

Draft

**European e-Call functional
specifications**

In Vehicle System

Version 1.0

Working Document

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| DOCUMENT CONTROL SHEET |
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1 Glossary *(to be reviewed later)*

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|----------------|--|
| API: | Application Programming Interface |
| +BAT: | Permanent voltage from vehicle's battery (e.g. 12 or 24V) |
| GPS: | Global Positioning System |
| GPRS: | General Packet Radio Services |
| GSM: | Global System for Mobile communications |
| HMI: | Human Machine Interface |
| IVS: | In Vehicle System. This is expected to be a module working either: - as a stand-alone solution for e-call (to be completed with connection, interfaces and antennas), - or as a system to provide necessary information to a customer's mobile phone, - or as an add-on on existing on-board electronic device. |
| MSD: | Minimum Set of Data, |
| MS: | Member State (European) |
| PSAP: | Public Safety Answering Point |
| SP Identifier: | Private Service Provider Coordinate, if any. |
| UMTS: | Universal Mobile Telecommunication Service |
| NAD: | Network Access Device (e.g. a GSM or UMTS module) |
| MNO: | Mobile Network Operator |
| GNSS: | Global Navigation Satellite System |

2 System overview

The objective of implementing the in-vehicle emergency call system (eCall) is to automate the notification of a traffic accident, wherever in the European Union, with the same technical standards and the same Quality of Services objectives by using the Mobile Telecommunication network (e.g. GSM) and a preassigned destination address (e.g. 112).

2.1 High level Functional Requirements:

- In the event of an accident the eCall system must determine whether or not to trigger an eCall.
- An eCall must be able to be triggered manually.
- Upon triggering an eCall the eCall system must try to send a Minimum Set of Data (MSD) to any given mobile network operator (MNO) with a preassigned destination address.
- The eCall system must also try to establish a voice connection between the vehicle and that preassigned destination address (e.g. a public safety answering point (PSAP) with 112)

'Actors': eCall 'system'
eCall user
Telecommunication network
PSAP

2.2 In-Vehicle Functional Requirements:

The vehicle unit is either an embedded unit with an integrated network access device (NAD, e.g. a GSM module) or a phone based solution, consisting of a standardized interface and a cellular phone. The interface could be Bluetooth or a standardized cable connection.

2.2.1 Phone based solution:

- IVS must be able to establish a connection with customer's mobile phone.
- IVS must relay information regarding the connection (mobile phone – vehicle) to the user (e.g. driver).
- IVS must detect when an 'eCall trigger' has been initiated after a severe accident.
- IVS must transmit via the connection the vehicle ID and other vehicle specific MSD content to customer's mobile phone.

'Actors': Vehicle
Mobile Phone (must provide position with the required accuracy and must put together the MSD)

2.2.2 Embedded solution:

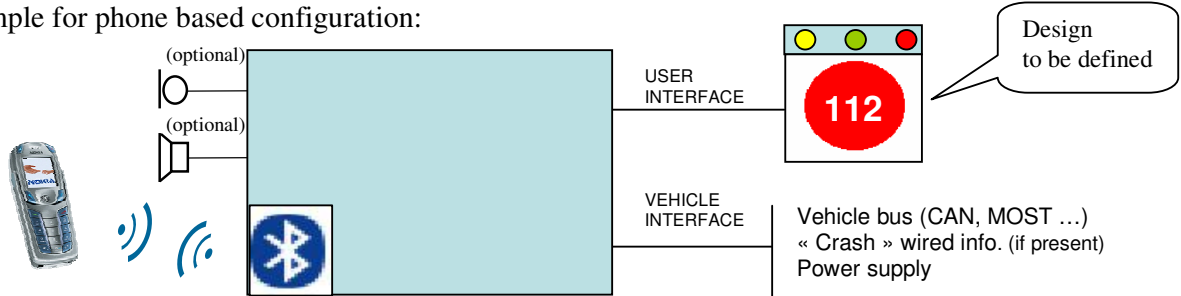
- IVS must detect when an 'eCall trigger' has been initiated.
- IVS must initiate eCall voice connection with mobile network operator (MNO).
- IVS must send the MSD to MNO.
- a voice connection is initiated between IVS and PSAP by the MNO in case of a disconnected eCall.

Actors: Vehicle
 eCall User
 Telecom Network

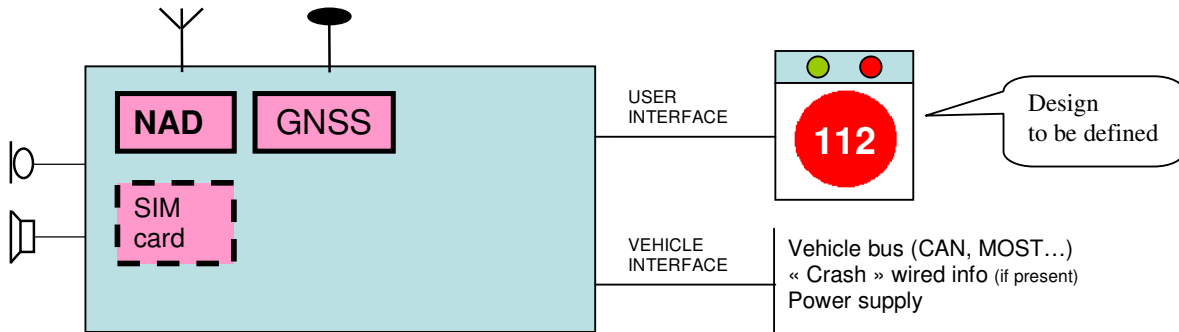
2.3 Interfaces

Below the two vehicle interface configurations are described.

Example for phone based configuration:



Embedded configuration:



(* use of eCall system without a SIM-Card must be possible)

Figure 1: Example for phone based and embedded configuration.

3 Functional Specification

The In Vehicle system must fulfil the specific OEM automotive requirements.

3.1 User-Interface Elements

The eCall system consists at least of the following elements:

1. 112-button (SOS)
 This button starts and ends the manual emergency call. The manual call will only be started when the button is pushed for at least 2 seconds.

A call will be aborted or ended immediately when pushing the button for at least 1 second during a call or the initiating of a manual or automatic call.

By starting a call, an acoustic feedback (beep for 0.5 sec) will be played.

By ending/aborting a call an acoustic feedback (2 beeps in 0.5 sec) will be played

The call must be given the highest priority.

2. System status indication with colour status light or alphanumeric display. The following status should be indicated:

- that no mobile phone is connected to the eCall system,
- if the Bluetooth connection is being in progress,
- the eCall system is powered ON and ready to make calls,
- a call is being connected or in progress,
- that your eCall system may not be functioning properly,

all colours to be discussed of dimming and blending character.

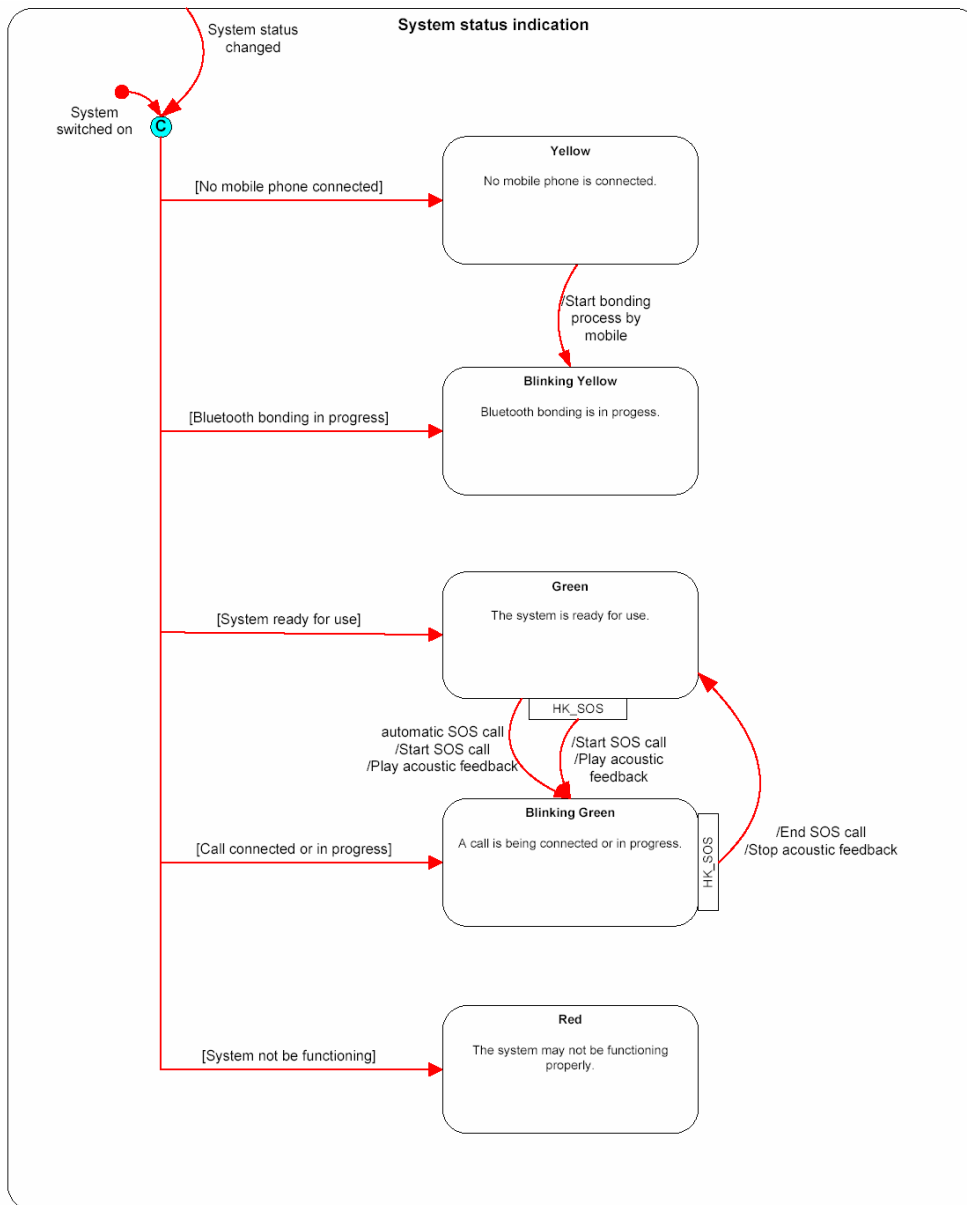


Figure 2: Example Human Machine Interface for phone based Bluetooth solution

3.2 Arming and disarming

The system is armed when ignition is ON, and disarmed when ignition is OFF.

If an e-Call is ongoing while ignition is being switched to OFF that call must not be terminated automatically. The system will then disarm after the e-Call was terminated by the user or the PSAP.

3.3 Manual activation

3.3.1 State chart

Manual triggering via a SOS button inside the vehicle pushed by the driver or passenger

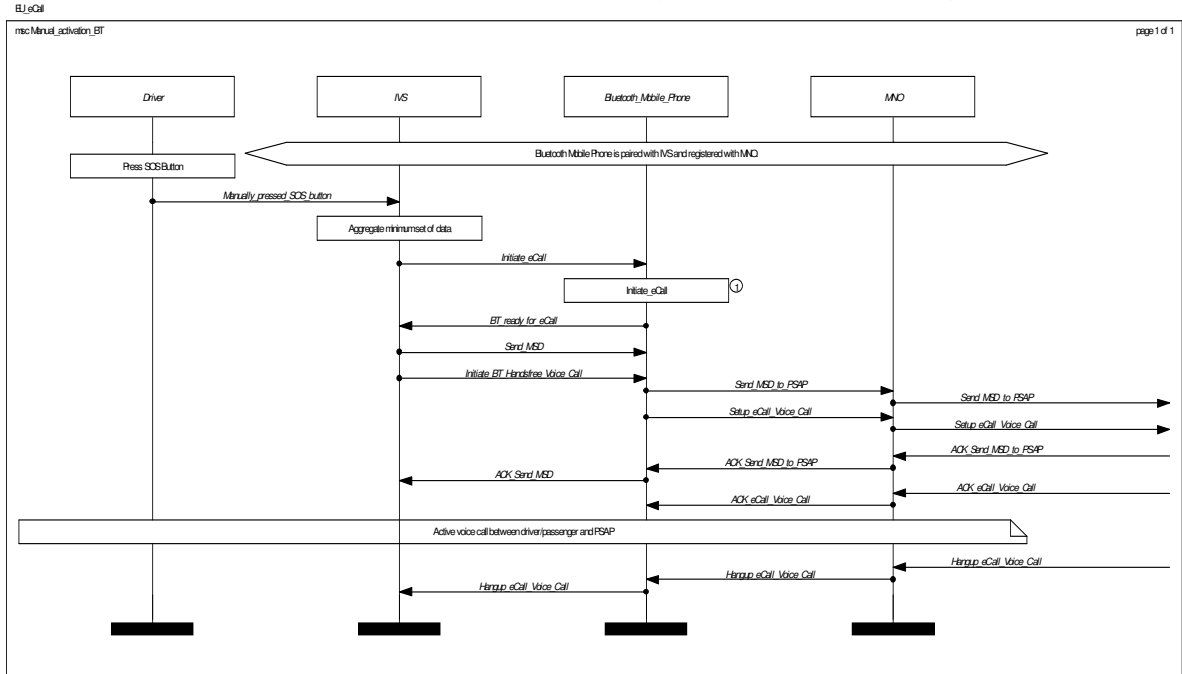


Figure 3: State chart for phone based solution and manual activation.

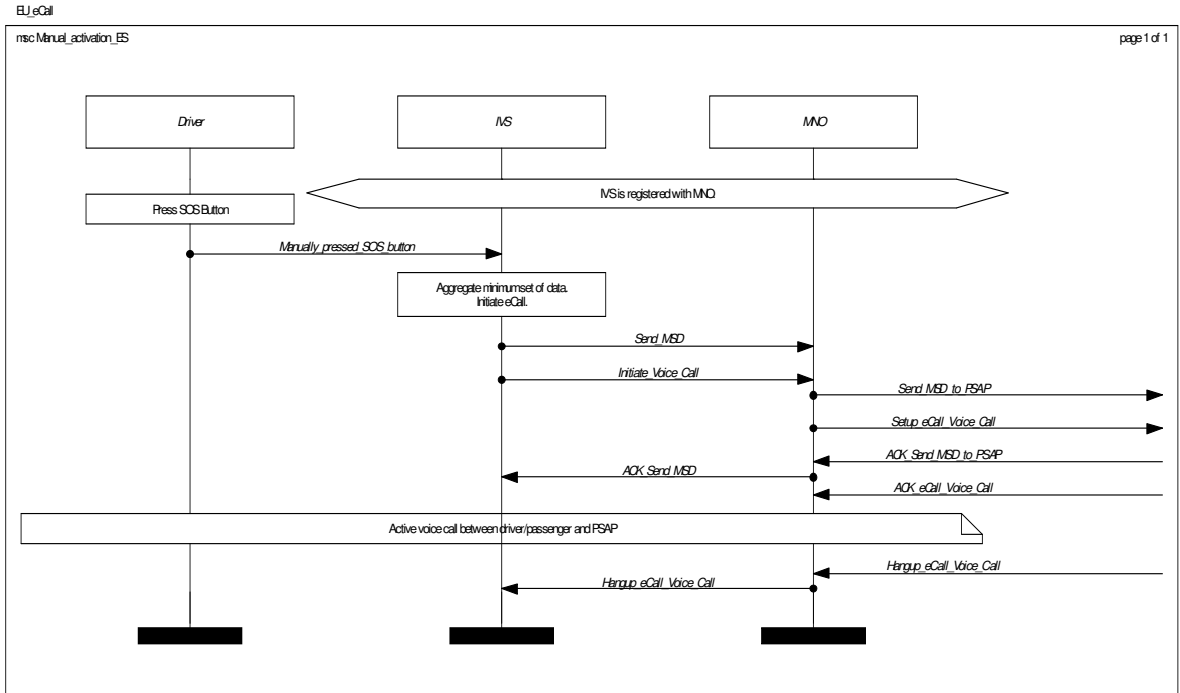


Figure 4: State chart for embedded solution and manual activation.

3.4 Automatic activation

3.4.1 State chart

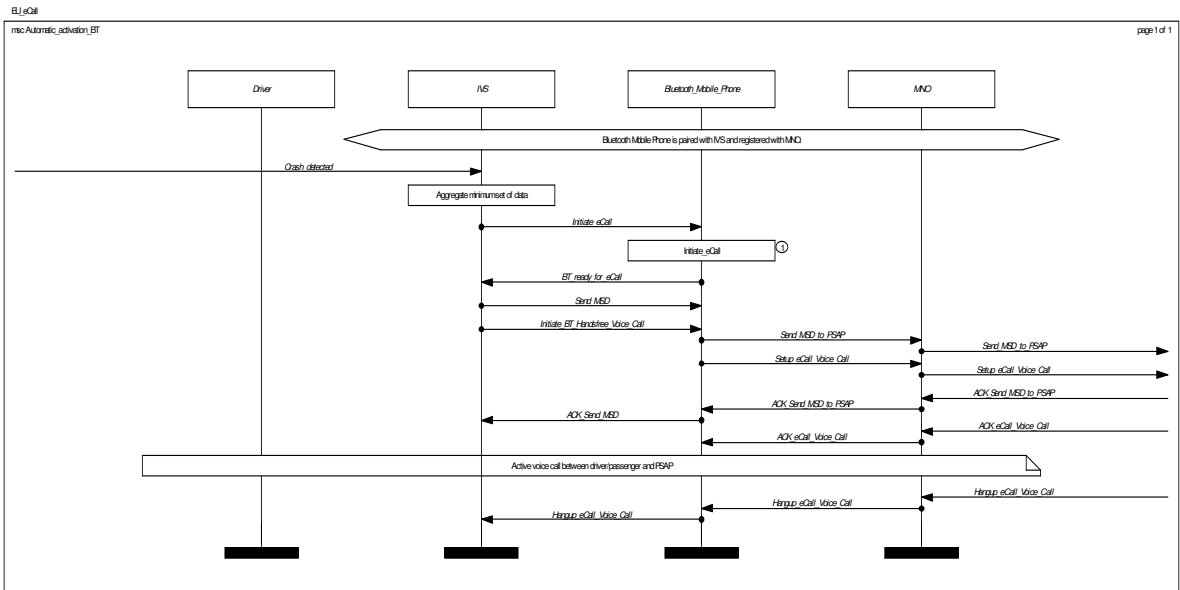


Figure 5: State chart for phone based solution and automatic activation.

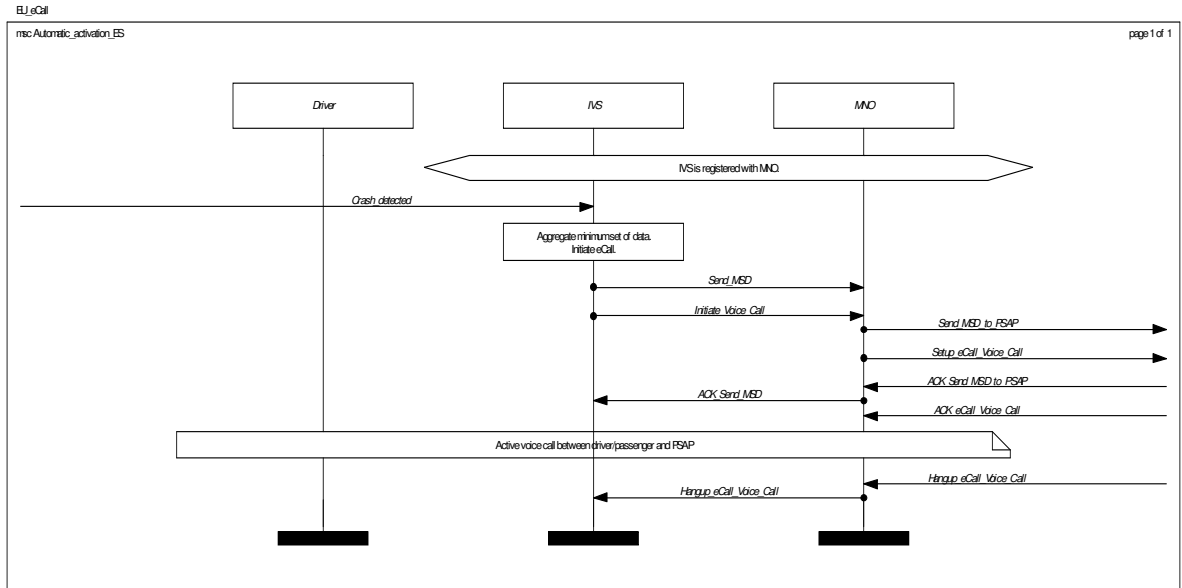


Figure 6: State chart for embedded solution and automatic activation.

3.4.2 Triggers

Automatic triggering generated by a "crash signal", created in the airbag control module and/or a combination of other sensor data (e.g. gyro, radar, axle load, speed). The car and truck manufacturers are responsible for the determination of the "crash signal".

The „crash signal“ can be:

- airbag deployment
- other crash information status (→ a severe accident has happened), e.g. created in the airbag control module without deployment of an airbag (e.g. rear crash), in responsibility of the manufacturer of the specific vehicle.

3.4.3 Call Back functionality

The IVS must try to re-establish an interrupted call unless the preassigned destination address (e.g. PSAP) has terminated the call intentionally or the user has pressed the 112-button for more than 1s (see 3.1).

3.5 Localization

Reference point is vehicle geometric vehicle centre

3.5.1 Location accuracy (according to US E911)

- +/-150m 95% of the time
- +/-50m 67% of the time
- 90% confidence for both

3.5.2 Direction of travel

Direction of travel to be calculated from the last 3 positions.

3.5.3 Confidence on Location accuracy

If the position can not be calculated with the required accuracy (e.g. in a tunnel) the system should indicate this with the confidence bit in the MSD.

3.6 Timing

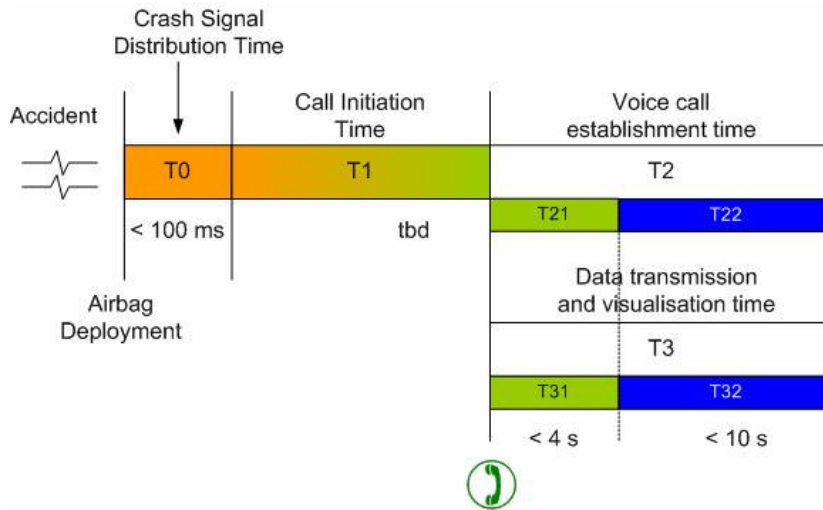


Figure 7 : Timing for automatic activation.

3.7 Minimum Set of Data (MSD)

The minimum Set of Data (MSD) shall be transmitted by the Network Access Device according to ETSI ??? (provided by ETSI 3GPP MSG).

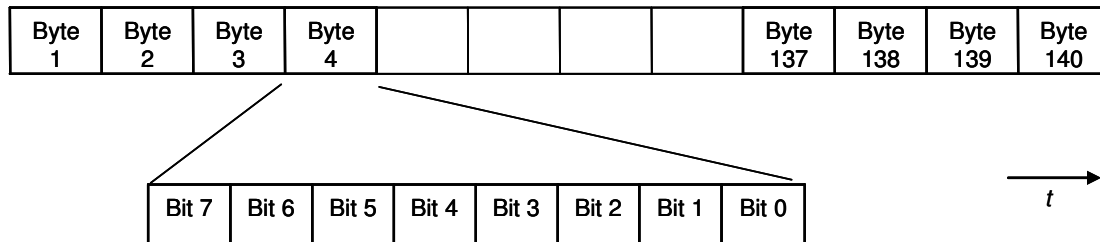


Figure 8 : MSD Frame format.

| Byte No. | Name | Size | Type | Unit | | Description |
|----------|------------------------|------------------|---------|-------------|---|---|
| 1 | Control | 1 Byte | Integer | | M | Bit 7: 1 = Automatic activation Bit 6: 1 = Manual activation Bit 5: 1 = Test Call Bit 4: 1 = No Confidence in position Bit 3: Bit 2: Bit 1: Bit 0: |
| 2 | Vehicle identification | 20 Bytes | String | | M | VIN number according ISO 3779 |
| 3 | Time stamp | 4 Bytes | Integer | UTC sec | M | Timestamp of incident event |
| 4 | Location | 4 Bytes | Integer | milliarcsec | M | GNSS Position Latitude (WGS84) |
| | | 4 Bytes | Integer | milliarcsec | M | GNSS Position Longitude (WGS84) |
| | | 1 Byte | Integer | Degree | M | Direction of Travel |
| 5 | Service Provider | 4 Bytes | Integer | IPV4 | O | Service Provider IP Address |
| 6 | Optional Data | 106 Bytes | String | tbd | O | Further data encoded in XML Format |
| | Sum: | 140 Bytes | | | | |

M – Mandatory data field
O – Optional data field (default blank characters)

Figure 9: MSD-Format field.

4 Annex

4.1 Corresponding documents

Reference to Extended Bluetooth Hands-free-Profile

Reference to ETSI eCall standard to be provided by ETSI 3GPP MSG

Reference to ISO 3779 / SAE J272

4.2 Vehicle Identifikation Number Passenger Car (VIN)

(according to ISO 3779 and SAE J272)

Example DaimlerChrysler:

Verwendung/Applications: USA/Kanada mit/with Code 494/460

Andere Länder mit/other countries with Code 986

| | | | |
|---|-----------|---|--|
| | | | |
| W | 1. – 3. | WMI – World Manufacturer Identifier | |
| D | digit | of the manufacturer DaimlerChrysler AG, | |
| D | | Stuttgart | |
| A | 4. digit | Line: siehe Blatt 3 / see sheet 3 | |
| J | 5. digit | he 4. character of type designation encoded: see sheet 3 | |
| 7 | 6. – 7. | (e.g. 199.378) | |
| 8 | digit | The last two characters of Mercedes-Benz type designation | |
| X | 8. digit | 3) | |
| | | Restraint system code (see sheet 3) | |
| 2 | 9. digit | check digit | |
| 3 | 10. digit | model year code | |
| | | see sheet 4) | |
| M | 11. digit | production plant (siehe Seite 5 / see sheet 5) | |
| 1 | 12.-17. | Fortlaufende, aufsteigende 6-stellige Zählnummer (identisch mit | |
| 2 | digit | der | |
| 3 | | 12. – 17. Stelle der “EG-Fahrgestellnummer) | |
| 4 | | sequential number, rising from 000001 to 999999 | |
| 5 | | | |
| 6 | | | |