



BSI Standards Publication

Intelligent transport systems - eSafety

Part 1: Extending eCall to other categories of vehicle

National foreword

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English Version

Intelligent transport systems - eSafety - Part 1: Extending eCall to other categories of vehicle

Intelligente Verkehrssysteme - eSicherheit - Teil 1:
Erweiterter eCall für andere Fahrzeugkategorien

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European foreword

This document (CEN/TR 17249-1:2018) 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.

The present series is composed with the following parts:

- CEN/TR 17249-1, *Intelligent transport systems - eSafety - Part 1: Extending eCall to other categories of vehicle*;
- FprCEN/TS 17249-2, *Intelligent transport systems - eSafety - Part 2: eCall for HGVs and other commercial vehicles*;
- FprCEN/TS 17249-3, *Intelligent transport systems - eSafety - Part 3: eCall for Coaches and buses*;
- FprCEN/TS 17249-4, *Intelligent transport systems - eSafety - Part 4: eCall for UNECE Category T, R, S agricultural/forestry vehicles*;
- FprCEN/TS 17249-5, *Intelligent transport systems - eSafety - Part 5: eCall for UNECE Category L1 and L3 powered two-wheeled vehicles, and*
- FprCEN/TS 17249-6, *Intelligent transport systems - eSafety - Part 6: eCall for UNECE Category L2, L4, L5, L6 and L7 tricycles and quadricycles*.

Introduction

The EU ICT “Rolling Plan” issued each year by DG MOVE has for some years recognized that *eCall*, as currently regulated, services only new model vehicles of Categories M1 and N1 (cars and light vans) and should be extended to cover other categories of vehicles. The 2017 ICT Rolling Plan states:

“Standards for next generation networks are also expected in 2017 for eCall, as well as standards for other users than M1 and N1 vehicles (lightweight vehicles for the carriage of goods or passengers)...”

“ACTION 1 SDOs to develop technical specification and standards for the implementation of eCall in-vehicles of categories other than M1 and N1 and for other user types, taking into account requirements included within type-approval regulation and ongoing activities in this area (pilots, the Connecting Europe Facility (CEF), etc).”

“The next generation of standards on eCall service should take into account future developments in mobile communication networks and the IP environment, in particular LTE and IPv6 networks. Standards for the extension to other vehicles types and services should also be developed — such as heavy duty vehicles, power two wheelers or hazardous goods tracking, and other classes of vulnerable road users, taking into account requirements from type-approval regulation and the results of other initiatives in this area (pilots, the CEF, etc).”

In order to achieve its objectives, the European Commission has funded a CEN Project team, PT 0278 1507, to further this objective:

“This call for experts applies to the preparation of deliverable(s) associated with the following task(s) as defined in the Project Plan:

- A Technical Report discussing the desirability, feasibility and problems associated with eCall for a particular class of road user*
- A Technical Specification of parameters that can provide eCall High Level operating requirements and application protocols to support service for other classes of user...”*

This proposal addresses the EC “Rolling Plan” for ITS implementation in respect of eCall, notably:

“It is also required to analyse the need and develop standards if needed for the extension to other vehicles types and services”

Some of these additional classes are listed in article 12 of the eCall type-approval regulation, “REGULATION (EU) 2015/758 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2015 concerning type-approval requirements for the deployment of the eCall”, while other potential users have not yet been classified

The additional classes of road user included in this proposal include:

- heavy goods vehicles*
- busses and coaches*
- agricultural tractors*
- P2WV (Moped/motorcycle drivers/passengers)*

This document addresses the requirement of the remit to CEN TC278 PT1507 for a “Technical Report discussing the desirability, feasibility and problems associated with eCall for a particular category of road user” and the content of this deliverable is the first of 6 associated documents parts. This Technical Report discusses the desirability, feasibility and problems associated with eCall for the identified additional categories of vehicle and provides the context and base assumption for FprCEN/TS 17249-2,

FprCEN/TS 17249-3, FprCEN/TS 17249-4, FprCEN/TS 17249-5 and FprCEN/TS 17249-6 which provide technical specifications to support eCall for these additional categories of vehicles over both circuit switched and packet switched networks.

1 Scope

This document discusses the desirability, feasibility and problems associated with *eCall* for the following categories of road user:

- a) HGV/commercial vehicles;
- b) coaches and busses;
- c) agricultural and forestry vehicles;
- d) powered 2 wheeled vehicles;
- e) tricycles and quadricycles.

NOTE Regulation issues are outside the scope of this document and the associated Technical Specification (although, where appropriate regulation(s) may reference the requirements of this deliverable).

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 16062:2015, *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*

CEN/TS 16405, *Intelligent transport systems – Ecall - Additional data concept specification for heavy goods vehicles*

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

FprCEN/TS 17184, *Intelligent transport systems – eSafety - eCall High level application Protocols (HLAP) using IMS packet switched networks*

FprCEN/TS 17249-2, *Intelligent transport systems - eSafety - Part 2: eCall for HGVs and other commercial vehicles*

FprCEN/TS 17249-3, *Intelligent transport systems - eSafety - Part 3: eCall for Coaches and buses*

FprCEN/TS 17249-4, Intelligent transport systems - eSafety - Part 4: eCall for UNECE Category T, R, S agricultural/forestry vehicles

FprCEN/TS 17249-5, Intelligent transport systems - eSafety - Part 5: eCall for UNECE Category L1 and L3 powered two-wheeled vehicles

FprCEN/TS 17249-6, Intelligent transport systems - eSafety - Part 6: eCall for UNECE Category L2, L4, L5, L6 and L7 tricycles and quadricycles

ISO 21217:2014, *Intelligent transport systems -- Communications access for land mobiles (CALM) -- Architecture*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16072:2015 and the following 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

[SOURCE: ETSI/TS 122 003]

3.2

112-eCall

'eCall' provided by a 'Teleservice 12' mobile communication network, as defined in EN 16072

3.3

ADR

European Agreement concerning the International Carriage of *dangerous goods* by Road: Accord Européen Relatif Au Transport International Des Marchandises Dangereuses Par Route (ADR)

3.4

agricultural/forestry vehicle

vehicle of category T, R, S

[SOURCE: UNECE ECE/TRANS/WP.29/78/Rev.4]

3.5

bus

coach (UNECE Category M2 & M3) which makes frequent stops with semi-random unplanned Hop-on/hop-off^(3.20) characteristics, with little or no use of seat belts and on which passengers may sit or stand and passenger movement is allowed

3.6

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)

3.7

CAN-BUS

data-bus standard for vehicles, designed to allow microcontrollers and devices to communicate with each other in applications without a host computer

3.8

cellular network

wireless communications network ^(3.53) 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

3.9

coach

vehicle of UNECE categorizations M2 or M3, designed and constructed for the carriage of *passengers*, comprising more than eight seats in addition to the *driver's* seat

3.10

collision

vehicle impacts with another vehicle or object or is impacted by another vehicle or object

3.11

commercial vehicle

mechanically propelled road vehicle (vehicle type N1, N2 or N3) that is of a construction primarily suited for the carriage of goods or burden of any kind (not including people) and travelling on a road laden

Note 1 to entry: This includes vehicles designed or adapted to have a maximum weight exceeding 3 500 t, but explicitly excludes *busses* or other vehicles designed and constructed for the carriage of *passengers* ^(3.37) (i.e. vehicle types M1, M2 or M3).

Note 2 to entry: See also 3.43 - *Regulated Commercial Vehicle*.

3.12

data

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

3.13

data concept

any of a group of data ^(3.12) 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

3.14

dangerous goods (ADR)

Categories of goods carried by road defined by the 'European Agreement concerning the 'International Carriage of Dangerous Goods by Road' (*ADR*) as dangerous; these are characterized as articles or substances which are capable of posing a significant risk to health, safety or to property when transported

3.15 driver

operator in control of the vehicle and managing its movements on the road

3.16 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* (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* (EN 16072)

3.17 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

3.18 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 an audio channel between the vehicle and the PSAP

3.19 equipment

device or *machine* that performs a specific *field* operation

[SOURCE: ISO 11783-1:2017, 3.20, modified – the original Note 1 to entry was deleted.]

3.20 Hop-on/hop-off

random ingress/egress to/from a *bus*, usually at predetermined access points (bus stops)

3.21 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*

3.22 implement

device or *machine* that performs a specific operation and which is normally attached to a *tractor*

[SOURCE: ISO 11783-1:2017, 3.30]

3.23 IMS-112-eCall

Pan-European *eCall* provided using IMS over packet switched cellular wireless networks (e.g. E-UTRAN/LTE, etc.)

3.24

IP-Multimedia Subsystem (IMS)

architectural framework for delivering IP multimedia services

Note 1 to entry: Historically, mobile phones have provided voice call services over a switched-circuit-style network, rather than over an IP packet-switched network.

3.25

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*

3.26

in-vehicle system (IVS)

equipment within the vehicle that manages the *eCall* session and 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*

3.27

ISOBUS

universal protocol for electronic communication between *implements*, *tractors* and computers

3.28

ITS-station

functional entity providing ITS communication and services; comprised of an ITS-s facilities layer, ITS-s networking and transport layer, ITS-s access layer, ITS-s management entity, ITS-s security entity, and ITS-s applications entity providing ITS services

3.29

long distance coach

vehicle of UNECE categorizations M2 or M3, designed and constructed for the carriage of *passengers*, comprising more than eight seats in addition to the *driver's* seat and which is being used for interurban or cross country journeys or tours and does not support *Hop-on/hop-off* stops

3.30

machine

device that uses or applies mechanical power, which has a definite function and which performs a specific kind or kinds of work

[SOURCE: ISO 11783-1:2017, 3.33]

3.31

minimum set of data

standardized *data concept* comprising *data elements* of relevant vehicle generated *data* essential for the performance of the *eCall service* (EN 15722) containing minimum set of data (MSD)

direct, timely *data* content of an *eCall* message to the PSAP operator receiving the emergency call containing information about the location of the incident, providing detail characterizing the vehicle, and potentially sometimes also providing additional *data* that is deemed relevant

3.32**mobile wireless communications network**

wireless communications network ^(3.53) with homogeneous handover between network access points ^(3.34)

3.33**most appropriate PSAP**

PSAP 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* ^(3.47) operating on behalf of the responsible authorities.

3.34**network access point**

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*.

3.35**optional additional data (OAD)**

part of the Minimum Set of Data allocated for additional optional data provided in a format determined in EN 15722

Note 1 to entry: It is an 'optional' additional data field contained within and transmitted as part of the MSD; any additional data element(s) should each consist of two parts:

- a) a relative 'object identifier' (OID) and
- b) the data content.

The following notes are copied from EN 15722 and originally sourced from EN ISO 24978.

Note 2 to entry: Examples: Additional *data* ^(3.12) may contain a reference to an external source of relevant information (such as a phone number, a website URL/URI, etc. where further information may be found, or additional *data* specific to the vehicle or incident (e.g. battery temperature in the case of an electric or hybrid vehicle; number of *roll-overs* ^(3.45); URL/URI to the technical specifications to a particular vehicle model; etc.). *Optional additional data* should not include any *data* concerning or identifying a person (*personal data*) unless the transfer of such *data* has been explicitly and expressly prior instructed and authorized by the person who is identified by the *data* and its provision should in any event only be provided only in accordance with European Union and National privacy regulations pertaining at the time of the transfer of any such *personal data*.

Note 3 to entry: CEN/TC 278/WG 15 or a body nominated by it should allocate an 'Object Identifier' (OID) for each '*Optional additional data* concept'. Within the MSD the '*Optional Additional Data* concept' used should be identified by a 'relative OID', i.e. it will only contain the arcs of the object identifier of the concept starting below the *eCall* MSD '*Optional Additional Data* concept' object identifier. See EN 15722. Additional *data* ^(3.6) should be represented using an ASN.1 representation definition that itself is made available to emergency services/PSAPs.

Note 4 to entry: When sending an MSD containing this additional *data* ^(3.12), using GSM/UMTS (EN 16062), the addition of such *data* shall never cause the total (UPER encoded) MSD message length to exceed the maximum available number of bytes (total message length = 140 bytes).

3.36

Original Equipment Manufacturer (OEM)

entity which first assembles the vehicle and provides *eCall equipment* ^(3.19) as part of its specification and subsequently sells the vehicle directly or via an agent

3.37

passenger

person who is travelling in a *coach* or *bus*, or other vehicle, but who is not driving it or working on it

3.38

passenger list

itemized written sequence of names of persons who are travelling on a specified journey on-board a *coach*, and in some circumstances associated relevant information

3.39

power take-off (PTO)

device which transfers mechanical power from an engine to another piece of equipment, especially on a tractor or similar vehicle

3.40

powered two wheeled vehicle (P2WV)

two-wheeled vehicle with an engine cylinder capacity in the case of a thermic engine not exceeding 50 cm and whatever the means of propulsion a maximum design speed not exceeding 50 km for vehicle categories L₁, or a maximum design speed exceeding 50 km/h for vehicle categories L₃

Note 1 to entry: As defined by UNECE vehicle categories L₁ and L₃.

3.41

prime mover

vehicle with engine, not prepared for carrying load, but to be used for towing trailer(s)

3.42

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, the 'first level' responder to whom an emergency call/*eCall* is directed

Note 1 to entry: See also *most appropriate PSAP* ^(3.33).

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

3.43

public mobile wireless communications network

mobile wireless communications network with access to a public telecommunications network

3.44

regulated commercial vehicle

commercial vehicle transporting goods covered by *ADR* regulations or other regulatory controls imposed by the Administration

3.45**roll-over**

overturning of a vehicle onto its side or upside down

Note 1 to entry: The side and the angle of rotation can be classified.

3.46**run-over**

knock down (a person) with a moving vehicle

3.47**service provider**

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

3.48**shoulder/road shoulder**

emergency stopping lane by the verge of a road or motorway

3.49**tractor**

vehicle that is used to pull farm machinery and to provide the energy needed for machinery connected to it to work

3.50**silent call**

situation where emergency call connection is made but PSAP is unable to make voice contact with the originator of the call

3.51**vehicle engine control**

operational state where full driving operation of the vehicle is possible (e.g. ignition on state for a traditional hydrocarbon powered engine, power on/available for an electric vehicle, engine operation available for a stop/start technology engine, etc.; antonym: engine power off)

3.52**vulnerable road user**

road users which are 'vulnerable' in a number of ways, such as by the amount of protection in traffic (e.g. pedestrians and cyclists) or by the amount of task capability (e.g. the young and the elderly and disabled), do not usually have a protective 'shell', whilst the difference in mass between the colliding opponents is often an important factor (Institute for Road Safety Research)

3.53**wireless communications network**

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

4 Symbols and abbreviations

3G	third generation mobile telecommunication system
ACK	ACKnowledgement
ADR	Accord Européen Relatif Au Transport International Des Marchandises Dangereuses Par Route (<i>dangerous goods</i>)
CAN	Controller Area Network

CAN-BUS	<i>Controller Area Network bus</i>
CEN	Comité Européen de Normalization
CS	circuit switched
EC	European Commission
EN	European Standard
ETSI	European Telecommunications Standards Institute
GSM	Global System Mobile (communications)
HGV	Heavy Goods Vehicle
HLAP	High Level Application Protocols
ICT	Information and Communications Technology
IETF	Internet Engineering Task Force
I_HeERO	Infrastructure_Harmonised <i>eCall</i> EuRopean pilOt
IP	Internet Protocol
IMS	<i>IP-Multimedia Subsystem</i>
ISO	International Standards Organization
ISOBUS	see <i>ISOBUS</i> definition ^(3.27)
ITC	Inland Transport Committee (UNECE)
ITS	Intelligent Transport Systems
IVS	<i>In-vehicle system</i>
LTE	long term evolution (of 3G UMTS access network)
MNO	mobile network operator
MSD	<i>minimum set of data</i> (EN 15722)
NEN	Nederlands Normalizatie-Instituut
OAD	<i>optional additional data</i> (concept)
OEM	<i>Original Equipment Manufacturer</i>
OID	ISO object identifier
P2W/P2WV	<i>powered two wheeler/powered two wheel vehicle</i>
PLMN	public land mobile network
PSAP	<i>Public Safety Answering Point</i>
PTO	<i>power take-off</i>
SDO	standards development organization
TPS	third party service
TPSP	third party service provider
TR	Technical Report
TS	Technical Specification
TS12	Teleservice 12 ETSI/TS 122 003

TS (ii)	teleservice
UMTS	Universal Mobile Telecommunications System
UNECE	United Nations. Economic Commission for Europe
UPER	Unaligned Packed Encoding Rules'
URI	Uniform Resource Indicator
URL	Uniform Resource Locator
WI	work item

5 Recommendations

Recommendation 1507-1: It is recommended that, in order to help future proof *eCall*, EN 15722 is revised so that all of the UNECE principle categories and first level sub-categories of vehicle can be accommodated in the MSD. This will not require any change to the structure of the MSD, and because the ASN.1 definition is ENUM, only requires adding additional references to the ENUM elaboration. See Clause 6 below.

(Examples: Category L3, M1, M2, M3, etc)

Recommendation 1507-2: If additional information concerning the vehicle to that provided in Recommendation 1507-1 is considered useful in a particular use case, it should be provided as part of an additional "Optional Additional Data" concept for that use case.

Recommendation 1507-3: PT1507 recommends that all future *eCall* standards, and particularly within its remit, new additional categories of vehicle that have the benefit of *eCall*, should be primarily based on the IMS communication subsystem. Specifically, the Standards deliverables to be produced by PT1507 should use packet switched *IMS-eCall* as their prime medium, defaulting to CS *eCall* as specified in 3GPP release 14 where IMS is not available.

Recommendation 1507-4: PT1507 recommends that PSAPs should adapt *eCall* receiving systems to accommodate and handle *IMS-112-eCall* at the earliest opportunity, because this will provide better alignment and call forwarding capabilities and will lessen delay time in receiving *eCall* MSD data, and will increase the ease and flexibility of call forwarding.

Recommendation 1507-5: It is recommended that 5 linked TS (one for each additional category of vehicle) are developed and approved. Thus the structure will be:

CEN/TR 17249-1, ITS – eSafety- Extending *eCall* to additional categories of vehicle

FprCEN/TS 17249-2, ITS – eSafety- *eCall* for HGV/commercial vehicles (UNECE Categories N1, N2, N3)

FprCEN/TS 17249-3, ITS – eSafety- *eCall* for Coaches and busses (UNECE Categories M1, M2, M3)

FprCEN/TS 17249-4, ITS – eSafety- *eCall* for Agricultural and forestry vehicles (UNECE Categories T,R,S)

FprCEN/TS 17249-5, ITS – eSafety- *eCall* for Powered 2 Wheeled vehicles (UNECE Categories L1, L3)

FprCEN/TS 17249-6, ITS – eSafety- *eCall* for Tricycles and Quadricycles (UNECE Categories L2, L4, L5, L6, L7)

Recommendation 1507-6: A common approach is recommended for widening *eCall* support for HGVs, *coaches / busses*, agricultural/forestry vehicles, and a similar but not identical approach is recommended for *eCall* vehicle based systems for P2WVs, tricycles and quadricycles.

Recommendation 1507-7: There is a base assumption, that, in line with EN 16072, all *eCall* equipped vehicles have a means for both automatic and manual *eCall* triggering. **It is recommended that** manufacturers of *agricultural/forestry vehicles* additionally provide a manual *eCall* trigger device (button/switch voice activated device etc., to the vehicle manufacturers design and discretion) *within*

easy reach of any PTO potential contact point, and that in the case of major connected *equipment* (such as log handler or processor, muck spreader, attached harvester, etc.) either provide a stand-alone *eCall* IVS with manual trigger, or provide data via the CAN bus to the *agricultural/forestry vehicle* that enables an *eCall* triggering to be reported to and cause an *eCall* triggering event in the vehicle *eCall* IVS.

Recommendation 1507-8: It is recommended that agricultural vehicle manufacturers, and particularly *tractor* manufacturers, install *equipment* to disable the vehicle from being driven (as opposed to operated) if there is no vehicle operator detected present on the *driver's* seat.

Recommendation 1507-9: *IMS-112-eCall* can provide *eCall* via satellite communications. **It is recommended** that resources are provided to develop and approve a separate Technical Specification specifically to support *eCall* using satellite communications.

Recommendation 1507-10: Aftermarket *eCall* will be particularly significant in the years 2018-2032. **It is recommended that** resources are provided to develop and approve Technical Specification specifically to support aftermarket *eCall* with variants for all of the supported categories of vehicle covered by OEM *eCall*. Further, real design work and practical *in situ* testing is required and a regulatory framework will be required.

Recommendation 1507-11: It is recommended that the practicality and benefit of equipping trailers with *eCall* capabilities is revisited within the 2020 –2025 timespan, after there has been some rollout of *eCall* for commercial vehicles, and the powering of such devices may be in a different paradigm.

Recommendation 1507-12: It is recommended that, until a new 3GPP Release removes the 140 byte length limit from IMS *eCall*, any referenced site address in the MSD should be a URI unless the referenced URL is below 30 characters.

Recommendation 1507-13: It is recommended that the ongoing reliability of operation of OEM fitted *eCall* systems should be ensured through periodic inspection testing.

Recommendation 1507-14: It is recommended that a project or project team is supported to consider the benefit and viability of further extending *eCall* to other classes of *vulnerable road users*, persons with identified risk medical conditions, cyclists, defibrillators, other medical and emergency equipment.

Recommendation 1507-15: It is recommended that in addition to extending the benefits of *eCall* to UNECE Category L1 and L3 road users, a Technical Specification is developed for powered tricycles and quadricycles (UNECE categories L2, L4, L5, L6, L7).

Recommendation 1507-16: It is recommended that the Technical Specification recommended in Recommendation 1507-15 is extended to include the benefit of *eCall* for *vulnerable road users* using mobility scooters.

Recommendation 1507-17: It is recommended that CEN/TC 278/WG 15, in its planned revision of EN 15722, amend the text to enable an MSD of more than 140 bytes when sent using IMS

Recommendation 1507-18: It is recommended that CEN TC278 WG15 issue a Liaison Statement to 3GPP and ETSI requesting that in the next Release of 3GPP protocols remove the 140 byte limitation of the MSD transmitted in the SIP header when the MSD is transmitted using IMS.

Recommendation 1507-19

Where the 140 byte length limit applies (for CS *eCall*, and IMS *eCall* before Release 15 hopefully removes the length restriction for IMS-*eCall*), it is recommended to remain with the current CEN/TS 16405 Schema A and Schema B data concepts.

Recommendation 1507-20

When the 140 byte MSD length restriction in 3GPP Release 14 is removed, it is recommended a new Schema C (Schema A with some additional vehicle data) without MSD data length limitation, and a Schema D (Schema B with some additional vehicle data) and without the URI/URL length restriction, for vehicles using IMS-*eCall*, are an option that may be presented by the IVS.

Recommendation 1507-21

Within the limits of recommendations 1507-19 and 1507-20, OEMs are recommended to provide Schema C or D data wherever possible.

6 Categories of vehicles**6.1 Context**

The regulatory framework for vehicles in Europe are enshrined in UNECE Regulations.

These Regulations provide specification and information on the legal texts under the framework of the 1958 UNECE Agreement (UN Regulations, Rules and specific requirements) applicable in the vehicle design, aiming the improvement of safety and the protection of the environment.

The scope of this UNECE Regulation is much wider than, but includes the formal categorization of vehicles. The document is not consistently structured, but it provides the only common vehicle categorization applicable within Europe, not the least for the reason that it is the basis for type approval regulations and the Regulations for categories of vehicles within Europe. This report therefore follows consistently to its structure, although this rather complicates the extension of eCall to additional categories of vehicles.

UNECE R.E.3 Revision 4 indicates the scope of the UN Regulation(s) and Rule(s). The bulk of the specification contains the main requirements for the construction of vehicles so far established and already included into UN Regulation(s) and Rule(s) by the World Forum. The document includes recommendations on matters such as market fuel quality and design principles for control systems of Advanced Driver Assistance Systems (ADAS). Section 2 is headed "Categorisation of power-driven vehicles and trailers".

The categories are as follows, they are cited in the sequence that they appear in the UNECE regulation:

Category L – Motor vehicles with less than four wheels

Category M - Power-driven vehicles having at least four wheels and used for the carriage of passengers

Category N - Power-driven vehicles having at least four wheels and used for the carriage of goods

Category O - Trailers (including semi-trailers)

Category T - Agricultural or forestry wheeled or tracked vehicle having at least two axles

Category R - Agricultural or forestry trailer

Category S - Interchangeable towed equipment (agricultural or forestry)

Category G - Off-road vehicles

Figure 1 provides visual examples of the UNECE vehicle categories.

L				
L				
M				
N & N+O				
O				
T				
R				
S				
G				

Figure 1 — Examples of vehicle categories (Source: CSi library)

6.2 Category L – Motor vehicles with less than four wheels

NOTE 1 This category of vehicles is more commonly described as “powered two wheel vehicles” (PTW or P2WV).

NOTE 2 However, this UNECE categorization includes tricycles and also quadricycles (L7) (which, by definition, have four wheels).

The UNECE categories for Category L are subdivided as:

6.2.1 “Category L1”:

(UNECE s2.1.1) A two-wheeled vehicle with an engine cylinder capacity in the case of a thermic engine not exceeding 50 cm³ and whatever the means of propulsion a maximum design speed not exceeding 50 km/h

6.2.2 “Category L2”:

(UNECE s2.1.2) A three-wheeled vehicle of any wheel arrangement with an engine cylinder capacity in the case of a thermic engine not exceeding 50 cm³ and whatever the means of propulsion a maximum design speed not exceeding 50 km/h

6.2.3 “Category L3”:

(UNECE s2.1.3) A two-wheeled vehicle with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm³ or whatever the means of propulsion a maximum design speed exceeding 50 km/h

6.2.4 “Category L4”:

(UNECE s2.1.4) A vehicle with three wheels asymmetrically arranged in relation to the longitudinal median plane with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm³ or whatever the means of propulsion a maximum design speed exceeding 50 km/h (motor cycles with sidecars).

6.2.5 “Category L5”:

(UNECE s2.1.5) A vehicle with three wheels symmetrically arranged in relation to the longitudinal median plane with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm³ or whatever the means of propulsion a maximum design speed exceeding 50 km/h.

6.2.6 “Category L6”:

(UNECE s2.1.6) A vehicle with four wheels whose unladen mass is not more than 350 kg, not including the mass of the batteries in case of electric vehicles, whose maximum design speed is not more than 45 km/h, and whose engine cylinder capacity does not exceed 50 cm³ for spark (positive) ignition engines, or whose maximum net power output does not exceed 4 kW in the case of other internal combustion engines, or whose maximum continuous rated power does not exceed 4 kW in the case of electric engines.

6.2.7 “Category L7”:

(UNECE s2.1.7) A vehicle with four wheels, other than that classified for the category L6, whose unladen mass is not more than 400 kg (550 kg for vehicles intended for carrying goods), not including the mass of batteries in the case of electric vehicles and whose maximum continuous rated power does not exceed 15 kW.

6.3 Category M - Power-driven vehicles having at least four wheels and used for the carriage of passengers

6.3.1 "Category M1"

NOTE This category of vehicles is more commonly described as "cars".

(UNECE s2.2.1) Vehicles used for the carriage of passengers and comprising not more than eight seats in addition to the driver's seat.

6.3.2 "Category M2"

NOTE This category of vehicles is more commonly described as "small coach" or "people carrier", but also described as "bus" in some use cases.

(UNECE s2.2.2) Vehicles used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass not exceeding 5 t.

6.3.3 "Category M3"

NOTE This category of vehicles is more commonly described as "large coach", but also described as "bus" in some use cases.

(UNECE s2.2.3) Vehicles used for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass exceeding 5 t.

6.3.4 Coach and bus sub-Categorization

6.3.4.1 General

UNECE s2.2.4. Vehicles of categories M2 and M3 belong to:

UNECE s2.2.4.1. For vehicles having a capacity exceeding 22 passengers in addition to the driver, there are three classes of vehicles:

UNECE s2.2.4.1.1. **"Class I"**: Vehicles constructed with areas for standing passengers, to allow frequent passenger movement.

UNECE s2.2.4.1.2. **"Class II"**: Vehicles constructed principally for the carriage of seated passengers, and designed to allow the carriage of standing passengers in the gangway and/or in an area which does not exceed the space provided for two double seats.

UNECE s2.2.4.1.3. **"Class III"**: Vehicles constructed exclusively for the carriage of seated passengers.

UNECE s2.2.4.1.4. A vehicle may be regarded as belonging in more than one class. In such a case it may be approved for each class to which it corresponds.

UNECE s2.2.4.2. For vehicles having a capacity not exceeding 22 passengers in addition to the driver, there are two classes of vehicles:

UNECE s2.2.4.2.1. **"Class A"**: Vehicles designed to carry standing passengers; a vehicle of this class has seats and shall have provisions for standing passengers.

UNECE s2.2.4.2.2. **"Class B"**: Vehicles not designed to carry standing passengers; a vehicle of this class has no provision for standing passengers.

6.3.4.2 Further Class M2-M3 sub-Categorization within UNECE Regulation

The UNECE regulation also provides the following characterizations:

UNECE s2.2.5.1. "Articulated bus or coach" is a vehicle which consists of two or more rigid sections which articulate relative to one another; the passengers compartments of each section intercommunicate so

that passengers can move freely between them; the rigid sections are permanently connected so that they can only be separated by an operation involving facilities which are normally only found in workshop.

UNECE s2.2.5.2. Articulated buses or coaches comprising two or more non-separable but articulated units shall be considered as single vehicles.

UNECE s2.2.5.3. In the case of a towing vehicle designed to be coupled to a semi-trailer (tractor for semi-trailer), the mass to be considered for classifying the vehicle is the mass of the tractor vehicle in running trim, increased by the mass corresponding to the maximum static vertical load transferred to the tractor vehicle by the semi-trailer and, where applicable, by the maximum mass of the tractor vehicle's own load.

UNECE s2.2.5.4. "Mass of a vehicle in running order" means the mass of an unladen vehicle with bodywork, and with coupling device in the case of a towing vehicle, or the mass of the chassis with cab if the manufacturer does not fit the bodywork and/or coupling device, including coolant, oils, 90% of fuel, 100 per cent of other liquids except used waters, tools, spare wheel, driver (75 kg) and, for buses and coaches, the mass of the crew member (75 kg) if there is a crew seat in the vehicle.

6.4 Category N - Power-driven vehicles having at least four wheels and used for the carriage of goods

6.4.1 "Category N1"

(UNECE s2.3.1) Vehicles used for the carriage of goods and having a maximum mass not exceeding 3,5 t.

NOTE This category of vehicles is more commonly described as "vans" or "light commercial vehicles".

6.4.2 "Category N2"

(UNECE s2.3.2) Vehicles used for the carriage of goods and having a maximum mass exceeding 3,5 t but not exceeding 12 t.

NOTE This category of vehicles are more commonly described as "light trucks" or "commercial vehicles". Most vehicles in this category are rigid body structure.

6.4.3 "Category N3"

(UNECE s2.3.3) Vehicles used for the carriage of goods and having a maximum mass exceeding 12 t.

This category of vehicles is more commonly described as "HGVs". Vehicles in this category may be rigid body structure, or may be a *prime mover* ^(3.41) for a semi-trailer. Both types may also tow one or more trailers.

The UNECE regulation also determines that the equipment and installations carried on certain special purpose vehicles (crane vehicles, workshop vehicles, publicity vehicles, etc.) are regarded as being equivalent to goods.

6.5 Category O - Trailers (including semi-trailers)

6.5.1 "Category O1"

(UNECE s2.4.1) Trailers with a maximum mass not exceeding 0,75 t.

6.5.2 "Category O2"

(UNECE s2.4.2) Trailers with a maximum mass exceeding 0,75 t, but not exceeding 3,5 t.

6.5.3 "Category O3"

(UNECE s2.4.3) Trailers with a maximum mass exceeding 3,5 t, but not exceeding 10 t.

6.5.4 “Category O4”

(UNECE s2.4.4) Trailers with a maximum mass exceeding 10 t.

6.5.5 Additional information

(UNECE s2.4.5)

Trailers of categories O₂, O₃ and O₄ are of one of the three following types:

UNECE s2.4.5.1. “Semi-trailer”: A towed vehicle, in which the axle(s) is (are) positioned behind the centre of gravity of the vehicle (when uniformly loaded), and which is equipped with a connecting device permitting horizontal and vertical forces to be transmitted to the towing vehicle. One or more of the axles may be driven by the towing vehicle.

UNECE s2.4.5.2. “Full trailer”: A towed vehicle having at least two axles, and equipped with a towing device which can move vertically (in relation to the trailer) and controls the direction of the front axle(s), but which transmits no significant static load to the towing vehicle. One or more of the axles may be driven by the towing vehicle.

UNECE s2.4.5.3. “Centre-axle trailer”: A towed vehicle, equipped with a towing device which cannot move vertically (in relation to the trailer) and in which the axle(s) is (are) positioned close to the centre of gravity of the vehicle (when uniformly loaded) such that only a small static vertical load, not exceeding 10 per cent of that corresponding to the maximum mass of the trailer or a load of 1,000 daN (whichever is the lesser) is transmitted to the towing vehicle. One or more of the axles may be driven by the towing vehicle.

UNECE s2.5. “Special purpose vehicle”: A vehicle of category M, N or O for conveying passengers or goods and for performing a special function for which special body arrangements and/or equipment are necessary.

UNECE s2.5.1. “Motor caravan”: A special purpose M1 category vehicle constructed to include accommodation space which contains at least the following equipment:

- a) *Seats and table;*
- b) *Sleeping accommodation which may be converted from the seats;*
- c) *Cooking facilities; and*
- d) *Storage facilities.*

This equipment shall be rigidly fixed to the living compartment; however, the table may be designed to be easily removable.

UNECEs 2.5.2. “Armoured vehicle”: Vehicle intended for the protection of conveyed passengers and/or goods and complying with armour plating anti-bullet requirements.

UNECE s2.5.3. “Ambulance”: Motor vehicle of category M intended for the transport of sick or injured people and having special equipment for such purpose.

UNECE s2.5.4. “Hearse”: Motor vehicle intended for the transport of deceased people and having special equipment for such purpose.

6.6 “Category T” motorized, wheeled or tracked agricultural or forestry vehicle

Any motorized, wheeled or tracked agricultural or forestry vehicle having at least two axles and a maximum design speed of not less than 6 km/h, the main function of which lies in its tractive power and which has been especially designed to pull, push, carry and actuate certain interchangeable equipment designed to perform agricultural or forestry work, or to tow agricultural or forestry trailers or

equipment; it may be adapted to carry a load in the context of agricultural or forestry work and/or may be equipped with one or more passenger seats.

6.7 “Category R - Agricultural trailer”

Any agricultural or forestry vehicle intended mainly to be towed by a tractor and intended mainly to carry loads or to process materials and where the ratio of the technically permissible maximum laden mass to the unladen mass of that vehicle is equal to or greater than 3,0.

6.8 “Category S - Interchangeable towed equipment”

Any vehicle used in agriculture or forestry which is designed to be towed by a tractor, changes or adds to its functions, permanently incorporates an implement or is designed to process materials, which may include a load platform designed and constructed to receive any tools and appliances needed for those purposes and to store temporarily any materials produced or needed during work and where the ratio of the technically permissible maximum laden mass to the unladen mass of that vehicle is less than 3,0.

6.9 UNECE s2.7 “Non-road mobile machinery”

Any mobile machine, transportable industrial equipment or vehicle with or without body work, not intended for the use of passenger- or goods-transport on the road, in which an internal combustion engine is installed.

NOTE This separately identified Categorization is not given a category identifier in the UNECE Regulation.

6.10 UNECE s.2.8.2-3 “Category G - off-road vehicles”

Off-road vehicles are considered to be the vehicles of categories M and N satisfying the requirements of this paragraph, checked under the conditions indicated in (UNECE) paragraphs 2.8.2. and 2.8.3.

UNECE s2.8.1.1. Vehicles in category N1 with a maximum mass not exceeding 2 tonnes and vehicles in category M1 are considered to be off-road vehicles if they have:

- a) *At least one front axle and at least one rear axle designed to be driven simultaneously including vehicles where the drive to one axle can be disengaged;*
- b) *At least one differential locking mechanism or at least one mechanism having a similar effect; and*
- c) *If they can climb a 30 per cent gradient calculated for a solo vehicle;*
- d) *In addition, they shall satisfy a least five of the following six requirements:*
 - e) *The approach angle shall be at least 25°;*
 - f) *The departure angle shall be at least 20°;*
 - g) *The ramp angle shall be at least 20°;*
 - h) *The ground clearance under the front axle shall be at least 180 mm;*
 - i) *The ground clearance under the rear axle shall be at least 180 mm;*

The ground clearance between the axles shall be at least 200 mm.

UNECE s 2.8.1.2. Vehicles in category N1 with a maximum mass exceeding 2 tonnes or in category N₂, M₂ or M₃ with a maximum mass not exceeding 12 tonnes are considered to be off-road vehicles either if all

their wheels are designed to be driven simultaneously, including vehicles where the drive to one axle can be disengaged, or if the following three requirements are satisfied:

- j) At least one front axle and at least one rear axle are designed to be driven simultaneously, including vehicles where the drive to one axle can be disengaged;
- k) There is at least one differential locking mechanism or at least one mechanism having a similar effect;
- l) They can climb a 25 % gradient calculated for a solo vehicle.

UNECE s2.8.1.3 Vehicles in category M3 with a maximum mass exceeding 12 tonnes or in category N3 are considered to be off-road either if the wheels are designed to be driven simultaneously, including vehicles where the drive to one axle can be disengaged, or if the following requirements are satisfied:

- m) At least half the wheels are driven;
- n) There is at least one differential locking mechanism or at least one mechanism having a similar effect;
- o) They can climb a 25 % gradient calculated for a solo vehicle;
- p) At least four of the following six requirements are satisfied:
 - (i) The approach angle shall be at least 25°;
 - (ii) The departure angle shall be at least 25°;
 - (iii) The ramp angle shall be at least 25°;
 - (iv) The ground clearance under the front axle shall be at least 250 mm;
 - (v) The ground clearance between the axles shall be at least 300 mm;
 - (vi) The ground clearance under the rear axle shall be at least 250 mm.

6.11 UNECE s.8.4 Combined designation

Symbols M and N may be combined with symbol G. For example, a vehicle of category N1 which is suited for off-road use may be designated as N1G.

6.12 Definition of type of bodywork (only for complete/completed vehicles)

UNECE s2.9 The type of bodywork may be indicated by the following codification:

UNECE s2.9.1. Passenger cars (M1)

UNECE s2.9.1.1 AA Saloon: Standard ISO 3833:1977, term No. 3.1.1.1., but including also vehicles with more than 4 side windows.

UNECE s2.9.1.2. AB Hatchback Saloon (AA) with a hatch at the rear end of the vehicle.

UNECE s2.9.1.3. AC Station Wagon (Estate car) Standard ISO 3833:1977, term No. 3.1.1.4.

UNECE s2.9.1.4. AD Coupé Standard ISO 3833:1977, term No. 3.1.1.5.

UNECE s2.9.1.5. AE Convertible Standard ISO 3833:1977, term No. 3.1.1.6.

UNECE s2.9.1.6. AF Multi-purpose vehicle: Motor vehicle other than those mentioned in AA to AC intended for carrying passengers and their luggage or goods, in a single compartment.

UNECE s 2.9.2. Special purpose vehicles (M1)

UNECE s 2.9.2.1. SA Motor caravan: see paragraph 2.5.1.

UNECE s 2.9.2.2. SB Armoured vehicle: see paragraph 2.5.2.

UNECE s 2.9.2.3. SC Ambulance: see paragraph 2.5.3.

UNECE s 2.9.2.4. SD Hearse: see paragraph 2.5.4.

6.13 PT1507 recommendation re vehicle Categorization

Knowledge of the vehicle category is considered important for PSAPs/emergency centres. But while all information may be considered to be useful, a PSAP/emergency centre shall quickly assess the situation in order to determine the appropriate primary response. Information overload can cloud that decision process. The extracts above are selective, and other categorization and categorization information is specified in the UNECE regulation. (To highlight this example we elected to show the full information given in UNECE s2.1.8.3, but we have otherwise chosen to include only the level of classification relevant to the emergency services in deciding the primary response.)

EXAMPLE For example, it is useful to know if a truck involved in an accident is a small *commercial vehicle* ^(3.11) or an HGV, but how useful is the information that we have provided UNECE s2.8.1.3? It may be technically interesting to know that the affected HGV has “*at least one differential locking mechanism or at least one mechanism having a similar effect and can climb a 25 per cent gradient calculated for a solo vehicle*”, but this information is of little, if any, use to assist the PSAP to provide an appropriate response.

PT1507 is charged only to consider adding *eCall* support to certain additional categories of vehicle, but does not consider this as necessarily an end to expansion of the benefits of the *eCall* service.

Recommendation 1507-1: It is recommended that, in order to help futureproof *eCall*, EN 15722 is revised so that all of the UNECE principle categories and first level sub-categories of vehicle can be accommodated in the MSD. This will not require any change to the structure of the MSD, and as the ASN.1 definition is ENUM, requires only adding additional references to the ENUM elaboration.

(Examples: Category L3, M1, M2, M3, etc)

Recommendation 1507-2: If additional information to that provided in Recommendation 1507-1 is considered useful in a particular use case, it should be provided as part of the OAD for that use case.

7 Evolution of mobile cellular telephone networks

7.1 Context

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 UMTS, and latterly LTE/4G/E-UTRAN), as specified in a number of ETSI standards and technical specifications.