Clarification Paper

EG1- Performance Criteria

Draft V8

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Authors

Yann Bouler (Renault) – YB

Emilio Davila-Gonzalez (EC) – EDG

Alfred R. Krappel (Motorola) – AK

Rasmus Lindholm (Ertico) – RL

Jan Malenstein (KLPD) – JM

Lennart Strandberg (Autoliv) – LS

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Chapter 1 - Executive Summary

Following items have been ultimately agreed:

1. the trigger from an airbag ECU which deploys the airbag automatically also triggers the 112 eCall
2. the maximum size of the MSD is 140 byte – the chosen data transport technology has to achieve this

Chapter 2 - Introduction

2.1 Objectives

The objectives of this group are to define the minimum performance criteria of the automotive 112 eCall in such a way that the goal of the European Commission of saving up to 2500 lives from traffic accidents and reduce average wound severity by 15% per year could be accomplished, while keeping the costs for the different stakeholders across the 112 eCall service chain (as depicted in figure 1) to a minimum.

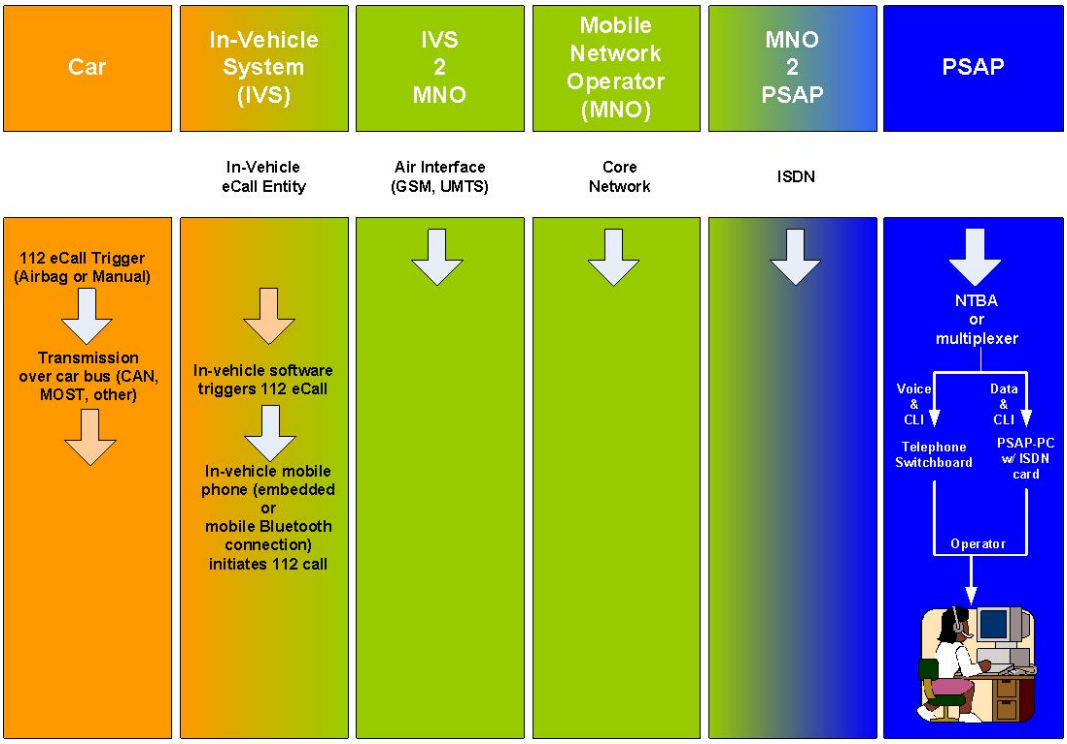


Figure 1: The 6 domains of the 112 eCall service chain

Following is a short definition of each of the 6 domains:

Car: The car domain is detecting an accident, either manually or automatically through airbag deployment which is typically based on more than one sensor input (see presentation of eCall expert meeting by Lennart Strandberg - 02. Dec. 2005, annex ..) and is forwarding this request to an in-vehicle system (IVS). The car domain is also responsible to deliver all the required information to the IVS that needs to be part of the additional data package (such as e.g. the VIN number) typically referred to as minimum set of data (MSD).

IVS: The IVS domain is responsible for handling all the aspects of the 112 emergency call, i.e. call initiation, audio management, HMI, MSD gathering and preparation etc. Precise location can either come from the car domain or the IVS domain, according to the selected technical architecture. This document is not discussing this point but only defining the requested level of performance to reach the EC efficiency target.

IVS2MNO: Ulrich, could you please take a first stab on this?

MNO: Ulrich, could you please take a first stab on this?

MNO2PSAP: Ulrich, could you please take a first stab on this?

PSAP: Jan, could you please take a first stab on this?

Furthermore Ulrich mentioned that the MNO's are currently drafting a paper that discusses e.g. national roaming (i.e. from one operator to another operator in case one operator does not have a network to deliver an eCall). To be commented by GSME.

2.2 Stakeholders concerned

Following stakeholders are/could be concerned:

- Vehicle Manufacturers (OEM's)
- Mobile Network Operators (MNO's)
- Fixed Network Operators (FNO's)
- In-Vehicle System (IVS) Suppliers
- Mobile Device Manufacturers (MD)
- Airbag Manufacturers
- PSAP equipment suppliers
- PSAP operators
- Member States
- Map suppliers

2.3 Assumptions

It is assumed that the MSD as defined by RESCUE will be transmitted (currently not more than 140 bytes) (see MSD definition 10102005 v1.5.doc, annex ..).

2.4 E112 vs. 112 eCall performance criteria comparison

It has been agreed that a comparison table should be established to compare benefits of E112 and 112 eCall; this should prevent that 112 eCall will only deliver marginal improvements on top of the already existing E112 mechanism.

Complete table with sources or assumptions rational in annex ..

Criteria	112 performance	e-Call target	Comments
Available mobile when crashed	*75%*	95%	if no mobile available, rely on good samaritan
Working mobile after crash	*80%*	95%	
Working mobile can reach network	*80%*	90%	e-Call assuming external antenas
Mobile able to send alert	**48%**	**81%**	
Enable triggered by airbag deployment	0%	100%	in 112 case occupants must dial 112
Airbag deployment succed in triggering a call	0%	95%	
MSD including vh. ID and location sent	0%	90%	
Airbag triggering succeeded	**0%**	**86%**	**Average alert time on airbag trigger : 15 sec.**
Manual triggering when airbag trigger failed	*50%*	5%	Average alert time on manual : *180* sec.
Good samaritan action	*50%*	9%	Average good samaritan action time : *600* sec.
Average trigger time on aibag deployment	**390**	**76**	**seconds**
Manual triggering	*85%*	95%	with e-Call, single knob/fixed place shall send alert
Time from triggering to emission			
Mobile not able to send alert	600	600	seconds
Mobile able to send alert	15	15	seconds
Average time to send alert	**319**	**125**	seconds
time from emission to PSAP	equal	equal	
Completion of MSD and voice to PSAP	no msd but cell loc.	95%	
Time to organise rescue			Impact to be assessed by PSAP
Rescue reach to the scene			
Location acuracy	50 to 500 m	5 to 50 m	
Urban	9	5,4	minutes
Rural	21	12,6	minutes
Average time to reach the scene	**13,80**	**8,28**	**Repartition Urban/rural accident : 60/40**
Average Trigger time	6,50	1,26	minutes
Average alert time	5,32	2,08	minutes
Average rescue time	13,80	8,28	minutes
Average Total Time	**25,62**	**11,62**	**minutes**
Total average time gained (I34 + I42)		**14**	**minutes**

Chapter 3 - Sector description

To define the ETSI standard and the IVS specification, following areas require clarification:

- **Backup**
  The E112 service (i.e. voice call + transmission of the best available location information that the MNO has access to) shall act as a back-up scenario in case the 112 eCall does not manage to deliver the MSD.

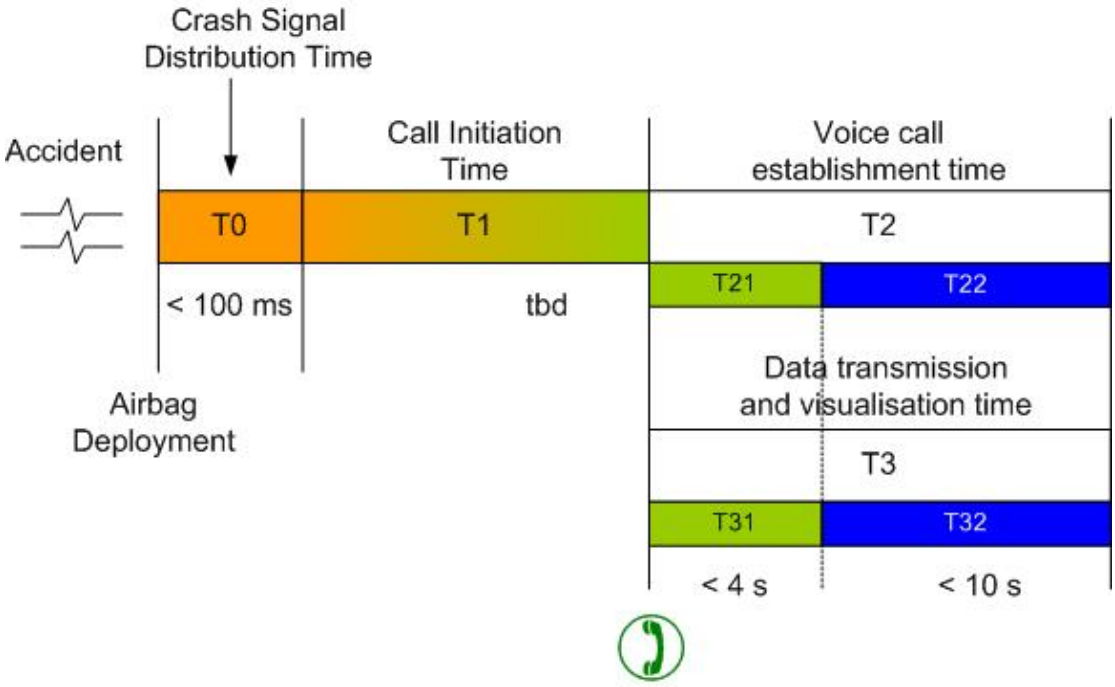
- **Boardnet robustness / back-up mechanisms**
  A recent study (see references) shows that in 25% of severe accidents the power supply gets disconnected and hence the 112 eCall IVS would not be able to send out the 112 eCall without a back-up mechanism. This data has been gathered for small and mid-size cars where the battery is in the front.
  In case that a back-up mechanisms should be required, the only mandatory requirement is that the MSD gets transmitted – a voice connection is not a mandatory requirement.

- **Language**
  For the basic 112 eCall service (i.e. which constitutes the minimum service offering such as MSD-only for example) it is decided that <u>no translation service is offered</u> between the involved vehicle and the PSAP. As the data (MSD) will be sent anyway, the PSAP will react even if he would not understand the involved people that had the accident. The PSAP may be in the position to deal with several languages, but this is beyond of the scope of this document. This was agreed upon by the PSAP expert, who said that dealing with the incident is first priority. Language is then mainly an issue for the rescue people on the spot.

- **GNSS (Global Navigation Satellite System) availability**
  - Localization data must be available when a crash occurs, i.e. it must not happen that the unit has to run through a warm or even a cold start procedure – this is because
    - a pearl chain has to be stored in the eCall system to calculate the travel direction (the heading information from GNSS is not adequate)
    - acquiring the fix after the crash typically takes too much time

- **GNSS minimum accuracy**
  as defined by CGALIES, i.e. < 50m for urban and < 100 m for rural or motorway scenarios

- **Timing requirements**



- Crash signal distribution time T0 [time from airbag detonation (i.e. time of crash output signal generation) to reception at the eCall system] ≤ 100 ms
- Call initiation time T1 [time from crash signal reception until the mobile phone system successfully* registers on the network and initiates a 112 call ()]

  *) to be clarified: scan for strongest channel time [time it takes the mobile phone to scan for the strongest channel]

  Practical tests at Autoliv have shown that this takes on average 3.3 s (with SIM card and with an already registered mobile phone).

  Proposal from Ulrich that the MNO's would prefer if the IVS would be kept in a kind of pre-registered mode (which continuously scans what is the best channel , then enters quick registering mode in case of an accident).
  Ulrich also mentioned that it is hard to give today an exact figure for the call initiation time, as it is not a controlled environment.

  Since the PSAPs do not have any insight into the network, it is hence suggested that the MNO's do specify

  - this target

- the number of lost calls in the network

- Voice call establishment time T2

  - Voice call transmission time T21 [time it takes for the voice call to reach the PSAP]

    Since the data transmission technologies are voice-based, i.e. transmitted as part of the voice channel, the voice call and data transmission time are assumed to be identical (even if this might not be a 100% correct statement theoretically). The performance target that are given by the PSAP experts are 4 s and were to be derived from the UK PSAP requirements

  - Voice call PSAP reaction time T22 [time it takes the PSAP to relay the voice call to an operator and answering the call]

    90% of incoming calls have to be answered within 10 s (requirement from the PSAP document for Finland and the Netherlands)

- Data transmission and visualization time T3

  - Data transmission time T31 [time it take to transfer the MSD to the PSAP] = T21 = 4 s

  - Data forwarding and mapping time T32 [time it takes the PSAP to relay the data to the same operator that also received the voice call and to visualise it]

    It is assumed that this pure machine-to-machine operation is faster then the human reaction time, specified under T22. Hence defining the identical value as under T22 seems to be a very realistic target.

    i.e. T32 = T22 = 10 s

- **PSAP acknowledgement and call-back**

  - Acknowledgement time

- It has been agreed that there has to be an acknowledgement from the PSAP that the emergency call has been received and is operated. If the acknowledgement does not arrive within a specified time – the acknowledgement time – then the IVS tries to establish a call again.

  T_Ack = tbd

- Call back possibility
  - It has been agreed that there should be a call-back mechanism that allows the PSAP's to

    - reassure people
    - keep them conscious
    - operating longer-term activites (pursuits)
  - The working group is currently looking into an alternative approach – one which potentially could also work without a SIM card and hence without a CLI. The idea goes as follows:

    Description:

    - "Let's assume that we have a trigger event, which has been defined to be the airbag deployment.
    - Let's further assume that this event triggers 112 calling. If there is no acknowledgement after a defined time (acknowledgement time – still tbd) it calls again until a connection is established. Once the connection is established only the PSAP can cancel the call. In case the connection is lost, the IVS will automatically re-dial 112.

    We shall then guarantee that all new calls triggered by IVS will reach the same rescue operator that initial alert.

    This needs to be investigated further.

Particular issues:

- national roaming
  - can take a serious time – how to define?
  - it was also mentioned that operator roaming would only be possible if there is no SIM card; in case that there is a SIM card operator roaming seems to be prevented
- international roaming:

  Comment Wavecom: **Difficulty to decide on multi border situation, on which network to send the eCall message. The one allowing 112 might be the weakest signal and therefore will not be selected first. Should be same behaviour that for mobile originated e112.**

Qualitative requirement

- The user must be informed via the HMI about the call status (call establishment in process or something similar); otherwise he could call 112 twice because he does not know the real status
- The customer must be able to cancel the call (for the manual call of course, e.g. if the call has been triggered accidentally, but also for the automated call, for privacy reasons: “I have just bumped into another car whilst leaving the pub car park and I don't want to talk to the police!” – source of this argument: will not be disclosed ;-)

3.1 Open issues

a) Define urban and rural for accuracy
b) Define statistical bandwidth for accuracy and for successful calls
c) SIM / No SIM --> Rasmus
d) MSD --> Rasmus
e) Acknowledgement time to be defined
d) Should HMI elements be covered in this document? Or rather in the system spec.?
e) Map accuracy --> see document from Jean-Francois (Navteq)

Chapter 4 - Conclusion

Will be filled-out at the very end.

Suggest that we state that :

e-Call is targeting a better rescue organization for road emergencies, and shall then compare to existing 112/e112 with proven and targeted added performance

- In alert time from exxident to rescue on the scene
- In alert accuracy (where, who, when)
- In side information (type of accident, severity)
- In availability of operational alert system after a crash occurs

We should then precise where the additional performance shall stand and what targets we must reach to meet EC and PSAPs expectations.

Chapter 5 - Appendix

5.1 Map accuracy document from Navteq:

See attached document from Navteq.

AirBag deployment strategy (Autoliv presentation)

MSD description (s)

E112/E-Call targets Comparison table

Chapter 6 - References

- 3GPP TR 22.967 V1.1.0
- MSD definition 10102005 v1.5.doc
- PSAP requirements – document by Jan Malenstein
- Emergency call – accident profile and power back-up need discussion paper; document by the joint Renault/PSA accident LAB