GCDC16 Local Message Set

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Contents

Version:	0.1	First draft
	0.2	Revised CAM and added DENM
	0.3	Added iCLCM
	0.4	Rewrote introduction

1 Introduction

This document presents the local message set (LMS) to be used for GCDC16. The LMS is used for sending and receiving CAM/DENM/iCLCM from/to the vehicle control system implemented in Simulink.

The communication stack includes a vehicle adapter that will receive these messages and use them to create proper CAM/DENM/iCLCM that will be forwarded to other vehicles and vice versa. The LMS follows the ETSI specification as closely as possible, but makes some changes to make is possible to create the messages in Simulink.

Every message type has a corresponding local message that is used for creating that specific message.

All local messages are of identical length, and bit masks are used to handle messages with optional containers. The bit mask is set to indicate which of the optional fields are present. If the bit mask indicates that the field is not present, its value is undefined.

All data is in network byte order, which is identical to big endian.

2 CAM

CAM messages are created by the vehicle adapter using the data fields present in a local CAM message as detailed below. CAM messages have both mandatory and optional data fields, where the optional data fields are contained in the low frequency container. The container mask is a bit mask that indicates whether this container is present. Note that the optional fields in the local CAM message always are present. However their values are undefined if they are not indicated as present.

Message part:	Bytes:	Data:	Notes:
Header	1	Message ID	= 2 for CAM
	4	Station ID	Given by organisers
Container Mask	1	ContainerMask	
Basic Container	4	StationType	
	4	Latitude	
	4	Longitude	
	4	SemiMajorConfidence	
	4	SemiMinorConfidence	
	4	SemiMajorOrientation	
	4	Altitude	
High Frequency Container	4	Heading	
	4	HeadingConfidence	
	4	Speed	
	4	SpeedConfidence	
	4	VehicleLength	
	4	VehicleWidth	
	4	LongAcceleration	
	4	LongAccelerationConfidence	
	4	YawRate	
	4	YawRateConfidence	
(opt) Low Frequency Container	4	VehicleRole	

Bytes:	Data:	Notes
1	Header	= 2 for CAM
1	Container Mask	
4	GenerationDeltaTime	See D3.2
4	Station Type	See D3.2
4	(opt) Vehicle Role	See D3.2
4	Vehicle Length	See D3.2
4	Vehicle Width	See D3.2
4	Latitude	See D3.2
4	Longitude	See D3.2
4	Semi Major Confidence	See D3.2
4	Semi Minor Confidence	See D3.2
4	Semi Major Orientation	See D3.2
4	Heading	See D3.2
4	Heading confidence 95%	See D3.2
4	Altitude	Not in D3.2?
4	Speed	See D3.2
4	Speed Confidence 95%	See D3.2
4	Yaw Rate	See D3.2
4	Yaw Rate Confidence 95%	See D3.2
4	Longitudinal vehicle acceleration	See D3.2
4	Longitudinal vehicle acceleration confidence 95%	See D3.2

3 DENM

The first part of the message, after the header, is a bit mask that indicates which of the optional containers that are present. The containers also start with a bit mask to indicate which of the optional data fields inside that container are used. Data fields marked as unused by the bit mask can have arbitrary values as they are ignored by the communication stack. This also means that every local DENM message has the same size, making it easier to use in Simulink.

Message part:	Bytes:	Data:	Notes:
Header	1	Message ID	= 1 for DENM
Container Mask	1	ContainerMask	
Management Container	1	ManagementMask	
	8	DetectionTime	
	8	ReferenceTime	
	4	(opt) Termination	
	24	EventPosition	
	4	(opt) RelevanceDistance	
	4	(opt) RelevanceTrafficDirection	
	4	(opt) ValidityDuration	
	4	(opt) TransmissionIntervall	
	4	StationType	
(opt)Situation Container	1	SituationMask	
	4	InformationQuality	
	8	CauseCode	
	8	(opt) LinkedCauseCode	
	0	(opt) EventHistory	Not implemented
(opt) Location Container	0	LocationMask	Not implemented
	0	(opt) EventSpeed	Not implemented
	0	(opt) EventPositionheading	Not implemented
	0	Traces	Not implemented
	0	(opt) RoadType	Not implemented
(opt) Alacarte Container	1	AlacarteMask	
	4	(opt) LanePosition	See D3.2
	0	(opt) ImpactReducationContainer	Not implemented
	4	(opt) ExternalTemperature	
	0	(opt) RoadWorksContainerExtended	Not implemented
	4	(opt) PositioningSolution	
	0	(opt) StationaryVehicleContainer	Not implemented

4 iCLCM

The iGAME Cooperative Lane Changing Message (iCLCM) is structured very similarly to CAM. It consists of a base message with additional containers added for various events or scenarios. As with the other message types, iCLCM are created by sending a corresponding local message to the vehicle adapter.

Please note that the iCLCM set is still under proposal and may change.

Message part:	Bytes:	Data:	Notes:
Header	1	Message ID	= 10 for iCLCM
Container Mask	1	Container mask	
High frequency container	4	Rear axle location	
	4	Controller type	
	4	Response time constant	
	4	Response time delay	
	4	Target longitudinal acceleration	
	4	Time headway	
	4	Cruise speed	
(opt) Low frequency container	1	Low frequency mask	
	4	(opt) Participants ready	
	4	(opt) Start platoon	
	4	(opt) End-of-scenario	
MIO	4	Mio ID	
	4	Mio Range	
	4	Mio Bearing	
	4	Mio Range rate	
Lane	4	Lane	
Pair ID	4	Forward ID	
	4	Backward ID	
	4	Acknowledgement flag	
Merge	4	Merge request	
	4	Safe-to-merge	
	4	Flag	
	4	Flag tail	
	4	Flag head	
Intersection	4	Platoon ID	
	4	Distance travelled in CZ	
	4	Intention	
	4	Counter	