

## Annex C: Exchanged Messages among Communication Modules

### C1. Structure of the dataset

Every experiment's logs are stored in a folder, every type of message has its own file in the folder. The name of the folder contains the information on the experiment (see Table 1). The use cases codes are shown in Table 2.

Table 1 Name of the folder, with example

Date	Time	Use case code	Driver code (or notes)	Vehicle ID
2020-05-22	10-42	ES1-1	100	401

Table 2 Use cases codes

Code	Use Case
ES1.1	VRU protection
ES1.2	Wrong way driving
ES5.1	Roadworks detection
ES7.3	Merging support
ES9.1	VMS, traffic detection
ES9.2	VMS, fuel or oil on road
ES9.3	VMS, low visibility (non-critical case)
ES11.2	Virtual toll
ES12	Parking and booking service

In the next sections and tables, the structures of the messages are depicted.

### C2. Strip CAM message

Table 3: StripCAM Message Content

StripCAM Message Content	
Field	Description
utc	describes time at which the signal event is sent
utc_logger	describes time at which the signal event arrives at the logger
StID	contains information about RSB Unique identifier
SrID	contains information about the ORU id
rfid	contains information about Vehicle Unique identifier
ST	contains information about the type of ITS-S, mobile devices or infrastructure
Lat	contains information about the absolute geographical latitude in a WGS84 coordinate system
Lon	contains information about the Absolute geographical longitude in a WGS84 co-ordinate system
ellm	contains information about the distance between the center point and major axis point of the position accuracy ellipse

ellm	contains information about the distance between the center point and minor axis point of the position accuracy ellipse
ellO	contains information about the orientation direction of the ellipse major axis of the position accuracy ellipse with regards to the WGS84 north
alt	contains information about the altitude in a WGS84 co-ordinate system
Hea	contains information about the orientation of a heading with regards to the WGS84 north
Speed	contains information about the Longitudinal speed value that is given by the odometer
VL	contains information about the Length of a vehicle
VW	contains information about the Width of a vehicle, including side mirrors
acc	contains information about the acceleration or deceleration of a vehicle
laneID	contains information about the Id of the lane in the intersection

### C3. Application output

**Table 4:** Mobile Application Message Content to MQTT

Mobile Application Message Content to MQTT	
Field	Description
utc	describes time at which the signal event is sent
utc_logger	describes time at which the signal event arrives at the logger
OuID	refers to the id of the event. It can be the VRU safety, merging support, rail crossing and road works, personalized VMS, Virtual Toll and parking
StID	is used to identify the objects, e.g. car, pedestrians, RSB, etc.
WL	provides the risk level of the event and how it will be illustrated in the GUI of the application, e.g. 0 means there is no warning and 1 means “yellow”.
jOf	is the time derivative of the acceleration of the safest manoeuvre. It is currently not taken into account by the mobile applications.
Tdist	provides the distance from the target, e.g. the distance from an intersection or the danger object
Tspeed	is the speed of the target. It is currently not taken into account by the mobile applications
Tclass	describes the type of the target. For example, a pedestrian (VRU) is 3, car is 5, road works is 7, etc.
TcomDir	indicates the direction where the danger comes from.

	1 = left   2 = right   3 = front   4 = behind   5 = front left   6 = front right   7 = behind left   8 = behind right.   9 = static   10 = multiple directions (intersection)
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## C4. Mobile CAM message

**Table 5:** Mobile Application CAM Message Content to MQTT

Mobile Application CAM Message Content to MQTT	
Field	Description
utc	describes time at which the signal event is sent
utc_logger	describes time at which the signal event arrives at the logger
msgID	describes the type of message, e.g. 1 is for DENM, 2 is for CAM
StationID	is the unique identifier for the vehicle or the RSU
GenDelTime	is the absolute timestamp in milliseconds since 2004-01-01T00:00:00.000Z
StType	is the station type. 1 means pedestrian, 2 is cyclist, etc.
Lat	is the latitude of the GPS device
Lon	is the longitude of the GPS device
CEM	is the absolute position accuracy; it is not used by the mobile applications
CEm	is not used by the mobile applications
sMO	is not used by the mobile applications
Alt	is the altitude of the GPS mobile device
Heading	describes the GPS mobile device heading
speed	comes from the GPS mobile device speed
vlength	is not used by the mobile applications
vwidth	is not used by the mobile applications
LongAcc	is the longitudinal acceleration comes from the devices accelerometer
YawRate	is not used by the mobile application