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Foreword

This document (TC 278 WI 00278220) has been prepared by Technical Committee CEN/TC 278 “Road traffic and transport telematics”, the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

Introduction

The scale of death and injury on roads in Europe needs to be fully comprehended to understand the need for "Emergency Call " (eCall). There were around 41,600 deaths and more than 1.7 million injured in 2007. 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-27 when fully deployed, and furthermore to reduce the severity of injuries, to bring significant savings to the society in terms of healthcare and other costs 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 prohibit proper communication.

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 a "user instigated or automatic system to provide notification to 'Public Safety Answering Point's (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 (112) services.

Definition of the minimum set of data, the communications media and means of transferring the data are not defined in this European Standard.

This European Standard defines the generic operational requirements for the provision of an 'eCall' service.

The practical provision and operation of eCall service and equipment is dependant on the communications medium being available throughout the lifetime of equipment installed in vehicles.

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 the Mobile Telecommunication network (e.g. GSM) and the European pre-assigned emergency destination address (112), and to provide a means of manually triggering the notification of an incident.

This European Standard defines 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.

Third party eCall supportive services, including private in-vehicle emergency services, are outside the scope of this document.

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

NOTE This European Standard determines 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.

2 Conformance

Test requirements and conformance requirements are described in Clause 12. Conformance procedures will be specified in a separate deliverable and are outside of the scope of this European Standard.

3 Normative references

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

EN 15722 Road transport and traffic telematics, eSafety, 'eCall' Minimum set of data

ISO 24978 Intelligent Transport Systems-ITS safety and emergency messages – Data Registry procedures

WGS84 World Geodetic System 84 (The latest revision is **WGS 84** dating from 1984 (last revised in 2004)

4 Terms and definitions

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

4.1
112
single European emergency call number

4.2
E112

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

4.3
association
data concept; structural relationship

4.4
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

4.5
data
representations of static or dynamic objects in a formalized manner suitable for communication, interpretation, or processing by humans or by machines

4.6
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

4.7
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.

4.8
eCall
automatic or user generated system to provide notification and relevant coordinate information to 'Public Safety Answering Point's, by means of *mobile wireless communications networks* and carries a defined standardised *Minimum Set of Data*, notifying that there has been an incident that requires response from the emergency services and establishes a voice channel between the vehicle and a *'Public Safety Answering Point'* .

4.9
eCall generator
occupant of a vehicle or equipment within a vehicle that has cause to trigger an 'eCall' transaction by automatic or manual means

4.10
eCall service
capability of a vehicle to be an 'eCall' *generator*, triggering of an 'eCall' *transaction*, intent of a PSAP to be an 'eCall' *responder* and provision of that response

4.11
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

4.12
full set of data
set of data in addition to the 'Minimum Set of Data' comprising additional data elements to be commonly agreed. Not yet defined.

4.13
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*

4.14
ignition on
first action taken by a driver to make the car operate

NOTE This may typically be turning a key in an ignition sequence or other methods of vehicle operation as specified by vehicle manufacturer

4.15
in-vehicle equipment
equipment within the vehicle that provides or has access to in-vehicle data required for the *minimum set of data* and any other data that is to be sent as part of or complementary to the *minimum set of data* to effect the 'eCall' *transaction* via a *public mobile wireless communications network* providing a link between the vehicle and a means of enacting the 'eCall' *service* via a *public mobile wireless communications network*

4.16
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 for a vehicle in order to effect the 'eCall' service

NOTE the in-vehicle equipment provider may be the vehicle manufacturer or the provider of aftermarket equipment that is given access to MSD data by the vehicle manufacturer

4.17
in-vehicle system
in-vehicle equipment together with the means to trigger, manage and effect the eCall transaction

4.18
minimum set of data
standardised *data concept* comprising *data elements* of relevant vehicle generated data essential for the performance of the 'eCall' *service*

4.19
mobile wireless communications network
wireless communications network with homogeneous handover between *network access points*

4.20
mobile wireless communications network device
device providing communications to a *mobile wireless communications network* with homogeneous handover between *network access points*

4.21
network access device
see *mobile wireless communications network device*

4.22
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 a network access point may or may not provide homogeneous or heterogeneous handover to another network access point

4.23
prime medium
wireless medium defined in an ETSI Standard to be suitable for transmission of an 'eCall' *transaction*

4.24
public mobile wireless communications network
mobile wireless communications network with access to a public telecommunications network

4.25
'Public Safety Answering Point' (PSAP)
Physical location where emergency calls are first received under the responsibility of a public authority or a private organisation recognised by the government.

NOTE A 'first level PSAP' is the first assistance point of contact for an 'eCall'. A number of different instantiations of PSAP service are supported within this European Standard

4.26
service provider
physical and functional component responsible for providing telematics based services to its subscribers

4.27
third party eCall supportive services
emergency and other support services operated by third party service providers that are complementary to or different from eCall

4.28
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

4.29
vehicle occupant(s)
person(s) inside the vehicle

4.30
wireless communications network
network operating using an air-interface capable of bi-directional transfer of data and or voice

NOTE there are different types of wireless communications such as *PAN, LAN, cellular network* etc.

5 Symbols and abbreviations

5.1
EC
European Commission

5.2
GIS
geographic information system

5.3
GNSS
global navigation satellite system

5.4
GSM
global system for mobile communications

5.5
HGV
Heavy Goods Vehicle

5.6
HMI
human machine interface

5.7
LAN
local area network (e.g. WiFi)

5.8
MSD
minimum set of data

5.9
MNO
mobile network operator

5.10
NAD
network access device (e.g. a GSM or UMTS module)

5.11
PAN
personal area network (e.g. Bluetooth, Zigbee)

5.12
PSAP
'Public Safety Answering Point'

5.13
UMTS
universal mobile telecommunication service

5.14
WGS
world geodetic system

5.15
WGS84
world geodetic system ;issue 1984 (last revised 2004)

6 Requirements

The requirements for compliance with this European Standard are defined in Clauses 6 through to and including Clause 12.

7 High level functional requirements

7.1 General high level functional requirements

The high level functional requirements of the in-vehicle system are as follows:

- The in-vehicle system unit shall be a network access device (NAD, e.g. a GSM module)
- The 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 given mobile network operator (MNO) with the European pre-assigned destination address 112.
- The 'eCall' system shall also try to establish a voice connection between the vehicle and that pre-assigned destination address (e.g. a 'Public Safety Answering Point' (PSAP) with 112)

7.1.1 Interfaces

This European Standard does not specify whether eCall is provided using embedded equipment or using nomadic or portable equipment, but requires only the following:

- that the communications equipment is capable of supporting eCall;
- is robust and will normally survive a crash (as defined elsewhere within this document);
- that the quality of service of the in-vehicle equipment, including communications equipment, is reliable
- meets the specification of the operating requirements of the ETSI communications Standard under which it operates and quality of service requirements defined in this document, and (at a later date) in EN XXXXX Quality of Service Requirements for eCall and Emergency Support Services;

7.1.2 eCall architecture

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

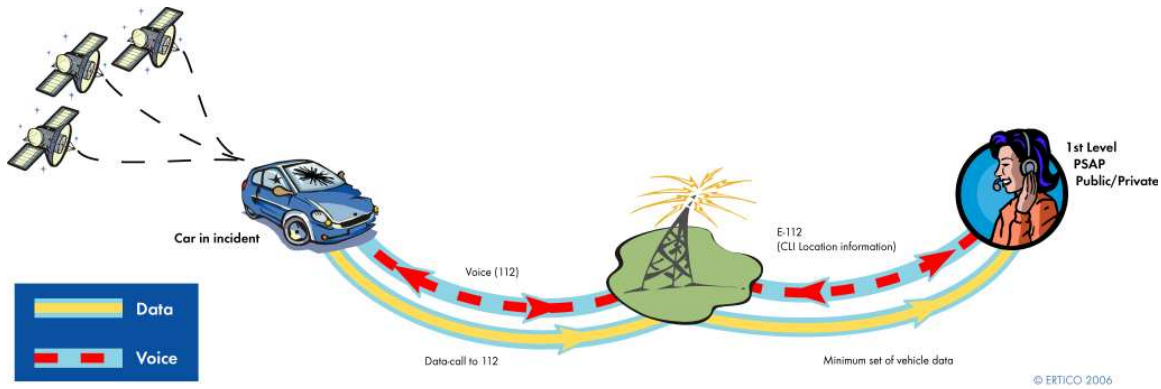

Figure 1: 'eCall' system overview
(Source: Driving Group 'eCall')

7.1.3 eCall operation sequence

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

7.1.3.1 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:

- the minimum set of data (MSD), and
- a voice (audio) telephone call based on 112

7.1.3.2 The 'eCall' carried through the wireless communications network, is recognized by the wireless communications network operator (MNO) as a 112 emergency call. Optionally the MNO may make use of an eCall indicator, received in the emergency call set-up, to differentiate eCalls from other 112 calls. eCall indicators may be used to filter or route eCalls to a dedicated PSAP.

7.1.3.3 The wireless communications network operator (MNO) shall treat the 'eCall' as any other E112 call, and shall include caller line identification and caller location information.

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

7.1.3.4 The wireless communications network operator (MNO) shall establish the 112 call and transmit the MSD to the appropriate PSAP, according to national regulation.

7.1.3.5 The PSAP transmits an acknowledgement to the 'eCall' Generator specifying that the MSD has been properly received. The detail of how this is achieved, and consequent responses, shall be determined in a definition of high level application protocols for eCall.

7.1.3.6 The voice (audio) link is established.

NOTE The exact order of voice establishment / data exchange is defined by the appropriate ETSI standards and the high level application protocols for eCall.

7.2 eCall service chain

eCall involves a number of different stakeholders all with separate responsibilities and tasks, which may overlap. In order to provide a clear understanding of the different aspects of the 'eCall' chain six different domains can be identified. This is shown in Figure 2.

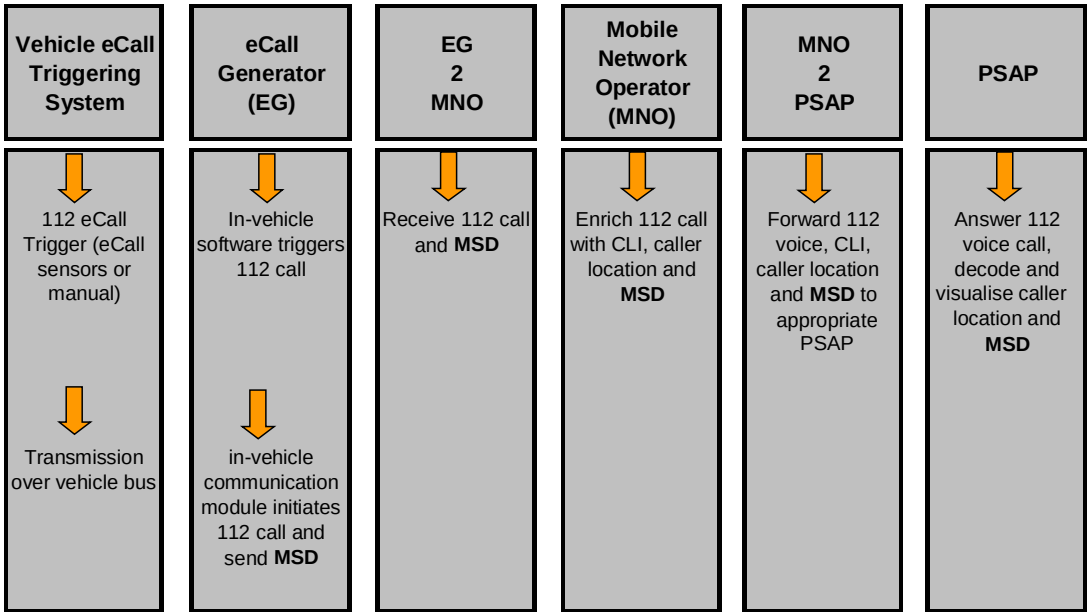

Figure 2: The 6 domains of the 'eCall' service chain
(Source: 'eCall' Driving Group)

7.2.1 Privacy aspects

7.2.1.1 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).

7.2.1.2 All stakeholders involved are obliged to comply with all directives related to the protection of data and the privacy of the citizens in relation to emergency service support.

7.2.1.3 Purchasers/lessees/hirees shall be informed by the vendor/lessor/hirer about the existence of the 'eCall' service at the moment of buying/hiring a vehicle, including the information of the data that will be transferred to the PSAP, and in the case of lessees/hirees the contract may include the explicit acceptance of the 'eCall' service by the lesee/hiree.

7.2.1.4 Occupants of the vehicle shall be given an easy method of activation or de-activation of the service at any time. *To be confirmed.

7.2.1.5 The 'eCall' service shall only operate from the point of service demand (manual or automatic 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.

7.2.2 Map accuracy at PSAP

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

PSAP's shall have access to an appropriate Geographic Information Service (GIS) so that the operator can identify the position and heading of the vehicle with a minimum accuracy as defined in EN 15722 for the MSD coordinates.

NOTE It is recommended that the PSAP's Geographical Information Service should also interpret and display the optional "recent positions" of the vehicle to provide the clearest possible understanding of the exact vehicle location (e.g. at complex junctions or bridges).

8 High level operational requirements

8.1 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 'Public Safety Answering Point' (PSAP). 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 'first level PSAP'. A 'first level PSAP' is the first assistance point of contact for an 'eCall'.

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 recognised that instantiations of the PSAP will vary from county 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 defines the minimum generic operational requirements for any 'eCall' service provision.

The objective of these European standardised essential requirements for transmitting data, and where possible, voice, via publicly available wireless networks, 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 (E112)
    - automatic acknowledgement

8.2 Actors in 'eCall' service provision

The principal actors in an 'eCall' system are:

- In-vehicle equipment provider(s) – The in-vehicle equipment provider may be a vehicle manufacturer, an originally equipment supplier, or an aftermarket vehicle equipment provider who is given access to the relevant minimum set of data by the vehicle manufacturer.

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

- Mobile telecommunication network operator (MNO) – provider of a mobile wireless communications network that supports 112/E112 emergency message services

· Public safety answering point (PSAP) –The physical location where the 'eCall' is received under the responsibility of a public authority.. A 'first level PSAP' is the first assistance point of contact for an 'eCall'. A number of different instantiations of PSAP service are supported within this European Standard. A PSAP may be a Public Authority or a private service provider operating under the control of a Public Authority

8.3 Liability

Important caveat: 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 in a vehicle 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.

8.4 Routing of an 'eCall'

The in-vehicle 'eCall' equipment shall support at least one wireless medium defined in an ETSI Standard to be suitable for transmission of an 'eCall' (the prime medium), that is able to sustain both data transfer and voice communication.

In the event of there being multiple wireless networks available to and supported by the in-vehicle equipment for eCall transactions, priority shall be given to transmission using one of the wireless media defined in an ETSI Standard to be suitable for transmission of an 'eCall'.

NOTE In the event that it is not possible to support a voice channel using the prime medium, the in-vehicle equipment may attempt to establish a voice channel communication using any other available and supported wireless medium.

NOTE Although desirable and encouraged it is not a requirement that in-vehicle equipment shall support more than one communications medium. for eCall transactions Although desirable and encouraged it is not a requirement that 'eCall' data is sent on multiple networks. Although desirable and encouraged it is not a requirement that in the event of failure to establish a voice channel via the prime medium any attempt is made to establish a voice link using another network.

JW + BFH will write a new text explaining the eCall Flag mechanism

8.5 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 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 in-vehicle system shall terminate or suspend any other communication session that is in progress and in conflict until the 'eCall' is terminated.

8.6 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 destroyed in the crash.

The in-vehicle eCall system shall transmit the MSD message, so long as there is an ETSI "prime network" available to receive the signal, in the following crash tests defined for the European type-approval:

Frontal crash: Directive 96/79, amended by Directive 1999/98 (or equivalent ECE R94-01)

Lateral crash: Directive 96/27 (or equivalent ECE R95-02)

NOTE In cases where it is impracticable to test using real crash tests, for example after market devices, equivalent functionality shall be demonstrated

NOTE For these cases, it is recommended to use the test call flag as defined in EN 15722

8.7 Location and direction

8.7.1 Location data

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

8.7.1.1 Vehicle based location data

8.7.1.1.1 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 vehicle manufacturer to determine how the location data is established.

8.7.1.1.2 In the event that at the time of the MSD generation there is 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 This may be, 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.

8.7.1.1.3 The confidence bit shall be set as determined in EN15722. 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 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 may be unreliable or lack precision.

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.

8.7.1.2 MNO calculated location

A second source of location of the affected vehicle shall be provided by the wireless communications network operator (MNO) who shall provide the best estimation of the location of the vehicle using best reasonable efforts and calculated from the received signal.

The MNO calculated location shall be sent according to the Universal Service Directive 2002/22/EC to the PSAP who has been determined as the appropriate recipient according to local specification.

If the MSD and the MNO locations are different, resolution on the situation shall be determined at a national level.

NOTE 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 (a 3G calculated location will usually be more accurate than a 2G location, whereas a mobile wireless

broadband calculation may 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 Clause 7.2.2 above)

8.7.2 Direction

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.

8.7.3 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 calculated and reported as determined in EN 15722.

Manufacturers of in-vehicle equipment shall ensure that the information provided is not sufficient for this information to be used for other purposes (e.g. such as speed enforcement, tracing vehicle movements etc.). This may be ensured by a variety of means, at the discretion of the vehicle manufacturer, and the means are not defined within this European Standard.

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

8.8 Minimum set of data (MSD)

8.8.1 MSD Data

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 a '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.

Where no calculated field is provided for an optional data concept, a field of data as determined in EN 15722 shall be sent.

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

8.8.2 Optional Additional data

At the discretion of the vehicle manufacturer/equipment supplier, optional additional data concepts may also be provided as part of the MSD. The format 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 as part of the MSD in a commonly used format, manufacturers of 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 ISO 24978.

NOTE .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 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.

NOTE Registration of such data concepts by vehicle manufacturers in a data registry maintained in accordance with 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 harmonise the data concept with competitors, and without the need to work through the necessarily slow process of Standardisation, 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.

8.9 Full Set of Data

Additional relevant data may be provided, where available, at the discretion of the vehicle manufacturer/equipment supplier in addition to the MSD. Where such additional data is provided to a PSAP it shall be made freely available through a publicly available ITS emergency data registry maintained in accordance with ISO 24978, and preferably in a single instantiation of such a data registry.

8.10 Modes of operation for automatic triggered eCall

The automatically triggered 'eCall' may be operated in one of two modes:

a) Automatically enabled on vehicle ignition-on

b) Manually disabled/enabled by driver.

The normal mode of automatic operation shall be that the 'eCall' system automatically enables an automatically triggered eCall on vehicle ignition-on, however the occupants of the vehicle shall be provided with an option to temporarily disable or enable again the automatic operation of the system at any time during a journey.

At every “ignition on” cycle the system shall be enabled automatically. The means by which such options are provided shall be at the discretion of the vehicle manufacturer/eCall in-vehicle equipment provider.

The owner of the vehicle shall be provided with the possibilities to permanently disable the system. The means by which such option is provided shall be at the discretion of the vehicle manufacturer/eCall in-vehicle equipment provider.

NOTE The Article 29 Working Party considers as illegal situations e..g. pressure from car insurance companies or car rental companies to keep the eCall tool activated. A similar obligation might be put on employees using company cars, where a consent to use eCall could be directly or indirectly forced.

8.11 In-vehicle human machine interface (HMI) aspects

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

8.11.1 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.

8.11.2 HMI aspects in the case of manual triggering

8.11.2.1 Vehicles shall be equipped with an activation "112/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.

8.11.2.2 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.

8.11.3 Acknowledgement of initiated 'eCall' (automatically or manually triggered)

Subsequent to the triggering of the event, whether initiated automatically or manually, the in-vehicle system shall wherever possible 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.

8.12 Triggering

8.12.1 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 (à a severe accident has happened), e.g. created in the airbag control module without deployment of an airbag (e.g. rear crash)

8.12.1.1 The system to initiate an automatic 'eCall' trigger signal shall be at the determination of the vehicle manufacturer/equipment supplier.

8.12.1.2 The automatic 'eCall' trigger shall be safe, robust and designed so that to maximise the number of valid 'eCall's whilst minimising the number of false 'eCall's, generated by the 'eCall' generator.

NOTE A later version of this standard may specify upper and lower triggering parameters

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

8.12.1.3 The automatic eCall system shall be armed when ignition is ON, and disarmed when ignition is OFF.

8.12.1.4 If an eCall is ongoing while ignition is being switched to OFF that call shall not be terminated automatically. The system shall disarm only after the eCall has been terminated.

8.12.1.5 The automatic 'eCall' trigger signal is generated by equipment installed in the vehicle 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.

EXAMPLE Examples of a trigger generator may be the airbag control module and/or a combination of other sensor data (e.g. gyro, radar, axel load, speed);

8.12.1.6 The 'eCall' shall be generated to reflect as many different crash types as possible (e.g. front, rear, side and roll crashes);

8.12.1.7 A state chart for automatic activation is shown in Figure 3.

Insert chart when final ETSI solution is available

Figure 3: State chart for automatic activation.

8.12.2 Manual 'eCall' Triggering strategy

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

8.12.2.2 Initiation of an '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.

8.12.2.3 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.

8.12.2.4 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 minimise the number of manual calls without emergency content.

A state chart for manual activation is shown in Figure 4.

Insert chart when final ETSI solution is available

Figure 4: State chart for manual activation.

8.13 Termination of an in progress eCall

8.13.1 An in progress eCall shall not be interrupted and shall be terminated only by the PSAP.

8.13.2 In the event of an interrupted call, the IVS shall try to re-establish an interrupted call. The IVS shall interpret the call as interrupted if an MSD acknowledge has been received (and therefore the PSAP is able to send messages to the IVS), and consequently a call ends before the IVS has received a "terminate allow" message. The means by which this is achieved shall be in accordance with a relevant ETSI standard. The number of reconnection attempts shall be limited as determined in the relevant ETSI standard or if not determined in that standard shall be not greater than 15 attempts and not less than 3 attempts.

The methods to terminate an eCall shall ensure that every eCall can be ended by every PSAP (100% reliability), even in case of back-end system malfunction.

This Clause to be revised (prior to EN ballot), including reference to "terminate allow" message, in collaboration with the development of the work item "high level application protocols".

8.14 Identification of eCall

It is important that a distinction can be made between emergency calls originating from a mobile phone and emergency calls ('eCalls') originating from a vehicle.

All 'eCalls' shall carry an identifier which shall be a "discriminator" as determined in the relevant ETSI standard.

The wireless network shall be able to recognise the eCall discriminator in the call setup message and shall route the call in accordance with national requirements concerning emergency services.

NOTE at the time of preparation of this deliverable the appropriate discriminator is determined in ETSI TS24.008. Implementers of this standard are advised to consult current ETSI eCall interface standards for the appropriate specification

NOTE The main argument behind this requirement is to provide EU States with the possibility to make the PSAP infrastructure as flexible as possible. (e.g. providing the option to retain the existing PSAP structure for 112 and E112 but route 'eCall' to a different location)

8.15 Requirements to physical layer

8.15.1 Transport Protocol

The transport protocol across the wireless communications interface(s) that support the provision of 'eCall' shall be as defined by specific ETSI Standard(s).

8.15.2 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 operator is established.

Certification and quality assurance of this requirement shall be specified in ETSI communications standards for media used for 'eCall'.

8.15.3 End-to-end performance criteria

8.15.3.1 Activation of 'eCall'

An 'eCall' generation sequence shall be commenced within one second after the confirmed triggering methods specified in Clause 8.12.1 (automatic) or Clause 8.12.2 (manual).

8.15.3.2 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 The eSafety Forum has determined that, in respect of the end-to-end successful transmission of an eCall MSD to the PSAP, it should be expected that:

By 2010 – at least 85% of all activated 'eCall's shall successfully reach the PSAP

By 2015 – at least 89% of all activated 'eCall's shall successfully reach the PSAP

By 2020 – at least 92% of all activated 'eCall's shall successfully reach the PSAP

NOTE In the above recommendation, an “activated eCall” assumes that the eCall has been successfully commenced, that an ETSI "prime network" 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. An automatically triggered eCall shall be deemed to have successfully reached the PSAP if the MSD is available, even if 2-way audio is not possible

8.15.3.3 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, however the requirements of Clause 8.15.2 shall be achieved.

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

NOTE 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. Subsequent conformance standards may make such provision, and may provide different performance requirements for different environments

8.15.3.4 PSAP processing

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

8.15.4 Performance criteria – Wireless network

The wireless communication network operator shall treat an 'eCall' as an E112 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 E112 support shall provide the same level of support to received 'eCall's.

8.15.5 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 regulations. PSAPs shall process 'Pan-European eCalls' to the same performance requirements as any 112/E112 call.

NOTE The driving group 'eCall' recommends that 99% of all received calls actually received by PSAPs shall be successfully handled by the PSAP.

8.16 Establish voice channel

In addition to the sending of the MSD the MNO shall make best reasonable efforts to establish a voice (audio) channel link between the vehicle and the PSAP.

8.16.1 Follow-up procedures (e.g. call the vehicle)

The PSAP shall be able to call the vehicle after it terminated the 'eCall'.

NOTE The user can also manually trigger a new eCall if the previous eCall has ended (see Clause 8.12.2)

8.16.2 Linguistic aspects

eCall shall receive the same linguistic benefits as any 112/E112 call.

8.16.3 Coverage issues

eCall shall receive the same coverage benefits as any 112/E112 call.

8.16.4 Roaming requirements for service

eCall shall receive the same roaming benefits as any 112/E112 call.

8.17 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.

NOTE The transport layer protocol as defined in the relevant ETSI standard 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 CEN xxxxx high level application protocol.

8.18 Continuing availability

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

8.19 PSAP structure

Where PSAPs support an 'eCall' service they shall support 'eCall' as defined herein.

NOTE This European Standard recognizes that there may be different 112/E112/'eCall' service instantiations across different countries.

8.20 eCall termination

The eCall comprises both the sending 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 in-vehicle system. Termination shall be indicated by sending/receipt of the data string. This termination message shall be sent using ASN.1 packed encoding rules "ISO8825-2 ASN.1 encoding rules, specification of packed encoding rules (PER)" a form consistent with definition in ISO15722. Figure xx shows the semantic and ASN.1PER definition for eCall transaction termination.

8.20.1 PSAP call back

If an eCall voice connection between the IVS and the PSAP is dropped unexpectedly and the IVS has not previously received confirmation from the PSAP that the eCall can be terminated, then the IVS may automatically attempt to re-establish a voice call to the PSAP. The number of these reconnection attempts shall be limited.

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

If the final eCall terminates abnormally (i.e. when no more automatic reconnection attempts will be made) then the IVS shall allow and automatically accept a call-back into the vehicle (from the PSAP) for at least 3 minutes after the final voice call has terminated.

If an eCall has been successfully terminated by the PSAP, then the IVS may optionally 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 an eCall voice connection to a PSAP drops abnormally for more than one minute, and the phone number of the vehicle is known, then the PSAP shall attempt at least one call-back to the vehicle if required within one further minute (i.e. within 2 minutes of the dropped call).

NOTE The delay of one minute is to avoid conflicts with any automatic redial from the vehicle.

9 European statement of principles on human machine interface

9.1 General provisions

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 in-vehicle system shall provide clear visual or audible information regarding the status of the connection (public mobile wireless communications network – vehicle.

10 Different requirements for HGVs

No specific requirements for HGVs are defined within this version of this Standard.

11 Different requirements for 2 wheel vehicles

No specific requirements for 2 wheel vehicles are defined within this version of this Standard.

12 Test and conformance requirements

12.1 General

Specific conformance requirements shall be the subject of specific aspects of 'eCall' service provision and shall be developed by appropriate Standards Development Organisations for that subject area. See also Clauses 2, 8.3, 8.6, 8.15. This Clause provides guidance general to the provision of ITS services.

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.

12.2 eCall Conformance

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

12.3 In-vehicle equipment conformance

The in-vehicle equipment shall conform to the requirements of this standard.

The 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 recognised certification procedures.

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

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

12.4 Network conformance

Network operators shall support the eCall service in accordance with relevant ETSI standard/ technical specification(s).

The network shall conform to the network related requirements of this standard.

As vehicle lives are frequently in excess of 15 years, it is an operational requirement that any communication system defined as suitable for eCall service provision operates throughout the life of the vehicle. 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.

12.5 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.

12.6 Interoperability conformance

Interoperability testing shall be in accordance with ETSI standard(s) developed for this objective.

13 Marking , labelling and packaging

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

14 Declaration of patents and intellectual property

No patent or intellectual property have been declared to affect the provisions of this Standard.

Bibliography