone
parts of the road network for which the contextual speed is valid

5 Symbols and abbreviated terms

ADU	Application Data Unit
ATS	Abstract Test Suite
BSMD	Bounded Secured Managed Domain
C-ITS	Cooperative ITS
CSM	Contextual Speed Message
HMI	Human Machine Interface
ICT	Information Communications Technologies
ITS	Intelligent Transport Systems
ITS-AID	ITS Application Identifier
ITS-S	ITS Station
ITS-SCU	ITS-S Communication Unit
ITS-SU	ITS-S Unit
LDM	Local Dynamic Map
n.a.	not applicable
OEM	Original Equipment Manufacturer
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
TSS&TP	Test Suite Structure and Test Purposes

6 Contextual Speeds: Architecture

The architecture of the ITS station (ITS-S) specified in ISO 21217 is illustrated in Figure 3.

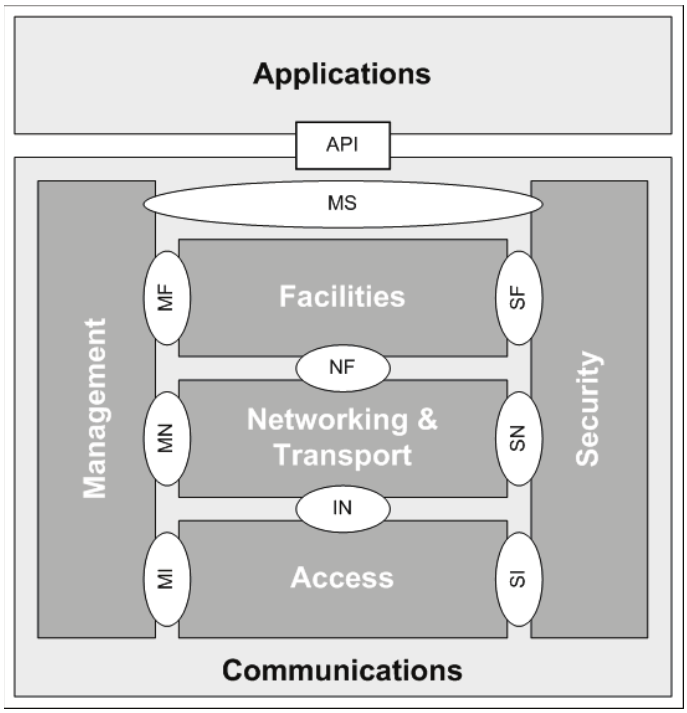


Figure 3 — Simplified ITS-S reference architecture (from ISO 21217)

The Contextual Speed Information Service is provided to users by execution of the Contextual Speed Application. The Contextual Speed Application is an instantiation of the Contextual Speed Information Service that involves the association of complementary ITS-S application processes.

In order to be able to install and execute these ITS-S application processes in an ITS station unit (ITS-SU) operated as a Bounded Secured Managed Domain (BSMD) specified in ISO 21217, registration procedures identified in ISO/TS 17419 shall be applied.

The Contextual Speed Application requires communications between these ITS-S application processes residing in ITS station units. Such communications include the exchange of Contextual Speed Messages (CSM).

In order to enable communications between ITS-S application processes residing in different ITS Station Communication Units (ITS-SCU) prior to transmission of application data units (ADUs), each ITS-S application process has to register at the ITS-S management and present its communication requirements as specified in ISO/TS 17423. Required values to be presented for the ITS-S application processes of the Contextual Speed Application are specified in Clause 11.

Upon this registration and presentation of communication requirements, the ITS-S management will identify the most appropriate communication profile for each source of data and assign a “FlowID” to it as specified in ISO 24102-6.

Communications requires features of the ITS-S facilities layer both for transmission and for reception of ADUs as specified in ISO/TS 17429.

The Contextual Speed Application requires that their related ITS-S application processes provide received geo-referenced and time-stamped information to a Local Dynamic Map (LDM) specified in ISO/TS 18750. The LDM is the key element to enable cooperative behaviour in an ITS-SU, i.e. the sharing of data between applications.

The Contextual Speed Application requires retrieving LDM data elements either by a subscription mechanism or by a query mechanism.

The Contextual Speed Application is uniquely identified by the registered "ITS Application Identifier" (ITS-AID) specified in ISO/TS 17419.

NOTE Contextual Speed Application uses predefined messages from the ITS Message Set as uniquely identified by the registered "ITS Message Set Identifier" (ITS-MsgSetID) specified in ISO/TS 17419. The values of ITS-AID and ITS-MsgSetID will be assigned by the respective registration authority. The numbering of messages in this ITS Message Set is as uniquely defined for this ITS Message Set.

7 Contextual speeds: Use cases

7.1 General

The Contextual Speed Information Service is provided to users by execution of the Contextual Speed Application. The Contextual Speed Application provides information from a sending ITS station to an ITS station in a vehicle. The sending ITS station is typically a roadside or a central ITS station. The ITS station in a vehicle may either be a vehicle ITS station or a personal ITS station. The information supported by the Contextual Speed Application concerns either static or dynamic advisory speed guidance or mandatory speed limits. This information is typically provided by road/traffic managers or authorized service providers to drivers in order to improve the road safety, reduce environmental impact, and enhance the traffic flow.

NOTE 1 Traditionally, much of this information is available on fixed plate road traffic signs or variable displays at the roadside or mounted above or to the side of specific lanes.

As an element of the Contextual Speed Information Service is the ability to transfer and use information from an external environment into the vehicle for subsequent presentation, it is essential that the service provides stable, robust, and reproducible results given a specified input condition especially in respect of mandatory speed limits.

Furthermore, some basic safety and legal constraints are necessary, such that advisory speed outputs shall never exceed the maximum mandatory speed limit (for the vehicle class, driver qualifications and other legally enforceable conditions that may apply) for defined identifiable sections of road. Similarly, the advisory speed shall never be less than a minimum mandatory speed limit (for legally enforceable conditions).

Both mandatory and advisory speed outputs shall relate to defined, repeatable, resolvable locations.

Where the Contextual Speed Information Service is used to convey mandatory speed limits, the application service provider shall ensure robust recording of mandatory speed limit information disseminated.

NOTE 2 Advisory speed may be provided for eco-driving (ecologic and economic) with the objective to reduce pollution and energy consumption costs.

The use cases identified are the following:

— Use case 1: Provision of mandatory speed limit information into vehicle – for driver awareness purposes;

— Use case 2: Provision of advisory speed information into vehicle – for driver awareness purposes.

Vehicle ITS station

Road side ITS station

Figure 4 — Display of Contextual Speed information (courtesy Renault)

7.2 Use case 1: Provision of mandatory speed limit information into vehicle – for driver awareness purposes

Table 1 gives details of the Use case 1 for provision of mandatory speed limit information into vehicle – for driver awareness purposes.

Table 1 — Use Case 1: Provision of mandatory speed limit information into vehicle – for driver awareness purposes

Use case name	Provision of mandatory speed limit information into vehicle – for driver awareness purposes
Use case description	This use case foresees the Contextual Speed Information Service providing information from a sending ITS station (typically a roadside or central ITS station) to an ITS station in a vehicle (typically a vehicle ITS station or a personal ITS station) concerning either static or dynamic mandatory speed limits. This information is presented through the vehicle's machine to human interface (HMI) to warn the vehicle's driver if a maximum speed limit is being exceeded (with user defined buffer) or that a minimum speed limit is not being achieved (with user defined buffer). This information shall be provided by an OEM or Content Service Provider (see Clause 8) as an authorized source. This source may often be road/traffic managers or authorized service providers. The Contextual Speed information is presented to drivers in order to improve the road safety, reduce environmental impact, and enhance the traffic flow.
Use case scope	The scope of this Use Case is the definition of the exchange from an ITS station (roadside or central ITS station) to an ITS station in a vehicle – for the provision of information concerning mandatory speed limit(s) into the vehicle – for driver awareness purposes. It does not include the exchanges of data between the sending ITS station and any other source systems, or vice versa; the mechanism for production of the Contextual Speed Message; or any actions taken by the vehicle's systems on receipt of the Contextual Speed Message.
Target system release	Cooperative ITS – Infrastructure-to-Vehicle applications
Generality/abstraction level	High-level abstract

Table 1 *(continued)*

Use case stakeholders	— Road administrations — Police and enforcement administrations — Automotive manufacturers and their supply chain — Radio spectrum regulators — Broadcast/RF industry — Drivers — Manufacturers of roadside and central station equipment — Other authorized government departments, agencies or agents — Road operators and traffic managers NOTE: Aftermarket stakeholders included.
Use case goal	To correctly provide suitable contextual information on mandatory speed limits.
Use case assumptions	— Methods for ensuring the accuracy of the context for mandatory speed limit information can be assured. Measures of accuracy include timeliness, representation of physical relevance of speed limit information, applicability to vehicle type/class, value of the speed limit. — Data exchange between the sending ITS station (typically a roadside/central ITS station) and the ITS station in the target vehicle(s) is successfully completed in a timely manner. — The positional relevance of a speed limit on creation suitably maps to the vehicles cognisant of position to exceed defined quality requirements. — Suitable fail-safe mechanisms will be put in place of areas of non-reception of information.
Use case technology restrictions	Data exchange between the sending ITS station and the ITS station in the vehicle is successfully completed in a timely manner.
Relationships to other use case(s)	Linked to other Contextual Speed Information Service use cases

Table 1 *(continued)*

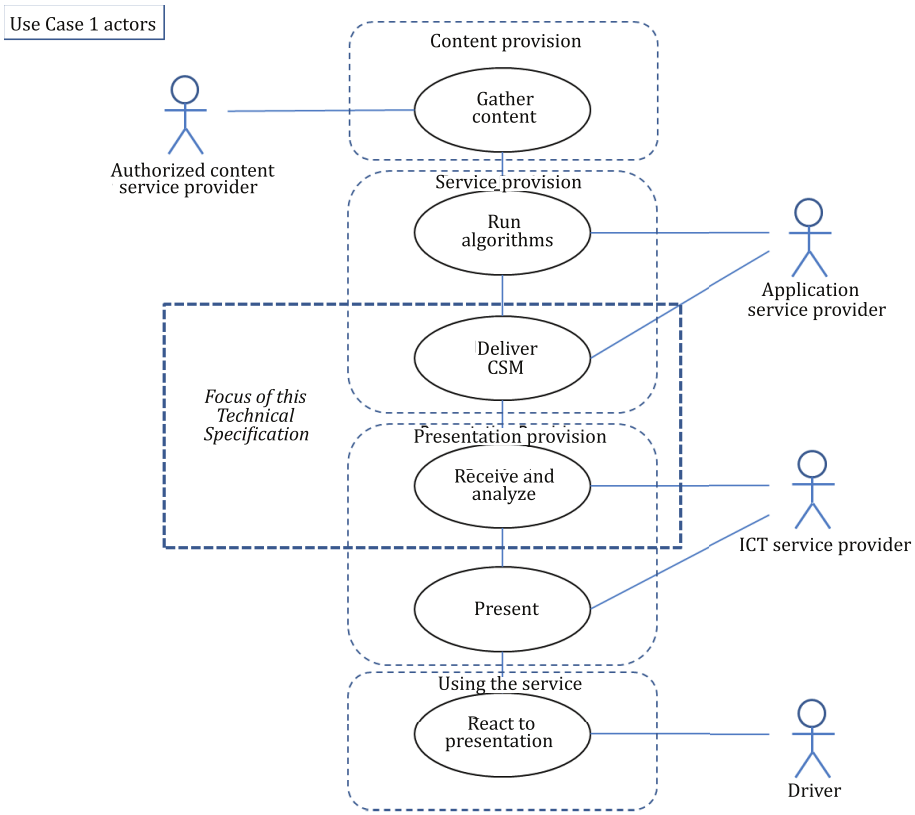
Actors for this use case	As indicated in Clause 8, the actors relevant for this use case are: For content provision: — Content Service Provider For service provision: — Application Service Provider For presentation provision: — ICT service provider These actor roles may be met by one or a combination of organizational entities, e.g. commercial service providers, road operators, etc. 
Use case triggers	None – foreseen as a high-periodicity broadcast or unicast from the sending ITS station (roadside or central ITS stations) of Contextual Speed information
Use case pre-conditions	— Availability of suitable quality speed limit information — Availability of means of communication between the sending ITS station and the ITS station in the target vehicle — Availability of sending ITS station(s) and an ITS station in the target vehicle

Table 1 *(continued)*

Use case steps	1) Gather Content – As part of the Content Provision sub-role (see Clause 8), information on mandatory maximum and, if present, minimum speed limits shall be collected from available sources. In the case of fixed speed limits, such sources could include road databases. In the case of dynamic speed limits other infrastructure sensor data and vehicle, probe data may be used to determine and validate the current dynamic mandatory speed limit. Such dynamic speed limits may reflect traffic conditions, weather conditions, ambient lighting conditions, road surface conditions, and environmental conditions. This step is outside the scope of this Technical Specification. 2) Run Algorithms – As part of the Service provision sub-role (see Clause 8), analyses are undertaken to identify the appropriate content to be distributed. For example, if different environmental and traffic conditions dedicate several distinct mandatory maximum speed limits for a specific class of vehicle and driver, the algorithms shall be used to select the lowest mandatory maximum speed limit applicable for distribution. The algorithms shall also validate that a dynamic mandatory maximum speed limit or environmental or traffic condition mandatory maximum speed limit shall not exceed the static mandatory maximum speed limit for the relevant location and vehicle class and driver categorizations. These are subject to local regulations that are applicable. Similar analyses shall be performed for mandatory minimum speed limits, if required. This step is outside the scope of this Technical Specification. 3) Deliver Contextual Speed Message(s) (CSM) – As part of the Service provision sub-role (see Clause 8) relevant mandatory speed limit information is prepared for distribution using Contextual Speed Messages. The period of validity of this information shall be included. The Deliver Contextual Speed Message process may be carried out by the roadside ITS station, central ITS station, or a service provider. 4) Receive and Analyse – As part of the Presentation Provision sub-role (see Clause 8), the vehicle processing unit processes the received Contextual Speed Message. The appropriateness of the message's validity, relevance to the vehicle's type/class shall be confirmed. The form of alarm to be raised shall be assessed. 5) Present – As part of the Presentation Provision sub-role (see Clause 8), the Vehicle's HMI Unit shall allocate the form of HMI interaction on the basis of the form of alarm raised. Visual and audible warnings may be presented as appropriate. The functionality of the vehicle's HMI Unit is outside the scope of this Technical Specification. 6) React to presentation – A non-system response to information presentation by the driver. This step is outside the scope of this Technical Specification.
Use case acceptance criteria	— The system reliably delivers to the interface of the Vehicle's HMI Unit the intended Contextual Speed information to or above a prescribed quality level in cases where radio communications coverage is available. — The system correctly handles information provision in cases where expired information is received or the vehicle moves beyond the defined relevance zone of the Contextual Speed Information received. NOTE: Quality assurance of the base speed limit data are vital to the correct performance of this application. Quality assurance procedures for this data are outside the scope of this Technical Specification.

Table 1 *(continued)*

Use case business rules	The Contextual Speed Information Service, as supported by Content Provision and Service provision (see Clause 8), shall provide no more than one mandatory maximum speed limit for each defined location (for specified classes or vehicles or all classes and other legal conditions) applicable for a specified period of time. Any later publication of similar information, as indicated by the information timestamp, will be considered to supersede the original publication. Similarly, the Contextual Speed Information Service, as supported by Content Provision and Service provision shall provide up to one mandatory minimum speed limit for each defined location (for specified classes of vehicles or all classes and other legal conditions) applicable for a specified period of time. Any later publication of similar information, as indicated by the information timestamp, will be considered to supersede the original publication. Some basic safety and legal constraints are necessary. For mandatory speed limits, the actor supplying Content Provision shall take necessary measures to ensure the accuracy of information provided, including, where possible, measures to ensure consistency of information. Mandatory speed outputs shall relate to defined, repeatable, resolvable locations.

7.3 Use case 2 - Provision of advisory speed information into vehicle – for driver awareness purposes

Table 2 gives details of the use case 2 for provision of advisory speed information into vehicle – for driver awareness purposes.

Table 2 — Use Case 2: Provision of advisory speed information into vehicle – for driver awareness purposes

Use case name	Provision of advisory speed information into vehicle – for driver awareness purposes
Use case description	This use case foresees the Contextual Speed Information Service providing information from a sending ITS station (typically a roadside or central ITS station) to an ITS station in a vehicle (typically a vehicle ITS station or a personal ITS station) concerning advisory speed information. This information is presented via the vehicle's HMI to advise the vehicle's driver of the vehicle's speed relative to the advisory speed. This information is provided by an OEM or Content Service Provider (see Clause 8) as an authorized source. This source may often be road/traffic managers or authorized service providers. This advisory speed information is intended to provide driver with informed contextual information that is not mandatory in nature. The Contextual Speed Information is presented to drivers in order to improve the road safety, reduce environmental impact, and enhance the traffic flow.
Use case scope	The scope of this Use Case is the definition of the exchange from the sending ITS station (roadside or central ITS station) to the ITS station in the target vehicle for the provision of information concerning advisory speed information into the vehicle – for driver awareness purposes. It does not include the exchanges of data between the sending ITS station and any other source systems, or vice versa; the mechanism for production of the Contextual Speed Message; or any actions taken by the vehicle's systems on receipt of the Contextual Speed Message.
Target system release	Cooperative ITS – Infrastructure-to-vehicle applications
Generality/abstraction level	High-level abstract

Table 2 *(continued)*

Use case stakeholders	— Road administrations — Police and enforcement administrations — Automotive manufacturers and their supply chain — Radio spectrum regulators — Broadcast/RF industry — Drivers — Manufacturers of roadside and central station equipment — Road operators and traffic managers NOTE: Aftermarket stakeholders are included.
Use case goal	To correctly provide suitable contextual information on advisory speeds.
Use case assumptions	— Methods for ensuring the accuracy of the context for advisory speed information can be assured. Measures of accuracy include timeliness, representation of physical relevance of speed limit information, applicability to vehicle type/class, value of the advisory speed given. — Data exchange between the sending ITS station (typically a roadside/central ITS station) and the ITS station in the target vehicle(s) is successfully completed in a timely manner. — The positional relevance of an advisory speed on creation suitably maps to the vehicles cognisant of position to exceed defined quality requirements. — Suitable fail-safe mechanisms will be put in place of areas of non-reception of information.
Use case technology restrictions	Data exchange between the sending ITS station and the ITS station in the target vehicle is successfully completed in a timely manner.
Relationships to other use case(s)	Linked to other Contextual Speed Information Service use cases

Table 2 *(continued)*

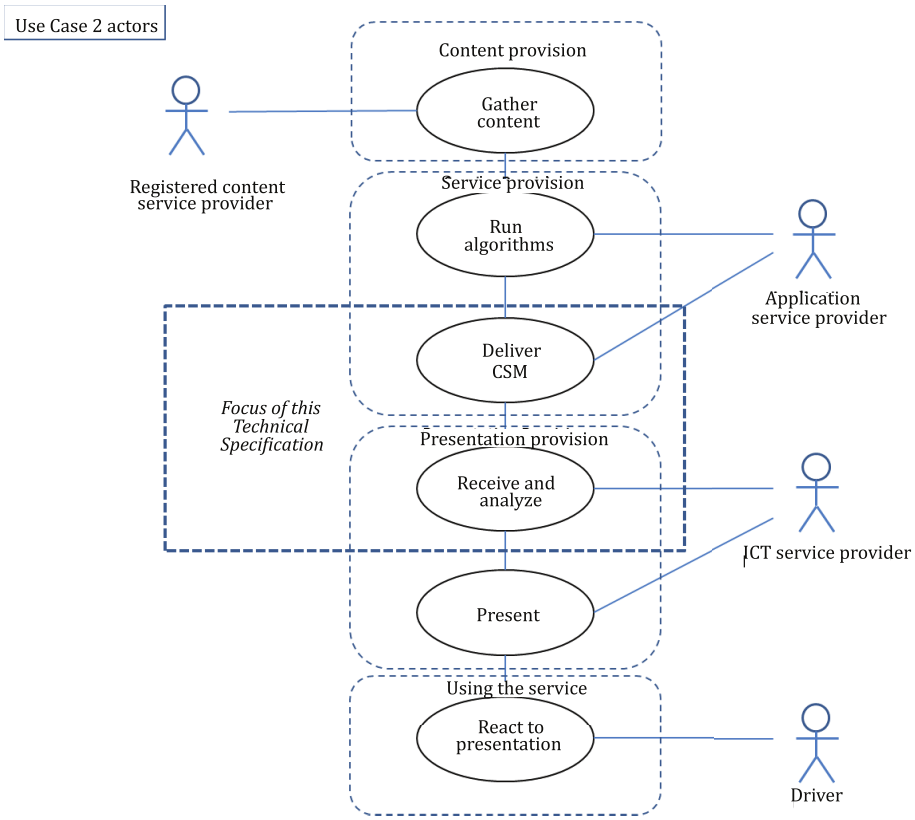
Actors for this use case	As indicated in Clause 8, the actors relevant for this use case are the following: For content provision: — Content Service Provider For service provision: — Application Service Provider For presentation provision: — ICT service provider These actor roles may be met by one or a combination of organizational entities, e.g. commercial service providers, road operators, etc. 
Use case triggers	None – foreseen as a high-periodicity broadcast or unicast from the sending ITS station (roadside/central ITS stations) of Contextual Speed information.
Use case pre-conditions	— Availability of suitable quality advisory speed information. — Availability of means of communication between the sending ITS station and the ITS station in the target vehicle — Availability of sending ITS station(s) and an ITS station in the target vehicle

Table 2 *(continued)*

Use case steps	1) Gather Content – As part of the Content Provision sub-role (see Clause 8), information on advisory speed information shall be collected from available sources – this may include relevant contextual information (e.g. environment conditions, traffic conditions) including information from infrastructure sensors and vehicle probe. Such advisory speed information may reflect traffic conditions, weather conditions, ambient lighting conditions, road surface conditions, and environmental conditions. This step is outside the scope of this Technical Specification. 2) Run Algorithms – As part of the Service provision sub-role (see Clause 8), analyses are undertaken to identify the appropriate content to be distributed. For example, if different environmental and traffic conditions dedicate several distinct sets of advisory speed information, the algorithms shall be used to select the most appropriate for distribution. The algorithms shall also validate that advisory speed information does not conflict with mandatory speed limits for the relevant location and vehicle class and driver categorisations. This step is outside the scope of this Technical Specification. 3) Deliver Contextual Speed Message(s) (CSM) – As part of the Service provision sub-role (see Clause 8), relevant advisory speed information is prepared for distribution using Contextual Speed Messages. The period of validity of this information shall be included. The Deliver Contextual Speed Message process may be carried out by the roadside ITS station, central ITS station or a service provider. 4) Receive and Analyse – As part of the Presentation Provision sub-role (see Clause 8), the vehicle processing unit processes the received Contextual Speed Message. The appropriateness of the message's validity, relevance to the vehicle's type/class shall be confirmed. The form of alarm to be raised shall be assessed. 5) Present – As part of the Presentation Provision sub-role (see Clause 8), the vehicle's HMI unit shall allocate the form of HMI interaction on the basis of the form of alarm raised. Visual and audible warnings may be presented as appropriate. The functionality of the Vehicle's HMI unit is outside the scope of this Technical Specification. 6) React to presentation – A non-system response to information presentation by the driver. This step is outside the scope of this Technical Specification.
Use case acceptance criteria	— The system reliably delivers to the interface of the Vehicle's HMI Unit the intended Contextual Speed information to or above a pre-scribed quality level in cases where radio communications coverage is available. — The system correctly handles information provision in cases where expired information is received or the vehicle moves beyond the defined relevance zone of the Contextual Speed information received.
Use case business rules	Some basic safety and legal constraints are necessary, such that advisory speed outputs shall never exceed the maximum mandatory speed limit (for the vehicle class, driver qualifications and other legally enforceable conditions that may apply). Similarly, the advisory speed shall never be less than a minimum mandatory speed limit (for legally enforceable conditions). Advisory speed information outputs shall relate to defined, repeatable, resolvable locations. For the sake of simplicity, if multiple environmental factors and conditions are input, the process output shall present the lowest advisory speed as an output, for each distinct vehicle class, driver qualification combination.

8 Contextual speeds: Roles and responsibilities

8.1 Scenarios for contextual speeds

The implementation of a role system management and policy framework will be the same for the different Cooperative ITS applications and services. The management and policy framework are not considered in this Clause but only the roles of system operation, content provision, service provision, and presentation provision. In the next sub-clauses, the different scenarios for the Contextual Speed Information Service are described based on the general scheme as presented in Figure 5.

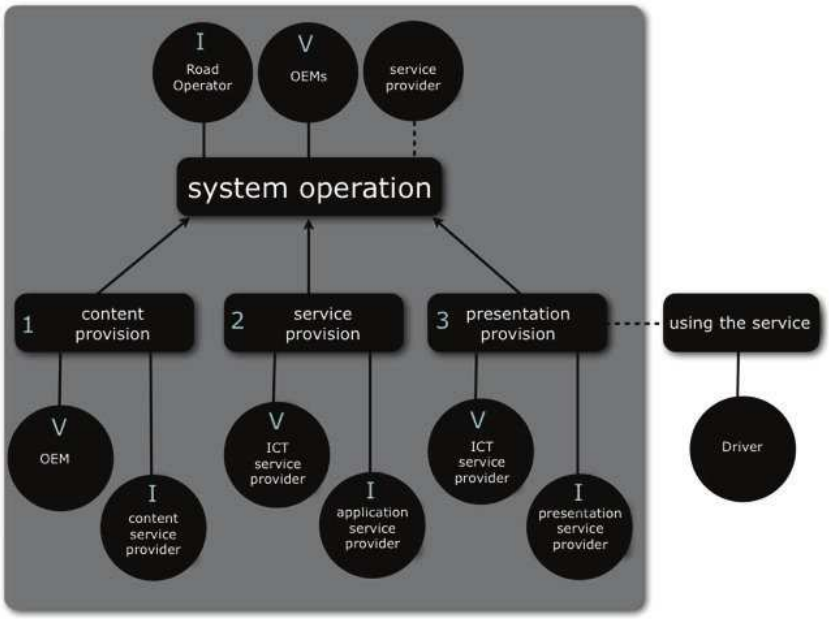


Figure 5 — General Roles and actors for Cooperative ITS

In line with the scope and general description the focus of this Technical Specification is on scenario 7, see Figure 6. For this scenario, the responsible actor for the role of system operation is not identified.

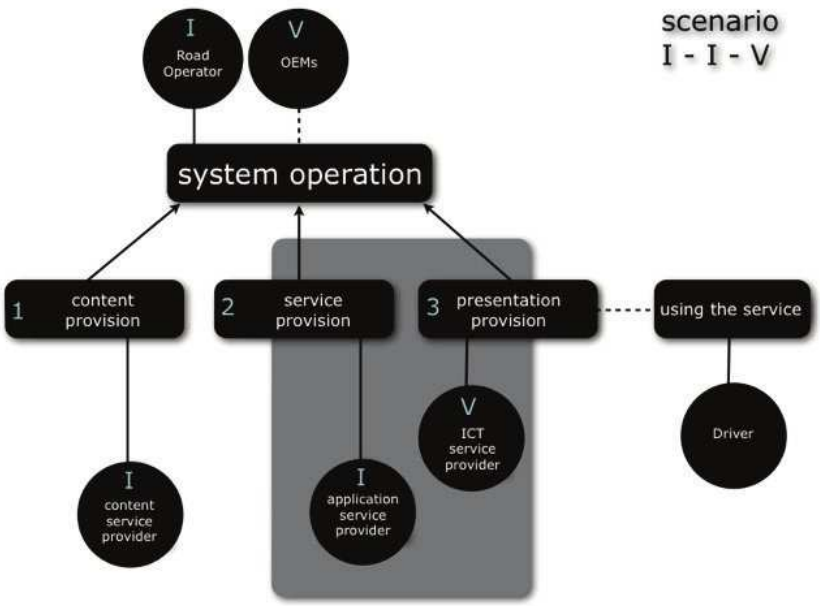


Figure 6 — Roles and actors for the Contextual Speed Information Service, scenario 7 (I-I-V)

The actor responsible for the role of content provision is the content service provider from the field of roadside infrastructure.

The actor responsible for the role of service provision is the application service provider from the field of roadside infrastructure.

The actor responsible for the role of presentation provision is the ICT service provider from the vehicle side.

8.2 System operation roles in scenario 7

The grey box in Figure 7 indicates the focus of the Contextual Speed Information Service in this Technical Specification, illustrated on a process level. It is assumed that the Content Provision is done according to systematic specifications (e.g. national standards/regulations), which is not part of the scope of this Technical Specification. This Technical Specification only considers roles and responsibilities for Service and Presentation Provision.

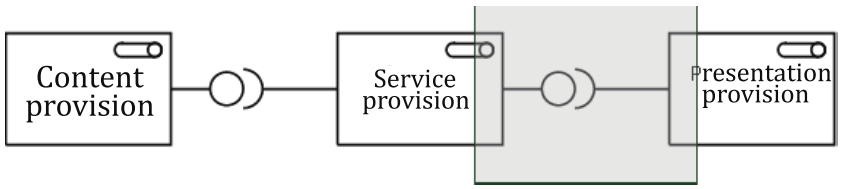


Figure 7 — Focus of the Contextual Speed Information Service, process level

Furthermore, there is also a more technical, communication level that needs attention. Figure 8 shows the relation between service provision and communication management, as well as the presentation provision.

Figure 8 — Communication management

8.3 Possible actors in the Contextual Speed Information Service

For delivery of the Contextual Speed Information Service, two technical implementations are foreseen: G5 technology and global network technology (see Clause 11). Figure 9 and Figure 10 show the possible actors for both implementations.

Although the responsibility for the presentation of the Contextual Speed information is in the vehicle, rules and regulations applicable need to be considered. The responsibility for these regulations is within the role of the policy framework. This is outside the scope of this Technical Specification.

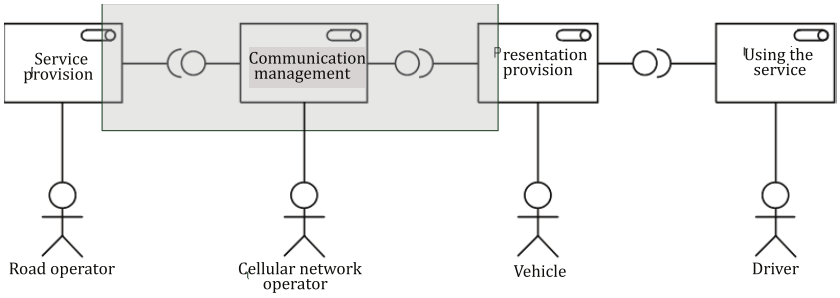


Figure 9 — Assignment of actors in case of usage of a global network technology

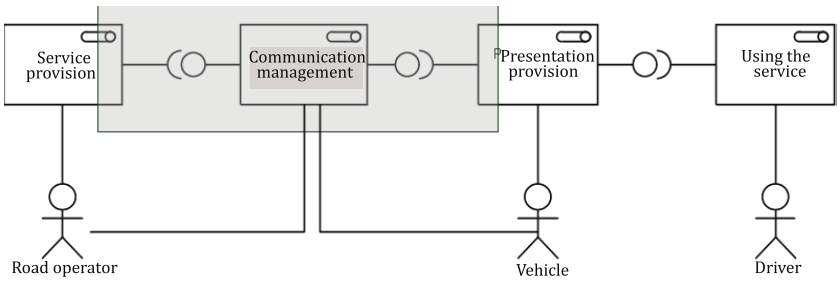


Figure 10 — Assignment of actors in case of usage of a DSRC/G5 technology

9 Contextual speeds: Characteristics

The Contextual Speed Information Service is characterized as follows.

a) Contextual Speed application transmits Contextual Speed information from a sending ITS station (typically a roadside or a central ITS station) to a receiving ITS station (typically a vehicle or a personal ITS station).

b) Contextual Speed application provides the relevant Contextual Speed information to a driver, e.g. via the vehicle HMI unit.

The general service requirements and communication requirements of the Contextual Speed Information Service shall take into consideration these characteristics.

10 Contextual speeds: General service requirements

Policies are non-enforceable rules which may be presented by the user of an ITS-SU, by an organization, or by an authority. Regulations are enforceable rules which may be presented only by an authority.

Policies and regulations typically are valid in a specific region. ISO/TS 17419 distinguishes policy regions and regulatory regions, and specifies how they may be identified.

GSR01: The Contextual Speed Information Service shall comply with applicable regulations and shall use applicable policies.

NOTE 1 The monitoring and management of regulations and policies related information (e.g. ITS Regulatory Region Identifier, ITS Policy Region Identifier) occurs both at ITS station and application level. Procedures to get updates of regulations and policies may use push or pull mechanisms.

GSR02: The Contextual Speed Information Service shall support the provision of C-ITS Authority Data Sets.

NOTE 2 A "C-ITS Authority Data Set" is a set of C-ITS data elements describing policies or regulations.

GSR03: It shall be possible to send more than one C-ITS Authority Data Set for the same location and the same type of regulated technical characteristics.

GSR04: The source of each C-ITS Authority Data Set shall be identified and certified in the Contextual Speed Message (CSM).

GSR05: The end-to-end integrity of each C-ITS Authority Data Set shall be maintained.

GSR06: Whenever an "End of speed limit" or an "End of compulsory minimum speed" sign shows up, the Contextual Speed Information Service shall provide the relevant speeds.

NOTE 3 There are several sources of information and it is not possible to ensure the consistency of all provided data. However, this should not prevent stakeholders to establish and maintain an organizational structure and process to ensure uniqueness of the Contextual Speed information given to the driver.

NOTE 4 It is expected that vehicle systems may support the setting of parameters that aid presentation of the most appropriate Contextual Speed information.

NOTE 5 The quality criteria of the Contextual Speed Information Service include timeliness, accuracy, and relevance (including positional relevance).

11 Contextual speeds: Communication requirements

11.1 General

The communication requirements are derived from the general service requirements and characteristics specified above. The communication system under consideration is represented in the Figure 11. The details of the communication flows are provided in general communication requirements.

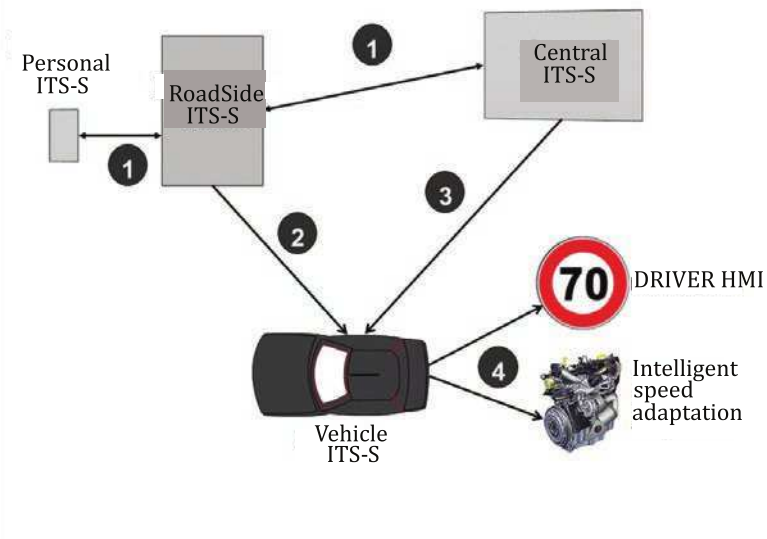


Figure 11 — Contextual Speed Application: Communications flows

11.2 General communication requirements

11.2.1 General

The Contextual Speed Application requires communications between ITS stations. Several communication flow types are identified. Each communication flow type has specific and different communication requirements. These communication requirements shall be provided by the other entities of the ITS station (ITS-S) so that relevant operations can be performed (reservation of resources, priority of communication flows, selection of the transport and network protocol, selection of access technology and channel, etc.).

The following sub-clauses introduce subsequently the possible flow types, the actions to be taken by the ITS-S application processes to provide these requirements and objectives to other ITS-S entities, and the values of the parameters for each flow type.

11.2.2 ITS-S application processes of the Contextual Speed Application

The Contextual Speed Application is an instantiation of the Contextual Speed Information Service that involves the association of complementary ITS-S application processes. An ITS-S application process is an element in an ITS station that performs information processing for a particular application, and uses ITS-S services to transmit and receive information (see ISO 21217).

GCR01: The Contextual Speed Application specified in this Technical Specification shall be implemented as ITS-S application processes as defined in ISO 17423.

11.2.3 Flow types of the Contextual Speed Application

According to Figure 11, several flows are possible depending on the communication technology being used, and depending on the role of the ITS station (roadside, central, vehicle, personal). Four flows have been identified so far:

Flow Type 1: This flow enables a central ITS-S or a personal ITS-S to provide Contextual Speed information to a roadside ITS-S or any other broadcasting ITS-S (identified as “flow 1” on the Figure 11). This flow is of the unicast type, and is acknowledged. Values of the parameters to be presented to the ITS-S management entity are indicated in Table 3 “Flow Type 1”. Parameters in bold are mandatory.

Flow Type 2 (Broadcast service communication flow): This flow enables a roadside ITS-S or any other broadcasting ITS-S to broadcast Contextual Speed Messages (CSM) to unspecified personal/vehicle ITS-S (identified as “flow 2” on the Figure 11). This flow is of the broadcast/geographical broadcast type. Values of the parameters to be presented to the ITS-S management entity are indicated in Table 4 “Flow Type 2”. Parameters in bold are mandatory.

Flow Type 3 (Push service communication flow): This flow enables a central ITS-S to send CSM directly (unicast) to subscribed vehicle ITS-S and personal ITS-S (e.g. through a cellular network or an urban WiFi 802.11n communication interface). The position of the vehicle ITS-S or the personal ITS-S is provided regularly to the central ITS-S. Values of the parameters to be presented to the ITS-S management entity are indicated in Table 5 “Flow Type 3”. Parameters in bold are mandatory.

Flow Type 4: This is an internal flow inside the vehicle between the vehicle ITS-S (or the personal ITS-S) and either the vehicle’s driver HMI or the Intelligent Speed Adaptation system. This flow is outside the scope of this Technical Specification, being under the responsibility of the OEM or equipment supplier providing the personal/vehicle system.

11.2.4 Flow Type 1 of the Contextual Speed Application

Table 3 — Flow Type 1: Provisioning the roadside ITS-S or any other broadcast ITS-S (e.g. satellite or terrestrial) from central and personal ITS-S (unicast)

Requirements	Value	Comment
Operational requirements		
CSP_LogicalChannelType	DATEXII	Provision from traffic management centre.
CSP_ContConnect	Not presented (or 0)	No continuous connectivity needed.
CSP_NxRepeat	0	Not repeated (message is acknowledged).
CSP_Flow Type	Not presented	Not presented unless flow parameters are registered in some registration authority.
CSP_MaxPrio	MEDIUM	No high priority since not for road safety.
CSP_PortNo	PORT GMDH	Make use the well-known common facilities port.
Destination requirements		
CSP_DestinationType	AddressBasedType (2)	Unicast between 2 ITS stations.
CSP_DestinationDomain	Global	Packets are transmitted on a global network e.g. Internet.
CSP_CommDistance	0	There is no indication about the distance.
CSP_Directivity	n.a.	
Performance requirements		
CSP_Resilience	YES	Messages have to be acknowledged.
CSP_MinThP	n.a.	Not used
CSP_MaxLat	5 s	Maximum acceptable latency.
CSP_MaxADU	<max message size>	TBD (depends on maximum size of the message).
Security requirements		
CSP_DataConfidentiality	n.a.	Not needed
CSP_DataIntegrity	required	To be applied by the facilities/security
CSP_DataRepudiation	required	To be applied by the facilities/security
CSP_SourceAuthentication	required	See specific security Requirements below
Protocol requirements		
CSP_Protocol	n.a.	Not used

11.2.5 Flow Type 2 of the Contextual Speed Application

Table 4 — Flow Type 2: Broadcast service communication flow type requirements

Requirements	Value	Comment
Operational requirements		
CSP_LogicalChannelType	SfCH/SCH2	Safety channel/Service Channel 2 used for traffic management.
CSP_ContConnect	Not presented (or 0)	No continuous connectivity needed.
CSP_NxRepeat	255	Repeat at 1 Hz (every second) until flow is cancelled.
CSP_Flow Type	Not presented	Not presented unless flow parameters are registered in some registration authority.
CSP_MaxPrio	MEDIUM	No high priority since not for road safety.
CSP_PortNo	PORT GMDH	Make use the well-known common facilities port.
Destination requirements		

Table 4 *(continued)*

Requirements	Value	Comment
CSP_DestinationType	GeoLocationBasedType (2).	Broadcast to geographic areas.
CSP_DestinationDomain	Site-local	Packets are transmitted from a broadcast network covering a limited area.
CSP_CommDistance	n.a.	According to broadcasting technology being used.
CSP_Directivity	Omnidirectional	
Performance requirements		
CSP_Resilience	n.a.	Not needed
CSP_MinThP	n.a.	Meaningless for repeated broadcast services.
CSP_MaxLat	100 ms	Maximum acceptable latency.
CSP_MaxADU	<max message size>	TBD (depends on maximum size of the message, but should be short).
Security requirements		
CSP_DataConfidentiality	n.a.	Not needed
CSP_DataIntegrity	required	To be applied by the facilities/security
CSP_DataRepudiation	required	To be applied by the facilities/security
CSP_SourceAuthentication	required	See specific security requirements below
Protocol requirements		
CSP_Protocol	n.a.	Not used

11.2.6 Flow Type 3 of the Contextual Speed Application

Table 5 — Flow Type 3: Push service from a central ITS-S to subscribed vehicle ITS-S and personal ITS-S (unicast)

Requirements	Value	Comment
Operational requirements		
CSP_LogicalChannelType	GPCH/SCH	General purpose channel/Service Channel.
CSP_ContConnect	Not presented (or 0)	No continuous connectivity needed.
CSP_NxRepeat	0	Not repeated (message is acknowledged).
CSP_Flow Type	Not presented	Not presented unless flow parameters are registered in some registration authority.
CSP_MaxPrio	MEDIUM	No high priority since not for road safety.
CSP_PortNo	PORT GMDH	Make use the well-known common facilities port.
Destination requirements		
CSP_DestinationType	AddressBasedType (2)	Unicast between 2 ITS stations.
CSP_DestinationDomain	Global	Packets are transmitted on a global network e.g. Internet.
CSP_CommDistance	0	There is no indication and no hint about the distance.
CSP_Directivity	n.a.	
Performance requirements		
CSP_Resilience	n.a.	Messages are not acknowledged nor repeated.
CSP_MinThP	n.a.	Meaningless for a single message.
CSP_MaxLat	1 min	Maximum acceptable latency.
CSP_MaxADU	<max message size>	TBD (depends on maximum size of the message).
Security requirements		

Table 5 *(continued)*

Requirements	Value	Comment
CSP_DataConfidentiality	required	To be applied by facilities/security.
CSP_DataIntegrity	required	To be applied by the facilities/security
CSP_DataRepudiation	required	To be applied by the facilities/security
CSP_SourceAuthentication	required	See specific security Requirements below
Protocol requirements		
CSP_Protocol	n.a.	Not used

11.2.7 Sources and Sink ITS stations of the Flow Types

GCR02: A Contextual Speed ITS-S application process installed in a given instantiation of an ITS-S shall implement the flow types according to its role as indicated in Table 6.

Table 6 — Sources and Sink ITS-S of the Flow Types

Flow TYpe	Roadside ITS-S	Vehicle ITS-S	Personal ITS-S	Central ITS-S
FlowType 1: Provision	Sink/Source		Sink/Source	Sink/Source
FlowType 2: Broadcast	Source	Sink	Sink	
Flow Type 3: Push from Centre		Sink/Source	Sink/Source	Source/Sink?

NOTE Flow types are registered, but this does not mean that all flow types are actually going to be used.

GCR003: For each source of a communication flow type, the ITS-S application process shall present its communication requirements and objectives to the ITS-S management entity using the service primitive A-REQUEST(ITS-S-App1-Reg) as specified in ISO/TS 17423 and using the values indicated in Table 3 (FlowType1), Table 4 (FlowType2), and Table 5 (FlowType3).

11.2.8 Other general communication requirements

GCR004: To be capable of ensuring required system communication performances, the Contextual Speed information shall include a generation time-stamp corresponding to the time at which the generated information was considered to be correct. This time-stamp shall be provided in all Contextual Speed Messages being specified to support the Contextual Speed Information Service.

GCR005: The end to end latency time shall be no more than 10 s. For its measurement, the Start time is given by the "generation time stamp" from the originating ITS-S and the End time is given by the delivery of the Contextual Speed information to the receiving application. When the receiving application is in the ITS-S which has to deliver the information to the driver, the latency time shall be measured from the generation time stamp to the presentation of the information to the driver. The "generation time stamp" shall be provided in all Contextual Speed Messages.

GCR006: The Contextual Speed information shall be provided in less than 500 ms to the relevant vehicle function (Driver HMI or Intelligent Speed Adaptation function) following the reception by the end destination ITS-S of a relevant Contextual Speed Message.

11.3 Application specific data element requirements

These application specific data element requirements are developed for the specification of the Contextual Speed Message (CSM) being achieved in Annex A. There are functional requirements specific to the Contextual Speed Information Service impacting the building of the CSM.

SDR001: An ITS-S issuing Contextual Speed Messages shall be registered and identified in CSM.

SDR002: The authority defining a Contextual Speed shall be identified in CSM.

SDR003: Triggering the transmission of Contextual Speed(s) shall be protected by an authorization scheme defined by the respective authority.

SDR004: The authority defining or cancelling a Contextual Speed shall be authorized and shall sign the message according to its authorization scheme (signature level) providing the required level of confidence to be associated to the use of the Contextual Speed information.

SDR005: Receiving targeted ITS-S shall authenticate received messages before using them according to assessed level of confidence.

SDR006: The CSM shall be structured as specified in Annex A. It shall contain a message ID.

SDR007: The CSM shall contain a unique message identifier for the purpose of addressing the relevant application(s) in the receiving ITS-S. It shall also contain a message number to distinguish different instantiations of CSM. It shall be possible to cancel Contextual Speed information.

SDR008: A CSM shall have the capability to transport several Contextual Speeds for various vehicle types or relevance areas.

SDR009: The CSM shall contain a Contextual Speed type indicating the purpose of the Contextual Speed information enabling to establish its priority level with regard to its use by the vehicle/personal ITS-S.

SDR010: It shall be possible in the CSM to indicate the applicability of contained Contextual Speed(s) to particular type(s) of vehicle(s).

SDR011: The CSM shall contain the validity time of each provided Contextual Speed(s). Once the validity time has elapsed, the associated Contextual Speed shall be removed from the system.

SDR012: For each Contextual Speed, the application area, called “Relevance Zone”, shall be provided in the CSM.

SDR013: A given Contextual Speed shall be provided to a relevant vehicle driver in such a way that the driver has sufficient time to adjust the speed of its vehicle before entering the relevance area.

NOTE Optionally, some information may be provided to precise the minimum distance or the position for Contextual Speed presentation to the driver. In such cases, it shall be indicated that the presented Contextual Speed is only applicable at the beginning of the relevance zone.

SDR014: It shall be possible for each Contextual Speed in the CSM to specify the relevance zone as a road segment, a lane segment, or a geographical area.

SDR016: For each applicable Contextual Speed, the CSM shall provide its value in the particular unit (kilometres/hour or miles/hour) applicable in the region the vehicle is moving. The region may be known through the C-ITS Authority Data Set.

Annex A
(normative)

Contextual speeds: IVI Profile (Definition of CSM)

A.1 General

This Annex provides the specification of the Contextual Speed Message (CSM) as a profile of the IVI Structure defined in ISO/TS 19321, based on the Contextual Speed Application specific data element requirements.

In the subclauses below, the requirements to the IVI Structure and containers are stated from the perspective of the Contextual Speed Information Service, which are more specific than the general IVI requirements. This includes, for example, more specific mandatory, optional, and absent (M/O/A) requirements and additional specification given in the rightmost column. Since the Contextual Speed Information Service can be deployed in different ways and ISO/TS 17426 is not a system specification, the profile below is a template to define messages but still does not define one single message. Specific messages shall be defined by standard users deploying the service.

For the definitions of the data element and data frames, refer to ISO/TS 19321.

A.2 CSM Structure

The CSM shall contain the following:

— IVI management container,

— one IVI geographic location container,

— one general IVI application container.

A.3 Use of the IVI management container

The IVI management container used in the CSM shall comply with Table A.1.

Table A.1 — IVI management container

Component	Data element	Nr	M/O/A[a]	Requirements	Additional specification
serviceProviderId	Provider	1	M	SDR002	
iviIdentificationNumber	IviIdentificationNumber	1	M	SDR006 SDR007	
Timestamp	TimestampIts	1	M	GCR004 SDR007	The data element shall be used to distinguish between different instantiations/updates of the CSM

[a] Mandatory (M) shall be included in the container. Optional (O) may be included in the container. Absent (A) shall not be included in the container.

Table A.1 *(continued)*

Component	Data element	Nr	M/O/A[a]	Requirements	Additional specification
validFrom	TimestampIts	1	O	SDR011	Shall be present if known by the Contextual Speed Information Service
validTo	TimestampIts	1	O	SDR011	Shall be present if known by the Contextual Speed Information Service
connectedIviStructures	IviIdentificationNumber	1..8	A	—	
iviStatus	IviStatus	1	M	SDR007 SDR015:	Status "new" shall be used for the first instance of CSM. Status "update" shall be used for all further instantiations of the CSM. Status "cancellation" shall be used to cancel the CSM

[a] Mandatory (M) shall be included in the container. Optional (O) may be included in the container. Absent (A) shall not be included in the container.

A.4 Use of the geographic location container

The geographic location container used for CSM shall comply with Table A.2 and Table A.3 and shall consist of the following:

— common content;

— 1 part describing the detection zone;

— 1 part describing the awareness zone (optional);

— and either of the following:

  — 1 part describing the entire carriageway as a relevance zone;

  — n parts describing the n lanes of the carriageway as single distinct parts of the entire relevance zone, if Contextual Speeds are lane specific and if lane specific location information is available.

Table A.2 — Geographic location container — Common location container content

Component	Data element	Nr	M/O/A[a]	Requirement	Additional requirements
referencePosition	ReferencePosition	1	M	SDR012 SDR013	Shall contain the position of the start of the Relevance Zone, measured at the lateral centre point of the carriageway
referencePositionTime	TimestampIts	1	A		
referencePositionHeading	Heading	1	A		
referencePositionSpeed	Speed	1	A		

[a] Mandatory (M) shall be included in the container. Optional (O) may be included in the container. Absent (A) shall not be included in the container.

Table A.3 — Geographic location container — Location container part (n parts)

Component	Data element	Nr	M/O/A[a]	Requirement	Additional requirements
zoneId	Zid	1	M	SDR012 SDR013	Different values shall be used to identify the definition of the relevance zone, the detection zone, and if applicable of the awareness zone.
laneNumber	LanePosition	1	O	SDR014	Shall be mandatory if lane segments are described.
zoneExtension	INTEGER (0..255)	1	A		
zoneHeading	HeadingValue	1	A		
Zone	Zone		M	SDR014	The alternative segment shall be used to specify the relevance zone as a road segment by means of an open polygonal line. The alternative area shall be used to specify the relevance zone as a geographical area by means of a closed polygonal line, defining the area of relevance zone area The alternative computedSegment shall be used to specify the relevance zone as a lane segment computed from another already defined adjacent road segment.

[a] Mandatory (M) shall be included in the container. Optional (O) may be included in the container. Absent (A) shall not be included in the container.

A.5 Use of the General IVI Application Container

The sending ITS-S shall define the information associated to Contextual Speeds in one or more General IVI Container Parts. If lane-specific Contextual Speeds are supported, as many parts as different Contextual Speeds shall be used.

The General IVI Application Container used in the CSM shall comply with Table A.4.

Table A.4 — General IVI Application Container — Container Part

Component	Data Element	Nr	M/O/A[a]	Requirement	Additional requirements
detectionZoneIds	Zid	1..8	M		Shall contain the value associated to the detection zone definition
its-Rrid	VarLengthNumber	1	O		May contain a pointer to C-ITS Authority Data Set
relevanceZoneIds	Zid	1..8	M	SDR008	Shall contain the value associated to the relevance zone definition
Direction	Direction	1	M	SDR014	
Driver AwarenessZoneIds	Zid	1..8	O	SDR013	May contain the value associated to the awareness zone definition
minimumAwarenessTime	INTEGER (0..255)	1	O	SDR013	May contain the time to adjust the speed of the vehicle as an alternative to: minimumAwarenessTime
applicableLanes	LanePosition	1..8	O	SDR014	Shall contain the identification of all lanes to which one specific Contextual Speed applies. Shall be used only if Contextual Speed Information is lane specific.
iviType	IviType	1	M	SDR009	The following values shall be used: Regulatory messages for Use Case 1 Traffic-related information messages for Use Case 2
iviPurpose	IviPurpose	1	M	SDR009	
laneStatus	LaneStatus	1	A		
vehicleCharacteristics	CompleteVehicleCharacteristics	1..8	O	SDR008 SDR010	Shall be provided if Contextual Speeds are applicable to specific types of vehicles only
driverCharacteristics	DriverCharacteristics	—	O		Shall be present if Contextual Speed depend on the driver characteristics
layoutId		—	A		
preStoredLayoutId		—	A		

[a] Mandatory (M) shall be included in the container. Optional (O) may be included in the container. Absent (A) shall not be included in the container.

Table A.4 *(continued)*

Component	Data Element	Nr	M/O/A[a]	Requirement	Additional requirements
roadSignCode	RSCode	1..4	M		Shall contain the road sign code for speed limit.
layoutComponentId	–	—	A		
Code	ISO 14823Code	1	M	SDR008	
pictogramCode	SEQUENCE	1	M	SDR008	
countryCode	OCTET STRING	—	A		
serviceCategory-Code	CHOICE	1	M	SDR008	
trafficSignPic-togram	ENUMERATED	1	M	SDR008	Value: 12 regulatory
pictogramCatego-ryCode	SEQUENCE	1	M	SDR008	
nature	INTEGER (0..9)	1	M	SDR008	Value: 5
serialNumber	INTEGER (0..99)	1	M	SDR008	Value: 57 Maximum Speed Limit
attributes	ISO 14823Attributes	1	M	SDR008	
ISO 14823 Attrib-utes	SPE	1	M	SDR008	
spm	INTEGER (0..250)	1	M	SDR008	Maximum Speed Limit value
mns	INTEGER (0..250)	1	O		
unit	RSCUnit	1	M	SDR016	Maximum Speed Limit unit
layoutComponentId	—	—	A		
code	ISO 14823 Code	1	M	SDR008	Shall contain the road sign code for speed limit.
pictogramCode	SEQUENCE	1	M	SDR008	
countryCode	OCTET STRING	—	A		
serviceCategory-Code	CHOICE	1	M	SDR008	
trafficSignPic-togram	ENUMERATED	1	M	SDR008	Value: 12 regulatory
pictogramCatego-ryCode	SEQUENCE	1	M	SDR008	
nature	INTEGER (0..9)	1	M	SDR008	Value: 7
serialNumber	INTEGER (0..99)	1	M	SDR008	Value: 95 Minimum Speed Limit
attributes	ISO 14823 Attributes	1	M	SDR008	
ISO 14823Attrib-utes	SPE	1	M	SDR008	
spm	INTEGER (0..250)	1	A		

[a] Mandatory (M) shall be included in the container. Optional (O) may be included in the container. Absent (A) shall not be included in the container.

Table A.4 *(continued)*

Component	Data Element	Nr	M/O/A[a]	Require-ment	Additional requirements
mns	INTEGER (0..250)	1	M	SDR008	Minimum Speed Limit value
unit	RSCUnit	1	M	SDR016	Minimum Speed Limit unit
extraText	Text	1..4	O		May contain pointers to a C-ITS Authority Data Set

[a] Mandatory (M) shall be included in the container. Optional (O) may be included in the container. Absent (A) shall not be included in the container.

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