GCDC16 Local Message Set

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Contents

Version: 0.1 First draft

1 Introduction

This document presents the local message set (LMS) to be used for GCDC16. LMS will be used by the sensor fusion system to generate CAM messages, and by the scenario control models to generate DENM/iGAME messages.

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

Different network ports will be used for CAM/DENM/iGAME messages in order to distinguish them.

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

2 CAM

- How is time measured? How is an Instant defined?
- Define:
  - Time, Instant
  - curvature
  - yawRate
  - headingDegreesFromNorth

CAM consists of a single large message that is sent to the communication stack periodically. The communication stack will pick up the message and make a decision on what parts of the message to forward to other vehicles. The message should contain the specified data, in the specified order. Data marked as N/A should be all zeroes.

Datatype:	Data:	Notes:
int	curvature	How is this defined?
byte	curvatureConfidence	
byte	accelerationControlStatus	Details below
byte	exteriorLightsStatus	Details below
byte	driveDirection	forward=0, backward=1, unavailable=2
int	yawRate	How is this defined?
byte	yawRateConfidence	
byte	stationType	5 for passenger cars
byte	vehicleRole,	specialTransport=2, default=0
boolean	embarkationStatus	N/A
byte	dangerousGoods	N/A
byte	dangerousGoodExt	N/A
byte	lightBarSiren	N/A
byte	ptActivationType	N/A
byte[]	ptActivationData	N/A, How many bytes?
byte[]	longPositionVector	Details below

Listed as unavailable in GeoNetworking stack:

- SemiAxisLength
- HeadingValue
- AltitudeValue
- AltitudeConfidence
- HeadingConfidence
- SpeedConfidence

Spec. according to D3.2

- What happened to curvature?

Bytes:	Data:	Notes
1	header	
4	GenerationDeltaTime	
4	Station ID	
1	Station Type	
1	Vehicle Role	
2	Vehicle Length	
2	Vehicle Width	
0	Reference position	
4	Latitude	
4	Longitude	
?	Position Confidence Ellipse 95%	Need more details
?	Altitude	Not in D3.2?
2	Heading	
1	Heading confidence 95%	
2	Speed	
1	Speed Confidence 95%	
2	Yaw Rate	
1	Yaw Rate Confidence 95%	
2	Longitudinal vehicle acceleration	
1	Longitudinal vehicle acceleration confidence 95%	

2.1 accelerationControlStatus

Bit:	Data:
0	brakePedalEngaged
1	gasPedalEngaged
2	emergencyBrakeEngaged
3	collisionWarningEngaged
4	accEngaged
5	cruiseControlEngaged
6	speedLimiterEngaged

2.2 exteriorLightsStatus

Bit:	Data:
0	lowBeamHeadlightsOn
1	highBeamHeadlightsOn
2	leftTurnSignalOn
3	rightTurnSignalOn
4	daytimeRunningLightsOn
5	reverseLightOn
6	fogLightOn
7	parkingLightsOn

2.3 longPositionVector

Byte:	Datatype:	Data:	Notes:
0-8	Address	address	Details below
9-12	Instant	timestamp	Details below
13-20	Position	position	Details below
21-22	short	confidenceAndSpeed	Details below
23-24	short	headingDegreesFromNorth	Details below

2.3.1 address

Bit:	Data:	Notes:
63	isManual	Should be 1
62-58	stationType	5 for passenger cars
57-48	countryCode	Haven't found Sweden
47-0	lowLevelAddress	Unique station address

2.3.2 timestamp

Time according to the TAI spec. From `http://stjarnhimlen.se/comp/time.html`: TAI = International Atomic Time (Temps Atomique International = TAI) is defined as the weighted average of the time kept by about 200 atomic clocks in over 50 national laboratories worldwide. TAI-UT1 was approximately 0 on 1958 Jan 1.

GPS time = TAI - 19 seconds

This is to account for leap seconds, which are not added to GPS time. The time is sent as an unsigned 32-bit integer.

2.3.3 position

Type:	Data:
int	latitudeDegrees
int	longitudeDegrees

2.3.4 confidenceAndSpeed

Bit:	Data:	Notes:
0-14	speed	Signed units of speed, in 0.01 meters per second
15	position accuracy indicator	1 if position is confident and 0 otherwise. When is it confident?

2.3.5 headingDegreesFromNorth

Heading is sent as an unsigned units of 0.1 degrees from North.

3 DENM

ID:	Message:	Bytes:	Data:
38	Event Type	1	ID
		8	Timestamp
		1	Cause Code
		1	Sub Cause Code
39	Closed Lanes	1	ID
		8	Timestamp
		1	Driving Lane Status
40	Lane Position	1	ID
		8	Timestamp
		1	Lane Position

4 iGAME

The iGAME message set is still under proposal. Details on this set will be presented in a future release of this document.