BS EN 16072:2015

BSI Standards Publication

# Intelligent transport systems — ESafety — Pan-European eCall operating requirements

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**National foreword**

This British Standard is the UK implementation of EN 16072:2015. It supersedes BS EN 16072:2011 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/278, Intelligent transport systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

# Intelligent transport systems - ESafety - Pan-European eCall operating requirements

Systèmes de transport intelligents - ESafety - Exigences opérationnelles du service eCall paneuropéen

Intelligente Transportsysteme - ESicherheit - Paneuropäische Notruf-Betriebsanforderungen

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EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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# Foreword

This document (EN 16072:2015) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2015, and conflicting national standards shall be withdrawn at the latest by October 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 16072:2011.

The following revisions have been introduced:

— References to CEN/TS 16454, and other relevant standards deliverables have been added;

— New notes have been added for clarification;

— Subclause 7.10.1 has been clarified;

— ‘Coverage’ has been replaced by ‘service area’ in 7.13.2;

— A paragraph has been removed from 7.13.3;

— The term USIM is now used consistently, and the term SIM is no longer used (for consistency with the ETSI eCall NAD standards deliverables);

— As later instantiations of eCall may use E_UTRAN or other communications technologies, references to ETSI standards are now made specific that they are in respect of GSM/UMTS instantiation;

— A clause (8.3) has been moved from EN 16062 re the role of USIM in managing false generation of eCalls);

— A clause (8.3) has been moved from EN 16062 re End of life management of IMEI;

— References/cross references have been updated;

— IVS has been changed to “IVS responsible for the eCall system” throughout;

— IVS redial (7.17.2) and PSAP call-back (7.17.3) have been reorganized and some content moved from one section to the other and the text clarified;

— Data storage. A reminder that data retention ‘shall respect European data protection regulations’ has been added to 7.17.4.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

# Introduction

The scale of death and injury on roads in Europe needs to be fully comprehended to understand the need for 'Emergency Call' (eCall). In 2008 there were 38 900 fatalities in EU-27. The figure for 2009 is around 34 500 fatalities. The trend 2001 to 2008 is around 5 % reduction annually. Road accident injuries are in the region of 1,7 million (2008). Roads remain unsafe and further efforts are needed. The pan-European in-vehicle emergency call, eCall, is estimated to have the potential to save up to 2 500 fatalities annually in EU-28 when fully deployed and furthermore to reduce the severity of injuries, to bring significant savings to the society in and to reduce human suffering.

Emergency calls made from vehicles or mobile telephones using wireless technologies can assist with the objectives of significantly reducing road deaths and injuries, but drivers often have poor (imprecise) location-awareness, especially on interurban roads or abroad. Additionally, in many situations, the car occupants may not be in a position to call using a normal mobile phone.

The situation is worse for those travelling abroad: A high (and increasing) number of vehicles travelling outside their home country is thus also contributing to the need for automated emergency call system in vehicles. In EU there are over 100 million trips to another EU country per year (EU-15). 65 % people feel less protected while abroad and most do not know which number to call in an emergency (in some countries over 60 %). Language problems are pertinent and may render proper communication difficult. Yet, in the most crucial cases, the victim(s) may not be able to call because they have been injured/trapped, do not know the local number to call and in many cases, particularly in rural situations and late at night, there may be no witnesses, who happen to have a mobile phone and a sense of community.

eCall, in the context of 'Road Traffic and Transport Telematics' (otherwise known as 'Intelligent Transport Systems' or 'ITS'), can be described as an 'automatic or user instigated system to provide notification to Public Safety Answering Points (PSAP), by means of wireless communications, that a vehicle has crashed, and to provide coordinates, a defined Minimum Set of Data, and where possible a voice link to the PSAP'.

The objective of implementing the pan-European in-vehicle emergency call system (eCall) is to automate the notification of a traffic accident, wherever in the European Union and associated countries, with the same technical standards and the same quality of services objectives of other emergency (TS12) services.

Definition of the Minimum Set of Data, the communications media and means of transferring the data are not specified in this European Standard.

This European Standard specifies the generic operational requirements for the provision of an eCall service. The practical provision and operation of eCall service and equipment is dependent on the communications medium being available throughout the lifetime of equipment installed in vehicles.

NOTE The term PSAP, which is most widely used in the eCall documentation, European Commission documents etc., equates to the term emergency call response centre.

The European Committee for Standardization (CEN) draws attention to the fact that it is claimed that compliance with this European Standard may involve the use of patents concerning eCall given in this European Standard.

The patents held may refer to the implementation of eCall in general using the network access device referenced (but not defined) in this European Standard, but do not specifically directly refer to any of the application specification clauses defined herein.

CEN takes no position concerning the evidence, validity and scope of these patent rights.

The holder of these patent rights has assured to CEN that he/she is willing to negotiate licenses under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holders of these patent rights are registered with CEN. Information may be obtained from:

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## 1 Scope

The objective of implementing the pan-European in-vehicle emergency call system (eCall) is to automate the notification of a traffic accident, wherever in Europe, with the same technical standards and the same quality of services objectives by using 'Public Land Mobile Networks'(PLMN) (such as GSM and UMTS), which supports the European pre-assigned emergency destination address (see normative references) and to provide a means of manually triggering the notification of an incident.

This European Standard specifies the general operating requirements and intrinsic procedures for in-vehicle emergency call (eCall) services in order to transfer an emergency message from a vehicle to a Public Safety Answering Point (PSAP) in the event of a crash or emergency, via an eCall communication session and to establish a voice channel between the in-vehicle equipment and the PSAP.

Private third party in-vehicle emergency supporting services may also provide a similar eCall function by other means. The provision of such services are defined in EN 16102, and are outside the scope of this European Standard.

The communications protocols and methods for the transmission of the eCall message are not specified in this European Standard.

This European Standard specifies the operating requirements for an eCall service. An important part of the eCall service is a Minimum Set of Data (MSD). The operating requirements for the MSD are determined in this European Standard, but the form and data content of the MSD is not defined herein. A common European MSD is determined in EN 15722.

This European Standard does not specify whether eCall is provided using embedded equipment or other means (for example in the case of aftermarket equipment).Conformance

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15722:2015, *Intelligent transport systems — eSafety — eCall minimum set of data (MSD)*

EN 16062:2011, *Intelligent transport systems — eSafety — eCall high level application requirements (HLAP)*

EN ISO 24978:2009, *Intelligent transport systems — ITS Safety and emergency messages using any available wireless media — Data registry procedures (ISO 24978:2009)*

ETSI/TS 122 101, *Universal Mobile Telecommunications System (UMTS); LTE; Service aspects; Service principles (Release 8)*

ETSI/TS 124 008, *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Mobile radio interface Layer 3 specification; Core network protocols; Stage 3 (Release 8)*

ETSI/TS 126 267, *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); eCall data transfer; In-band modem solution; General description (Release 8)*

ETSI/TS 126 268, *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); eCall data transfer; In-band modem solution; ANSI-C reference code (Release 8)*

ETSI/TS 126 269, *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); eCall data transfer; In-band modem solution; Conformance testing (Release 8)*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1**
**112**
single European emergency call number supporting *Teleservice 12*

[SOURCE: ETSI/TS 122 003]

**3.2**
**E112**
emergency communications service using the single European emergency call number, 112, which is enhanced with location information of the calling user

**3.3**
**association**
*data concept*; structural relationship

**3.4**
**cellular network**
*wireless communications network* consisting of multiple adjacent access points (cells) with the capability of homogeneous transfer of a communications session instance to an adjacent cell without significant interruption to the session

**3.5**
**data**
representations of static or dynamic objects in a formalized manner suitable for communication, interpretation, or processing by humans or by machines

**3.6**
**data concept**
any of a group of *data* structures (i.e., object class, property, value domain, *data elements,* message, interface dialogue, *association*) referring to abstractions or things in the natural world that can be identified with explicit boundaries and meaning and whose properties and behaviour all follow the same rules

**3.7**
**data element**
single unit of information of interest (such as a fact, proposition, observation, etc.) about some (entity) class of interest (e.g. a person, place, process, property, concept, *association*, state, event) considered to be indivisible in a particular context

**3.8**
**eCall**
emergency call generated either automatically via activation of in-vehicle sensors or manually by the *vehicle occupants*; when activated it provides notification and relevant location information to the most appropriate *Public Safety Answering Point*, by means of *mobile wireless communications networks*, carries a defined standardized *Minimum Set of Data* notifying that there has been an incident that requires response from the

emergency services, and establishes an audio channel between the occupants of the vehicle and the most appropriate *Public Safety Answering Point*

**3.9**
**eCall generator**
occupant of a vehicle or equipment within a vehicle that has cause to trigger an *eCall transaction* by automatic or manual means

**3.10**
**eCall identifier**
one of two information element bits (flags) included in the emergency call set-up message that may be used by the mobile network to filter and route automatically and manually initiated *eCalls* to a designated PSAP

**3.11**
**eCall in-vehicle system**
*in-vehicle equipment* together with the means to trigger, manage and effect the *eCall transaction*

**3.12**
**eCall service**
capability of *in-vehicle equipment* to be an *eCall generator*, triggering of an *eCall transaction*, intent of a PSAP to be an *eCall* responder and provision of that response

**3.13**
**eCall transaction**
establishment of a *mobile wireless communications session* across a *public wireless communications network* and the transmission of a *Minimum Set of Data* from a vehicle to a *Public Safety Answering Point* and the establishment of a voice channel between the vehicle and the PSAP

**3.14**
**eCall trigger**
signal emanating from within the vehicle to the *eCall in-vehicle equipment* which requests to start an *eCall transaction*

**3.15**
**emergency call response centre**
Term used in ITS Implementation Directive to mean ‘Public Safety Answering Point’ (PSAP)

**3.16**
**geographic information service/system (GIS)**
system or service that provides spatial data, management, retrieval, analysis, and visualization functions designed to capture, store, manipulate, analyse, manage, and present all types of geographical data

**3.17**
**identifier**
any label, symbol or token that names or identifies an entity or a collection of *data* or the means of designating or referring to a specific instance of a *data concept*

**3.18**
**ignition-on**
vehicle status where vehicle functions are available following first action taken by a driver to make the car operate

Note 1 to entry: This is typically initiated by the turning of a key in an ignition sequence or other methods of vehicle operation as specified by *vehicle manufacturer*.

**3.19**
**Ignition-off**
vehicle status where vehicle functions and related systems are shut down following action taken by the driver

Note 1 to entry This action is typically initiated by turning the ignition key to an 'off' position, or other method as specified by the vehicle manufacturer. Related systems may take a few seconds to shut down before 'ignition –off' is achieved.

**3.20**
**in-vehicle equipment**
within the context of this European Standard 'in-vehicle equipment' refers only to 'in-vehicle equipment' for the purposes of eCall (eCall in-vehicle equipment), sometimes referred to as *eCall in-vehicle system* or *IVS*, and does not refer to any other in-vehicle equipment provided for purposes other than eCall; see *eCall in-vehicle system*

**3.21**
**in-vehicle equipment provider**
provider of *eCall in-vehicle equipment* which is given access to the relevant *Minimum Set of Data* by the *vehicle manufacturer*, or which is providing the relevant *Minimum Set of Data* in order to effect the *eCall service*

Note 1 to entry: The *in-vehicle equipment provider* can be the *vehicle manufacturer* or the provider of aftermarket equipment.

**3.22**
**in-vehicle system**
see *eCall in-vehicle system; in-vehicle equipment* together with the means to trigger, manage and effect the *eCall transaction*

**3.23**
**Minimum Set of Data (MSD)**
standardized *data concept* comprising *data elements* of relevant vehicle generated *data* essential for the performance of the *eCall service*

**3.24**
**mobile telecommunication network operator (MNO)**
provider of a mobile *wireless communications network* that supports TS12 emergency services

[SOURCE: ETSI/TS 122 003]

**3.25**
**mobile wireless communications network**
*wireless communications network* with homogeneous handover between *network access points*

**3.26**
**most appropriate PSAP**
PSAP defined beforehand by the responsible authorities (Member State) to cover emergency calls from a certain area or for emergency calls of a certain type

Note 1 to entry: See also PSAP.

Note 2 to entry: A number of different instantiations of PSAP service are supported within this European Standard. A PSAP can be a Public Authority or a private *service provider* operating under the control of a Public Authority.

**3.27**
**network access device (NAD)**
device providing communications to a *mobile wireless communications network* with homogeneous handover between *network access points*

**3.28**
**network access points**
beacon, antenna or similar source of signal propagation and receipt together with equipment to manage communication sessions with users operating within the operating reach of the *network access point* and provide connectivity for the users within the operating reach of the single *access point* to a wider communications network

Note 1 to entry: A network access point may or may not provide homogeneous or heterogeneous handover to another network access point.

**3.29**
**pan-European eCall**
*eCall* sent directly using, in the case of GSM/UMTS circuit switched networks circuit switched networks, ETSI defined *Teleservice 12* over mobile telephone networks designed to work throughout European Union Member States

**3.30**
**prime medium**
wireless medium defined in an ETSI standard to be suitable for transmission of an *eCall transaction* (in the case of GSM/UMTS circuit switched networks circuit switched networks, ETSI/TS 122 101, ETSI/TS 124 008, ETSI/TS 126 267, ETSI/TS 126 268, ETSI/TS 126 269 [Release 8 or later])

**3.31**
**public mobile wireless communications network**
*mobile wireless communications network* with access to a public telecommunications network

**3.32**
**Public Safety Answering Point (PSAP)**
physical location where emergency calls are first received under the responsibility of a public authority or a private organization recognized by the national government, working on behalf of the responsible authorities

Note 1 to entry: See also 'most appropriate' PSAP.

Note 2 to entry: A number of different instantiations of PSAP service are supported within this European Standard.

**3.33**
**reference point**
*reference point* location provided by the *data* contained in the ‘location’ field of the MSD

[SOURCE: EN 15722:2015]

**3.34**
**service provider**
physical and functional component responsible for providing telematics based services to its subscribers

**3.35**
**Teleservice**
*Teleservices* supported by a PLMN that supports *Teleservice 12* are described by a number of attributes which are intended to be largely independent. They are grouped into three categories: - High layer attributes. - Low layer attributes (describing the Bearer capabilities which support the *Teleservice*). - Information transfer attributes. - Access attributes. - General attributes; examples include including fax-on-demand, voice mail computer telephone integration and emergency services support; in the case of GSM/UMTS circuit switched networks circuit switched networks

[SOURCE: ETSI/TS 122 003]

[SOURCE: ETSI/TS 100 905]

**3.36**
**Teleservice 12**
emergency service supported by PLMNs

[SOURCE: ETSI/TS 100 905]

**3.37**
**vehicle manufacturer**
entity which first assembles the vehicle and provides *eCall* equipment as part of its specification and subsequently sells the vehicle directly or via an agent

**3.38**
**vehicle occupant(s)**
person(s) inside the vehicle

**3.39**
**wireless communications network**
network operating using an air-interface capable of bi-directional transfer of *data* and or voice

Note 1 to entry: There are different types of wireless communications such as PAN, LAN, *cellular network* etc.

## 4 Symbols and abbreviations

**CLI** caller line identification

**EC** European Commission

**GIS** geographic information system

**GNSS** global navigation satellite system

**GSM** global system for mobile communications

**HGV** heavy goods vehicle

**HMI** human machine interface

**IMEI** international mobile station equipment identity

**IMSI** international mobile subscriber identity

**IVS** In-vehicle system

**LAN** Local Area Network (e.g. WiFi)

**MSD** *Minimum Set of Data*

**MNO** Mobile Network Operator

**NAD** *Network Access Device* (e.g. a GSM / UMTS or other module that supports *Teleservice 12*)

**PAN** Personal Area Network (e.g. Bluetooth, Zigbee)

**PLMN** Public Land Mobile Network

**PSAP** *Public Safety Answering Point*

**TS12** *TeleService 12*

**UMTS** Universal Mobile Telecommunication Service

**USIM** Universal Subscriber Identity Module

**WGS** World Geodetic System

**WGS 84** World Geodetic System; issue 1984 (last revised 2004)

# 5 Conformance

Test requirements and conformance requirements are described in Clause 11. Conformance procedures are specified in a separate deliverable (CEN/TS 16454) and are outside of the scope of this European Standard. CEN/TS 16454 is in the process to be balloted to be upgraded to EN 16454 status.

# 6 High level functional requirements

## 6.1 General high level functional requirements

### 6.1.1 General

The high level functional requirements of the *eCall in-Vehicle System* are as follows:

— the *eCall in-Vehicle System* shall include a *Network Access Device* (NAD, e.g. PLMN (such as GSM AND UMTS), module);

— the *eCall in-Vehicle System* shall detect when an *eCall trigger* has been initiated;

— in the event of an accident the *eCall* system shall automatically determine whether or not to trigger an *eCall* and where appropriate make such an *eCall* automatically;

— an *eCall* shall also be able to be triggered manually;

— upon triggering an *eCall* the *eCall* system shall attempt to send a *Minimum Set of Data* (MSD) to any system operated by a given Mobile Network Operator (MNO) with the European pre-assigned TS12 destination address (112);

— the *eCall* system shall also try to establish a voice connection between the vehicle and that pre-assigned destination address (preferably a *Public Safety Answering Point* (PSAP) with TS12).

### 6.1.2 Linguistic aspects

*eCall* shall receive the same linguistic benefits as any emergency call (TS12).

### 6.1.3 High level In-vehicle system requirements

This European Standard requires the following from the in vehicle system including communications equipment:

— it is capable of supporting *eCall*;

— it is robust and will normally survive a crash (as defined in 7.5);

— it meets the specification of the operating requirements of the ETSI communications standards, in the case of GSM/UMTS circuit switched networks circuit switched networks, (ETSI/TS 122 101, ETSI/TS 124 008, ETSI/TS 126 267, ETSI/TS 126 268, ETSI/TS 126 269 [Release 8 or later]) under which it operates and the quality of service requirements defined in this document;

— It uses an ETSI *prime medium* when transmitting the MSD message.

### 6.1.4 eCall architecture

The very highest level generic *eCall* architecture is described in Figure 1.

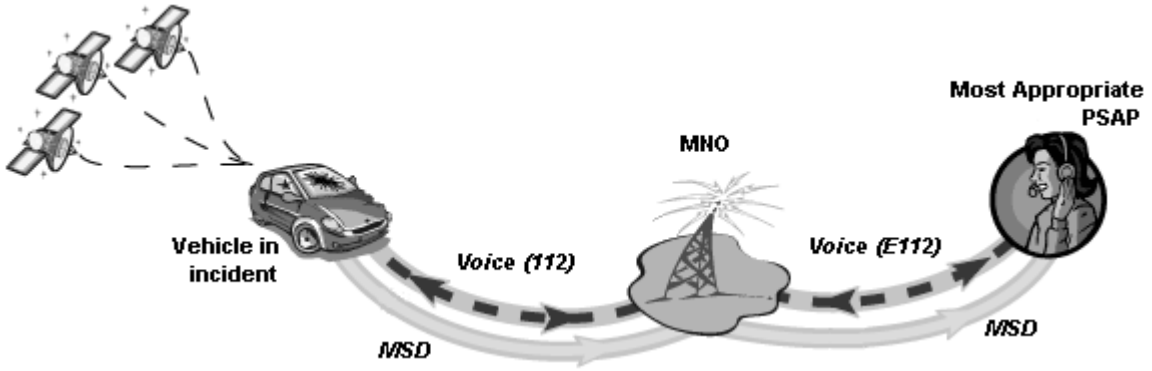


**Figure 1 — eCall system overview**

(SOURCE: European Commission)

### 6.1.5 eCall operation sequence

The MNO system shall treat the *eCall* as any other emergency call (in the case of GSM/UMTS circuit switched networks circuit switched networks, a 'TS12' call), and shall include caller line identification and caller location information.

NOTE 1 This caller line identification and caller location information is obtained from the network and is in addition to the vehicle calculation of location that is included in the MSD.

The generic *eCall* functional operational sequence is as follows:

a) the *eCall generator* initiates the *eCall* by sensors triggered and/or manually, sends the in-vehicle triggered *eCall* to a PSAP. The *eCall* consists of two elements:

   1) the *Minimum Set of Data* (MSD), and

   2) a voice (audio) telephone call based on TS12;

b) the *eCall* carried through the *wireless communications network*, is recognized by the *wireless communications network* operator (MNO) system as an emergency call (in the case of GSM/UMTS circuit switched networks, a TS12 call). An *eCall* compliant MNO system shall make use of an *eCall* flag, (in the case of GSM/UMTS circuit switched networks, as specified in ETSI/TS 124 008 [Release 8 or later]), received in the emergency call set-up message, to differentiate *eCalls* from other emergency calls. *eCall* flags may be used to filter and route *eCalls* to a dedicated destination if required;

c) the MNO shall then treat the *eCall* as any other emergency call (in the case of GSM/UMTS circuit switched networks, a TS12 call);

d) the *wireless communications network* operator (MNO) system shall establish the emergency call (in the case of GSM/UMTS circuit switched networks, a TS12 call) and route the voice call, including the MSD, to the *most appropriate PSAP*, according to national arrangements;

e) the PSAP transmits an acknowledgement to the *IVS responsible for the eCall system* specifying that the MSD has been properly received. (In the case of GSM/UMTS circuit switched networks, the detail of how this is achieved, and consequent responses, are determined in EN 16062);

f) the voice (audio) link is established.

NOTE 2 In the case of GSM/UMTS circuit switched networks, the exact order of voice establishment / *data* exchange is defined by the appropriate the high level application protocols for *eCall* (EN 16062).

## 6.2 eCall service chain

### 6.2.1 General

*eCall* involves a number of different stakeholders all with separate responsibilities and tasks, which may overlap.

### 6.2.2 Actors in eCall service provision

The principal actors in an *eCall* system are:

— in-vehicle equipment provider(s);

— mobile telecommunication network operator (MNO);

— Public Safety Answering Point (PSAP).

### 6.2.3 Privacy aspects

*eCall* shall be considered as a public service operating as part of the public emergency call service, where the first part of service provision is a *Public Safety Answering Point* (which may be a public or private organization under public delegation as determined within nation states).

All stakeholders involved shall comply with all EU and national regulations related to the protection of *data* and the privacy of the citizens in relation to emergency service support.

The *eCall service* shall only operate from the point of service demand (automatic or manual) triggering of the *eCall*. *eCall* shall therefore be a 'sleeping' application and shall not be used to monitor the movement of vehicles other than at the point of *eCall* message triggering as defined in the appropriate high level application protocol standard. (In the case of GSM/UMTS circuit switched networks, EN 16062). For detail of network registration in the case of GSM/UMTS circuit switched networks, see ETSI/TS 122 101.

NOTE Article 29 Working Party on the protection of the individuals with regards to the processing of personal *data* have provided an interpretation of these requirements, and the attention of implementers is directed to these interpretations. Article 29 Working Party requirements are now enshrined in “REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning type-approval requirements for the deployment of the eCall in-vehicle system based on the 112 service and amending Directive 2007/46/EC”.

### 6.2.4 Use of location and heading at PSAP

In the case of an emergency call it is critical to identify the location of the caller from the coordinates provided in the MSD and to derive a location which can be sent to the emergency service vehicle.

The *most appropriate PSAP* shall have access to an appropriate *Geographic Information Service* (GIS) so that the operator can identify the location and heading supporting the full resolution as received in the MSD coordinates (see EN 15722).

The PSAP shall provide location and other relevant *data* to the appropriate emergency service(s).

It is recommended that the PSAP’s geographical information service should also interpret and display the optional 'recent locations' of the vehicle to provide the clearest possible understanding of the exact vehicle location and direction (e.g. at complex junctions or bridges).

# 7 Operational requirements

## 7.1 General

The overall objective of an *eCall* system is to establish an emergency call providing information and where practicable a voice link from a 'vehicle in distress' to a 'most appropriate' *Public Safety Answering Point* (PSAP) where a *prime medium* is available. A 'vehicle in distress' is a vehicle that has been involved in a crash or other impact situation where an *eCall* is generated automatically, or is a vehicle where a *vehicle occupant* has activated an *eCall* manually.

An *eCall service* is based on a quasi-simultaneous *data*/voice link from an *eCall generator* to a *most appropriate PSAP*. The *most appropriate PSAP* is the PSAP defined beforehand by the responsible authorities to cover emergency calls from a certain area or for emergency calls of a certain type.

NOTE It is important to understand that these operating requirements are generic, and make no requirement for the business, operational, or political model of the PSAP, and it is recognized that instantiations of the PSAP will vary from country to country and possibly models will vary within different regions of a country. This European Standard makes no prescription for common PSAP operational models, but specifies the minimum generic operational requirements for any *eCall service* provision.

The objective of these European standardized essential requirements for transmitting *data*, and where possible, voice, via publicly available wireless networks that support emergency calls (in the case of GSM/UMTS circuit switched networks, a TS12 call), is to provide:

— a predetermined and defined PSAP coverage for any area within Europe;

— pan-European roaming capability;

— supportability via publicly available *wireless communications networks* commonly implemented by European network operators, which can offer:

  — a real time transport mechanism;

  — quasi simultaneous *data* transfer and, where possible simultaneous voice call;

  — secure transport and routing mechanism (in the case of GSM/UMTS circuit switched networks, TS12);

  — automatic acknowledgement (following high level application protocols defined in EN 16062 which establish the link).

See also 6.2.

## 7.2 Liability

There are many actors involved in the successful creation of an *eCall* session, the transmission of the *Minimum Set of Data* (MSD) and establishment of a voice link with the vehicle. No one actor is in a position to guarantee the performance of other actors or all aspects of the system. In order to claim compliance with this European Standard an actor therefore cannot and does not carry the requirement for the quality of total service provision, but is required to be able to demonstrate that he has met all specified conformance requirements in respect of the part(s) of the system under his design and/or control.

NOTE Specifically this means that save in the case that an actor is providing multiple facets of the system and restricted to those under his own duty of care; an automotive manufacturer installing an *eCall system* or any other *in-vehicle equipment provider* is not required to accept any liability for the availability nor operation of the wireless network to the telecommunications operator, nor the routing through the system to the *Public Safety Answering Point* (PSAP) nor the response from the PSAP; a telecommunications operator is not responsible for equipment in the vehicle nor the response

from the PSAP; and the PSAP is not responsible for the performance of equipment in the vehicle or the transmission of the *eCall* to him.

## 7.3 Routing of an eCall

### 7.3.1 General

The in-vehicle *eCall* equipment shall support at least one wireless medium, (in the case of GSM/UMTS circuit switched networks, as defined in ETSI/TS 122 101, ETSI/TS 124 008, ETSI/TS 126 267, ETSI/TS 126 268, ETSI/TS 126 269 [Release 8 or later]) to be suitable for transmission of an *eCall* (the *prime medium*) that is able to sustain both *data* transfer and voice communication.

The IVS responsible for the eCall system shall identify the *eCall* communications with the *eCall* 'flag', (in the case of GSM/UMTS circuit switched networks, as specified in ETSI/TS 124 008 [Release 8 or later]).

### 7.3.2 eCall 'flag'

NOTE The purpose of the *eCall* 'flag' is to enable a serving mobile network, that supports this functionality, to differentiate between speech only emergency calls (in the case of GSM/UMTS circuit switched networks *Teleservice 12)* e.g. 112 / E112, and *eCalls*. Additionally, when supported by the mobile network, the mobile network may also be able to discriminate between manually initiated *eCalls* and automatically initiated *eCalls*.

An *eCall in-Vehicle System*, or other user equipment designed to support *eCall* functionality, shall include in the emergency call set-up information that the present call is either a 'Manually Initiated *eCall*' (MIeC) or an 'Automatically Initiated *eCall*' (AIeC).

This indication is provided by the *eCall* 'flag' as specified, (in the case of GSM/UMTS circuit switched eCall, in ETSI/TS 124 008 [Release 8 or later]).

PLMNs shall make use of the *eCall* 'flag', received in the emergency call set-up, to differentiate *eCalls* from other emergency calls (in the case of GSM/UMTS circuit switched networks, other TS12 calls).

The *eCall* flag may be used to route *eCalls* to a dedicated PSAP operator.

In the case of GSM/UMTS circuit switched networks, the above service requirements are as specified in 3GPP TS 122.101 and a detailed description of the 'Call Set-up Service Category Information Element' can be found in ETSI/TS 124 008 [Release 8 or later].

Although primarily intended to facilitate the filtering and routing of *eCalls* to an operator defined PSAP, MNO systems might also use the *eCall* 'Service Category *identifiers*' for call record/statistical purposes to determine:

— the number and ratio of *eCalls* to TS12 (112/E112, 911, other) emergency calls;

— the number and ratio of manually initiated to automatically initiated *eCalls*;

Even a PLMN which does not yet fully support *eCall* differentiation from a normal emergency call (in the case of GSM/UMTS circuit switched networks, a TS12 call) shall ensure that a call setup from an IVS responsible for the eCall system using an *eCall* flag gets routed to the *most appropriate PSAP* as an emergency call (in the case of GSM/UMTS circuit switched networks, a TS12 call) . This should be ensured even outside of the EU-28.

It may be noted that although an indication of manual or automatic *eCall* initiation is included in the MSD, this information is not used by the mobile network for routing *eCalls* to a particular PSAP, but may be used by the receiving PSAP.

#### 7.3.3 eCall routing to PSAP

The network provider shall route *eCalls* to separate PSAP connections (telephone lines) compared to normal 112 calls, if this is required by individual PSAPs.

In case a single PSAP handles both *eCalls* and 112 calls and if the PSAP uses the Euro ISDN primary rate interface (E1) for 112, the network provider shall ensure that the *eCalls* are always routed to selected E1 channels, if this is required by individual PSAPs.

### 7.4 Prioritisation of an eCall

An *eCall*, whether generated automatically or manually, shall normally be given the highest priority on the use of whatever wireless networks are used by the *eCall in-Vehicle System* for an *eCall transaction*, except where these are required for time-critical active safety messages.

Except in the circumstance described in previous paragraph, in the event of an *eCall* initiation, any communication medium that is supported by the *eCall in-Vehicle System* shall terminate or suspend any other communication session that is in progress and in conflict until the *eCall* is terminated.

### 7.5 Post crash performance of in-vehicle equipment

The automotive manufacturer/equipment supplier shall make best reasonable effort to enable an audio channel to be established so long as the relevant equipment has not been disabled in the crash.

The in-vehicle *eCall* system shall transmit the MSD message, so long as there is an ETSI *prime medium* wireless network available to receive the signal, in all crash tests which are required by regulation for the European type-approval:

NOTE At the time of developing this European Standard, the relevant frontal crash tests are defined in Directive 96/79, amended by Directive 1999/98 (or equivalent ECE R94-01); and lateral crash tests are defined in: Directive 96/27 (or equivalent ECE R95-02).

In cases where it is impracticable or not commercially viable to test using real crash tests, for example after-market devices, equivalent functionality shall be demonstrated.

For these cases, it is recommended to use the test call flag as defined in the appropriate high level application protocol standard. (In the case of GSM/UMTS circuit switched networks, EN 16062:2011, Annex C).

### 7.6 Location and direction

#### 7.6.1 Location data

##### 7.6.1.1 General

The format of the location *data* in the MSD shall be as defined in EN 15722.

##### 7.6.1.2 Vehicle based location data

The *reference point* shall be the last known vehicle's position at the triggering time as determined by the on–board system at the time of message generation. It shall be at the responsibility of the *in-vehicle equipment provider* to determine how the location *data* is established.

In the event that at the time of the MSD generation there are inadequate sources of information to provide a reliable determination of location, the confidence bit shall be set to 'no confidence in position' as determined in EN 15722. In this event, the location *data* element shall contain the manufacturer/equipment supplier best estimate based on available information.

NOTE 1 For example, the last location obtained where there was adequate *data* source available, or a calculation based on that *data* and other information made available to the MSD calculation, for example a dead-reckoning.

The confidence bit shall be set as determined in EN 15722. This flag should only be cleared to 'position can be trusted' if a 2D or 3D position fix from current GNSS reception is available or the manufacturer/equipment supplier has another means of being confident that the information provided is within the limit set by EN 15722.

NOTE 2 In the event that the flag is set to 'no confidence in position' this does not mean that the information is necessarily wrong, only that it can be unreliable or lack precision.

NOTE 3 Satellite technology such as EGNOS may be of assistance to provide and validate a “true’ response (position can be trusted).

#### 7.6.1.3 MNO calculated location

NOTE 1 Because MNOs are already required to comply to Universal Service Directive 2002/22/EC (the so-called E112) they are already required to provide the location of the emergency call (not of the vehicle).

MNOs shall provide the location of the *eCall* made from the affected vehicle using the provisions of the E112 regulations. This provides a second source of location of the affected vehicle.

The MNO system calculated location shall be provided to the PSAP who has been determined by the Member State (and the Member State has advised the MNO) as being the appropriate recipient.

If the MSD location is available and confirmed by the confident bit contained in the MSD as provided by the IVS responsible for the eCall system, the MSD location can be taken in account by the PSAP. If the MSD location is not available or not confirmed by the confidence bit, the MNO system location may be taken in account if available from the network. Resolution of the situation shall be determined at a national level.

NOTE 2 This is information obtained from the network and is in addition to the vehicle calculation of location that is included in the MSD. The accuracy of this *data* will depend on the physical properties of the network carrying the *eCall* message ( for example, a UMTS calculated location will usually be more accurate than a GSM location, whereas a mobile wireless broadband calculation can be less accurate than either). Calculation accuracy is strongly related to the density of base stations, which is a function of the technology design, although other factors affect the accuracy (see note to 6.2.3 above).

### 7.6.2 Data concerning direction and location

Direction shall be as defined in EN 15722.

The requirement to provide *data* in the form prescribed by EN 15722 is an operational requirement; however the means of calculating the direction of travel shall be at the discretion of the *in-vehicle equipment provider*.

The current vehicle heading value shall represent the vehicle’s real direction of travel; random fluctuations of GNSS signals shall not affect the value sent.

NOTE The purpose of providing the direction is to help PSAPs to determine the carriageway vehicle was using at the moment of the incident. GNSS provided direction only may not be sufficient to determine vehicle heading.

### 7.6.3 Optional data regarding location and direction

EN 15722 determines that additional *data* may optionally be provided in the MSD for recent location identifications. In this event the *data concepts* shall be presented as determined in EN 15722.

Manufacturers of *eCall in-vehicle systems* shall ensure that the information provided in the recent location parameters is not sufficient for this information to be used for determining vehicle speed, the means to ensure this are not defined within this European Standard.

EXAMPLE Typical means may be a randomness between which recent location fixes are used, with holding time coordinate information etc.

## 7.7 Minimum Set of Data (MSD)

### 7.7.1 Data within the MSD

The format of the MSD content of the *eCall* message shall be as determined in EN 15722.

Subsequent clauses of this European Standard define the sequence of operations that comprise *eCall*. A key feature of *eCall* is to provide a *Minimum Set of Data* (MSD) to assist a PSAP to respond appropriately.

Where a *data concept* of the MSD is identified as a 'Mandatory' (M) field, a value, as determined in EN 15722, shall always be sent.

Where a *data concept* of the MSD is identified as an 'Optional' (O) field, it is preferred but not required, that a value, as determined in EN 15722, is sent, but this is not mandatory as a general rule for all the countries.

The MSD provides the VIN number of the vehicle, from which, with the assistance of, for example, a VIN decoder, precise detail of aspects of the vehicle model can be obtained. Further information concerning the *data content* of the VIN is available in EN 15722.

In respect of the MSD *data concepts* defined in EN 15722 the following operational requirements shall apply:

### 7.7.2 Optional additional data

At the discretion of the *vehicle manufacturer*/equipment supplier, optional additional *data concepts* may also be provided by the IVS responsible for the eCall system. The presentation of such *data concepts* shall be defined and the *data concept* shall be elaborated as determined in EN 15722.

Where optional additional *data* is provided in addition to the MSD, manufacturers of *eCall in-vehicle equipment* and/or *vehicle manufacturers* shall register such *data concept* definitions in any freely available ITS emergency *data* registry maintained in accordance with EN ISO 24978. Such optional additional *data* shall incorporate tag identification in the beginning of the optional *data* stream which identifies the type and structure of the optional additional *data*.

NOTE 1 It is of course necessary for the PSAP to be able to immediately understand the meaning and limitations of any optional additional *data* provided. Registering the *data concept* with a freely available ITS emergency *data* registry maintained in accordance with EN ISO 24978 means that PSAPS are able to freely download such *data* registry *data* to a local database on a regular and probably automatic basis so that local software can provide an immediate human readable interpretation of the meaning and limitations of the *data concept* when an incident occurs.

The provision of additional *data* over and above the options offered in the MSD (EN 15722) may be possible in some circumstances but is outside the scope of this European Standard. However, it is recommended that for consistency and interoperability the format of all such *data* is made freely available in a *data* registry maintained in accordance with EN ISO 24978.

NOTE 2 Registration of such *data concepts* by *vehicle manufacturers* in a *data* registry maintained in accordance with EN ISO 24978 enables them to quickly make such information available to PSAPs, for example when a new model or model upgrade is launched, without the need to harmonize the *data concept* with competitors, and without the need to work through the necessarily slow process of standardization, and to provide updated and further *data concepts*. It also enables different *data concepts* for different models and different model years, yet retaining immediate comprehension by PSAPs.

NOTE 3 At the time of developing this deliverable such a data registry may be found, for example, at www.esafetydata.com

## 7.8 Modes of operation for automatic triggered eCall

The automatically triggered *eCall* may be set into one of two modes:

a) automatically enabled on vehicle *ignition-on*;

b) permanently disabled at the request of the vehicle owner by maintenance personnel and processes approved by the equipment supplier.

The normal mode of automatic operation shall be that the *eCall* system automatically enables an automatically triggered *eCall* on vehicle *ignition-on*.

See 5.2.3 for requirements in respect of privacy.

## 7.9 In-vehicle 'Human Machine Interface' (HMI) aspects

### 7.9.1 General

As defined within this European Standard, an *eCall* may be triggered automatically or manually. The consequences on the requirements for the vehicle user, differs between these options.

The *eCall in-vehicle system* shall provide clear visual and/or audible information regarding the status of the connection (IVS-MNO-PSAP) when the *eCall* system is automatically or manually activated.

The general provisions of the updated 'European Statement of Principles on Human Machine Interface' shall apply.

NOTE Commission recommendation (2006) 7125 of 22 December 2006 on safe and efficient in-vehicle information and communication systems: update of the European Statement of Principles on Human Machine Interface.

The human machine interface of the *eCall in-vehicle system* shall inform the driver if the *eCall* system on board is not functioning properly.

### 7.9.2 HMI aspects in the case of automatic triggering

In the event of automatic triggering, there is, by definition, no action necessary by the *vehicle occupants* to trigger the event.

### 7.9.3 HMI aspects in the case of a manual triggering

Vehicles shall be equipped with an activation 'emergency call/SOS' means. The design and positioning of these activation means shall be a function of product design and is not defined in this European Standard.

The design of the means to manually trigger an *eCall* shall be such to avoid accidental triggering by *vehicle occupants*. The means by which this is achieved is at the discretion of the *vehicle manufacturer*/equipment supplier.

### 7.9.4 Alerting of initiated eCall (automatically or manually triggered)

Subsequent to the triggering of the event, whether initiated automatically or manually, the *eCall in-Vehicle System* shall wherever practicable alert the *vehicle occupants* that an *eCall* message has been sent and that the system shall attempt to make a direct voice connection with the PSAP. The means by which this alert is made, and the nature of the alerts, shall be a function of product design and it is not defined in this European Standard.

## 7.10 Triggering

### 7.10.1 Automatic eCall triggering strategy

Automatic triggering shall be generated by a signal emanating from one or more sensors or processors within the vehicle to the *eCall in-vehicle equipment*.

EXAMPLE A signal generated by the airbag control module and/or a combination of other sensor *data.* (e.g. gyro, radar, axle load, speed), or 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).

Without specifying the means of achievement, the following general requirements shall be met:

— the triggering of an automatic *eCall system* shall be armed when ignition is ON, and disarmed when ignition is OFF. If an *eCall* is ongoing while ignition is being switched to OFF that call shall not be terminated automatically;

— the automatic *eCall trigger* signal is generated by *in-vehicle equipment* to identify a probable collision. The nature of this device and its operational process shall be at the discretion of the *vehicle manufacturer*/equipment supplier;

— the *eCall* shall be generated to reflect as many different crash types as possible (e.g. front, rear, side crashes). The automatic *eCall trigger* shall be safe, robust, reliable, and designed so as to maximize the number of valid *eCalls* whilst minimizing the number of false *eCalls*, generated by the *eCall generator*.

### 7.10.2 Manual eCall triggering strategy

The availability of the manual triggered *eCall* with ignition off shall be at the discretion of the *vehicle manufacturer*/*eCall in-vehicle equipment provider*.

Initiation of a manual *eCall* trigger signal shall be at the determination of an occupant of the vehicle, in accordance with the equipment provisions provided by *vehicle manufacturer*/equipment supplier.

The *vehicle manufacturer*/equipment supplier shall design and implement reasonable precautions to avoid accidental manual triggering by the *eCall generator*. No specific requirements are determined within this European Standard.

Appropriate education shall be provided in vehicle user manuals or otherwise given to the users on the proper use of the *eCall* system in order to minimize the number of manual calls without emergency content.

### 7.10.3 Manual termination of eCall by vehicle occupants before trigger confirmation

Abandonment of an *eCall* shall only be allowed in the limited situation described in this subclause.

The IVS responsible for the eCall system may allow *vehicle occupants* to abandon a manually initiated *eCall* (in order to cancel an unwanted triggering) before the *eCall* has been activated, but once the *eCall trigger* has been confirmed within the IVS responsible for the eCall system and therefore the *eCall* has been activated, the *eCall transaction* shall not be terminated by the *vehicle occupants*.

In the case of an automatic *eCall*, it shall not be possible for the *eCall transaction* to be terminated by the *vehicle occupants*.

## 7.11 Termination of an in progress eCall

An in progress *eCall* shall not be terminated by the IVS responsible for the eCall system (other than because of expiry of a timer) and shall be terminated only by the PSAP.

In the event of the call being interrupted (other than because of expiry of a timer), the IVS responsible for the eCall system shall try to re-establish the connection. The means by which this is achieved shall be in accordance EN 16062.

## 7.12 Requirements to physical layer

### 7.12.1 Transport protocol

The transport protocol across the wireless communications interface(s) that support the provision of *eCall* shall be in accordance with EN 16062.

### 7.12.2 Performance requirements- time required to transmit data

Assuming the availability of a suitable *wireless communications network*, the transmission of the mandatory elements of the MSD (as defined in EN 15722) shall typically be completed within approximately four seconds, measured from the time when end-to-end connection with the PSAP is established and the synchronization of the in-band modem is completed. (In the case of GSM/UMTS circuit switched networks, the in-band technology is defined by ETSI). Certification and quality assurance of this requirement shall be specified in ETSI communications standards for media used for *eCall,* (in the case of GSM/UMTS circuit switched networks, ETSI/TS 122 101, ETSI/TS 124 008, ETSI/TS 126 267, ETSI/TS 126 268, ETSI/TS 126 269 [Release 8 or later]).

### 7.12.3 End-to-end performance criteria

#### 7.12.3.1 Activation of eCall

An *eCall generation* sequence shall be commenced within one second after the confirmed triggering methods specified in 7.10.1 (automatic) or 7.10.2 (manual).

#### 7.12.3.2 Transmission of activated eCalls

Overall quality of service for the transmission aspects of an *eCall* shall be equal to (or better than) 'mobile telephony service' as determined by ETSI/3GPP.

NOTE In the above recommendation, an 'activated *eCall*' assumes that the *eCall* has been successfully commenced, that an ETSI *prime medium* is available to receive and successfully transport the MSD and voice call, and that the necessary equipment is in good working order and has not been destroyed.

#### 7.12.3.3 Time constraint of eCall transmission

The maximum time that a transmission shall take shall be determined in an appropriate ETSI Standard for that communications medium, (in the case of GSM/UMTS circuit switched networks, ETSI/TS 122 101, ETSI/TS 124 008, ETSI/TS 126 267, ETSI/TS 126 268, ETSI/TS 126 269 [Release 8 or later]), however the requirements of 7.13.2 shall be achieved.

NOTE 1 Shortening the time for response is crucial to achieving high quality processing and response to emergency messages.

NOTE 2 In a wide range of geographical, physical and operational environments, minimum service requirement end-to-end timing requirements are difficult to prescribe. This European Standard does not make such requirement in order to claim compliance.

#### 7.12.3.4 PSAP processing

PSAPs shall process the *eCall* to achieve the requirements of national regulations for emergency call processing.

#### 7.12.4 Performance criteria – Wireless network

The wireless communication network operator shall treat an *eCall* as an emergency call (in the case of GSM/UMTS circuit switched networks a TS12 call) and shall treat the *eCall* with the same priority and reliability as any other emergency message through their core network. Any *wireless communications network* operator providing emergency call support shall provide the same level of support to received *eCalls*.

The MNO shall ensure that the MSD transmission sequence including the acknowledgements (in the case of GSM/UMTS circuit switched networks using the ETSI in-band modem) is robust and reliable across the network.

#### 7.12.5 Performance criteria – PSAP

The operational procedures related to the PSAP operator when receiving an emergency call may differ from country to country, however the requirements shall be defined in national or local regulations. PSAPs shall process *pan-European eCalls* to the same performance requirements as any emergency call. It is up to the responsible authorities to decide what regulations are required.

### 7.13 Establish voice channel

#### 7.13.1 General

The IVS responsible for the eCall system shall attempt to establish a 'hands-free' audio connection between the occupants of the vehicle and the PSAP.

In addition to the sending of the MSD the MNO system shall make best reasonable efforts to maintain a direct audio channel between the vehicle and the PSAP to give opportunity to the PSAP to speak directly with the occupants of the vehicle. (In the case of GSM/UMTS circuit switched networks, a voice channel is established and the data is sent in the voice channel. Later generations of eCall may use other techniques to achieve this objective).

#### 7.13.2 Service area issues

*eCall* shall receive the same service area benefits as any emergency call (in the case of GSM/UMTS circuit switched networks a TS12 call).

#### 7.13.3 Roaming requirements for service

*eCall* shall receive the same roaming benefits as any emergency call (in the case of GSM/UMTS circuit switched networks a TS12 call).

### 7.14 Acknowledgement of eCall

The system that receives the MSD *data* packet directly from the *in-vehicle equipment* shall transmit an acknowledgement to the *eCall generator* specifying that the MSD has been properly received as defined in EN 15722 and the appropriate high level applications protocol standard (in the case of GSM/UMTS circuit switched networks, EN 16062).

NOTE In the case of GSM/UMTS circuit switched networks, the transport layer protocol, is as defined in ETSI/TS 122 101, ETSI/TS 124 008, ETSI/TS 126 267, ETSI/TS 126 268, ETSI/TS 126 269 [Release 8 or later], manages retransmission in the transport layer.

In the event that the transport layer is unsuccessful in its attempts to send the MSD, the transport layer shall advise the application layer and subsequent actions shall be as determined in a higher layer applications protocol standard (in the case of GSM/UMTS circuit switched networks, in EN 16062).

## 7.15 Continuing availability

After the MSD has been sent the IVS responsible for the eCall system shall continue to be available to respond to MSD resend request from the PSAP for the duration of the call.

## 7.16 PSAP response

A PSAP shall take appropriate measures and activate emergency response (not just respond) to a received MSD from an automatic *eCall* even if a two way audio channel cannot be established with the occupants of the vehicle.

Where PSAPs support a *pan-European eCall service* they shall support *eCall* as defined herein.

NOTE This European Standard recognizes that there can be different emergency call (112/E112/*eCall*) service instantiations across different countries.

## 7.17 eCall termination

### 7.17.1 General

The *eCall* comprises both the sending of the MSD and the establishment of a direct voice channel between the PSAP and the occupancy of the vehicle. The PSAP shall determine when the *eCall* is terminated and shall notify the *eCall In-Vehicle System*. Termination shall be indicated as determined in the appropriate high level application protocol standard (in the case of GSM/UMTS circuit switched networks, EN 16062).

### 7.17.2 IVS redial

If an *eCall* voice connection between the IVS responsible for the eCall system and the PSAP is dropped unexpectedly and the IVS responsible for the eCall system has not previously received confirmation from the PSAP that the *eCall* can be terminated, then the IVS responsible for the eCall system may automatically attempt to re-establish a voice call to the PSAP. The number of these reconnection attempts shall be limited, as defined in the appropriate high level application protocol standard. (In the case of GSM/UMTS circuit switched networks, EN 16062).

If an *eCall* has been successfully terminated by the PSAP, then the IVS responsible for the eCall system shall not attempt to reconnect to the PSAP unless a new trigger is received.

### 7.17.3 PSAP call-back

Once the IVS responsible for the eCall system is registered on the network, it shall remain registered for a minimum period of one hour after the *eCall* is terminated or until available power is exhausted, in case the PSAP wishes to reconnect to the vehicle.

NOTE 1 Whether the system is available for recall after ignition is turned off is a system design issue.

If an *eCall* has been successfully terminated by the PSAP, then the IVS responsible for the eCall system shall allow a call-back into the vehicle. Such a call-back after a successfully terminated *eCall* may be treated with lower priority and it is therefore not necessary to block other vehicle functions to allow this. If such a call-back is accepted then other entertainment sources shall be muted to allow a hands-free conversation.

NOTE 2 The user can also manually trigger a new *eCall* if the previous *eCall* has ended (see 7.10.2).

If an *eCall* has terminated abnormally, and permitted retries failed to reconnect, then the IVS responsible for the eCall system shall allow and automatically accept a call-back into the vehicle (from the PSAP) for at least 3 min after the last retry attempt. See also 7.11.

If an *eCall* voice connection to a PSAP drops abnormally for more than 2 min, and the CLI of the vehicle is known, then if the PSAP attempts to call-back to the vehicle it is recommended to do this within one further minute (i.e. within 3 min of the dropped call) in order to maximize the probability of success.

NOTE 3 The delay of 2 min is to avoid conflicts with any automatic redial from the vehicle.

Any automatic redial implementation which may be implemented in the IVS responsible for eCall shall be designed to achieve reconnection as soon as possible, and to have been completed within 2 min in a manner as defined in the appropriate high level application protocol standard. (In the case of GSM/UMTS circuit switched networks, EN 16062).

#### 7.17.4 Record transaction

The IVS responsible for eCall shall register recent *eCalls* in non-volatile memory. The method and means by which this is done, and number of records stored is not specified in this European Standard. The storage of data shall respect European data protection regulations.

## 8 Defences against attack

### 8.1 Call line security

*eCall* is afforded the same level of protection as any 112 call.

ETSI 121 133 provides detail of security provisions on the mobile telephone network and provides guidance to threat management.

*eCall* NAD has a USIM to enable authenticated call set-up.

The threat of call line security is therefore less than that for normal E112 calls.

The window of opportunity is in any event limited to 2 s by the protocols, or in the event of deference to a 112 call, 10 s.

### 8.2 Hoax calls

The threat of hoax calls is a continual problem for PSAPs. However, unlike a hoax voice call the potential hoaxer would have to simulate the protocols and create a false MSD, otherwise the *eCall* will fail, and will transfer to an operator, or the identity of the calling vehicle will be identified, unless, of course the call is generated from a 'faked' USIM.

NOTE The use of an in-band modem makes it more difficult to spoof than a voice call SMS call or standard modem. Security in these respects is therefore significantly better than normal 112 calls.

### 8.3 False generation of eCalls

All user equipment designed to access a PLMN, including *IVS responsible for eCall* NADs, shall have a valid universal subscriber identification module (USIM) and a unique international mobile equipment identity (IMEI).

NOTE 1 in the case of GSM/UMTS circuit switched networks, the IMEI is stored in a tamper proof way on the equipment and not on the USIM, as described in. ETSI/TS 122 016 “Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; International Mobile Equipment Identities (IMEI)” (Release 8 or later).

NOTE 2 In the event that the IVS responsible for eCall malfunctions e.g. generates repeated false *eCalls*, thus causing interference to the mobile network and the PSAP, then a PLMN operator has the capability to deregister the IVS responsible for eCall and deny further access to the network.

### 8.4 End of life management

The NAD's IMEI may also be used for end of life management. The means by which this is achieved is in the hands of the issuing MNO and any national regulations or practices, and is outside the scope of this Standard.

NOTE 1 During the IVS responsible for eCall NAD network registration process, both the USIM's IMSI (subscriber ID) and the IMEI (unique equipment *identifier*/serial number) are authenticated and checked by the network operator. An emergency call from blacklisted *IVS responsible for eCall* IMEI would not normally be accepted by a PLMN that has access to the central PLMN IMEI database.

NOTE 2 It is not in the scope of this document who takes care of the blacklisting / de-registering. It is a subject for national decision.

### 8.5 Denial of service attack

Assuming the use of the *eCall* flag, the call will be directed to the PSAP *eCall* modem, thus minimizing the demand on PSAP audio lines. Denial of service attacks through system overload is therefore much less likely than, for example a direct attack using 112 calls from mobile telephones.

### 8.6 Malicious attack on PSAP

This is a constant risk to PSAPs. The possibility that a malicious caller/terrorist will attempt to lure emergency resources to, or away from, a target is always present. This threat is more probable with a mobile phone 112 call than an *eCall*.

*eCall* could however potentially be used in the same way. The probability of threat to 'fake' the ID of a genuine emergency vehicle is small enough (because of USIM security) that no specific additional provisions are made.

In the event that an MSD is simulated, assuming that the MSD is comprehensible, both the vehicle location from the MSD and the location of the phone cell will be available for comparison.

The faking of an MSD in this circumstance would be more complicated than simply triggering an *eCall* at the designated location, or making a 112 call from this location, so is not seen as a probable event.

However, PSAP procedures for handling such threats are already determined by PSAPs. It is not the intention of this European Standard to propose or suggest such procedures (and ETSI/TS 121 133 is available to provide guidance if needed). However it is important to show that *eCall* does not increase these risks, and indeed carries less risk than an E112 voice call.

## 9 Different requirements for HGVs

No additional specific requirements for HGVs are defined within this version of the European Standard. For an HGV optional additional dataset see FprCEN/TS 16405.

## 10 Different requirements for 2 wheel vehicles

No additional specific requirements for 2 wheeled vehicles are defined within this version of this European Standard.

# 11 Test and conformance requirements

## 11.1 General

Specific conformance requirements shall be the subject of specific aspects of *eCall service* provision and shall be developed by appropriate standards development organizations for that subject area. See CEN/TS 16454. See also Clause 5, 7.3, 7.6, 7.13.

Test and conformance requirements for public wireless network equipment and service shall be defined by reference to the relevant standard(s) for that wireless network, (in the case of GSM/UMTS circuit switched networks, ETSI/TS 122 101, ETSI/TS 124 008, ETSI/TS 126 267, ETSI/TS 126 268, ETSI/TS 126 269 [Release 8 or later]).

Any test and conformance requirements regarding the sequence of operations to effect the *eCall* are defined in any relevant high level application protocol standard for eCall using a specific wireless medium (in the case of GSM/UMTS circuit switched networks, EN 16062).

Any test and conformance requirements regarding the MSD are defined in EN 15722.

Equipment shall generally be provided within the European regulations for self-certification of equipment (Decision no 768/2008/EC of the European Parliament and of the Council on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC).

If technology evolution means that the initial communication equipment provided in the vehicle will no longer be operational, it is required that adequate notice is provided and that where necessary a viable migration path is provided. Network operators, *vehicle manufacturers*, equipment manufacturers, technology providers and regulators are relevant for this process. See also EN 16062.

## 11.2 eCall conformance

In accordance with the provisions of European trading regulations, self-certification shall be used wherever practicable.

## 11.3 In-vehicle equipment conformance

The *in-vehicle equipment* and communication system shall comply with the requirements in the Directives EMC 2004/108/EC and R&TTE 1999/5/EC.

The *eCall in-vehicle equipment* shall conform to the requirements of this European Standard. The *eCall in-Vehicle System* shall aggregate the MSD to conform to EN 15722.

*Vehicle manufacturers* and equipment suppliers shall be responsible for the certification of the *eCall generator* using recognized certification procedures.

NOTE Such procedures are to be found in CEN/TS 16454.

## 11.4 Network conformance

Network operators shall support the *eCall service,* (in the case of GSM/UMTS circuit switched networks, in accordance with ETSI/TS 122 101, ETSI/TS 124 008, ETSI/TS 126 267, ETSI/TS 126 268, ETSI/TS 126 269 [Release 8 or later]).

The network shall conform to the network related requirements of this European Standard.

### 11.5 PSAP conformance

PSAPs shall be responsible for the conformance of their operation to meet the requirements defined herein. PSAP shall be able to receive *eCall* (voice and *data*) and relate to the information therein in line with national standards for operation of the emergency services.

PSAP conformance requirements are defined in EN 16062 and CEN/TS 16454.

### 11.6 Interoperability conformance

Interoperability testing shall be in accordance with ETSI standard(s) developed for this objective (in the case of GSM/UMTS circuit switched networks, ETSI/TS 122 101, ETSI/TS 124 008, ETSI/TS 126 267, ETSI/TS 126 268, ETSI/TS 126 269 [Release 8 or later]).

## 12 Marking, labelling and packaging

No marking, labelling or packaging requirements are determined in this European Standard.

# Bibliography

[1] WGS 84, World Geodetic System 84 (The latest revision is WGS 84 dating from 1984 (last revised in 2004))

[2] Decision no 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC

[3] ETSI/TS 122 003, *Digital cellular communications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Circuit Teleservices supported by a Public Land Mobile Network (PLMN). (Teleservice 12/TC12) /E12) [Release 8]*

[4] ETSI/TS 100 905, *Digital cellular telecommunications system (Phase 2+) (GSM); Teleservices supported by a GSM Public Land Mobile Network (PLMN)*

[5] Directive 96/79/EC of the European Parliament and of the Council of 16 December 1996 on the protection of occupants of motor vehicles in the event of a frontal impact and amending Directive 70/156/EEC

[6] Directive 96/27/EC of the European Parliament and of the Council of 20 May 1996 on the protection of occupants of motor vehicles in the event of a side impact and amending Directive 70/156/EEC

[7] Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive)

[8] ETSI 121 133, *Universal Mobile Telecommunications System (UMTS); 3G security; Security threats and requirements*

[9] Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC Text with EEA relevance

[10] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity

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