SLOVENSKI STANDARD
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Inteligentni transportni sistemi - e-Varnost - Visokonivojski aplikacijski protokoli za e-Klic z uporabo IMS v paketno preklopnih omrežjih

Intelligent transport systems - eSafety - eCall High level application Protocols (HLAP) using IMS packet switched networks

Intelligente Verkehrssysteme - eSicherheit - Allgemeines eCall Anwendungsprotokoll (HLAP) unter Verwendung von IMS paketvermittelnden Netzwerken

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European foreword

This document (CEN/TS 17184:2018) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

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

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Introduction

An *eCall* is an emergency call generated either automatically via activation of in-vehicle sensors or manually by the vehicle occupants; when activated, to provide notification and relevant location information to the most appropriate Public Safety Answering Points (PSAP), by means of mobile wireless communications networks and 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 PSAP.

EN 15722 specifies a standardized MSD for *eCall*, and EN 16072 specifies pan-European *eCall* operating requirements (for third party systems, EN 16102 specifies third party services supporting *eCall* operating requirements; see EC Communication on *eCall* Implementation 2009 [COM(2009) 434 final] and Official Journal *eCall* Recommendation C_2011_6269, for more information) and EN 16062 specifies High Level Application Protocols for eCall using GSM/UMTS.

The operating requirements for pan-European *eCall* are made using Public Land Mobile Networks (PLMN) (such as GSM and 3G, and latterly LTE/4G/E-UTRAN), as specified in a number of ETSI standards and technical specifications.

In order to provide the *eCall* service across a wireless network, high level application protocols are required as an important essential element to affect this service provision.

NOTE The term PSAP, which is most widely used in the *eCall* documentation, European Commission documents, etc., is used throughout this document and equates to the term emergency call response centre used in the ITS Implementation Directive.

Subsequent to the publication of the suite of eCall standards which support the eCall Regulations, EN 16072, EN 16062 and EN 16454, new communications technologies have become available. Over the course of time, these networks (such as LTE/4G and in turn their successors) are expected to complement and eventually replace the circuit switched GSM/UMTS networks. These technologies use so called 'packet switched' technologies using Internet protocols (IP). Particularly, 3GPP have evolved a communication management system called IMS (Internet protocol Multimedia System) which is suitable to operate over a number of bearer technologies, including LTE/ 4G/E-UTRAN.

In circuit switched networks the eCall is identified as an emergency call and specifically an eCall in the telecircuit switching (TS) process. The long number is not dialled as the TS identifiers inform the MNO that the call is an emergency call/eCall and the MNO has procedures to direct these calls to "the most appropriate" PSAP. Having established a voice channel, GSM/UMTS eCall then mutes microphones and speakers and uses a modem to transfer the Minimum Set of Data (MSD) to the PSAP before opening up the line to enable conversation between the PSAP operator and the occupants of the vehicle.

In a 'packet switched' network, packets of data (including voice) are sent through an internet protocol (IP) communication system, using SIP (Session Initiation Protocol) which is managed, most popularly using IMS.

This document provides High Level Application Protocols (HLAP) for eCall using IMS. It therefore provides the LTE/4G E-UTRAN equivalent of EN 16062 for GSM/UMTS and should be suitable for all/any packet switched networks that support IMS and LTE/ 4G/E-UTRAN wireless access.

This document specifies the protocols to put into effect the pan-European *eCall* operating requirements, and also identifies common elements that can be used in the link between third party services supporting *eCall* and PSAPs.

The European Committee for Standardization (CEN) draws attention to the fact that, while no direct patents are known in express regard to the content of these specifications, the underlying ETSI communications Standards may involve patents and the reader is directed to the referenced ETSI standards in these respects. Similarly, there is a default option to circuit switched eCall in the

specifications below which may involve the use of patents specified in EN 16062, and the reader is directed to EN 16062 in respect of these aspects.

1 Scope

In respect of 112-eCall (pan-European *eCall)* (operating requirements defined in EN 16072), this document defines the high level application protocols, procedures and processes required to provide the *eCall service* via a packet switched wireless communications network using IMS (Internet protocol Multimedia System) and LTE/ 4G/E-UTRAN wireless access.

NOTE 1 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 a PLMN (such as ETSI prime medium) which supports the European harmonized 112/E112 emergency number (TS12 ETSI TS 122 003 or IMS packet switched network) and to provide a means of manually triggering the notification of an emergency incident.

NOTE 2 HLAP requirements for third party services supporting eCall can be found in EN 16102, and have been developed in conjunction with the development of this work item, and are consistent in respect of the interface to the PSAP. This document makes reference to those provisions but does not duplicate them.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 15722:2015, *Intelligent transport systems – ESafety - ECall minimum set of data*

EN 16062, *Intelligent transport systems – ESafety - eCall high level application requirements (HLAP) using GSM/UMTS circuit switched networks*

EN 16072:2015, *Intelligent transport systems – ESafety - Pan-European eCall operating requirements*

EN 16102, *Intelligent transport systems – eCall - Operating requirements for third party support*

EN 16454, *Intelligent transport systems – ESafety - ECall end to end conformance testing*

CEN/TS 17240[1], *Intelligent transport systems – ESafety - ECall end to end conformance testing for IMS packet switched based systems*

ETSI TS 122 003, *Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Circuit Teleservices supported by a Public Land Mobile Network (PLMN) (3GPP TS 22.003)* [version 8.0.0, Release 8, and Release 14]

ETSI TS 122 011, *Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Service accessibility (3GPP TS 22.011)* [Release 14 or later]

ETSI TS 122 071, *Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Location Services (LCS); Service description; Stage 1 (3GPP TS 22.071* [Release 14 or later]

ETSI TS 122 101, *Universal Mobile Telecommunications System (UMTS); LTE; Service aspects; Service principles (3GPP TS 22.101)* [Release 14 or later]

[1] Under preparation. Stage at the time of publication: FprCEN/TS 17240.

ETSI TS 123 122 V14.4.0 (2017-10), *Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Non-Access-Stratum (NAS) functions related to Mobile Station (MS) in idle mode (3GPP TS 23.122 version 14.4.0 Release 14)*

ETSI TS 123 167 V14.5.0 (2017-10), *Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) emergency sessions (3GPP TS 23.167 version 14.5.0 Release 14)*

ETSI TS 123 216, *Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Single Radio Voice Call Continuity (SRVCC); Stage 2 (3GPP TS 23.216)* [Release 14]

ETSI TS 123 401 V14.7.0 (2018-04), *LTE; General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access (3GPP TS 23.401 version 14.7.0 Release 14)*

ETSI TS 124 229 Rel-14 (2018-04), *Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (3GPP TS 24.229 version 14.7.0 Release 14)*

ETSI TS 124 301, *Universal Mobile Telecommunications System (UMTS); LTE; Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3 (3GPP TS 24.301)* [Release 14]

ETSI TS 131 102, *Universal Mobile Telecommunications System (UMTS); LTE; Characteristics of the Universal Subscriber Identity Module (USIM) application (3GPP TS 31.102)* [Release 14]

ETSI TS 133 203, *Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; 3G security; Access security for IP-based services (3GPP TS 33.203)* [Version 8.8.0, Release 8, and Release 14]

ETSI TS 136 331, *LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification (3GPP TS 36.331)* [Release 14]

IETF RFC 8147, *Next-Generation Pan-European eCall*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
112
single European emergency call number supporting Teleservice 12

Note 1 to entry: See ETSI TS 122 003.

3.2
Base Station Controller (BSC) area
area of radio coverage consisting of one or more cells controlled by one BSC

Note 1 to entry: The boundaries of a BSC area and a location area are independent; a location area may span the boundary between BSC area and a BSC area may span the boundary between location areas.

3.3
call clear-down
termination of call and freeing up of line (usually achieved by hanging up the receiver or pressing 'end call' or similar on screen)

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; in packet switched networks, voice is carried in packets of data

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, state, event) considered to be indivisible in a particular context

3.8
E112
emergency communications service using the single European emergency call number, 112, which is enhanced with location information of the calling user

Note 1 to entry: The number is not actually used directly in the communication but sets indicators in the IMS call header that identifies the call as an emergency call of type 'eCall' to the MNO.

3.9
eCall
emergency call generated either automatically via activation of in-vehicle sensors or manually by the *vehicle occupants*

Note 1 to entry: 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* (MSD) 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*.

3.10
eCall generator
occupant of a vehicle or equipment within a vehicle that has cause to trigger an *eCall session* by automatic or manual means

3.11
eCall identifier
flag, marking, element, or bit which is included in the emergency call set-up request message identifying the call request as a manually or automatically initiated eCall, and which may be used by the mobile network to process and route automatically and manually initiated *eCalls* to a designated PSAP

3.12
eCall service
end-to-end emergency service to connect occupants of an affected vehicle to the most appropriate PSAP via an audio link across a PLMN together with the transfer of a minimum set of data to the PSAP

3.13
eCall session
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 an audio channel between the vehicle and the PSAP

3.14
Emergency Call Server (ECS)
functional entity that consists of a Location Retrieval Function (LRF) and either a routing proxy or a redirect server, e.g. an ECS contains a VPC and a Routing Proxy or Redirect Server in NENA I2 architecture

3.15
emergency control centre
unit which deals with emergency calls and which has the capacity to consider professionally the need for response, and which has the provision to mobilise the needed resources to deal with the emergency in question

3.16
emergency call response centre
term used in ITS Implementation Directive to mean Public Safety Answering Point (PSAP)

3.17
identifier
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
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 session* 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

3.19
in-vehicle equipment provider
provider of *eCall* in-vehicle equipment

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

3.20
in-vehicle system (IVS)
in-vehicle equipment together with the means to trigger, manage and effect the *eCall session*

3.21
Location Area (LA)
area in which a mobile station may move freely without updating the VLR

Note 1 to entry: A location area includes one or several GERAN/UTRAN cells.

3.22
minimum set of data
standardized data concept comprising data elements of relevant vehicle generated data essential for the performance of the *eCall* service

Note 1 to entry: See EN 15722.

3.23
mobile wireless communications network
wireless communications network with homogeneous handover between *network access points*

3.24
mobile wireless communications network device
device providing communications to a *mobile wireless communications network* with homogeneous handover between *network access points*

3.25
most appropriate PSAP
destination for eCall defined beforehand by responsible authorities 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 document. A PSAP can be a Public Authority or a private *service provider* operating on behalf of the responsible authorities.

3.26
network access device (NAD)
see *mobile wireless communications network device*

3.27
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 but does not need to provide homogeneous or heterogeneous handover to another network access point.

3.28
public mobile wireless communications network
mobile wireless communications network with access to a public telecommunications network

3.29
Public Safety Answering Point (PSAP)
physical location working on behalf of the national authorities where emergency calls are first received under the responsibility of a public authority or a private organization recognized by the national government

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 document.

3.30
Radio Network Controller (RNC) area
area of radio coverage consisting of one or more cells controlled by one RNC

Note 1 to entry: The boundaries of a RNC area and a location area are independent; a location area may span the boundary between RNC area and a RNC area may span the boundary between location areas.

3.31
Routing Area (RA)
area in which a mobile station, in certain operation modes, may move freely without updating the SGSN

Note 1 to entry: A routing area includes one or several GERAN/UTRAN cells and is always contained within a location area.

3.32
service provider
physical and functional component responsible for providing telematics based services to its subscribers

3.33
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

3.34
vehicle occupant(s)
person(s) inside the vehicle