



Socle commun des spécifications techniques et fonctionnelles pour SCOOP

Common set of functional and technical specifications for SCOOP

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1 Document presentation

1.1 Introduction

The general objective of the SCOOP project is to test the implementation conditions for the cooperative systems. The stakes of the project are as follows:

- Improve road safety
- Optimise the management and impact of traffic and road information
- Help reduce environmental pressures, especially greenhouse gas emissions
- Optimise the costs of managing the infrastructure and develop new services, including intermodal
- Help prepare the vehicles of tomorrow

It has been agreed to focus on use cases for which there is a body of standards that the consortium has deemed mature.

The specification needs for the SCOOP project result from this approach.

The first objective of this deliverable is to identify and present the **specification needs** of the SCOOP project. The detailed specifications for the SCOOP project will be presented in several deliverables. This deliverable presents the specifications common to all specification deliverables that the other deliverables must refer to, and specifies the connection between the different specification deliverables.

1.2 Document objectives and summary

The objective of the document is to present the architecture of the SCOOP project's functional specifications. Based on key definitions described in the reference documents or standard documents, it involves :

- presenting the connections between the different SCOOP documents that deal with the specifications;
- presenting the SCOOP system by presenting the generic cases of data and information transmission used to characterise where the intelligence functions are located in the SCOOP chain, which amounts either to qualifying the information upon transmission (qualifying upon transmission or processing to requalify upon retransmission) or arbitration or prioritisation functions upon reception;
- identifying what amounts to a specification need (i.e., what amounts to a consensual choice of all SCOOP partners (with their justification, if necessary)), compared to what amounts respectively to "trivial" or information processing engineering rules, which are the different entities' art without necessarily belonging to a common base;
- proposing the specifications identified as reference specifications (e.g., those that are inherent to the criteria and the rules for filling in the "containers" when messages are transmitted, including the definition of the values taken by default (based on the state of the art, these default values may be subject later to more in-depth work);
- proposing common rules for prioritising the use cases displayed.

This documents aims, with the other specification documents (concerning the prioritisation of services, the list of applicable standards for specifications and development, the R-ITSS specifications, the SCOOP platform and the V-ITSSs) to make it possible for SCOOP to be developed based on the interoperability





objectives.

This document presents in particular the consensuses that have emerged on the subjects covered in chapters 2 to 6:

- Chapter 2 presents a summary of the entire SCOOP system. It lists the use cases that will be allowed, the system components and their functions, the different types of messages and the architecture principles for the information flows.
- Chapter 3 covers the CAM and DENM message specifications. It addresses the nomenclature based on the transmitters and use cases, and explains the mandatory fields that have to be filled in and the optional fields.
- Chapter 4 addresses the message transmission conditions.
- Chapter 5 covers the major prioritisation principles for the display.
- Chapter 6 presents the connection between specifications given in this deliverable and in those expected in other deliverables.
- Chapter 7 presents the DENM details.

1.3 Document status

This deliverable may be subject to several successive versions validated based on Steering Committee decisions.

- ► An appendix of this deliverable will subsequently define:
 - the R-ITSSs' service announcement messages, the methods of exchanging certificates for the PKI, the methods of reporting U-logs and T-logs, as well as all detailed communication channels associated with these mechanisms.
 - the values of SCOOP parameters that are not shown in this version of the deliverable
 - how the V-ITSS U-logs and T-logs are reported will be specified in the appendix of this deliverable

2 Definition of the SCOOP system

2.1 List of SCOOP use-cases

The purpose of the cooperative systems implemented in the SCOOP project is to enable communications between vehicles and a road infrastructure in order to produce the SCOOP use cases defined in the deliverable L2.8 Prioritisation of services, in its version 0 of 17 December 2014 (Table 1).

Table 1: Use Cases list

Use case	Surname	Nomenclature developed for the messages transmitted
A1	Traffic data (position, speed, direction)	





Use case	Surname	Nomenclature developed for the messages transmitted
A2	Collected Data from Road Hazard Signaling (crashes, etc.)	A2-D1: warning - temporary slippery road A2-D4a: stationary vehicle A2-D4b: vehicle breakdown
	Note: A2 translates the reported information by automatic triggering	A2-D5: vehicle in accident A2-D6: reduced visibility A2-D10: warning - emergency brake A2-D11: warning - end of queue A2-E6: extreme weather conditions
Α3	Collected Data from Road Hazard Signaling Note: A3 translates the information reported manually	A3-D2a: animal on the road A3-D2b: people on the road A3-D3: obstacle on the road A3-D5: accident A3-D8: unmanaged blockage of a road
B1	Roadwork Warning - planned roadwork (stationary and mobile plus salting zone)	
B2	Roadwork Warning – road operator intervention	
B3	Roadwork Warning - winter maintenance	
C2	In-vehicle Speed limits	
C3	In-vehicle signage	
D1	Road hazard Signalling - temporary slippery road	
D2	Road hazard Signalling - animal, people on the road	D2a: animal on the road D2b: pedestrian on the road
D3	Road hazard Signalling - obstacle on the road	
D4	Road hazard Signalling - stationary vehicles, breakdown	D4a: stationary vehicle D4b: vehicle breakdown
D5	Road hazard Signalling - unprotected accident area	
D6	Road hazard Signalling - reduced visibility	
D7	Road hazard Signalling - vehicle travelling the wrong direction	
D8	Road hazard Signalling - unmanaged blockage of a road	
D10	Road hazard Signalling - emergency brake	
D11	Road hazard Signalling - end of queue	





Use case	Surname	Nomenclature developed for the messages transmitted
E6	Road hazard Signalling - exceptional weather conditions	

► These use cases have been developed and are to be specified based on the body of standards presented in the deliverable L2.4.1.bis.

► The recommended upgrades of standards are to be traced in the document 2.4.1 bis, as well as the variances from the C2C recommendations.

► The C2, C3 and D7 use cases are not specified in the version of this deliverable. They will be specified in a later version, if the calendar allows and if the technical predispositions allow.

2.2 List of SCOOP system components

SCOOP system components shall designate all physical components that enable users to produce or exchange the messages necessary to produce the SCOOP use cases. They are listed in the table below with the SCOOP nomenclature.

The components underpinning the cooperative systems are the ITS stations as defined in the standard ETSI EN 302 665.

Table 2: SCOOP system components and SCOOP nomenclature

SCOOP system component and nomenclature					
R-ITSS = Road-Side Unit	R-ITSS = Road-Side Unit				
V-ITSS= vehicle ITS station	VG -ITSS= V-ITSS manager	VG-ITSS in "user" mode (includes the same functions as the VU-ITSS)			
		VG-ITSS in "operator" mode (includes the functions specific to the road operator (e.g., "mobile R-ITSS" function)			
	VU-ITSS = V-ITSS user	VU-ITSS Renault			
		VU-ITSS PSA			
		VG-ITSS in "user" mode			
C-ITSS = central ITS station = SCOOP Platform					
Traffic Management Center (TMC) or management terminal (MT)					
PKI = Public Key Infrastructure					





SCOOP System (apart from PKI)



A transmitter can transmit to a recipient





SCOOP System



➤ A communication between SCOOP system components





Roles of system components (excluding PKI)

The central ITS station, marked C-ITSS, or SCOOP platform receives and processes information received from the management terminal or the road operator's traffic management system. It sends information to the operator's cooperative equipment (roadside stations or stations in the operators' vehicles), but does not communicate directly with the users' vehicles. It processes information received from the roadside stations and makes it available to the operator.

► The functional specifications for the SCOOP platform, C-ITSS, are set out in the specification 2.4.3.1 (general specifications) and 2.4.3.2 (detailed specifications) deliverables.

The roadside stations, **R-ITSS**, receive the information from the SCOOP platform, and broadcast them locally to user vehicles. They receive information and queries transmitted by vehicles, which are then processed (for storage, routing or sending). They send the event-based messages (i.e., all SCOOP use cases except A1) in a non-consolidated form to the SCOOP platform. They send the traffic information (apart from event-based messages, i.e., A1 cases) to the platform after consolidating the data. They broadcast service announcement messages (see 2.4.3).

► The R-ITSSs' technical specifications are described in the deliverable 2.4.2.1.

The vehicle embedded units, V-ITSS are the ITS stations installed in users' vehicles (VU-ITSS or user V-ITSS) or operators' vehicles (VG-ITSS or operator V-ITSS), which are equipped with a human-machine interface (HMI). They are able to broadcast automatically and manually via the HMI messages to other ITS stations. They receive information sent by other vehicles or roadside stations, process information for potential display to the driver via his HMI.

VU-ITSSs cannot communicate (send and receive messages) directly with the SCOOP platform whereas the VG-ITSSs can. The VG-ITSSs include all the functionalities of the VU-ITSSs plus the functionalities specific to the road operator ("operator" mode).

"mobile R-ITSS" function designates an operator V-ITSS function that sends to the platform the eventbased messages (i.e., all SCOOP use cases except A1) transmitted by the users' vehicles or created by the operator V-ITSS itself, like the R-ITSSs. On the other hand, the mobile R-ITSS function does not send traffic information (apart from event-based messages, i.e. A1 cases) from the consolidation processing in the first version of the operator V-ITSSs.

► The technical specifications concerning the VG-ITSSs' operation are described in the deliverable L.2.4.2.2.

▶ Human-machine interfaces (HMI) connected to the V-ITSSs are used to display warning messages or to inform drivers. The VU-ITSSs' HMI are specific to each automobile manufacturer. They will be described in two SCOOP deliverables (2.4.2.3 Renault and 2.4.3.3 PSA) on HMI components developed by each manufacturer but they won't be considered as specification.. The common display principles are nevertheless addressed further in this document.







View of the possible functional communication paths in the SCOOP system (without representing the PKI)

Interaction between a human and the SCOOP system

Two SCOOP components can communicate = transmission or reception of a content transmission on a specific channel, in one or more data formats, developed based on the data available to the transmitting entity

Illustration 3 - View of the functional communication channels for the SCOOP system (excluding PKI)

2.3 General architecture of an ITS station and list of related standards

The SCOOP ITS stations are based on an architecture defined by the European standardisation organisation, ETSI (European Telecommunications Standards Institute) in the standard EN 302 665. They include different layers.

► These different layers are described in the deliverables L2.4.2.1, L2.4.2.2 and L2.4.2.3.

- ► The application layer will only be addressed here and from a functional point of view.
- ► The technical aspect is described in the deliverables L2.4.2.1, L2.4.2.2 and L2.4.2.3.

► In the context of SCOOP, the standards considered as a minimal reference group to implement the V-ITSSs, R-ITSSs and C-ITSSs are described in the deliverable 2.4.1bis.

► The document 2.4.1.bis also recounts the recommendations to upgrade the standards.

► this deliverable specifies the choices related to the implementation of CAM and DENM considering the following version: EN 302 637-2 v1.3.2. (2014-11) and EN 302 637-3 v1.2.2. (2014-11).

2.4 Types of messages exchanged in SCOOP





2.4.1 CAM AND DENM

The messages exchanged between SCOOP vehicles or between the R-ITSSs and the SCOOP vehicles, are the **CAM and DENM** addressed in detail further in this deliverable.

► The special case of the definition of the CAM message sent by the R-ITSSs will be detailed later in the appendix of this deliverable. Nevertheless, it should be noted that this message should make it possible to use the following field of the CAM standard:

Field name in the CAM standard	Additional description of the CAM standard	Mandatory field? (see definition § 3.2)	SCOOP comments and choices
B.50	Information about the position of	O=optional	CAMs transmitted by the R-ITSSs
ProtectedCommuni	a toll using the 5.8 GhZ	in the	will use this field.
cationZonesRSU	frequency band. This	standard and	
	information, broadcast by an R-	mandatory in	The filling for the R-ITSSs is left up
	ITSS, should make it possible for	SCOOP	to the discretion of each road
	vehicles to adopt the toll's		operator and the V-ITSSs must be
	neighbourhood mitigation		ready to interpret it in order to
	techniques.		implement the reception mitigation
			techniques.

2.4.2 MESSAGES RELATED TO SCOOP EXPERIMENTATION

Other **messages related to SCOOP experimentation** for assessment, supervision and validation needs are sent by the V-ITSSs and ITSS-Rs: these are the U-logs and T-logs.

► The specifications regarding the definition of the **U-logs and T-logs for assessment needs** and their use are covered in the deliverable 2.3.1.

► The specifications concerning the definition of the **U-logs and T-logs for system component supervision needs** and their use are covered in the deliverables for the 2.4.2.1 components for the R-ITSSs, 2.4.2.2. for the operator V-ITSSs, 2.4.2.3 Renault and PSA for the user V-ITSSs.

► The specifications concerning the definition of the **U-logs and T-logs for validation needs** and their use are covered in the deliverable 2.6.1.

► How the V-ITSS U-logs and T-logs are reported will be specified in the appendix of this deliverable

2.4.3 R-ITSS SERVICE ANNOUNCEMENT MESSAGES

► The specifications will be addressed later in the appendix of this deliverable.

2.4.4 DATEX II V2.3 MESSAGES

The messages transmitted by the SCOOP platform to the R-ITSSs are sent as DATEX II V2.3. The R-ITSSs translate the DATEX II V2.3 messages into DENM to broadcast them to the V-ITSSs. The DENM





translation to DATEX II V2.3 is not translated field by field in the DENM. Moreover, it should be verified that chosen container can be translated into DATEX II V2.3.

► A DATEX II V2.3 – CAM DENM dictionary is specified in the appendix of the deliverable 2.4.2.1 based on the CAM and DENM messages defined in this deliverable.

2.5 Principles for the system architecture

2.5.1 TRANSMISSION, RECEPTION, PROCESSING AND RELAY

The cooperative message broadcast logic distinguishes 3 steps:

- Transmission of a message;
- Reception of a message; and
- How to process a message received.

Once received, cooperative messages can be relayed.

2.5.2 DEFINITION PRINCIPLES FOR SCOOP

The architecture principles for SCOOP can be stated as follows:

– Transmitters are responsible for qualifying the information upon transmission.

- Transmitter qualifies the information independently of the processes that will then be performed by the receiving entities.

- Rules for qualifying the information are shared between all SCOOP partners at a level that enables the same level of understanding.

- Major principles concerning the prioritisation between displayed uses cases should be jointly established between the partners.

– Each receiving entity is responsible for displaying and processing the information.

2.5.3 COMMUNICATION PRINCIPLES BETWEEN SYSTEM COMPONENTS

Two types of transmitted messages will be differentiated:

- Transmitted messages are intended to be broadcast in a relevant geographic zone and do not identify the receiver in advance (every ITS station travelling in the geographic zone is likely to be a receiver of the message). This is the broadcast mode that can be assigned to a precise or undefined geographic zone.

- Transmitted messages are addressed to a pre-identified recipient. This is the "unicast" mode (point-to-point).

The table specifies the message transmission modes by transmitter-receiver pair.





Table 3: Transmission mode for messages

RECEIVER TRANSMITTE R	R-ITSS	Operator V-ITSS (operator mode and user mode)	Renault user V- ITSS	PSA user V-ITSS	SCOOP platform	ТМС	PKI	Ulog Tlog server s
R-ITSS		D_denm D_cam	D_denm D_cam	D_denm D_cam	А		A (via operator network)	
Operator V- ITSS (operator mode and user mode)	D_denm D_cam	D_denm D_cam	D_denm D_cam	D_denm D_cam	A		A (via operator network)	
Renault user V-ITSS	D_denm D_cam	D_denm D_cam	D_denm D_cam	D_denm D_cam			A (via operator network)	
PSA user V- ITSS	D_denm D_cam	D_denm D_cam	D_denm D_cam	D_denm D_cam			A (via operator network)	
SCOOP platform	A	A				A		A
ТМС					А			
PKI servers	A	A (via operator network)	A (via operator network)	A (via operator network)				

[A]=Addressing: transmitted messages that are addressed to one or more pre-identified recipients

[D_denm] = Geographic broadcasting: transmitted messages are broadcast in a relevant geographic zone and do not identify the receiver in advance (DENM logic)

[D_cam] = General broadcasting: transmitted message is intended to be received by every ITS station in the ad-hoc network (CAM logic)

► This table is valid for use cases covered in this document and does not foresee any changes made necessary by the inclusion of other use cases.

2.5.4 TRANSMISSION

2.5.4.1 CAM AND DENM INFORMATION FLOWS RELATED TO SCOOP USE CASES

The information flow transmission are defined for SCOOP use cases. There are 3 message creation logics:





 - 1. Creation and broadcast logic for a DENM or CAM message = message created by an VU-ITSS; message broadcasted; message received by an V-ITSS or an R-ITSS; and message processed by the V-ITSS or R-ITSS



Figure 4: Creation of a message by a VU-ITSS

NOTE: same logic for a message transmitted by an VG-ITSS in "user" mode

 - 2. Creation of a VG-ITSS message, broadcast and reception by a V-ITSS or a R_ITSS. Messages are processed by the V-ITSS or R-ITSS.

NOTE: same logic for a message transmitted by an VG-ITSS in "operator" mode

- 3. Message created by the operator via its TMC: the TMC transmits the message to the SCOOP platform; the platform identifies the relevant R-ITSSs and transmits the message for broadcasting; the R-ITSSs broadcast the message; message received by an V-ITSS; message processed by the V-ITSS (broadcast logic for a DENM from the TMC).











Figure 6: Creation of a message by the road operator via the TMC

2.5.5 BROADCAST FOR SERVICE ANNOUNCEMENTS BY A R-ITSS





Service announcement by a R-ITSS allows to initiate routing actions or to announce tolls.



Figure 7: Service Announcement by a R_ITSS

► This subject will be addressed later in the appendix of this deliverable.

2.5.6 ROUTING PROCESS BY AN R-ITSS: LOG AND PKI

► This subject will be addressed later in the appendix of this deliverable.

2.6 General SCOOP technical choices

- DENMs can be sent according to manual or automatic triggering. Initially, it had been planned to allow the user to use an "ATTENTION" button to report events the user considers dangerous that aren't considered as SCOOP manually triggered use cases. The information will then be qualified by the road operator. This option was abandoned in light of the following harmful and undesired effects:
 - The users could use this option to report the presence of police or radar,
 - This simplification button could be used intensively to report a range of events, by ease/economy.
- The U-logs and T-logs are sent to the R-ITSSs or to the SCOOP platform for storage based on methods that can be configured by each road operator.
- The R-ITSSs transmit general broadcast messages in order to announce the available services (routing capability)
- The SCOOP use cases are not based on the communications between R-ITSSs.
- The SCOOP platform receives and sends messages in DATEX II V2.3.
- The SCOOP project doesn't impose cartography in the VU-ITSSs nor in the R-ITSSs.







- The SCOOP wave 1 does not consider hybridation, even if the operator vehicles are equipped with cellular and G5. The messages sent by the operator vehicles to the platform do not go through the R-ITSSs, but are sent directly via cellular (operator vehicle's position message, PKI requests, U-Log and T-log). The VG-ITSSs in "mobile R-ITSS" function send messages in DATEX II V2.3 via cellular to the SCOOP platform. On the other hand, CAM and DENM messages are sent via ITSG5. User vehicles do not have cellular; therefore messages sent to the platform will go through R-ITSSs (in real time routing for the PKI and in batch mode for U-logs and T-logs).
- Messages are sent in IPv6 when it is technically possible:
 - Messages sent by the VU-ITSSs and the VG-ITSSs in G5 are in IPv6.
 - Messages sent by the R-ITSSs in G5 are in IPv6.
 - Messages sent by the VG-ITSSs via cellular are in IPV4 for the SCOOP wave 1 and will be in IPv6 for wave 2.

This implies that the SCOOP components must be able to support IPv6, potentially encapsulated in IPv4.

3 CAM and DENM messages

3.1 General concept of CAM and DENM

Two main types of cooperative messages are used to realize SCOOP use cases: the CAM (Cooperative Awareness Message) and DENM (Decentralized Environmental Notification Message). They are defined respectively by the standards defined in §2.3.

CAM are intended to activate the cooperative awareness (i.e., locate in real time the vehicles or cooperative infrastructure and signal the position and state of the vehicles). CAM are transmitted regularly by the V-ITSSs and all of the ITSSs within range can receive and process them.

DENM are warning messages intended to be broadcast in a geographic zone. They are only transmitted during an unexpected event. They are triggered automatically (involving the different sensors on the vehicle) or can result from an agent's (driver or operator) manual action via a human machine interface embedded in the vehicle.

These messages can also be transmitted by the R-ITSSs to broadcast information from the operator, generally coming from a TMC.

CAM architecture is described in the following illustrations. It is composed by mandatory data (*ITS PDU header, Basic container* containing in particular the ID and the last geographic positions of the ITS station as well as the *High Frequency* (HF) *container* containing the vehicle's fast-changing data) and conditional data, which should be specified based on the message's sender.

DENM are defined by a *header* followed by a set of *containers*, including different sets of unitary fields to be filled in. All of the different fields defined in the standards do not have to be filled in: consequently, a choice had to be made among the *containers* and the non-mandatory fields to construct the messages.











Illustration 9 - structure of a DENM

► The structure of the secure messages sent in SCOOP is presented in the deliverable 2.4.4.6-bis.

Here is an illustration of a secure CAM message:







3.1.1 PROCESSING OF CAM AND DENM FOR DATA COLLECTION

The V-ITSSs regularly transmit CAM (Cooperative Awareness Message) data. The R-ITSSs consolidate CAM messages to construct the traffic data (e.g., average speed), which are then sent to the SCOOP platform.

The R-ITSSs do not consolidate the DENM messages. There is no prioritisation between the DENMs to be processed by an R-ITSS: all DENMs are translated individually in DATEX II V2.3 and sent to the platform, which makes them available to the TMC.

The DENM messages transmitted by a VG-ITSS in "mobile R-ITSS" mode, which are broadcast for the V-ITSSs, are systematically translated in DATEX II V2.3 and sent to the SCOOP platform individually.

3.1.2 COMMUNICATION PROFIL FOR CAMS AND DENMS

Sender: V-ITSS, ITSS- R/R-ITSS Addressing mode: Geographic broadcast	Receiver: Any ITS station in the defined geographic zone	Content transmitted DENM messages created or relayed	Access layer G5= 802.11p Channel CCH	Application protocol DENM No. of related port Port 2002	Network transport BTP Geonet
Creator V-ITSS Addressing mode: General broadcast	Receiver: Any ITS station in the ad-hoc local network	Content transmitted CAM messages created	Access layer G5= 802.11p Channel CCH	Application protocol CAM No. of related port Port 2001	Network transport BTP Geonet
Creator VG-ITSS in operator mode Addressing mode: Addressing without routing by an R-ITSS	Receiver: platform	Content transmitted Position of the road operator vehicle	Access layer cellular 3G Channel 3G	Application protocol DatexIIv2 in FTP or HTTP	Network transport TCP/IPv4 (IPv6 in wave 2)

► The other communication channels specific to the PKI, to the R-ITSSs' service announcement messages and to the U-log and T-log exchanges will be covered later in the appendix of this deliverable.

► The communication profil between the R-ITSSs and the platform, which only require a consensus between operators, will not be discussed in this deliverable.



3.2 Specification needs related to the CAM and DENM architecture

3.2.1 CHOICE OF FIELDS TO FILL IN AND HOW TO FILL THEM IN

The fields defined in the CAM and DENM standards are either:

- mandatory (i.e., mandatory fields that the transmitting entity must fill in)
- optional (i.e. fields that don't have to be filled in)

The non-mandatory character concerns the existence of the field in the messages to transmit.

► It has been decided to define the notion of "mandatory" field for SCOOP based on the written definition of *mandatory* in the CAM standard:

A *mandatory* field is a field that must absolutely exist in a message transmitted with a value other than (0) (i.e., *unavailable*) - when the information exists and is available, and only take the value (0) in case of an error, when the data supplied are temporarily missing or erroneous due to a malfunction in the applications loaded. If the information cannot be supplied or doesn't exist, the default value is (0).

► All of the *mandatory* fields in CAM and DENM standards are considered as mandatory for SCOOP and this deliverable may specify how to fill them in.

► All of the *optional* fields in the CAM and DENM standards listed in this deliverable (see §3.2.2 and § 3.2.3) are considered as *mandatory* for SCOOP and this deliverable may specify how to fill them in.

► All of the *optional* fields in the CAM and DENM standards that are not listed in this deliverable (see §3.2.2 and § 3.2.3) remain non-mandatory for SCOOP.

NOTE: For DENM messages, as soon as a field will be filled in with a value other than (0) by at least one SCOOP transmitter (VU-ITSS, VG-ITSS or ITSS-R) for at least one use case, this field is rendered "mandatory" to fill in for all of the messages transmitted, whatever is the use case of the transmitted message and whatever is the transmitter.

NOTE: The *mandatory* fields of the CAM or DENM standards, which specifically concern the information presented on the CAN bus of vehicles cannot be supplied by the ITS stations not connected to the vehicle's CAN bus and will be permanently filled with the default value (0) (i.e., *unavailable*).

► Consequently, the components concerning the transmission of messages subject to a SCOOP choice are relative to:

- The choice of the fields to report among the non-mandatory fields to realize the use cases
- Potentially, the precise definition of the content of each field (mandatory or non-mandatory)
- Potentially, the definition of each field format

3.2.2 CAM FIELDS (RENDERED) MANDATORY FOR SCOOP

All of the fields listed in this table are rendered mandatory for the CAM messages transmitted by the ITTS-VUs and the VG-ITSSs. The CAM messages transmitted by the ITTS-Rs will be defined later in the appendix of this deliverable.



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Table 4: CAM definition: ITS PDU Header

ITS PDU HEADER							
Field No. and name (as in the appendix of the CAM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices				
B.1 Header	CAM header that includes the following information: * the version of the communication protocol * the type of message (CAM), * the ID of the CAM transmitter (station ID)	Mandatory for SCOOP because <i>mandatory</i> in the standard	For all CAM messages transmitted (VU-ITSS and VG-ITSS): protocolVersion = (1) messageID = (2) stationID = INTEGER(0429496729 5) ► stationID corresponds to the pseudonym certificates, see Deliverable L2.4.4.7				
B.3 GenerationDeltaTime	Deneration time of the CAM	Mandatory for SCOOP because					
		<i>mandatory</i> in the standard					

Table 5: CAM definition: Basic container

	BASIC CONTAINER								
Field No. and name (as in the appendix of the CAM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices						
B.18 StationType	Type of transmitting station NOTE: According to ETSI TS 102 894-2: unknown (0), pedestrian (1), cyclist (2), moped (3), motorcycle (4), passengerCar (5), bus (6), lightTruck (7), heavyTruck (8), trailer (9), specialVehicles (10), tram (11), roadSideUnit (15)	Mandatory for SCOOP because <i>mandatory</i> in the standard	The VU-ITSSs should use the code (5). The VG-ITSSs should use: code (5) in user mode, (15) in operator mode with mobile R-ITSS function; operator mode without mobile R-ITSS function: (9) if FLR and (10) for all other operator vehicles in operator mode.						





	BASIC CONTAINER								
Field No. and name (as in the appendix of the CAM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP choices	comments	and				
B.19 Reference Position	Vehicle's position and related precision. This measurement is made on the temporal basis of B.3 GenerationDeltaTime The position is the position of the front central point of the front bumper.	Mandatory for SCOOP because <i>mandatory</i> in the standard							
	The precision, obtained based on a PositionEllipse Confidence, should be 95% Failing this, it is declared unavailable. It is defined based on two ellipse axes: * a North-South axis * an East-West axis								

Table 6: CAM definition: High frequency container

	HIGH FREQUENCY CONTAINER							
Field No. and name (as in the appendix of the CAM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices					
B.21 Heading	Vehicle's orientation vis-à-vis North and precision of the orientation value provided. This precision should be reliable at 95%. Failing this, the precision is declared unavailable.	Mandatory for SCOOP because <i>mandatory</i> in the standard	This information is not necessarily available for all VG-ITSSs (without connection to the CAN bus)					
B.22 Speed	Vehicle's speed and precision of the speed value This precision should be reliable at 95%. Failing this, the precision is declared unavailable.	Mandatory for SCOOP because <i>mandatory</i> in the standard	This information will be aggregated by the R-ITSSs					
B.25 DriveDirection	Vehicle's direction of motion: frontwards or backwards	Mandatory for SCOOP because <i>mandatory</i> in the standard						





	HIGH FREQUENCY CONTAINER							
Field No. and name (as in the appendix of the CAM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices					
B.35 VehicleLength	Length of the vehicle and related precision: * the length of the vehicle includes the accessories like a trailer * the precision covers the detection of an accessory like a trailer and the knowledge of its length	Mandatory for SCOOP because <i>mandatory</i> in the standard	This information will be aggregated by the R-ITSSs					
B.36 Vehicle Width	Vehicle's overall width (including the side view mirrors)	Mandatory for SCOOP because <i>mandatory</i> in the standard	This information will be consolidated by the R-ITSSs					
B.26 Longitudinal Acceleration	Vehicle's longitudinal acceleration at the vehicle's centre of gravity when empty. This data also includes the precision of the acceleration value, which should be reliable at 95%. Failing this, it is declared unavailable.	Mandatory for SCOOP because <i>mandatory</i> in the standard	This information is not necessarily available for all VG-ITSSs (without connection to the CAN bus)					
B.31 Curvature	Curvature followed by the vehicle and direction of this curvature (left/right) This data also includes the precision of the curvature value, which should be reliable at 95%.	Mandatory for SCOOP because <i>mandatory</i> in the standard	This information is not necessarily available for all VG-ITSSs (without connection to the CAN bus)					
B.32 CurvatureCalculation Mode	Precision of the consideration of the yawrate in the curvature calculation. Failing this, the precision is declared unavailable.	Mandatory for SCOOP because <i>mandatory</i> in the standard	This information is not necessarily available for all VG-ITSSs (without connection to the CAN bus)					





HIGH FREQUENCY CONTAINER								
Field No. and name (as in the appendix of the CAM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices					
B.33 YawRate	Yawrate: characterises the vehicle's speed of rotation around its centre of gravity when empty: * negative value if rotation is clockwise (as seen from above) * positive value if rotation is counter clockwise (as seen from above) This data also includes the precision of the yawrate, which should be reliable at 95%. Failing this, the precision is declared unavailable.	Mandatory for SCOOP because <i>mandatory</i> in the standard	This information is not necessarily available for all VG-ITSSs (without connection to the CAN bus)					

	LOW FREQUENCY CONTAINER							
Field No. and name (as in the appendix of the CAM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices					
B.23 VehicleRole	Role of the vehicle transmitting the CAM message. This field is numbered. NOTE: According to ETSI TS 894 V2 V1.2.1: default(0), publicTransport(1), specialTransport(2), dangerousGoods(3), roadWork(4), rescue(5), emergency(6), safetyCar(7), agriculture(8), commercial(9), military(10), roadOperator(11), taxi(12), reserved for future usage (13, 14, 15). The use of codes (1) to (7) requires the use of mandatory fields that have to be filled in.	optional in the standard and rendered mandatory in SCOOP	The VU-ITSSs should use by default the value (0). The VG-ITSSs should use the values (0) in user mode and (11) in operator mode.					





LOW FREQUENCY CONTAINER							
Field No. and name (as in the appendix of the CAM standard)	Description in appendix	(See co B of the	mple star	ete def ndard)	inition	Mandatory character of the field?	SCOOP comments and choices
B.37 ExteriorLights	Activation exterior ligh	status its	of	the	main	<i>optional</i> in the standard and rendered mandatory in SCOOP	This will enable operators to refine the reasons for a warning (e.g., reduced visibility). In the context of an impact study, this will make it possible to determine which driver behaviour the warning message provokes (see deliverable L231). This information is not necessarily available for all VG-ITSSs (without connection to the CAN bus)





	LOW FREQUENCY CONTAINER						
Field No. and name (as in the appendix of the CAM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices				
B.38 PathHistory	History of the latest movements over a given time or distance. This history involves a list of points (up to 23 points), whose generation/coding should comply with the standard SAE J2735.	optional in the standard and rendered mandatory in SCOOP	 ► Exchanges with the ITS corridor: The manufacturers rely on a maximum of 40 tracking points with a distance of 22.5 m between the points The operators can use different variables ► Path History implementation is based on the Design Method One specified in CAMP 811492B - Vehicle Safety Communications – Applications (VSC-A), Final Report: Appendix Volume 1 - System Design and Objective Test, September 2011, Appendix B-2, while taking into account the following parameters: K_PHALLOWABLEERROR _M = 0.47 m, where PH_ActualError < K_PHALLOWABLEERROR _M · Maximum distance between concise path points, K_PH_CHORDLENGTHTH RESHOLD = 22.5 m . K_PH_MAXESTIMATEDR ADIUS = REarthMeridian · K_PHSMALLDELTAPHI_R = 1 degree 				
			· REarthMeridian = 6378.137 km				





3.2.3 DENM FIELDS (RENDERED) MANDATORY FOR SCOOP

All of the fields listed in these tables are rendered mandatory for the DENM messages transmitted by the ITTS-VUs, the VG-ITSSs and the ITSS-Rs.

Table 7: DENM definition: Header

Field No. and name (as in the appendix of the DENM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices
B.1 Header	DENM header that includes the following information: * the version of the communication protocol * the type of message (DENM), * the ID of the DENM transmitter (station ID)	Mandatory for SCOOP because <i>mandatory</i> in the standard	protocolVersion = (1) messageID = (1) stationID = pseudonym certificate, see Deliverable 2.4.4.7

Table 8: DENM definition: Management container

MANAGEMENT CONTAINER					
Field No. and	Description (See complete definition in	Mandatory	SCOOP	comments	and
name (as in the	appendix B of the standard)	character of the	choices		
appendix of the		field?			
DENM standard)					





MANAGEMENT CONTAINER			
Field No. and name (as in the appendix of the DENM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices
B.7 ActionID	ActionID is given by: * The identifier of the transmitting ITS station (whole number between 0 and 4294967295), * sequential number attributed by the transmitting station (whole number between 0 and 65535) Each terminal (V-ITSS, R-ITSS, C-ITSS) increments each new event it detects, starting with 0. Once the maximum number of events is reached (65535), the event numbering starts over at 0. When sending an update of an already reported event, the DENM sent takes the same ActionID number as the actionID of the initial DENM report for the event. The new reported DENM is then considered as an update of the DENM initially sent and carries the same Action ID. When cancelling or deleting an already reported event, the DENM sent takes the same ActionID number as the actionID of the initial DENM report for the event. Then the new ActionID number as the actionID of the initial DENM report for the event. Then the same ActionID number as the actionID of the initial DENM report for the event. Then the same ActionID number as the actionID of the initial DENM report for the event. Then the new DENM reports that the event reported initially is terminated.	Mandatory for SCOOP because mandatory in the standard	





MANAGEMENT CONTAINER			
Field No. and name (as in the appendix of the DENM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices
B.11 DetectionTime	Instant when the reported event in the DENM: • is detected, in the case of a new event, • is updated • is terminated, in the case of the end of an event. * in the case of a repeated message, this time remains the same as the time included in the first message (detection)	Mandatory for SCOOP because mandatory in the standard	There is no required way in the standard to fill in <i>detectionTime</i> . The ITS stations' application fills in this field. Consequently, it has to be specified for SCOOP. The detectionTime field is different than the time when a message is transmitted/generated (<i>referenceTime</i>). For SCOOP, it is proposed by default that the detectionTime corresponds to: - when the triggering conditions are fulfilled for automatic or automated triggering, - when the user activates a manually triggered report via the embedded HMI, - the beginning of the event estimated by the TMC when the TMC





	MANAGEMENT CONTAINER			
Field No. and name (as in the appendix of the DENM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices	
B.37 ReferenceTime	Instant when a new message, updated message or termination message is transmitted/generated.	Mandatory for SCOOP because <i>mandatory</i> in the standard	Different from detectionTime.	
B.50 Termination	The message indicates that it is "Cancelation" or "Deletion" of a previously sent message (the message carries the same ActionID as the message it terminates). NOTE: * This information is optional * This message should be kept in memory by the transmitter	optional in the standard and rendered mandatory in SCOOP	The VU-ITSSs, VG-ITSSs C-ITSSs or ITSS-Rs ca fill it in with a value othe than (0) depending on th use cases. Depending on the us cases, a vehicle (or an R ITSS) can cancel a DENN that it has transmitte itself. ► It has been decided i SCOOP that the SCOOP ITS stations do not hav the right to delete th DENMs transmitted b another ITS station.	





MANAGEMENT CONTAINER			
Field No. and name (as in the appendix of the DENM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices
B.14 EventPosition	Event's geographic position The DENM standard specifies that when the event's position corresponds to a position of the vehicle transmitting the DENM message, then eventPosition corresponds to the vehicle's position when the event is detected and entered in the mandatory detectionTime field.	Mandatory for SCOOP because <i>mandatory</i> in the standard	For the DENMs that are activated manually, it is considered that the eventPosition corresponds by default to the vehicle's position when the user activates the function via the HMI ► The positioning error due to the fact that the user doesn't necessarily report an event when it happened is taken into account in the definition of the relevanceDistance default values. ► It has been decided that initially there won't be any algorithms designed to recalculate the event position reported manually by a user in SCOOP wave
B.38 RelevanceDista nce	SCOOP uses a different definition that the definition in the DENM standard, which is not considered as precise enough. In the DENM standard, <i>relevanceDistance</i> indicates the zone in which the event can be relevant for the receiver. For SCOOP, the <i>relevanceDistance</i> indicates the minimum distance to inform the user. See. §3.2.7 and 3.3.1	<i>optional</i> in the standard and rendered mandatory in SCOOP	► Filling in this field for SCOOP is detailed by use case.




	MANAGEMENT CON	TAINER	
Field No. and name (as in the appendix of the DENM standard)	Description (See complete definition in appendix B of the standard)	Mandatory character of the field?	SCOOP comments and choices
B.39 Relevance- TrafficDirection	Traffic direction where event information is relevant for the receiver This field is numbered: allTrafficDirections(0), upstreamTraffic(1), downstreamTraffic(2), oppositeTraffic(3)	<i>optional</i> in the standard and rendered mandatory in SCOOP	► Filling in this field for SCOOP is detailed by use case.
B.55 ValidityDuration	Estimation of the event's validity duration > determines the duration during which the message should be kept in the zone of relevance If the event lasts beyond the duration initially estimated, the original transmitter transmits the message again while updating the estimate of the remaining duration If the validity duration of the event cannot be estimated, a default value shall be entered If not entered, the default validity duration of a DENM message is DefaultValidity.	optional in the standard and rendered mandatory in SCOOP	► The filling in of this field for SCOOP is detailed by use case, otherwise the default value is DefaultValidity (see DENM field defined in B.10).
B.49 StationType	Type of transmitting station NOTE: According to ETSI TS 102 894-2: unknown (0), pedestrian (1), cyclist (2), moped (3), motorcycle (4), passengerCar (5), bus (6), lightTruck (7), heavyTruck (8), trailer (9), specialVehicles (10), tram (11), roadSideUnit (15)	<i>optional</i> in the standard and rendered mandatory in SCOOP	The VU-ITSSs use (5); the VG-ITSSs use (5) in user mode, (10) in "operator" mode (potentially (9)) or (15) in "operator" mode and "mobile R-ITSS" function; the ITSS-Rs use(15)







Table 9: DENM definition: Situation container

	SITUATION C	ONTAINER	
Field No. and name (as in the appendix of the DENM standard)	See definition in appendix B of the corresponding standard	Mandatory character of the field?	SCOOP comments and choices
B.23 InformationQual ity	SCOOP uses a different definition than the definition the Amsterdam group This involves the quality level of the information transmitted taking into account the probability that the event exists in the location indicated.	Mandatory for SCOOP because <i>mandatory</i> in the standard	 The definition for this field for SCOOP is detailed specifically in § 3.2.5 Filling in this field for SCOOP is detailed by use case. (see InformationQuality)
B.17 EventType	Description of the type of event, including the "cause code" and the "sub- cause code".	Mandatory for SCOOP because <i>mandatory</i> in the standard	► The choice of cause codes and sub-cause codes, as well as the related transmission conditions, are detailed by use case.
B.26 LinkedCause	Description of an event that is linked to the event signalled in eventType	optional in the standard and rendered mandatory in SCOOP	Not used for SCOOP in wave 1.
B.13 EventHistory	History of positions based on the <i>eventPosition</i> .	optional in the standard and rendered mandatory in SCOOP	► This field is used to signal an event spread over a linear zone, otherwise it is filled with the default value (0). This field is used by the Eco-AT project. It is also used in the UC D6 (reduced visibility), E6 (precipitation) and D1 (slippery road) in the C2C specifications.





Table 10: DENM definition: Location container

		ONTAINER	
Field No. and name (as in the appendix of the DENM standard)	See definition in appendix B of the corresponding standard	Mandatory character of the field?	SCOOP comments and choices
B.16 EventSpeed	Event's speed. If the event is associated with an ITS vehicle, the speed is the vehicle's one. This information is associated with a confidence level. If there is no confidence level, the confidence level will be considered as equal to 95%. However, it should be noted that an ITS application may require a specific confidence level	optional in the standard and rendered mandatory in SCOOP	In practice, this field will be filled in by the V-ITSSs: - for the B1 (mobile roadwork), B2 (approaching vehicle) and B3 (winter road maintenance vehicle) cases for the VG-ITSSs; - by the non-stationary transmitting vehicles for the relevant use cases for the VU-ITSSs
B.15 EventPositionH eading	Direction or orientation of the event on the road. This information is associated with a confidence level. If there is no confidence level, the confidence level will be considered as equal to 95%. However, it should be noted that an ITS application may require a specific confidence level	optional in the standard and rendered mandatory in SCOOP	Must be filled in for the VU-ITSSs, the VG-ITSSs, the C-ITSS or the ITSS- Rs: - according to the meaning of <i>mandatory</i> for messages from the C- ITSS, - according to the meaning of <i>mandatory</i> for messages from the VU-ITSSs, in automatic mode, - otherwise "unavailable"
B.51 Traces	Groups of traces: each trace is defined by a set of points determining a path leading to the event Several traces or paths can lead to the event; up to 7 traces should be able to be integrated in the message.	Mandatory for SCOOP because <i>mandatory</i> in the standard	 All SCOOP transmitters will fill in this field. Consequently, the platform should make provisions to know how to fill in this field for the ITSS-R/R-ITSSs. ▶ see filling the CAM B.38 PathHistory field for filling this field.
B.42 RoadType	Type of road where the event is located.	<i>optional</i> in the standard and rendered mandatory in SCOOP	It should be possible to have a map to provide this information. In practice, this information will be available for the operator (C-ITSS, ITSS-R and VG-ITSS), but not necessarily for the VU-ITSSs.









	A LA CARTE C	ONTAINER	
Field No. and name (as in the appendix of the DENM standard)	See definition in appendix B of the corresponding standard	Mandatory character of the field?	SCOOP comments and choices
B.24 LanePosition	In the case of a road with several lanes, lane on which the event is positioned. NOTE: * This data should be supplied with a minimum confidence level of 95%.	optional in the standard and rendered mandatory in SCOOP	In practice, the information will only be filled in relevantly by the C-ITSS or the ITSS-Rs because the GPS' precision is insufficient to fill in this field for the V-ITSSs (even if they would have a map)
B.18 ExternalTemperat ure	Outside temperature where the event is reported	optional in the standard and rendered mandatory in SCOOP	In practice, this information is easy for the VU-ITSSs to report because it is interesting for the operators. Value unavailable by default for the VG-ITSSs and the C-ITSS.
B.9 ClosedLanes	Specifies whether the work involves one or more closed traffic lanes. This additional information also specifies whether the emergency traffic lane is closed to traffic or whether it can be used for specific needs (e.g., for the closing)	optional in the standard and rendered mandatory in SCOOP	This field is rendered mandatory in SCOOP to the extent that the operators who so wish will potentially fill it in, but its use is not required to produce the SCOOP use cases.
B.44 SpeedLimit	Speed limit authorised in the work zone	<i>optional</i> in the standard and rendered mandatory in SCOOP	The operator should provide this information (via the C-ITSS or an ITSS-R) when it is available. The V-ITSSs transmit (0) by default.
B.52 TrafficFlowRule	Side of the work zone that the traffic should be on (right side or left side)	<i>optional</i> in the standard and rendered mandatory in SCOOP	The Amsterdam Group recommends using this field. This field is rendered mandatory in SCOOP to the extent that the operators who so wish will fill it in, but its use is not required to produce the SCOOP use cases.
B.36 ReferenceDenms	History of DENM messages related to a signalled event.	optional in the standard and rendered mandatory in SCOOP	Won't be used in wave 1.





A LA CARTE CONTAINER							
Field No. and name (as in the appendix of the DENM standard)	See definition in appendix B of the corresponding standard	Mandatory character of the field?	SCOOP comments and choices				
B.30 PositioningSoluti on	Specifies the technical position used by the transmitter to estimate the position of the event.	<i>optional</i> in the standard and rendered mandatory in SCOOP					
B.47 StationarySince	elapsed time of the stationary vehicle	optional in the standard and rendered mandatory in SCOOP	In practice, this field is always filled in with the default value (0) except for use cases where the transmitter is a stationary vehicle.				
B.56 Vehicleldentificati on	Characteristics of the stationary vehicle: * Brand (ETSI TS 101 539-1) * Model (ISO 3779)	<i>optional</i> in the standard and rendered mandatory in SCOOP	This field will be filled in with a value other than (0) if the manufacturers can get their customers to fill in this information. The operator can use this information to identify a SCOOP vehicle with the cameras, if needed.				

Table 12: Other parameters for DENM

Other parameters						
Field No. and name (as in the appendix of the DENM standard)	See definition in appendix B of the corresponding standard	Mandatory character of the field?	SCOOP comments and choices			
B.10 DefaultValidity	Default value for the duration of validity of a DENM	Mandatory for SCOOP because <i>mandatory</i> in the standard	This a default value set at 600s as recommended.			

3.2.4 EVENTTYPE - DEFINITION OF THE MESSAGES TRANSMITTED BY USE CASE

Tables below list the cause codes and sub-cause codes used for SCOOP by use case.



Table 13: Cause codes and sub-cause codes for Temporary slippery road

D1 - Temporary slippery road							
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes			
A2-D1 Temporary slippery road	6: adverse weather condition - adhesion	0: unavailable	Automatic transmission by an V-ITSS				
D1 Temporary slippery road	6: adverse weather condition - adhesion	0: unavailable	Transmission from the TMC				
D1 Temporary slippery road- persistent frost	6: adverse weather condition - adhesion	1: heavy frost on road	Transmission from the TMC	If used, this case can be displayed the			
D1 Temporary slippery road- diesel fuel	6: adverse weather condition - adhesion	2: fuel on road	Transmission from the TMC	same way as 6/0 because the HMI			
D1 Temporary slippery road- mud	6: adverse weather condition - adhesion	3: mud on road	Transmission from the TMC	a level of granularity The cause codes 6/1, 6/5, 6/6, 6/9 signal different types of ice or black ice that it is interesting			
D1 Temporary slippery road- snow	6: adverse weather condition - adhesion	4: snow on road	Transmission from the TMC Transmission from the TMC				
D1 Temporary slippery road- ice	6: adverse weather condition - adhesion	5: ice					
D1 Temporary slippery road- black ice	6: adverse weather condition - adhesion	6: black ice	Transmission from the TMC	to differentiate for drivers used to these			
D1 Temporary slippery road- oil	6: adverse weather condition - adhesion	7: oil on the road	Transmission from the TMC	different indications.			
D1 Temporary slippery road- gravel	6: adverse weather condition - adhesion	8: LooseChippin gs	Transmission from the TMC	recommended that the operators only use the code 6/6 to			
D1 Temporary slippery road- instant black ice	6: adverse weather condition - adhesion	9: instantBlackIc e	Transmission from the TMC	signal black ice and not 6/1, 6/5 or 6/9.			
D1 Temporary slippery road- roads salted	6: adverse weather condition - adhesion	10: roadsSalted	Transmission from the TMC				





Table 14: Cause codes and sub-cause codes for Warning - animal, people on the road

	Warning - animal, people on the road							
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes				
A3-D2a animal on the road	11: hazardous animal – animal on the road	0: unavailable	Report triggered manually by a user	To the question of distinguishing between a small and big animal, it was decided to stay with a unique "Animal on the road" triggered report				
D2a Animal on the road	11: hazardous animal – animal on the road	0: unavailable	Transmission from the TMC					
D2a Animal on the road - wild	11: hazardous location – animal on the road	1: wild animal	Transmission from the TMC	If used, this case can be displayed the same way as 11/0 because				
D2a Animal on the road - herd	11: hazardous location – animal on the road	2: herd of animals	Transmission from the TMC	the HMI may not report such a level of granularity				
D2a Animal on the road - small animal	11: hazardous location – animal on the road	3: small animal	Transmission from the TMC					
D2a Animal on the road - big animal	11: hazardous location – animal on the road	4: big animal	Transmission from the TMC					
A3-D2b person on the road	12: human presence on the road	0: unavailable	Report triggered manually by a user	See box hereafter [Comment on the choice of codes for A3- D2b]				

[Comment on the choice of codes for A3-D2b]

The detection will not be automatic. The driver of the SCOOP vehicle or the driver of another SCOOP vehicle who sees a person on the road will make the detection.

NOTE: Based on the RHS standard, the manually triggered reports from a vehicle should only concern the vehicle's occupants:

FRUC1002: Event triggering condition:

- Automatic triggering by the Vehicle ITS-S detecting that one of its occupants is leaving the vehicle.
- Manually triggered by one of the passenger of the vehicle signalling its departure from the vehicle.
- Manually triggered by the human himself using a nomadic device."
- \rightarrow to be traced in the upgrade recommendations for the SCOOP standards





Warning - animal, people on the road							
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes			
D2b person on the road	12: human presence on the road	0: unavailable	Transmission from the TMC				

Table 15: Cause codes and sub-cause codes for obstacle on the road

	D3 - obstacle on the road						
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes			
A3-D3 Obstacle on the road	10: hazardous – obstacle on the road	0: unavailable	Report triggered manually by a user	See box hereafter [Comment on the choice of codes for A3-D3]			
[Comment on the choice of codes for A3-D3] To the question of distinguishing between a small and big obstacle, it was deemed difficult to implement and would require an additional choice in the HMI. Therefore it was decided to stay with a unique "Obstacle on the road" report.							
D3 Obstacle on the road	10: hazardous – obstacle on the road	0: unavailable	Transmission from the TMC	It seems difficult to provide additional clarifications about the objects using the sub- cause code (for the record: 1- shedload, 2- parts of vehicles, 3- tyres, 4- big objects, etc.)			

Table 16: Cause codes and sub-cause codes for Warning stationary vehicles, breakdown

D4 - Warning stationary vehicles, breakdown						
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes		
A2-D4a - Warning stationary vehicle	94: stationary vehicle	0: unavailable	Automatic transmission by an V-ITSS			
D4 vehicle stationary/breakdo wn	94: stationary vehicle	0: unavailable	Transmission from the TMC	Some operators only handle breakdowns and will only broadcast the code 94/2 and not 94/0.		





A2-D4b EGO breakdown	Warning vehicle	94: stationary vehicle	2: vehicle breakdown	Automatic by an V-IT	transmission SS	See box he the choice	ereafter [Comment on of codes for A2-D4b]	
[Comment o	on the cho	ce of codes for A2-D4	b]					
The operators would like to use the Cause Code 91, with the breakdown details, for the following reasons: *They don't service all breakdowns, like an air conditioning breakdown *They want to be able to manage the priority of service calls, in case of simultaneous breakdowns, towards long-term breakdowns (e.g., priority for an engine breakdown (sub-cause code 3) rather than a flat tyre (sub-cause code 8).								
The operators will see whether they formulate a request to upgrade these recommendations with the C2C.								
D4 vehicle stationary/l wn	breakdo	94: stationary vehicle	2: vehicle breakdown	cle Transmission from the Some of breakd broadc 94/0.		Some oper breakdowr broadcast 94/0.	erators only handle vns and will only st the code 94/2 and not	
Table 17: Ca	use codes a	and sub-cause codes for	Warning static	onary vehicles	, breakdown			
		D5 - Warn	ing stational	y vehicles,	breakdown			
SCOOP not	menclatuı	e Cause code	Sub-cau	ise code	se code Type of transmission		Comments on the choice of codes	
A2-D5 Warr accident zo vehicle in a	ning one – EGC accident	94: stationary veh	nicle 3: post o	3: post crash Aut		ansmission S		
A3-D5 Warı	ning	2: accident	0: unava	0: unavailable Report triggered See hereafter		See hereafter		

[Comment on the choice of codes for A3-D5]

accident zone

Manually triggered reports are deemed useful for the following reasons:

• Enable SCOOP vehicles to report this type of event for another vehicle, SCOOP or not, due to the deemed low probability of an accident with a SCOOP vehicle.

manually by a user

- In case of a low impact crash (e.g., a repeatable impact at 15km/h) no passive safety component is triggered and the Crash information is not transmitted. Consequently, such a crash could not be covered by a DENM;
- o In case of a more severe crash, the battery connection could be lost. In this case as well, a DENM could not be transmitted.

NOTE: due to a lower position precision than in the case of an automatic transmission by the vehicle in the accident, a 2 / 0 transmission will have a lower quality level than a 94 / 3.

NOTE: The cause code 2 is provided in the DENM, but not in the RHS standard (track in the upgrade recommendations for SCOOP standards)



[Comment on the choice of codes for

A3-D5]



D5 Warning accident zone	2: accident	0: unavailable	Transmission from the TMC	See box hereafter [Comment on the choice of codes for D5]		
[Comment on the choice of codes for D5]						
It has been decided to take triggered report (94 / 3).	e the Cause Code and	sub-cause code 2 / 0	to differentiate it from the	e automatically		
The operator will be able to etc.).	o specify the type of ac	cident: (1-multiple veh	nicles, 2-major rescue me	eans, 3-lorry, 4-Bus,		
NOTE: The HMI may not r	eport to the driver such	a level of detail due t	o clarification reasons.			
NOTE: The cause code 2 i recommendations for SCC	s provided in the DENI OP standards)	M, but not in the RHS	standard (track in the up	grade		
D5 Warning - unprotected accident area	2: accident	7: unsecured Accident	Transmission from the TMC	See box hereafter [Comment on the choice of codes for D5]		
D5 Unprotected accident area - multiple vehicles	2: accident	1: multi vehicle accident	Transmission from the TMC	If used, this case can be displayed the same way as		
D5 Unprotected accident area - major rescue means	2: accident	2: heavy accident	Transmission from the TMC	2/0 because the HMI may not report such a level of		
D5 Unprotected accident area - lorry	2: accident	3: accident involving lorry	Transmission from the TMC	granulanty		
D5 Unprotected accident area - Bus	2: accident	4: accident involving bus	Transmission from the TMC			
D5 Unprotected accident area - hazardous materials	2: accident	5: accident involving hazardous materials	Transmission from the TMC			
D5 Unprotected accident area - accident on opposite lanes	2: accident	6: accident on opposite lanes	Transmission from the TMC			

The operators are not interested by the stationary Vehicle event but by the Vehicle breakdown information, with the cause of the breakdown, if possible, to decide and define the service priorities. To the extent that it will be difficult to report this level of detail manually, this Use Case is abandoned in the "manual reporting" mode.





Table 18: Cause codes and sub-cause codes for Warning reduced visibility

	D6 - Warning reduced visibility					
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes		
A2-D6 Warning reduced visibility	18: Adverse weather condition - visibility	0: unavailable	Automatic transmission by an V-ITSS			
A2-D6 Warning reduced visibility	18: Adverse weather condition - visibility	0: unavailable	Transmission by the TMC	For this type of warning some operators will prefer to transmit the IVS messages deployed in phase 2 (e.g., "FOG RISK")		
D6 warning reduced visibility - fog	18: adverse weather condition - visibility	1: fog	Transmission from the TMC	The operators plan to be able to transmit these cause codes. The manufacturers		
D6 warning - reduced visibility - smoke	18: adverse weather condition - visibility	2: smoke	Transmission from the TMC	should make provisions to be able to display this use case if at all possible (if the		
D6 warning - reduced visibility - snow	18: adverse weather condition - visibility	3: heavySnowfall	Transmission from the TMC	calendar and the technical predictions allow it). If used, this case can be displayed the same way as 18/0 because the HMI may not report such a level of granularity		
D6 warning - reduced visibility - rain	18: adverse weather condition - visibility	4: heavy Rain	Transmission from the TMC			
D6 warning - reduced visibility - hail	18: adverse weather condition - visibility	5: heavy Hail	Transmission from the TMC	For this type of warning some operators will prefer to transmit the IVS messages deployed in phase 2 (e.g., "FOG RISK")		

Table 19: Cause codes and sub-cause codes for Warning vehicle driving in wrong direction

D7 - Warning vehicle driving in wrong direction					
Cause code Sub-cause code Type of transmission Comments on the che					
A3-D7 - Warning vehicle driving in wrong direction	14: Wrong Way Driving	2: Vehicle Driving in Wrong Way Direction	Report triggered manually by a user	Not specified in SCOOP wave 1. tbc if subsequent specification	





Table 20: Cause codes and sub-cause codes for unmanaged blockage of a road

	D8 - unma	naged blockage o	f a road	
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes
A3-D8: unmanaged blockage of a road (road with blocked traffic)	9: hazardous location – surface condition	0: unavailable	Report triggered manually by a user	The standard doesn't appear to provide for this use case. SCOOP chooses to use this cause code to allow the use of the sub-cause codes provided by diverting the use to signal obstacles on the road that cause an unmanaged obstacle or blocked traffic.
D8: unmanaged blockage of a road (road with blocked traffic) - rock falls	9: hazardous location – surface condition	1: rock falls	Transmission from the TMC	The operators plan to be able to transmit these cause codes.
D8: unmanaged blockage of a road (road with blocked traffic) - subsidence	9: hazardous location – surface condition	4: subsidence	Transmission from the TMC	The manufacturers should make provisions to be able to display this use case if at all possible (if the calendar and the technical predictions allow it). If used, this case can be displayed the same way as 9/0 because the HMI may not report such a level of granularity
D8: unmanaged blockage of a road (road with blocked traffic) - avalanche	9: hazardous location – surface condition	5: snow drifts	Transmission from the TMC	
D8: unmanaged blockage of a road (road with blocked traffic) - burst pipe	9: hazardous location – surface condition	7: burst pipe	Transmission from the TMC	





Table 21: Cause codes and sub-cause codes for emergency brake warning

D10 - emergency brake warning				
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes
A2-D10 warning emergency brake	99: Dangerous situation	1: Emergency electronic Brake lights	Automatic transmission by an V-ITSS	

Table 22: Cause codes and sub-cause codes for end of queue warning

	D11 - end of queue warning					
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes		
A2-D11 warning end of queue	27: Dangerous end of queue	0: unavailable	Automatic transmission by an V-ITSS	NOTE: This cause code (and its meaning) is provided in the DENM, but not in the RHS standard (but recommended in the C2C) → track in the upgrade recommendations for SCOOP standards		
A2-D11 warning end of queue	27: Dangerous end of queue	0: unavailable	Transmission by the TMC	This information is not currently specified in the TMCs, but could be improved thanks to vehicles reporting.		

Table 23: Cause codes and sub-cause codes for exceptional weather conditions warning

E6 - exceptional weather conditions warning				
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes
A2-E6 Warning exceptional weather conditions	19: Adverse weather condition - precipitation	0: unavailable	Automatic transmission by an V-ITSS	See hereafter [Comment on the choice of codes for A2-E6]





	E6 - exceptional weather conditions warning					
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes		
[Comment on the choice of codes for A2-E6]						
The cause code 19/0 i feasible one in V2V. H	The cause code 19/0 is recommended by the C2C and is centred on the "heavy rain" use case because it is the only feasible one in V2V. Hence the choice to use 19/0 and not 17/0.					
Nevertheless, SCOOF types of information ca - For wave 1, these co - For wave 2, other co	Nevertheless, SCOOP makes provision to flow information downwards in I2V. This way, operators that have other types of information can use other codes: - For wave 1, these codes are specified in this deliverable for the use case Eg (e.g., 17/1, 17/4) ; - For wave 2, other codes can be added in a subsequent version of this deliverable (e.g., 19/2)					
E6 - Warning exceptional weather conditions - strong winds	17: Adverse weather condition – extreme weather condition	1: strong winds	Transmission from the TMC	The operators plan to be able to transmit these cause codes. The manufacturers should make provisions to be able to display this use case if at all possible (if the calendar and the technical predictions allow it). If used, this case can be displayed the same way as 19/0 because the HMI may not report such a level of granularity		
E6 - Warning exceptional weather conditions - thunderstorm	17: Adverse weather condition – extreme weather condition	4: thunderstorm	Transmission from the TMC	The operators plan to be able to transmit these cause codes. The manufacturers should make provisions to be able to display this use case if at all possible (if the calendar and the technical predictions allow it). If used, this case can be displayed the same way as 19/0 because the HMI may not report such a level of granularity		





Table 24: Cause	codes and sub-cause	codes for Planne	d roadwork warning
I abic 2 ii Cause	coues and sub cause	coucs for i famile	a road work warning

B1 - Planned roadwork warning					
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes	
B1 warning scheduled roadwork - stationary	3: Roadwork	0: unavailable	Transmission from the TMC	The TMC indicates the traffic- rerouting zone in the case of stationary roadwork and the roadwork zone in case of mobile roadwork (linear location).	
B1 warning scheduled roadwork - stationary	3: Roadwork	0: unavailable	Transmission from an operator vehicle (automatic or manual case)	The operator vehicle that transmits is the one that is in the roadwork protection zone	
B1 warning scheduled roadwork - stationary	3: Roadwork	3: Slow moving Road Maintenance	Transmission from an operator vehicle (automatic or manual case)	The operator vehicle that transmits is the one that is in the roadwork protection zone	
B1 warning scheduled roadwork - stationary	3: Roadwork	3: Slow moving Road Maintenance	Transmission from the TMC	The information sent concerns a pre-scheduled zone in which the user risks coming upon mobile roadwork.	
B1 warning scheduled roadwork - winter road maintenance vehicle in action	3: Roadwork	6: winter Service	Transmission from the TMC	Some operators do not use triggered reports of roadwork for active winter service vehicles, preferring to use a VMS message (embedded VMS in the case of SCOOP) of the type "CAUTION SALTING UNDERWAY"	





Table 25: Cause codes and sub-cause codes for road operator intervention warning

B2 - road operator intervention warning				
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes
B2 warning road operator intervention - the operator vehicle on patrol	26: Slow Vehicle	1: maintenance Vehicle	Transmission from an operator vehicle (automatic or manual case)	The operator vehicle that transmits is the one that is on patrol
B2 warning road operator intervention - operator vehicle out on service call	95: Emergency vehicle approaching	0: unavailable	Transmission from an operator vehicle (automatic or manual case)	See hereafter [Comment on the choice of codes for B2 on 95/0]

See box hereafter [Comment on the choice of codes for B2 on 95/0]

Code 95 does not comply with C2C because it is identified as only being attributable to authorised vehicles as defined in the highway code.

The manufacturers stress the display difficulties. The Compass 4D project had addressed this point, but

unsatisfactorily for integration in a mass-produced HMI. The manufacturers have to verify the display feasibility in this use case vis-a-vis the LDM.

This use case will have to be tested in SCOOP, with a major validation phase.

The police and the French gendarmerie could eventually test this case.

The use of the cause code 95 will be addressed later in the appendix of this deliverable.

B2 warning road operator	15: Rescue and recovery work in	0: unavailable	Transmission from an operator vehicle	This code is transmitted when the operator vehicle
intervention - operator vehicle	progress		(automatic or manual case)	stops in a protected mode
stopped in a protected mode				This code is provided in the DENM, but not in the RHS standard.





Table 26Cause codes and sub-cause codes for winter maintenance warning

B3 - winter maintenance warning						
SCOOP nomenclature	Cause code	Sub-cause code	Type of transmission	Comments on the choice of codes		
B3 - Warning winter maintenance - winter road maintenance vehicle on road	3: Roadwork	6: winter Service	Transmission from an operator vehicle (automatic or manual case)	Transmission conditions: blade raised and no salting This code corresponds to the case where the winter service vehicle does not have priority because it is not clearing snow nor salting (amber flashing lights)		
B3 - Warning winter maintenance - winter road maintenance vehicle clearing snow	26: slow vehicle	6: snow plough	Transmission from an operator vehicle (automatic or manual case)	Transmission conditions: blade lowered. This code corresponds to the case where the winter road maintenance vehicle is clearing snow		
B3 - Warning winter maintenance - winter road maintenance vehicle is salting	26: slow vehicle	8: salting vehicle	Transmission from an operator vehicle (automatic or manual case)	This code corresponds to the case where the winter road maintenance vehicle is only salting		





3.2.5 INFORMATIONQUALITY – DEFINITION OF THE QUALITY INDEX

It has been decided that the quality index for SCOOP is the level of probability that the event or situation signalled by the message is true, from the point of view of the message transmitter. Consequently, it is a qualitative notion that incurs the transmitter's responsibility. This notion should be shared between the SCOOP partners.

The quality of SCOOP information does not take into account the event's positioning error, which is intrinsic to the system. If a transmitter transmits with a maximum quality level, this should mean that it provides information that it undertakes to consider as proven.

It has been decided to consider three quality levels for SCOOP, as defined in the three-level quality scale of DATEX II V2.

A SCOOP DENM message can therefore be transmitted with 3 quality levels:

- Q1 = risk
- Q2 = Probable
- Q3 = Certain

It should be noted that there is no unavailable field. The default value is Q1.

The InformationQuality field in the DENM standard is a list that takes the values (0) unavailable, (1)lowest, (2), (3), (4), (5), (6) and (7)highest.

The quality levels for SCOOP are harmonised by the manufacturers to retranscribe the C2C recommendations by use case, which don't necessarily transcribe a quality scale.

3.2.5.1 QUALITY LEVELS FOR MESSAGES TRANSMITTED BY THE USER VEHICLES

► We then designate by "messages transmitted by user vehicles," the messages transmitted by the following SCOOP components: VU-ITSS ; VG-ITSS in "user" mode.

Here is a translation table of the quality levels (i.e., the values of the informationQuality field) into quality levels for SCOOP (3 levels: Q1, Q2 or Q3) for the messages transmitted by the VU-ITSSs in SCOOP.

Table 27: Quality levels - Messages transmitted by the VU-ITSSs in automatic mode

Messages transmitted by the VU-ITSSs in automatic mode						
Use case	codes	Q1 = risk	Q2 = Probable	Q3 = Certain		
A2-D1 warning - temporary slippery road 6/0 (0), (1), (5) (2), (3) (4), (6), (
Note: A2-D1 translates the probability that the EGO vehicle has slip because the road is slippery						
A2-D4a warning - EGO vehicle stationary 94/0 (0) (1), (2) (3)				(3)		
Note: A2-D4a translates the probability that the EGO vehicle not involved in an accident would be stationary without being in a traffic jam						
A2-D4b Warning EGO vehicle breakdown	94/2	(0)	(1), (2)	(3)		



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Messages transmitted by the VU-ITSSs in automatic mode						
Use case	codes	Q1 = risk	Q2 = Probable	Q3 = Certain		
Note: A2-D4b translates the probability that the EG	O vehicle i	s in a stationary	breakdown			
A2-D5 Warning accident zone – EGO vehicle in accident	94/3	(0)	(1), (2)	(3)		
Note: A2-D5 translates the probability that the EGO vehicle is stationary because it has been in an accident						
A2-D6 warning - reduced visibility	18/0	(0)	(1), (2)	(3), (4)		
Note: A2-D6 translates the probability that the EG	Note: A2-D6 translates the probability that the EGO vehicle has turned on its fog lights because the visibility is low					
A2-D10 warning - emergency brake	99/1	(0)	Not used	(1)		
Note: A2-D10 translates the probability that the EG	O vehicle l	has braked in an	emergency			
A2-D11 warning - end of queue	27/0	(0)	(1), (2)	(3)		
Note: A2-D11 translates the probability that the EGO vehicle has slowed down because it is in a traffic jam						
A2-E6 warning - exceptional weather conditions	19/0	(0)	(1), (2)	(3), (4)		
Note: A2-E6 translates the probability that the EGC	Note: A2-E6 translates the probability that the EGO vehicle is crossing a heavy rain zone					

Table 28: Quality levels - Messages transmitted by the VU-ITSSs as manually triggered reports

Messages transmitted by the VU-ITSSs as manually triggered reports						
Use case	codes	Q1 = risk	Q2 = Probable	Q3 = Certain		
A3-D2a animal on the road	11/0	(0)	Not used	Not used		
Note: A3-D2a translates the probability that an an seen an animal	Note: A3-D2a translates the probability that an animal is on the road when and where the user reports having seen an animal					
A3-D2b person on the road	12/0	(0)	Not used	Not used		
Note: A3-D2b translates the probability that a person is on the road when and where the user reports having seen a person						
A3-D3 obstacle on the road	10/0	(0)	Not used	Not used		
Note: A3-A3-D3 translates the probability that an obstacle is on the road when and where the user reports having seen an obstacle on the road						
A3-D5 unprotected accident area	2/0	(0)	Not used	Not used		
Note: A3-A3-D5 translates the probability that an accident happened on the road when and where the user reports having seen an accident						
A3-D8 unmanaged blockage of a road	9/0	(0)	Not used	Not used		
Note: A3-D5 translates the probability that an unmanaged obstacle is on the road when and where the user reports having seen an unmanaged blockage of a road						





► The details of the transmission conditions for each quality level for the messages transmitted by the VU-ITSSs for each use case are covered in §.4.1 of this document.

3.2.5.2 QUALITY LEVELS FOR MESSAGES TRANSMITTED BY THE OPERATOR

► We then designate by "messages transmitted by the operator," the messages transmitted by the following SCOOP components: TMC or TG; C-ITSS or SCOOP platform; R-ITSS; VG-ITSS in "operator" mode.

In order to establish coherency between the DENM messages transmitted with the same cause codes, it is proposed that the quality be filled in with arbitrary values that respect the C2C relation when the operator transmits the messages. Arbitrarily, the value used is the largest among those used by the C2C for the same quality level. If no value is used by the C2C, it is proposed to use (0) for risk, (4) for probable and (7) for certain for the messages transmitted by the operator.

Table 29: Quality levels - Messages transmitted by the operator

Messages transmitted by the operator using the same cause codes as the messages transmitted by the VU-ITSSs (manually or automatically triggered report)					
Use case	codes	Q1 = risk	Q2 = Probable	Q3 = Certain	
D1 warning - temporary slippery road	6/0	(1) if used	(3) if used	(7)	
D2a warning - animal on the road	11/0	(0)	(4) if used	(7) if used	
D2b warning - person on the road	12/0	(0)	(4) if used	(7) if used	
D3 obstacle on the road	10/0	(0)	(4) if used	(7) if used	
D4 stationary vehicle, breakdown - stationary vehicle		(0) if used	(2) if used	(3)	
D4 stationary vehicle, breakdown - vehicle breakdown		(0) if used	(2) if used	(3)	
D5 Warning accident zone	2/0	(0) if used	(4) if used	(7)	
D6 Warning reduced visibility	18/0	(0) if used	(4) if used	(7)	
D11 warning - end of queue	27/0	(0) if used	(2) if used	(3)	

For the other messages transmitted by the TMC, it is proposed to use the quality scale proposed previously: (0) for Q1 = risk, (4) for Q2 = probable and (7) for Q3 = certain.

In practice, the policy of filling in the quality is as follows for the operators: the transmitted messages are necessarily proven information, therefore the messages cited are in principle transmitted with a quality level Q3.





Messages transmitted by the operator with the codes not used by the VU-ITSSs					
Use case	codes	Q1 = risk	Q2 = Probable	Q3 = Certain	
B1 warning - scheduled roadwork	3/0 3/1 3/3 3/6	(0) if used	(4) if used	(7)	
B2 - warning - work on lane	26/1 95/0 15/0	(0) if used	(4) if used	(7)	
B3 - Warning winter maintenance - winter road maintenance vehicle on road	3/6 26/6 26/8	(0) if used	(4) if used	(7)	
D1 warning - temporary slippery road	6/1 6/2 6/3 6/4 6/5 6/6 6/7 6/8 6/9 6/10	(0) if used	(4) if used	(7)	
D2a warning - animal on the road	11/1 11/2 11/3 11/4	(0) if used	(4) if used	(7)	
D5 - warning - accident zone	2/1 2/2 2/3 2/4 2/5 2/6 2/7	(0) if used	(4) if used	(7)	
D6 - warning - reduced visibility	18/1 18/2 18/3 18/4 18/5	(0) if used	(4) if used	(7)	
E6 warning - exceptional weather conditions - strong winds	17/1 17/4	(0) if used	(4) if used	(7)	





Messages transmitted by the operator with the codes not used by the VU-ITSSs				
Use case	codes	Q1 = risk	Q2 = Probable	Q3 = Certain
D8 unmanaged blockage of a road	9/1 9/4 9/5 9/7	(0) if used	(4) if used	(7)

► The operators can explain the transmission conditions of their I2V messages from the TMC in a document that will be appended later to this deliverable.

3.2.6 VALIDITYDURATION

ValidityDuration represents both the duration of validity of the signalled event and the duration of validity of the message so it is processed. This parameter is defined use case by use case in the DENM field table.

This duration is not an absolute duration, it can potentially be increased at each DENM update as long as the validityDuration of the previously transmitted DENM has not expired.

► The operation of updates (and the change in the ValidityDuration) can potentially be specified later by use case in the appendix of this deliverable.

For SCOOP it is considered that the duration of validity is defined independently of the message's quality level and depends in principle on the type of transmitter, the type of transmission and the type of event.

► See case by case in the table defining the messages by use case and by transmitter.

3.2.7 RELEVANCEDISTANCE

See Definition of zones (next §)

Definition for SCOOP:

The relevanceDistance is the user's minimum distance from the information, not nil, variable based on the use cases (even variable for the same use case, e.g., roadwork warning), including the positioning error for the manual or weather cases and the pre-signalling distance for the roadworks







eventPosition + relevanceDistance should provide as a minimum the beginning of the event from which one wants the user to be informed.

See. diagrams of 3.3.1

► See case by case in the table defining the messages by use case and by transmitter.

3.2.8 RELEVANCETRAFFICDIRECTION

This is the direction in which a displayed event should be taken into account.

Logics for default values:

- "AllTrafficDirections" on a road that does not have divided carriageways;

- "UpStreamTraffic" for some stationary events, via automatically signalling, on a divided carriageway if the mapping is available;

- for manually triggered reports, by default "AllTrafficDirection"
- "DownStreamTraffic" for the priority vehicle warning case (message sent by operator vehicles only)
- ► See case by case in the table defining the messages by use case and by transmitter.

3.2.9 EVENTHISTORY

The eventHistory field is used to signal events that are linear. It has been decided to use this field for SCOOP.

► See case by case in the table defining the messages by use case and by transmitter.





3.2.10 REFERENCEDENMS

The referenceDENMs field is used to associate the DENMs that refer to the same event.

▶ It has been decided to not use this field for the SCOOP wave 1.

3.3 Other notions to specify outside of the CAM and DENM fields

3.3.1 NOTION OF ZONES

The notion of zone is covered by several definitions for the SCOOP project:

- the **minimum distance**, marked **D0**, is the distance used to fill in the DENM field *relevanceDistance*. SCOOP defines D0 as the user's minimum distance from the information, not nil, variable based on the use cases (even variable for the same use case, e.g., roadwork warning), including the positioning error for the manual or weather cases and the pre-signalling distance for the roadworks

► This distance is transmitted in the relevanceDistance field of DENM messages. It is a SCOOP parameter whose default values will be specified later use case by use case in the appendix of this deliverable.

- The objectives of the definition of the D0 default values are as follows depending on the use case:
 - inform the user who arrives at 130 km/h sufficiently in advance
 - enable the user to move aside so a priority vehicle can pass
 - inform the user arriving in a roadwork zone before he perceives the first roadwork panel

- the **advance notice distance**, marked **D**, is the distance between the eventPosition and the place where we want the user to be informed, which can be configured by the automobile manufacturers. D is greater than or equal to D0.

- ► This distance is transmitted in the DENM messages of SCOOP.
- eventHistory is a linear representation from the eventPosition
- ► It is one of the DENM fields that will be filled in for SCOOP.
 - For bidirectional linear events, two DENMs (one per direction) are transmitted for a linear event transmitted by the operator.

- the **broadcast zone**, marked **D**', is the distance from the position of the event or the linear of the event – zone in all the directions the information is broadcast in.

► The DENM standard doesn't define the default broadcast zone for a cooperative message. A message's broadcast zone is not a parameter to enter in a field; the standard defines the destination area. The applications provide this information to the DENM service, which then transmits it to the networking & transport layer (see the DENM standard, §6.1.3.3)

It has been decided to consider the broadcast zone as a SCOOP parameter defined as follows:

- Default value = 10 km.
- For user vehicle transmissions (VU-ITSS): the objective of the choice of default values is to enable a transmitted message to reach an R-ITSS (via rebounds).





• For operator transmissions (C-ITSS, ITSS-R, VG-ITSS): each operator can configure this value according to the R-ITSS density in its network.



Illustration 11 - Illustration of the different notions of zones







Illustration 12 - Representation of zones on a map



The areas (general points)



(1)



Stationary roadwork use case

Receive message Process message

Message stored in Flash memory Message stored in RAM memory

- 2 Start of display (display area / relevance area) positioned at the same point as the (notice distance) marked "D". Comments :
 - the first signage is always a warning panel (thus triangular) for AK5 work
 - AK5 panel display => D = D0 + 200m (i.e., 50 m before the 150 m that the user can see the panel)
 - for 2-lane roads (bidirectional) the minimum distance between the AK5 installation and the beginning of actual work is 330 m. These 330 m - for the LD38 - correspond to the minimum distance (relevance distance) marked "D0" (see sheet CF23 and CF24 of the SETRA)
 - LD38 suggestion: to simplify (initially) the processing and display, only the AK5 should be used for the entire duration of the scenario (since in any case only the field signage will refer to it)





3.3.2 REPETITION OF DENMS



SCOOP - Livrable 2.4.1_vEN_1.0.docx



The repetition frequency of a DENM message is not defined in the standard. The repetition interval of DENMs could be harmonised between the SCOOP partners, consistent with the logics recommended by the Amsterdam Group and the C2C consortium.

► This notion could be specified later in the appendix of this deliverable.

3.3.3 LOCAL DYNAMIC MAP

► The DENM standard doesn't define the Local Dynamic Map, but this doesn't present an interoperability issue.

3.3.4 DENM RELAY

► The DENM standard defines two types of **relays** for DENM messages: a KAF (Keep Alive Forwarding) application relay and a relay at the network and transport layer level. **The SCOOP project chooses not to implement the KAF application type relay.**

4 Message transmission conditions

4.1 Automatic transmissions by the user vehicle

4.1.1 A1: DATA FROM THE VEHICLE

The V-ITSS generates CAM messages every 100 ms indicating the vehicle's status and position, which are received by all stations (V-ITSS and ITSS-R) within range of the vehicle.

The ITSS-R that receives the CAMs from vehicles can perform different types of processing on these data before transmitting them to the C-ITSS (calculate average speed, calculate traffic, average length, other consolidation of CAMs, etc.)

4.1.2 A2-D1: TEMPORARY SLIPPERY ROAD

<u>Transmission conditions</u>: Estimated loss of adhesion based on trigger information from the ABS/ASR, the travel of the pedals and the vehicle's acceleration and speed.

Use case	Information Quality defined for SCOOP	Trigger conditions	Comments
	0	Transmission without respecting 1, 2, 3, 4, 5, 6 or 7	
A2-D1 Warning temporary slippery road	1	[ASR request OR ABS action] >200 ms + [accelerator pressure >30% of max OR brake pressure >20% of max] + [acceleration <40% of max OR deceleration <30% of max] NOTE: values defined in reference to an equivalent situation with 0.85 asphalt	





2	ASR request >200 ms + accelerator pressure >30% of max + [acceleration <20% of max] NOTE: values defined in reference to an equivalent situation with 0.85 asphalt	
3	[ASR request OR ABS action] >200 ms + [accelerator pressure >30% of max OR brake pressure >20% of max] + [acceleration <10% of max OR deceleration <25% of max] NOTE: values defined in reference to an equivalent situation with 0.85 asphalt	
4	ABS action >200 ms + brake pressure >20% of max + [deceleration <10% of max] NOTE: values defined in reference to an equivalent situation with 0.85 asphalt	
5	[ASR request OR ABS action] >200 ms + [accelerator pressure >30% of max during activation of the ASR OR + brake pressure <20% of max]	
6	Friction coefficient <0.3 during at least 5s	
7	Friction coefficient <0.2 during at least 5s	

4.1.3 A2-D4A STATIONARY VEHICLE

<u>Transmission conditions</u>: Warnings activated and speed nil during 30 seconds (Tempo reduced based on the position of the gearbox, the parking brake, the state of the doors, the seat belts and the ignition switch)

Use case	Information Quality defined for SCOOP	Trigger conditions	Comments
	0	Transmission without respecting 1, 2 or 3	
A2-D4a Warning	1	Warning + V=0 since 30s	Risk of traffic jam without data on the vehicle's position (lane or shoulder)
stationary vehicle	2	Warning + V=0 since 30s + [Neutral OR parking brake OR seat belt unbuckled]	Risk of traffic jam without data on the vehicle's position (lane or shoulder), for the case of the vehicle in neutral





	Warning	
3	+ V=0 since 30s	
	+ [door open during at least 3s OR -APC]	

4.1.4 A2-D4B VEHICLE IN BREAKDOWN

<u>Transmission conditions</u>: Service indicator light activated on the instrument panel + Warnings activated and speed nil during 30 seconds (Tempo reduced based on the position of the gearbox, the parking brake, the state of the doors, the seat belts and the ignition switch)

Use case	InformationQuality defined for SCOOP	Trigger conditions	Comments
	0	Transmission without respecting 1, 2 or 3	
	1	Warning + Breakdown message on the instrument panel + V=0 since 30s	Risk of non-immobilising breakdown. The driver may be in a stopped situation to perform a diagnosis and decide to start again if not immobilising
A2-D4b Warning vehicle breakdown	2	Warning + Breakdown message on the instrument panel + V=0 since 30s + [Neutral OR parking brake OR seat belt unbuckled]	Risk of non-immobilising breakdown, especially for the case of a vehicle in neutral. Moreover, the driver may be in a stopped situation to perform a diagnosis and decide to start again if not immobilising
	3	Warning + Breakdown message on the instrument panel + V=0 since 30s + [door open during at least 3s OR - APC]	

4.1.5 A2-D5: VEHICLE IN AN ACCIDENT

<u>Transmission conditions</u>: Crash detected by the vehicle's passive safety systems (Stop the transmission if the vehicle moves).

NOTE: the automatic transmission will only occur if the crash is sufficiently strong and there is no loss of Battery.

Use case	Information Quality defined for SCOOP	Trigger conditions	Comments
A2-D5 Warning	0	Transmission without respecting 1, 2 or 3	





vehicle in accident (accident not	1	V=0 + manual E-call 15s after the vehicle stops	Vehicle stopped for a reason other than an accident (assault, passenger discomfort) and E-Call		
secured)	2	[crash without Pyro triggering OR pedestrian crash with reversible triggering] + V=0 15s max after crash	Even if the pyros don't trigger, one is able to know for example whether an APV crash has occurred (independently of the transmission from the crashoutput system> airbag ECU analyses all signals) > One can decide to restart for a small crash (vehicle moving) but probably not in a pedestrian crash, which supposes a rescue intervention ==> consider eventually separating the two scenarios at the C2C level (impact on the type of intervention)		
	3	Severe crash with Pryo triggering			

4.1.6 A2-D6: REDUCED VISIBILITY

<u>Transmission conditions</u>: Fog lights and dipped headlights on during at least 20 seconds and taking into account the speed for the level of quality (60 km/h<)

Use case	Information Quality defined for SCOOP	Trigger conditions	Comments
	0	Transmission without respecting 1, 2, 3 or 4	
A2-D6	1	7kmh <v<80kmh + Rear fog lights and dipped headlights activated since 20 s</v<80kmh 	We don't use the speed limit stipulated on the section in question: one can be limited to 70 km/h and have his fog lights on after having gone through a fog zone
Warning reduced visibility	2	7kmh <v<60kmh + Rear fog lights and dipped headlights activated since 20 s</v<60kmh 	We don't use the speed limit stipulated on the section in question: one can be limited to 50 km/h and have his fog lights on after having gone through a fog zone
	3	7kmh <v<80kmh + Visibility (fog) less than 80 m since 5s</v<80kmh 	
	4	7kmh <v<60kmh + Visibility (fog) less than 80 m since 5s</v<60kmh 	

4.1.7 A2-D10: WARNING EMERGENCY BRAKE

<u>Transmission conditions</u>: Automatic activation of emergency brake (Warning) lights and hard braking (>4m/s²)





Use case	InformationQuality defined for SCOOP	Trigger conditions	Comments
	0	Transmission without respecting 1	
A2-D10 warning emergency brake	1	Automatic activation of emergency brake (Warning) lights + hard braking (>4m/s2)	

Cause codes: 99 / 1: Dangerous situation / Emergency electronic brake lights

4.1.8 A2-D11: WARNING END OF QUEUE

<u>Transmission conditions</u>: Sudden slowdown in vehicle speed or warning lights on at least 3 seconds AND information on neighbouring vehicles (via CAM or vehicle sensor) AND vehicle outside urban zone, based on vehicle's speed and handling of the steering wheel (no 90° turn) in the preceding instants.

This case could hardly happen in situ.

Nevertheless, it has been decided to keep this Use Case for test purposes in a controlled environment. These tests are deemed important in a competitive context where companies test equivalent solutions with the DAB.

Use case	InformationQuality defined for SCOOP	Trigger conditions	Comments
	0	Transmission without respecting 1, 2 or 3	
A2-D11 Warning end of queue	1	[Sudden slowdown in vehicle speed OR warning lights on at least 3 s] + stationary vehicles detected by [DENM or CAM]	We leave this scenario at "Probable." Otherwise, level 3 has no interest and could be deleted. Shouldn't we envisage "[Sudden slowdown in vehicle speed AND warning lights on at least 3 s]"?
	2	[Sudden slowdown in vehicle speed OR warning lights on at least 3 s] + stationary vehicles detected by on-board sensors	We leave this scenario at "Probable." Otherwise, level 3 has no interest and could be deleted. RSA: Verify on BFB the use of the stock mobile eye (pedestrian impact, other) Shouldn't we envisage "[Sudden slowdown in vehicle speed AND warning lights on at least 3 s]"?

NOTE: This cause code (and its meaning) is provided in the DENM, but not in the RHS standard (but recommended in the C2C) \rightarrow track in the upgrade recommendations for SCOOP standards





	[Sudden slowdown in vehicle speed OR warning lights on at least 3 s]	
3	+ stationary vehicles detected	
	by [DENM or CAM]	
	+ stationary vehicles detected	
	by on-board sensors	

4.1.9 A2-E6: EXCEPTIONAL WEATHER CONDITIONS

In this case, it is a question of "Heavy rain.

<u>Transmission conditions</u>: Windscreen wipers at maximum speed and dipped headlights on during at least 20 seconds and taking into account the speed for the level of quality

Use case	InformationQuality defined for SCOOP	Trigger conditions	Comments
	0	Transmission without respecting 1, 2, 3 or 4	
A2 E6 Warning	1	7kmh <v<80kmh + [Windscreen wipers at MAX + dipped headlights] since 20s</v<80kmh 	PSA: * in case of heavy rain, one can drive at 110 km/h on the motorway> revise the speed conditions? * We don't turn on the dipped headlights but the DRL in the day: PSA is going to take into account the DRL * decorrelation "heavy rain" and turn on lights: people won't necessarily turn on their lights
exceptional weather conditions	2	7kmh <v<60kmh + [Windscreen wipers at MAX + dipped headlights] since 20s</v<60kmh 	PSA: * in case of heavy rain, one can drive at 110 km/h on the motorway> revise the speed conditions?* We don't turn on the dipped headlights but the DRL in the day: PSA is going to take into account the DRL * decorrelation "heavy rain" and turn on lights: people won't necessarily turn on their lights
	3	7kmh <v<80kmh + Rain Sensor Measurement >90% of max measurable + [Windscreen wipers at MAX + dipped headlights] since 20s</v<80kmh 	PSA is going to take into account the DRL







4	7kmh <v<60kmh + Rain Sensor Measurement >90% of max measurable + [Windscreen wipers at MAX +</v<60kmh 	PSA is going to take into account the DRL
	dipped headlights] since 20s	

4.2 Automatic transmissions by the operator vehicles

► The transmission conditions for the messages sent by the operator vehicles in "user" mode will be the same as the transmission conditions for the messages sent by the user vehicles for the use cases concerned.

► The transmission conditions for the messages sent by the operator vehicles in "operator" mode may be detailed later in the appendix of this deliverable.

4.3 Automatic transmissions from the TMC

These transmissions concern the messages transmitted by the TMC, which will then be broadcast by the C-ITSSs or the VG-ITSSs.

► The transmission conditions for the messages sent by the operator vehicles in "operator" mode may be detailed later in the appendix of this deliverable.

5 Major display prioritisation principles

► The message display principles for the HMI are detailed in the deliverables of specifications 2.4.2.2 and 2.4.2.3.

The parameters taken into account for the display are all of the information in the DENM fields.

The main parameters taken into account to determine the type of display on the screen are:

- the location of the event (eventPosition and eventHistory)
- the type of event (eventType)
- the event's validity duration (validityDuration)
- the quality level (informationQuality)
- the minimum display distance D0 from the user (relevanceDistance)

6 Specifications' connection with the other deliverables







Illustration 14 - diagram of the structure of deliverables

► The appendix of this deliverable 241 will define the R-ITSSs' service announcement messages, the methods of exchanging certificates for the PKI, the methods of reporting U-logs and T-logs, as well as all detailed communication channels associated with these mechanisms.





7 Details of SCOOP parameters for DENM messages

► All of the values presented in these tables are indicative and will be subject to a formal validation subsequently in the appendix of this deliverable.

Table 30: DENM SCOOP parameters For ITSS-VU

	ITSS-VU (or an operator vehicle potentially in user mode)										
Use case	Manu al Auto	Cause code	Sub- Cause Code	Quality	Unknown factor or error	Relevance Distance (D0)	ValidityDuration	Repetition (duration/interval)	Destinati onArea	Relevance TrafficDire ction	Mesg. Const. Strat. Comments
A2-D1: Warning - temporary slippery road	Auto	6: Adverse weather condition - Adhesion	0: Unavaila ble	See C2C recommend ations	(C2C lessThan1km) lessThan100m (corresponds to a weak unknown factor because automatic)	see Livrable 2.4.1.2	3600s (300s / 1s (180s / 4s in urban) (10km by default	allTrafficDi rection	Estimated loss of adhesion based on trigger information from the ABS/ASR, the travel of the pedals and the vehicle's acceleration and speed.
D2a: Animal on the road	Manu al	11: Hazardou s Location - Animal on the road	0: Unavaila ble	See C2C recommend ations	lessThan500m (manually triggered report)	see Livrable 2.4.1.2	600s	see deliverable Livrable 2.4.1.2	10km by default (allTrafficDi rection	Manually triggered report: * Imprecise GPS for the triggered report * GPS dispersion if several reports triggered




				TI	SS-VU	(or an oper	ator vehicle poten	tially in user mod	le)		
Use case	Manu al Auto	Cause code	Sub- Cause Code	Quality	Unknown factor or error	Relevance Distance (D0)	ValidityDuration	Repetition (duration/inter val)	Destinati onArea	RelevanceTraf ficDirection	Mesg. Const. Strat. Comments
D2b: Person on the road	Manu al	12: Human presen ce on the road	0: Unavail able	See C2C recommend ations	lessThan500m (manually triggered report)	see Livrable 2.4.1.2	1200s	see Livrable 2.4.1.2	10km by default	allTrafficDirect ion	Manually triggered report: * Imprecise GPS for the triggered report * GPS dispersion if several reports triggered
D3: Obstacle on the road	Manu al	10: Hazard ous Locatio n - Obstac le on the road	0: Unavail able	See C2C recommend ations	lessThan500m (manually triggered report)	see Livrable 2.4.1.2	1200s	see Livrable 2.4.1.2	10km by default	Upstream if DIVIDED ROAD and AllTrafficDirecti on otherwise = AllTrafficDirecti on by default because no map available	Manually triggered report: * Imprecise GPS for the triggered report * GPS dispersion if several reports triggered



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					ITSS-VI	J (or an ope	erator vehicle p	otentially in u	ser mode)		
Use case	Manu al Auto	Cause code	Sub- Cause Code	Quality	Unknown factor or error	Relevance Distance (D0)	ValidityDuratio n	Repetition (duration/inte rval)	Destinatio nArea	RelevanceTrafficDirect ion	Mesg. Const. Strat. Comments
D4a: Warning stationary vehicle	Auto	94: Stationa ry vehicle	0: Unavaila ble	See C2C recomme ndations	(C2C lessThan1km) lessThan10m	see Livrable 2.4.1.2	30s	15s/1s	10km by default	Upstream if DIVIDED ROAD and AllTrafficDirection otherwise = AllTrafficDirection by default because no map available	Warnings activated and speed nil during 30 seconds (Tempo reduced based on the position of the gearbox, the parking brake, the state of the doors, the seat belts and the ignition switch)
D4b: Warning vehicle breakdow n	Auto	94: Stationa ry vehicle	2: Vehicle breakdo wn	See C2C recomme ndations	(C2C lessThan1km) lessThan10m	see Livrable 2.4.1.2	30s (900s if ignition terminal disabled)	15s/1s	10km by default	Upstream if DIVIDED ROAD and AllTrafficDirection otherwise = AllTrafficDirection by default because no map available	Service indicator light activated on the instrument panel + Warnings activated and speed nil during 30 seconds (Tempo reduced based on the position of the gearbox, the parking brake, the state of the doors, the seat belts and the ignition switch)





					ITSS-VI	J (or an ope	erator vehicle p	otentially in u	ser mode)		
Use case	Manu al Auto	Cause code	Sub- Cause Code	Quality	Unknown factor or error	Relevance Distance (D0)	ValidityDurati on	Repetition (duration/in terval)	Destinati onArea	RelevanceTrafficDir ection	Mesg. Const. Strat. Comments
D5: Unprotec ted accident area	Manu al	2: Accide nt	0: Unavail able	See C2C recomme ndations	lessThan500m (manually triggered report)	see Livrable 2.4.1.2	1200s	see Livrable 2.4.1.2	10km by default	allTrafficDirection	Manually triggered report: * Imprecise GPS for the triggered report * GPS dispersion if several reports triggered
D5: Unprotec ted accident area	Auto	94: Station ary vehicle	3: Postcra sh	See C2C recomme ndations	(C2C lessThan5km) lessThan10m	see Livrable 2.4.1.2	180s (1800s if ignition disabled)	60s/1s	10km by default	Upstream if DIVIDED ROAD and AllTrafficDirection otherwise = AllTrafficDirection by default because no map available	Crash information on the vehicle CAN





	ITSS-VU (or an operator vehicle potentially in user mode)													
Relevan ceTraffic Directio n	Manu al Auto	Cause code	Sub- Cause Code	Quality	Unknown factor or error	Relevance Distance (D0)	ValidityDurati on	Repetition (duration/in terval)	Destinati onArea	RelevanceTrafficDir ection	Mesg. Const. Strat. Comments			
D6: Warning reduced visibility	Auto	18: Advers e weathe r conditi ons - Visibilit v	0: Unavail able	See C2C recomme ndations	(C2C lessThan1000m) lessThan1000m	see Livrable 2.4.1.2	300 s	180s/4s	10km by default	allTrafficDirection	Fog lights and dipped headlights on during at least 20 seconds and taking into account the speed for the level of quality			
D8: Unmana ged blockage of a road	Manu al	9: Hazard ous locatio n – Surfac e conditi on	0: Unavail able	See C2C recomme ndations	lessThan500m (manually triggered report)	see Livrable 2.4.1.2	3600s	see Livrable 2.4.1.2	10km by default	Upstream if DIVIDED ROAD and AllTrafficDirection otherwise = AllTrafficDirection by default because no map available	Manually triggered report: * Imprecise GPS for the triggered report * GPS dispersion if several reports triggered			





	ITSS-VU (or an operator vehicle potentially in user mode)													
Use case	Manu al Auto	Cause code	Sub- Cause Code	Quality	Unknown factor or error	Relevance Distance (D0)	ValidityDurati on	Repetition (duration/in terval)	Destinati onArea	RelevanceTrafficDir ection	Mesg. Const. Strat. Comments			
D10: Warning emergen cy brake	Auto	99: Danger ous situatio n	1: Emerge ncy electroni c brake lights	See C2C recomme ndations	(C2C lessThan500m) lessThan100m (because corresponds to a weak unknown factor because automatic and signals an almost stationary vehicle)	see Livrable 2.4.1.2	V2V logic: C2C recommendati on 2s	see Livrable 2.4.1.2	10km by default	Upstream if DIVIDED ROAD and AllTrafficDirection otherwise = AllTrafficDirection by default because no map available	Automatic activation of emergency brake (Warning) lights and hard braking (>4m/s2) > No C2C quality level			
D11: Warning end of queue	Auto	27: Danger ous end of queue	0: Unavail able	See C2C recomme ndations	(C2C lessThan1000m) lessThan500m	see Livrable 2.4.1.2	V2V logic: C2C recommendati on 20s	20s/0.5s	10km by default	Upstream	tbc: Sudden slowdown in vehicle speed or warning lights on at least 3 seconds AND information on neighbouring vehicles (via CAM/DENM or vehicle sensor)			





				ITS	SS-VU (or	an operator	vehicle potentia	ally in user mo	ode)		
Use case	Manu al Auto	Cause code	Sub- Cause Code	Quality	Unknown factor or error	Relevance Distance (D0)	ValidityDurati on	Repetition (duration/in terval)	Destinati onArea	RelevanceTrafficD irection	Mesg. Const. Strat. Comments
E6: Warning - exceptional weather conditions	Auto	19: Adverse weather precipitati on – Extreme weather condition	0: Unavai lable	See C2C recommend ations	(C2C lessThan1000m) lessThan1km	see Livrable 2.4.1.2	20s (corresponds to transmission conditions)	180s/4s	10km by default)	allTrafficDirection	Windscreen wipers at maximum speed and dipped headlights on during at least 20 seconds and taking into account the speed for the level of quality (60km/h<)





Table 31: DENM SCOOP Paramaters for ITSS-VG

						ITS	6S-VG	i			
Event	trigger	Cause Codes	Sub- Cause Code	Quality	Unknown factor or error	type of event (occasional, linear or linear zone type)	Advance notice distance	Validity Duration	Repetition (duration/interval)	DestinationArea	Relevance TrafficDirection
B1: Warning schedule	automat ic	3: Roadwo rk	0: Unavailab Ie	Q3	lessThan 100m	linear zone type	1km	to be clarified between operators and manufacturers	AmsterdamGroup: between 95ms and 250 ms For SCOOP:	10km by default	to be clarified between operators and manufacturers
d roadwork	automat ic	3: Roadwo rk	3: SlowMovi ngRoadM aintenanc e	Q3	lessThan 100m	linear zone type	1km	to be clarified between operators and manufacturers	AmsterdamGroup: between 95ms and 250 ms For SCOOP: 150ms (or according to the recommendations of the AmsterdamGroup)	10km by default	to be clarified between operators and manufacturers





						ITSS	-VG				
Event	trigger	Cause Codes	Sub- Cause Code	Qualit y	Unknown factor or error	type of event (occasional, linear or linear zone type)	Advance notice distance	ValidityDurat ion	Repetition (duration/inter val)	Destination Area	RelevanceTraf ficDirection
B2: Warning	automat ic	95: Emerge ncy vehicle approac hing	0: Unavailab Ie	Q3	lessThan100 m	occasional	1km	20s (V2V logic)	AmsterdamGro up: between 95ms and 250 ms For SCOOP: 150ms (or according to the recommendatio ns of the AmsterdamGro up)	10km by default	downstream on divided road and allTrafficDirect ion on Bidirectional (= AllTrafficDirec tion on divided road if no map available)
work on lane	automat ic	15: Rescue and recovery work in progress	0: Unavailab Ie	Q3	lessThan100 m	occasional	1km	20s (V2V logic)	AmsterdamGro up: between 95ms and 250 ms For SCOOP: 150ms (or according to the recommendatio ns of the AmsterdamGro	10km by default	upStream on divided road and allTrafficDirect ion on Bidirectional (= AllTrafficDirec tion on divided road if no map





				up)	available)

	ITSS-VG													
Event	trigge r	Cause Codes	Sub-Cause Code	Quali ty	Unknow n factor or error	type of event (occasional, linear or linear zone type)	Advance notice distance	ValidityDur ation	Repetition (duration/interval)	Destinati onArea	RelevanceTrafficDir ection			
B2: Warning work on lane	auto	26: Slow vehicle	1: Slow moving maintenance vehicle	Q3	lessThan 100m	occasional	1km	20s (V2V logic)	AmsterdamGroup: between 95ms and 250 ms For SCOOP: 150ms (or according to the recommendations of the AmsterdamGroup)	10km by default	upStream on divided road and allTrafficDirection on Bidirectional (= AllTrafficDirection on divided road if no map available)			





ITSS-VG

Event	trigge r	Cause Codes	Sub-Cause Code	Quali ty	Unknow n factor or error	type of event (occasional, linear or linear zone type)	Advance notice distance	ValidityDur ation	Repetition (duration/interval)	Destinati onArea	RelevanceTrafficDir ection
B3: Warning - winter maintena nce	auto	3: Roadwork	6: Winter service (blade raised: vehicle larger but not slower)	Q3	lessThan 100m	occasional	1km	20s (V2V logic)	AmsterdamGroup: between 95ms and 250 ms For SCOOP: 150ms (or according to the recommendations of the AmsterdamGroup)	10km by default	upStream on divided road and allTrafficDirection on Bidirectional (= AllTrafficDirection on divided road if no map available)
B3: Warning - winter maintena nce	auto	26: Slow vehicle	6: Snowplough	Q3	lessThan 100m	occasional	1km	20s (V2V logic)	AmsterdamGroup: between 95ms and 250 ms For SCOOP: 150ms (or according to the recommendations of the AmsterdamGroup)	10km by default	upStream on divided road and allTrafficDirection on Bidirectional (= AllTrafficDirection on divided road if no map available)





ITSS-VG

Event	trigge r	Cause Codes	Sub-Cause Code	Quali ty	Unknow n factor or error	type of event (occasional, linear or linear zone	Advance notice distance	ValidityDur ation	Repetition (duration/interval)	Destinati onArea	RelevanceTrafficDir ection
B3: Warning - winter maintena nce	auto	26: Slow vehicle	8: Salting vehicles	Q3	lessThan 100m	type) occasional	1km	20s (V2V logic)	AmsterdamGroup: between 95ms and 250 ms For SCOOP: 150ms (or according to the recommendations of the AmsterdamGroup)	10km by default (see §3.3.1 of version 3.1 of L2.4.1)	upStream on DIVIDED ROAD and allTrafficDirection on Bidirectional (= AllTrafficDirection on DIVIDED ROAD if no map available)
D11: Warning end of queue	autom atic	27: Dangerous end of queue	0: Unavailable	Q3	lessThan 100m	occasional	1km	30s	AmsterdamGroup: between 95ms and 250 ms For SCOOP: 150ms (or according to the recommendations of the AmsterdamGroup)	10km by default (see §3.3.1 of version 3.1 of L2.4.1)	upStream on DIVIDED ROAD and allTrafficDirection on Bidirectional (= AllTrafficDirection on DIVIDED ROAD if no map available)





Table 32: SCOOP Parameters for R- ITSS

	R-ITSS (from the TMC)											
Event	Cause Codes	Sub-Cause Code	Quali ty	Unknow n factor or error	type of event (occasional, linear or linear zone type)	advance notice distance	ValidityDur ation	Repetition (duration/interval)	destination area	RelevanceTraffi cDirection		
B1: Warning schedule d roadwork	3: Roadwork	0: Unavailable	Q3	lessThan 100m	linear	1km	to be clarified between operators and manufactur ers	AmsterdamGroup: between 95ms and 250 ms For SCOOP: 150ms	Configurable according to the R-ITSS density, 10km by default	to be clarified between operators and manufacturers		
B1: Warning schedule d roadwork	3: Roadwork	3: SlowMovingR oadMaintenan ce	Q3	lessThan 100m	linear zone type	1km	to be clarified between operators and manufactur ers	AmsterdamGroup: between 95ms and 250 ms For SCOOP: 150ms	Configurable according to the R-ITSS density, 10km by default	to be clarified between operators and manufacturers		
B1: Warning schedule d roadwork	3: Roadwork	6: Winter service	Q3	lessThan 100m	linear zone type (1km	to be clarified between operators and manufactur ers	AmsterdamGroup: between 95ms and 250 ms For SCOOP: 150ms	Configurable according to the R-ITSS density, 10km by default	to be clarified between operators and manufacturers		





R-ITSS (from the TMC)											
Event	Cause Codes	Sub-Cause Code	Qualit y	Unknow n factors or error	type of event (occasional, linear or linear zone type)	advance notice distance	ValidityDur ation	Repetition (duration/interval)	destination area	RelevanceTraffic Direction	
A2-D1: Warning - temporar y slippery road	6: Adverse weather condition - Adhesion	0: Unavailable and other sub-cause codes	Q3	lessThan 500m	occasional or linear	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	allTrafficDirectio n	
D2a: Animal on the road	11: Hazardous Location - Animal on the road	0: Unavailable and other sub-cause codes	Q3	lessThan 500m	occasional	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	allTrafficdirectio n	





	R-ITSS (from the TMC)											
Event	Cause Codes	Sub-Cause Code	Qualit y	Unknow n factors or error	type of event (occasional, linear or linear zone type)	advance notice distance	ValidityDur ation	Repetition (duration/interval)	destination area	RelevanceTraffic Direction		
D2b: Person on the road	12: Human presence on the road	0: Unavailable	Q3	lessThan 500m	occasional	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	AllTrafficDirectio n		
D3: Obstacle on the road	10: Hazardous Location - Obstacle on the road	0: Unavailable	Q3	lessThan 100m	occasional or linear	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default (Upstream if divided road and AllTrafficDirectio n otherwise = AllTrafficDirectio n by default because no map available		
D4b: Warning vehicle breakdow n	94: Stationary vehicle	0: Unavailable	Q3	lessThan 100m	occasional	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	Upstream if divided road and AllTrafficDirectio n otherwise = AllTrafficDirectio n by default because no map available		





	R-ITSS (from the TMC)										
Event	Cause Codes	Sub-Cause Code	Qualit y	Unknow n factors or error	type of event (occasional, linear or linear zone type)	advance notice distance	ValidityDur ation	Repetition (duration/interval)	destination area	RelevanceTraffic Direction	
D4b: Warning vehicle breakdow n	94: Stationary vehicle	2: Vehicle breakdown	Q3	lessThan 100m	occasional	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	upstream if divided road and alltrafficdirection otherwise = alltrafficdirection by default because no map available	
D5: Unprotect ed accident area	2: Accident	0: Unavailable and other sub-cause codes	Q3	lessThan 100m	linear zone type	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	AllTrafficDirectio n	
D5: Unprotect ed accident area	2: Accident	7: Unsecured accident	Q3	lessThan 100m	linear zone type	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	AllTrafficDirectio n	





R-ITSS (from the TMC)											
Event	Cause Codes	Sub-Cause Code	Qualit y	Unknow n factors or error	type of event (occasional, linear or linear zone type)	advance notice distance	ValidityDur ation	Repetition (duration/interval)	destination area	RelevanceTraffic Direction	
D6: Warning reduced visibility	18: Adverse weather conditions - Visibility	0: Unavailable	Q3	lessThan 500m	linear zone type	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	AllTrafficDirectio n	
D6: Warning reduced visibility	18: Adverse weather conditions - Visibility	1: Fog	Q3	lessThan 500m	linear zone type	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	AllTrafficDirectio n	
D6: Warning reduced visibility	18: Adverse weather conditions - Visibility	2: Snow	Q3	lessThan 500m	linear zone type	1 km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	AllTrafficDirectio n	





				R-	ITSS (fro	m the	TMC)			
Event	Cause Codes	Sub-Cause Code	Qualit y	Unknow n factors or error	type of event (occasional, linear or linear zone type)	advance notice distance	ValidityDur ation	Repetition (duration/interval)	destination area	RelevanceTraffic Direction
D6: Warning reduced visibility	18: Adverse weather conditions - Visibility	3: Heavy snowfall	Q3	lessThan 500m	linear zone type	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	AllTrafficDirectio n
D6: Warning reduced visibility	18: Adverse weather conditions - Visibility	4: Rain	Q3	lessThan 500m	linear zone type	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	AllTrafficDirectio n
D6: Warning reduced visibility	18: Adverse weather conditions - Visibility	5: Hail	Q3	lessThan 500m	linear zone type (see §3.3.1 of version 3.1 of L2.4.1)	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density, 10km by default	AllTrafficDirectio n
D8: Unmanag ed blockage	10: Hazardous Location - Obstacle on the road	7: Unavailable	Q3	lessThan 100m	occasional	1km	depends on the operator's policy	see Livrable 2.4.1.2	Configurable according to the R-ITSS density,	Upstream if divided road and AllTrafficDirectio n otherwise =





				R-	ITSS (froi	m the	TMC)			
Event	Cause Codes	Sub-Cause Code	Qualit y	Unknow n factors or error	type of event (occasional, linear or linear zone type)	advance notice distance	ValidityDur ation	Repetition (duration/interval)	destination area	RelevanceTraffic Direction
of a road									10km by default	AllTrafficDirectio n by default because no map available

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