D6.5 Implementation roadmap and guidelines for eCall deployment in Europe

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Terms and abbreviations

TERM	DEFINITION
112	Single European emergency call number 112 (ETSI TS 122 003)
E112	emergency communications service using the single European emergency call number, 112, which is enhanced with location information of the calling user TS12
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 standardised *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*
eCall generator	Occupant of a vehicle or equipment within a vehicle that has cause to trigger an *eCall* transaction by automatic or manual means
eCall Discriminator or Identifier	One of two information element bits (flags) included in the emergency call set-up message that may be used by the mobile network to filter and route automatically and manually initiated *eCalls* to a designated PSAP
eCall Message Handler	Software components that support the optimization of information exchange
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 Public Land Mobile Network together with the transfer of a *minimum set of data* to the PSAP
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
eCall trigger	Signal emanating from within the vehicle to the eCall In-Vehicle Equipment which requests to start an eCall transaction
In Band Modem	The technology to transfer the MSD from the IVS to the PSAP
In-Vehicle Equipment	Equipment within the vehicle that provides or has access to In-Vehicle D*ata* 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*
in-Vehicle System	*In-vehicle equipment* together with the means to trigger, manage and effect the *eCall transaction*
Minimum Set of Data	Standardised *data concept* comprising *data elements* of relevant vehicle generated *data* essential for the performance of the *eCall service* [EN 15722:2011]
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
Network Access Device (NAD)	Device providing communications to a *mobile wireless communications network* with homogeneous handover between *network access points*
Process	The method of operation in any particular stage of development of the material part, component or assembly involved.
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 organisation recognised by the national government
Service Provider	Physical and functional component responsible for providing telematics based services to its subscribers
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
Vehicle occupant(s)	person(s) inside the vehicle

Abbreviations

API	Application Programming Interface
CCFT	Fall-back Timer
CEN	Comité Européen de Normalisation
CIP	Competitiveness and Innovation Framework Programme
DoW	Description of Work
DFT	De-registration Fall-back Timer
EC	European Commission
EN	European Standard
ENT	Ericsson Nikola Tesla
ERC	Emergency Rescue Centre
ETSI	European Telecommunications Standards Institute
EUCARIS	European CAR and driving license Information System
FIA	Fédération Internationale de l'Automobile
GIS	Geographic Information System
GLONASS	Global Navigation Satellite System (Russian GNSS system)
GNSS	Global Navigation Satellite System (Umbrella term)
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HAK	Croatian Automobile Club/Hrvatskiautoklub
HGV	Heavy Goods Vehicle
HW	Hardware
ICT PSP	ICT Policy Support Programme
ICT	Information and Communications Technology
IMS	IP Multimedia Core Network Subsystem
IVS	In-Vehicle System

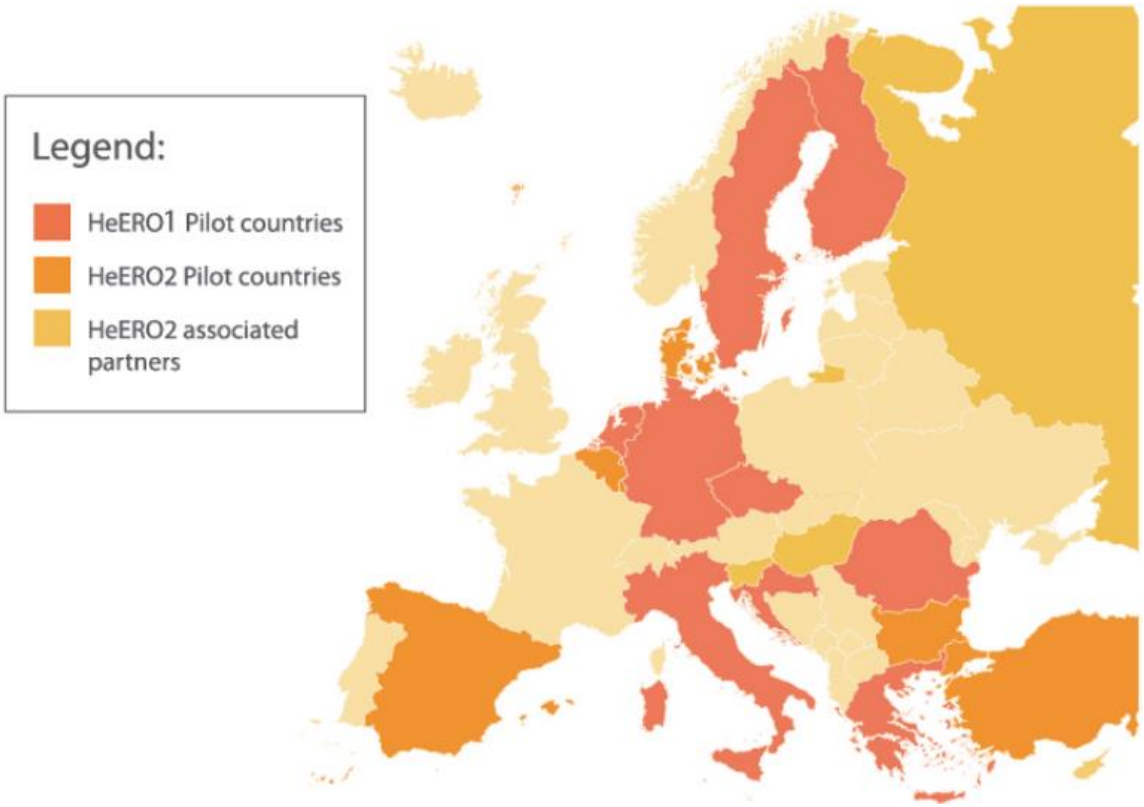
KPI	Key Performance Indicators
LTE	Long Term Evolution (4G mobile network)
MNO	Mobile Network Operator
MS	Member State
MSD	Minimum Set of Data
MCI	Multi Country Inquiry
NAD	Network Access Device
NCP	National Contact Point
OEM	Original Equipment Manufacturer
P-PSAP	Primary Public Safety Answering Points
PSAP	Public Safety Answering Points
PSTN	Public Switched Telephone Network
PTI	Periodical Technical Inspection
RDW	Vehicle registration plates of the Netherlands
SIM	Subscriber Identity Module
SOAP	Simple Object Access Protocol
SW	Software
TCP/IP	Transmission Control Protocol/Internet Protocol
TMC	Traffic Management Centre
TPS	Third Party Services
TPS eCall	Third Party Services supported eCall (definition taken from EN 16102)
TPSP	Third Party Service Provider (definition taken from EN 16102)
UMTS	Universal Mobile Telecommunications System
USIM	Universal Subscriber Identity Module
VDS	Vehicle descriptor section
VIN	Vehicle Identification Number
VIS	Vehicle Indicator Section
VoIP	Voice over Internet Protocol

WMI	World Manufacturer Identifier
WAN	Wireless Area Network
3GPP	Third Generation Partnership Project

1. Introduction

1.1 HeERO2 project

HeERO phase 2 aims to extend the HeERO project to new Member States or other associated countries to demonstrate the scalability of the HeERO solution and to widen the acceptance of eCall. Given the success of the first edition of the project, it looks necessary to open it to other locations and other partners who are willing to contribute to the implementation of the HeERO resulting system or need to improve it. Six new countries participate in the pilot extension: Belgium, Bulgaria, Denmark, Luxemburg, Spain, and Turkey.



1.2 Purpose of the document

Based on the experience gained in HeERO Phase 1 in the different tasks WP2, WP3 and WP4, and on the results obtained in HeERO2, this document is an update and an integration of the contents reported in Deliverable D6.4 Guidelines for eCall deployment in Europe of HeERO1. Specifically, sections and tables of the document will be reported with new information obtained thanks to the work carried out by HeERO2 participants.

Therefore hyperlinks and references to D6.4 of HeERO1 will be included in this document as well as an update of the timeline for the eCall implementation in the HeERO countries. This

will provide a solid foundation to the project that will help Member States to implement eCall as the mandated deployment date approaches.

The aim is to provide guidelines for the eCall implementation that are the result of the continuity, interrelation and integration of the activities carried out during the two project phases and to include aspects related to the new emerging topics (Truck, PTW and retrofit devices), which are part of the focus of HeERO2, along with GNSS issues and to address the identified shortfalls of eCall.

1.3 HeERO Contractual References

HeERO2 is a Pilot type A of the ICT Policy Support Programme (ICT PSP), Competitiveness and Innovation Framework Programme (CIP). The acronym stands for Harmonised eCall European Pilot.

The Grant Agreement number is 325075 and project duration is 24 months, effective from 1 January 2013 until 31 December 2014. It is a contract with the European Commission, DG CONNECT.

The principal EC Project Officer is:

Aude Zimmermann

EUROPEAN COMMISSION
DG CONNECT
Office: BU 31 – 6/35
B - 1049 Brussels
Tel: +32 296 2188
E-mail: Aude.ZIMMERMANN@ec.europa.eu

One other Project Officer will follow the HeERO project:

Dimitrios AXIOTIS

dimitrios.AXIOTIS@ec.europa.eu

Address to which all deliverables and reports have to be sent:

Aude Zimmermann

EUROPEAN COMMISSION
DG CONNECT
BU 31 – 6/35
B - 1049 Brussels
Tel: +32 296 2188

by mail: Aude.ZIMMERMANN@ec.europa.eu

Any communication or request concerning the grant agreement shall identify the grant agreement number, the nature and details of the request or communication and be submitted to the following address:

European Commission
Communications Networks, Content and Technology
B-1049 Brussels
Belgium

by electronic mail: CNECT-ICT-PSP-270906@ec.europa.eu

2. Objectives

2.1 eCall implementation roadmap for Europe

The objective of this deliverable is to create an eCall implementation roadmap for the member states involved in the HeERO 2 project.

To this aim, the actions needed to deploy the eCall in HeERO2 Member States are described following the structure of the roadmap prepared in the context of HeERO1 project. The roadmap includes the aspects related to the implementation of the eCall for truck, dangerous goods tested in Luxembourg, PTW that has been tested in Spain.

Following the structure of D6.4 of HeERO1, the roadmap will update the description of the eCall chain from the IVS to the PSAP. The description of the activities carried out at European level on the new emerging topics are not reported in this document, as they are already present in the D6.2 Barriers and enablers for eCall implementation of HeERO2 Final report.

2.2 Guidelines for eCall deployment

Following the D6.4 of HeERO1, the second objective of this deliverable is to provide new guidelines for the implementation and operation of eCall by updating the list of barriers identified in HeERO1 and indicating whether these have been solved and by presenting the solutions to the barriers for eCall deployment listed in the D6.2 of HeERO2, which include all the aspects related to the emerging topics.

Finally, this document includes a section with the timeline and the description of the procedures for the eCall implementation at Country level: in fact, the expected audience of the guidelines are those stakeholders in Countries intending to implement an eCall system.

3. Methods

3.1 Overview

The methodology to prepare the eCall implementation roadmap and the illustration of the elements that contribute to the preparation of the eCall guidelines and recommendations has been described in chapter 3 of D6.4 of HeERO1. The initial idea was that any participating Country had to implement the eCall in mobile networks and PSAP, to plan the roll-out of the service and related political decisions. This had to be done taking into account questionnaires (filled by Member States leaders), National regulations and all the other documents collected in the previous phases of the HeERO project.

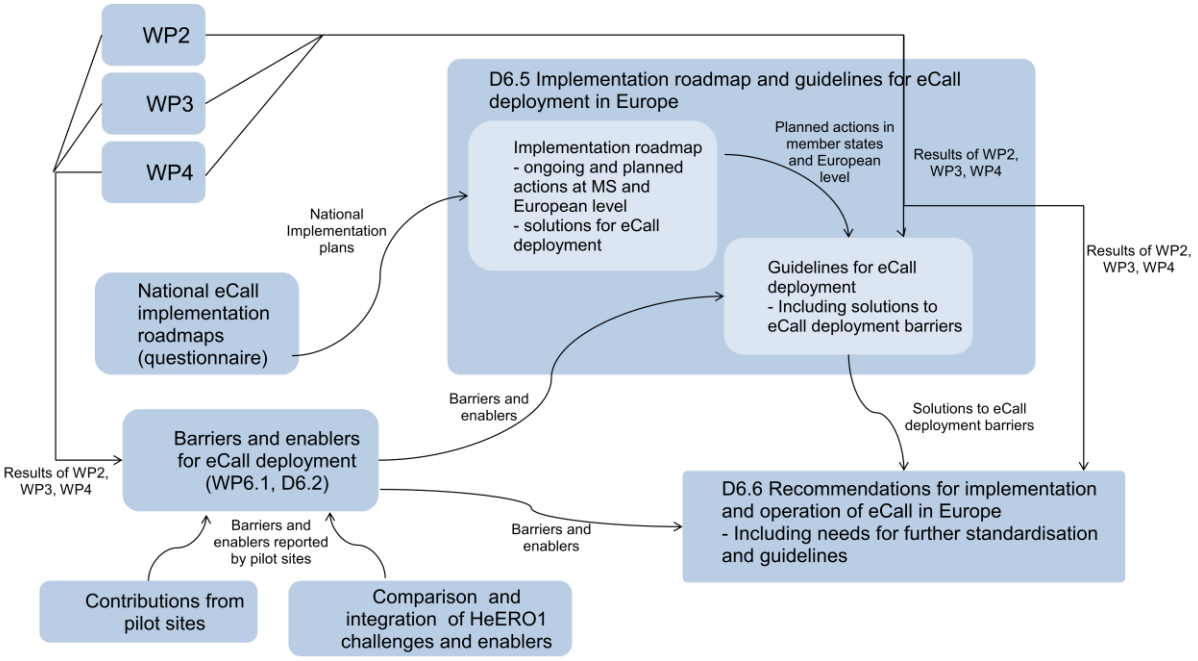


Figure 1: Elements of HeERO2 WP6 (adapted from Figure 2, D6.4 of HeERO Phase 1)

The Figure 1, in which the deliverables and WPs numbers have been updated, is reported above. It represents the updated flows between information collected at the actual date and the final goal that is to provide recommendations for the implementation and operation of eCall in European Countries (D6.6 Recommendations on implementation and operation of eCall).

3.2 eCall implementation roadmap

The eCall roadmap at country and European level has been prepared following the methodology already described in D6.4 (Öörni, 2014). The method consists of a questionnaire posed to the project participants and in the collection of other relevant information on the web. The questionnaire includes sections related to the plan for eCall implementation, and on the status of implementation at PSAP and MNOs level. In particular, the questionnaire asked if a roadmap for the eCall implementation was already present in the country, and if not which could be the activities to carry on to implements it, including main private and public actors involved. It also asked the status of the piloting activities and if any public authority had taken the responsibility for the eCall deployment. Given the answers of the questionnaire, a list of needs have been collected. This information has been integrated with a detailed research of each Country national regulation and other material available. Finally, it was possible to publish a roadmap of all necessary data to provide guidelines to deploy the eCall system.

3.3 Guidelines for eCall deployment

As mentioned above, guidelines for eCall deployment are based on the results of the HeERO phase one project, on the results of the HeERO2 project, which are documented in previous deliverables and presentations, and on other publicly available material on eCall.

The scope of guidelines is to provide an update and to complement the service description for eCall, the description of eCall service chain and of its components (IVS, PSAP and mobile network), which are described in HeERO1. Moreover, the deliverable includes solutions to barriers for eCall deployment identified during the project duration by taking into account the contents of HeERO2 D6.2. In fact, partners have been asked to provide updates of their National pilot projects: some barriers have been solved and other was not solved. In any case, comments and further observations have been given. This will be useful for the next implementation phase.

Finally, a summary of the guidelines is provided with a list of documents and web sites with further information on eCall. In the following chapters the barriers which have been encountered by the HeERO2 pilot sites and the barriers which are most likely to be encountered during the implementation and operation of eCall are described in detail.

In particular, guidelines for implementation and operation of the eCall are given in Chapter 4, where the technical, administrative and financial issues are analysed. Emerging topics are showed in Chapter 5; the Europe-specific cases are explained in Chapter 6, while Chapter 7

focuses on the issues connected to the EUCARIS system. Chapter 8 provides a summary of the eCall implementation roadmap and of the final guidelines.

In practice, this document provides a summary of solutions to barriers for eCall deployment. The summary of barriers and the related solutions mentioned in the guidelines takes into account also the contents of HeERO2 deliverable D6.1 (Brizzolara and Hadjidimitriou 2013) and its final version D6.2.

The guidelines describe the most significant barriers which have been encountered by the HeERO2 pilot sites and the barriers which are most likely to be encountered during the implementation and operation of eCall.

4. Guidelines for eCall implementation and operation

4.1 eCall Service key actors and stakeholders

EU Commission (DG Move & Connect) & EU Parliament

European Commission has adopted several measures to ensure eCall deployment by 2017. These measures have been voluntary in the beginning, but they are currently being implemented as regulatory measures. They address the upgrading of emergency call response centres to receive and process 112 eCalls, including calls from vehicles registered in any EU country and vehicle type approval measures. The Commission's aim is to have a fully functional eCall service in place all over the European Union and other European countries such as Iceland, Norway and Switzerland. The commission works in cooperation with Russia in matter related to in-vehicle emergency call services. Also the European parliament supports the aim to have eCall operational in 2017.

Standardization bodies

Two standards organisations are involved in the formulation of the standards Comité Européen de Normalisation (CEN) and European Telecommunications Standards Institute (ETSI). They formally accepted the Mandate M/453 in January 2010. The Mandate included a list of minimum set of standards for interoperability and the split of responsibility between these two European standards organisations (ESO). The ESOs have initiated the standardization activity, and a number of standards have been developed and published as European Norms (EN) or Technical Specifications (TS) in the typical process towards EN approval as requested in the Commission Mandate. The ITS Coordination Group (ITS-CG) between CEN and ETSI has been established to ensure ongoing coordination of the standardization activities within the ESOs. (1st joint CEN/ETSI-Progress Report to the European Commission, 3.4.2011).

EENA

The European Emergency Number Association is dedicated to promoting high-quality emergency services based on the common European emergency number 112 throughout the EU. EENA serves as a discussion platform for emergency services, public authorities, decision makers, associations and solution providers in view of improving emergency response in accordance with citizens' requirements. EENA is also promoting the establishment of an efficient system for alerting citizens about imminent or developing emergencies. The EENA membership includes about 800 emergency services representatives from 43 European countries, 60 solution providers, 9 international associations/organisations as well as 26 Members of the European Parliament.

EeIP

The European eCall Implementation Platform (EeIP) is the coordination body bringing together representatives of the relevant stakeholders associations representing technology providers together with the National Platforms supporting the implementation of a pan-European in-vehicle emergency call in Europe. It aims to guide, coordinate and monitor the progress of the implementation of the eCall service across Europe to ensure a timely, effective and harmonised deployment of the eCall service in Europe.

eSafety eCall Driving group

The Driving Group on eCall was one of the Working Groups established by the European Commission under the eSafety Forum. eSafety was a joint industry/public initiative for improving road safety by using new Information and Communications Technologies. The overall objective was to join forces and build up a European strategy to accelerate the research and development and deployment and use of Intelligent Integrated Safety Systems. The eCall Driving Group has finalised its activities with the release of the "Recommendations of the DG eCall for the introduction of the pan-European eCall" in 2006.

National bodies

National bodies of member states relevant in the context of eCall include Ministries and agencies such as Public Safety Answering Points and Centres (PSAP), Rescue Forces, Police, Health Care Road Authorities and Vehicle Inspection Agencies.

Mobile Network Operators

Mobile Network Operators are responsible of handling eCall voice and Minimum Set of Data delivery in the same order of priority to the Public Service Answering Points as normal 112 emergency calls. They have to upgrade their systems for monitoring and mediating eCall indicators in their communication networks.

Vehicle Industry

Vehicle industry has to equip vehicles with standardized eCall In-Vehicle Systems (IVS). They have to find eCall products operating with high performance and reliability over the whole life span of the vehicle or to find a way to update the in-vehicle system.

In-Vehicle system manufactures

Device and system manufacturers have to produce high-quality products according to standards. Preferably, they have to test their products in national or Pan European interoperability test-beds and “plug-tests” well before the devices get the certificate for approved eCall service.

Service and Maintenance Providers

eCall related services can be provided in development of software, device production, facilitating tests, consulting different decision makers etc.

Certification bodies

Mandatory devices, like the eCall IVS, must be certified before releasing to the market. Certification bodies can national or international.

Satellite Navigation Systems and Services & Digital Map Providers

eCall is dependent on accurate positioning provided by global navigation satellite services. The location information provided by eCall to the PSAP is presented using a digital map. The operation of eCall has to be based accurate and updated maps.

4.2 Standards

The HeERO 2 project has been commissioned to look at standard CEN EN16102, which is outside of the eCall based on 112 as it deals with Third Party Service eCall. However this standard deals with the performance requirements of a third party service centre in the treatment and handling of eCall before it reaches the PSAP. This is a key area in the management of eCall based on 112 and the mitigation of false and inappropriate calls, before they reach the PSAP. This task has been allocated to the HeERO 2 Belgian Pilot Site, as this is the exact system being operated at this pilot site.

Recent activity on eCall standardization within ETSI and 3GPP covers:

- circuit-switched based 112 eCall over 2G and 3G mobile networks,
- HLAP Conformance Testing Abstract Test Suite (ATS) for CEN TS 16454,
- eCall HLAP Interoperability Testing.

An ETSI Special Task Force (STF) on migration of eCall transport (STF 456), was been established in 2013 and it is co-funded by the EC.

At MSG#38 (March 2014), the STF report was approved for publication

The main conclusions of the study on migration of eCall transport are the following:

- The ETSI/3GPP in-band modem is not recommended for VoIP,
- Fallback to 2G/3G is the near-term solution for LTE,
- The existing standards for "IMS Emergency Service" and "IMS Multimedia Emergency Service" are suitable, with relatively minor modifications, to support eCall. This requires new standardisation to implement eCall features in IMS Release-13 (or

later) routing, eCall inactive mode, deliver MSD and end-to-end acknowledgement, indicator of network support

- PSAP should be upgraded before IMS-based eCall occurs in the network.
- IMS eCall opens the possibility of additional eCall functionality.
- A new version of the CEN High Level Application Protocol for IMS eCall is recommended (the current EN 16062 is for the in band modem).

4.3 Relevant stakeholders for in-vehicle system

Several stakeholders need to be involved for in-vehicle system, i.e. vehicle manufacturers, equipment manufacturers, tier 1 and tier 2 suppliers. Each of them has their own roles in order to succeed the eCall deployment. Vehicle manufacturers should include the eCall in-vehicle system in the design plans for new type-approved vehicles. They should adopt strategies on whether they will offer just the basic eCall service in their models or whether additional commercial services will be offered based on the eCall platform. In the latter case, appropriate agreements with suppliers, service providers and mobile network operators should be made. Those vehicle manufacturers, equipment manufacturers and service providers currently offering proprietary TPS-eCall services should consider migration paths towards the pan-European eCall. Moreover, vehicle and equipment manufacturers and their suppliers should join their respective national platforms and/or stakeholders associations.

There are two possible instantiations of the in-vehicle system, i.e. 1) factory fitted eCall system and 2) after-market devices for those vehicles already in the market. In the first case, the vehicle manufacturer will be the core stakeholder while in the latter one it may be an equipment manufacturer or provider. In case of after-market equipment, it is the responsibility of the equipment manufacturer to design the eCall in-vehicle system in a way that it can obtain the necessary information to be able to bundle the MSD. In both cases, the vehicle/equipment manufacturers should ensure that the eCall system conforms to the relevant standards.

In case of retrofit devices, some other stakeholders are to be taken into account including dealers and their role in the distribution (and possible) installation of the devices, professional certified installers and workshops (taking care of the installation of devices and periodical inspection of them), competent authorities (in charge of enforcement activities to check and make sure that the retrofit device is correctly installed and works correctly, by means of on-the-spot stops and controls to the vehicles), insurance companies (with a role in the definition of some aspects related with regulation and certification of retrofit devices as far as liabilities in case of malfunctioning of the system and its consequences are concerned).

Finally, in case a standardization process were defined and fixed, accredited authorities should be taken into account and considered an additional participant in the chain.

4.3.1 EU regulation for in-vehicle systems

The following documents set the European level regulatory framework for eCall in-vehicle systems:

European Parliament legislative resolution of 26 February 2014 on the proposal for a regulation of the European Parliament and of the Council concerning type-approval requirements for the deployment of the eCall in-vehicle system and amending Directive 2007/46/EC (COM(2013)0316 – C7-0174/2013 – 2013/0165(COD)) (Ordinary legislative procedure: first reading)

COM(2013) 316 final 2013/0165 (COD): Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning type-approval requirements for the deployment of the eCall in-vehicle system and amending Directive 2007/46/EC

COMMISSION DELEGATED REGULATION (EU) No 305/2013: Supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the harmonised provision for an interoperable EU-wide eCall

COM(2003) 542 final: "Information and Communications Technologies for Safe and Intelligent Vehicles"

DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

4.3.2 Certification of in-vehicle systems

As the type approval regulation applies only for vehicle passing type approval in 2015, additional regulations are required for all equipment not covered by the type approval. This might be the installation of an IVS already type approved for one model of one make into other models of the same make or all aftermarket devices. In some Member States it is forbidden by law to automatically initiate a call to 112 however with the exception for eCall. This shall prevent that the PSAP are flooded by calls not directly related to emergency intentionally (misuse).

The key factors of guaranteeing an EU-wide deployment are the standardization and the interoperability of the system. Therefore it is strongly recommended to implement a (voluntary) certification scheme allowing differentiation between IVS implementations

meeting the requirements of European standards and IVS implementations not meeting the requirements.

Taking the previous issues under consideration, the certification has to validate all aspects required in the type approval. This includes the conformance requirements to the standards and all performance requirements included in the type approval regulation and delegated acts in this context. Additional performance requirements might be necessary to better reflect challenges with after-market devices to fulfill all requirements of eCall. The HeERO projects have been tasked with providing the certification framework, and as such project participants worked with the industry to prepare Deliverable 6.3.

Looking at the certification chain from a global point of view, it is not a simple process as the system involves the vehicle and the infrastructure. This supposes the involvement of different stakeholders. Currently a proposal for this process is under definition and HeERO 1 and 2 experiences will contribute with recommendations to this point.

4.3.3 Requirements for in-vehicle systems

Pan-European eCall system should involve a few basic modules and procedures described below. The core standards of eCall have been completed.

High level functional requirements for in-vehicle systems are:

- the In-Vehicle System shall include a Network Access Device (NAD, e.g. PLMN (such as GSM AND 3G), module);
- the In-Vehicle System shall detect when an eCall trigger has been initiated;
- in the event of an incident the eCall system shall automatically determine whether or not to trigger an eCall and where appropriate, make such an eCall automatically;
- an eCall shall also be able to be triggered manually;
- upon triggering an eCall, the eCall system shall attempt to send a Minimum Set of Data (MSD) to any system operated by a given Mobile Network Operator (MNO) with the European pre-assigned TS12 destination address (112);
- the eCall system shall also try to establish a voice connection between the vehicle and that pre-assigned destination address (preferably a Public Safety Answering Point (PSAP) with TS12);
- After a crash event (or rollover of the vehicle), the IVS and the antenna should be in a protected environment. With external antennas, chances to break the coaxial cable that connects the IVS to the external antenna increase. With no antenna, there is no

communication nor connectivity, and therefore, no call to an emergency center. Internal antenna is the way to keep this protected environment;

- No visual impact on the vehicle design;
- Robust and crash-proof solution;
- Modular and integrated solution. Only one reference for several car platforms; unlike having external antennas, which add complexity depending on the final vehicle platform (i.e. depending on length coax cable, configuration, routing of coax cable, etc.).

Procedures following power-up of the in-vehicle system

The IVS network access device (NAD) shall conform in all respects to the applicable ETSI specifications and in particular to the requirements specified in ETSI TS 122 101 and ETSI TS 124 008 with regard to this initial power - up procedure.

As specified in ETSI TS 122 101, an eCall IVS NAD shall have a valid SIM/USIM. The SIM/USIM enables the provision of the eCall service, The SIM/USIM can be configured only for eCall (in this European Standard referred to as "eCall only"), or a combination of eCall and commercial service provision.

Activation

Once the in-vehicle system is made aware by the eCall generator of a triggering event that fulfills the requirement described in EN 16072, and provided that there is no ongoing eCall in progress, the activation sequence shall start. In order to meet the objectives of the provision of the service defined in EN 16072, additional application protocols are required to successfully affect an activation sequence.

The in-vehicle system shall:

- if necessary immediately interrupt any ongoing communication using the communication channel required for eCall;
- disconnect the in-vehicle microphone from the line;
- disconnect the in-vehicle loudspeaker from the line;
- start the eCall transaction at the IVS level;
- except for retrofit eCall systems, installed in-vehicle equipment shall ensure that the in-vehicle audio equipment is muted for the duration of the eCall (as defined in EN 16072);

- alert the vehicle occupants of an initiated eCall as described in EN 16072.

References to standards:

- Information content of MSD: CEN/TS 15722 (EN 15722)
- Functional requirements concerning eCall: EN 16072
- Additionally, the in-vehicle systems must also be compliant with the following standards:
- CEN EN 16062, High Level Application Protocol
- 3GPP TS 26 267, 3GPP TS 26 268 In-band modem
- Call set-up
- Emergency call set-up is initiated by the IVS "Activation Function" executed by IVS network access device (NAD).
- Timer T2 - IVS Call clear-down Fall-back Timer (CCFT).

MSD transfer

The process of MSD transmission is documented in

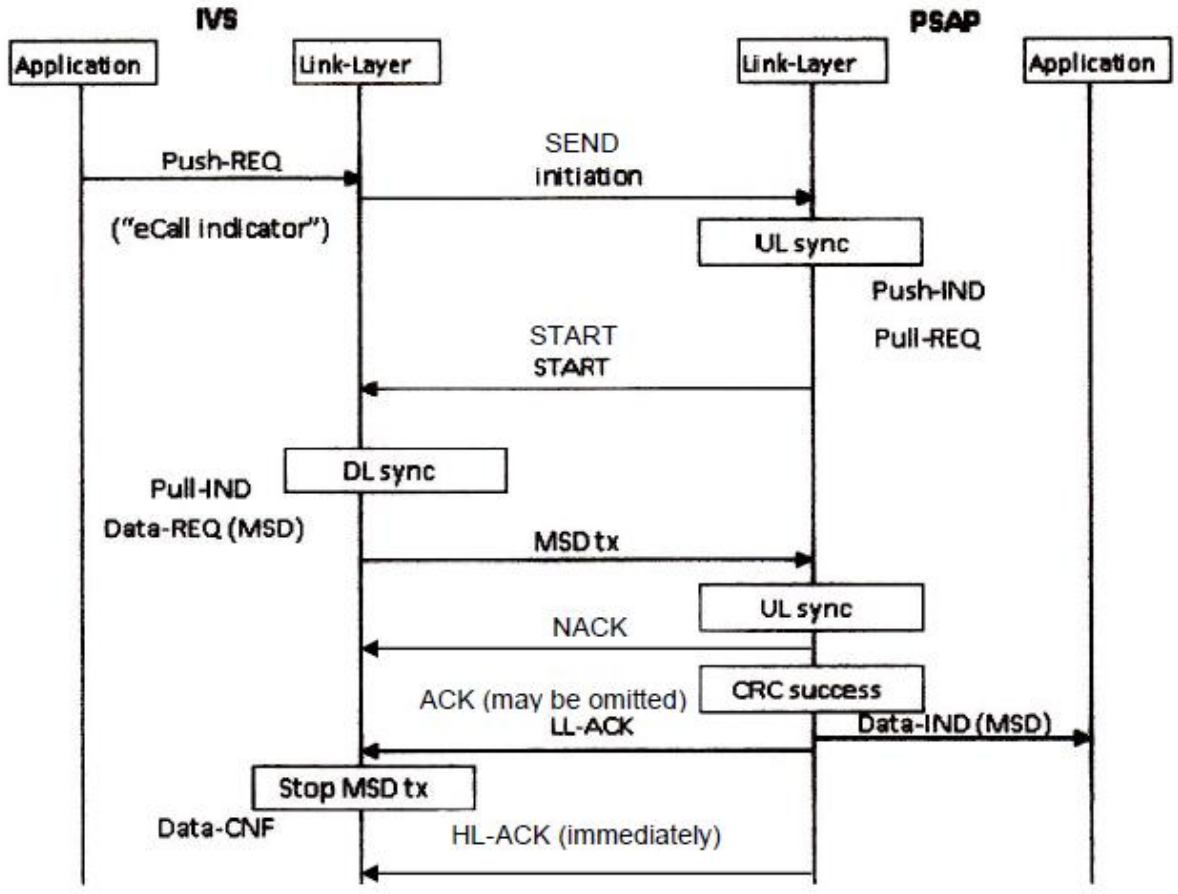


Figure **2**.

Sequence of steps:

- Send initiation signal (5 * “SEND” bursts) from IVS eCall modem to PSAP.
- eCall modem synchronization in PSAP.
- Request MSD by PSAP eCall modem to IVS eCall modem (n * “START” bursts).
- eCall modem synchronization in IVS.
- IVS eCall modem: MSD transmission to PSAP eCall modem (“MSD tx”), potentially in several repetitions, until link layer “ACK” is received from PSAP or “HL-ACK” is received from PSAP (“ACK” may be omitted completely).
- PSAP eCall Modem: Send link layer “NACK”, until CRC successful.
- PSAP: Link layer error check.
- PSAP: Link layer ACK from PSAP eCall modem to IVS eCall modem.
- PSAP: Sends “HL-ACK” immediately after “NACK” and “ACK” (“ACK” may be omitted), if format check is successful.

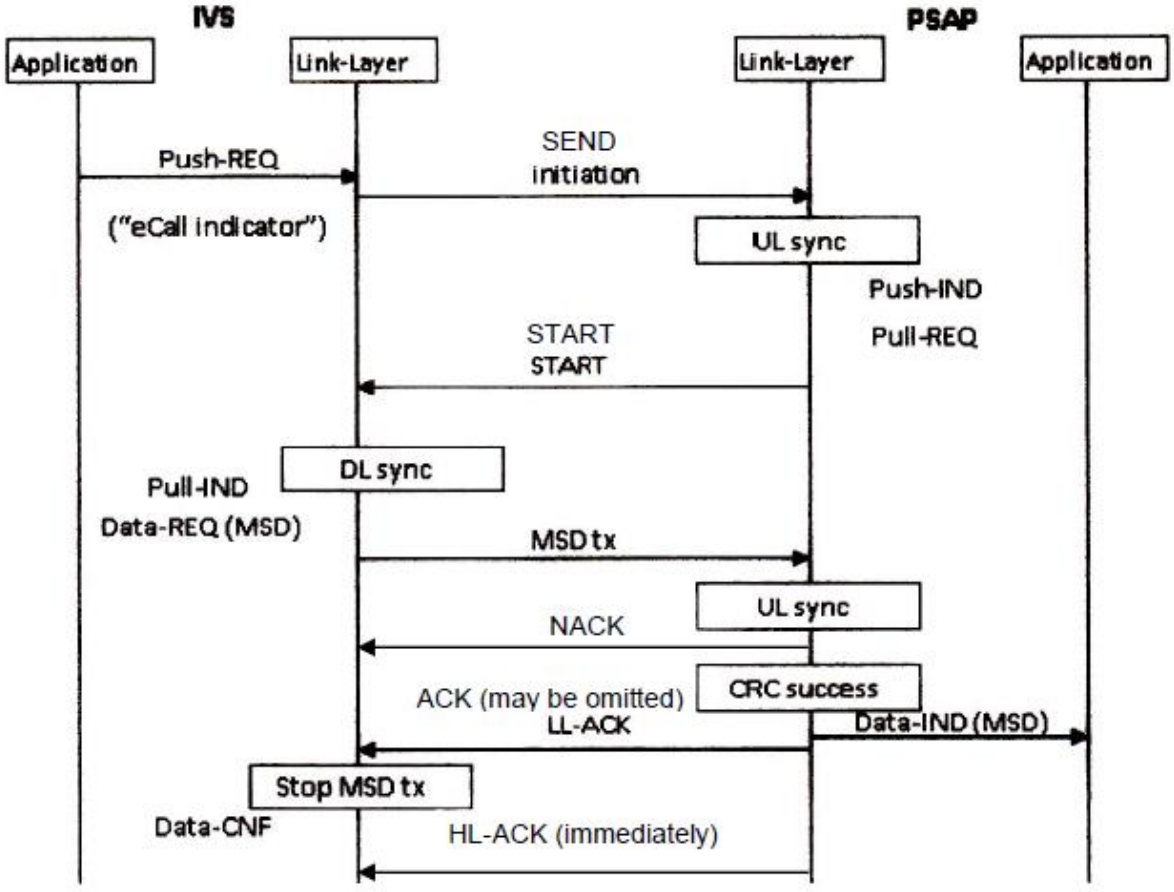


Figure 2: Data flow description (adapted from CEN 2011, Figure 6)

Application layer acknowledgement (AL- ACK) (called “HL-ACK” in TS 26.267)

After successful MSD transfer, the PSAP shall check the MSD content automatically. If the format check succeeded, the PSAP shall subsequently automatically send the positive AL-ACK to the IVS so it can be received within 5 s from reception of the LL-ACK (T6 – IVS wait for AL-ACK period) (Figure 3).

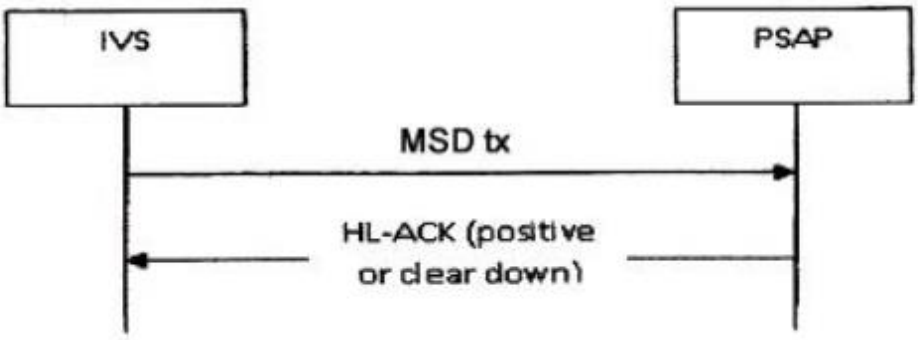


Figure 3: AI – ACK diagram (adapted from CEN 2011, Figure 4)

Proposal: If the CRC was found OK, but the format check detects an invalid MSD, then the PSAP shall ignore the MSD. In most cases it does not make sense to repeat an invalid MSD.

Request "SEND MSD" (called “START” in TS 26.267)

The PSAP application shall have the capability to instruct the PSAP modem to request the IVS to send the latest version of the MSD at any time a voice connection is active to the IVS.

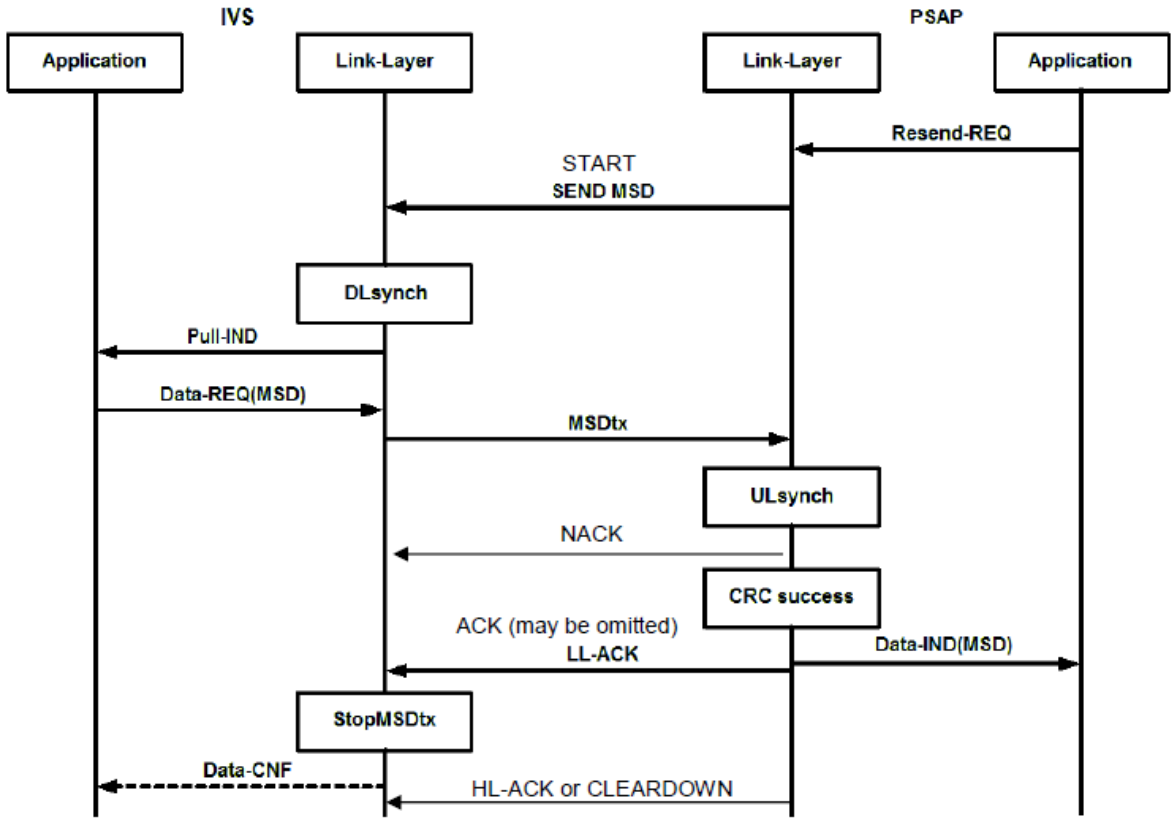


Figure 4: Send MSD diagram (adapted from CEN 2011, Figure 8)

Note: The PSAP may only send the CLEARDOWN at the end of a successful MSD (re-) transmission. In case of marginal radio link coverage or other obstacles in the voice path the

MSD transmission may be unsuccessful, in which case the CLEARDOWN cannot be sent to the IVS.

List of timers

The timers related to eCall session are summarized in Table 1**.**

T1 Manually initiated eCall (MieC) false triggering cancellation period	Vehicle occupants may cancel a false triggering of a manually initiated eCall before call set-up	Specified by manufcturer. May be zero
T2 IVS Call Clear-down Fall-back Timer (CCFT)	If the IVS NAD does not receive a call clear-down indication from the mobile network, or an application layer call clear-down message from the PSAP and the call clear-down timer has reached 60 min., the call shall be cleared down	60 min
T3 IVS INITIATION signal duration	The IVS INITIATION signal shall not persist for longer than 2 s from when the UE receives notification that the call is first answered	2s
T4 PSAP wait for INITIATION signal period	If a valid INITIATION message is not received by the PSAP modem within 2s from when the NAD knows that the call has been answered then the call shall be routed to a PSAP operator	2s
T5 IVS wait for SEND MSD period	If the IVS eCall modem, whilst sending the INITIATION message, does not receive or recognise a valid “SEND MSD” message from the PSAP eCall modem within 2s, from the time that the IVS receives an indication that the PSAP has answered the call, it shall reconnect the IVS loudspeaker and microphone in the vehicle	2s
T6 IVS wait for AL-ACK period	If an AL-ACK is not received within 5s from receipt of the link layer ACK, the loudspeaker and microphone in the vehicle shall be reconnected to the line in order to enable the call to revert to an E112 voice call	5s
T7 IVS MSD maximum transmission time	If the IVS does not receive a link layer ACK (LL-ACK) within 20s from the start of MSD transmission, it shall cease transmission and the IVS audio system shall be re-connected	20s
T8 PSAP MSD maximum reception time	If the PSAP eCall modem does not send a link layer ACK (LL-ACK) within 20s after having sent the “SEND MSD” message to the IVS eCall modem, it shall route the voice call to a PSAP operator.	20s
T9 IVS NAD (eCall only configuration) minimum network registration period	Following call clear-down by the PSAP the IVS NAD shall remain registered on the serving network and available to receive calls from the PSAP and rescue workers for a minimum period of one hour as defined in EN 16072	1h
T10	An IVS NAD configured to make eCalls and test calls only shall, following call clear-down and	12h

IVS NAD (eCall only configuration) network De-registration Fall-back Timer (DFT)	maximum expiration period of the De-registration Fall-back Timer (DFT) 12h period, de-register from the serving network	

Table 1: List of timers

References to standards:

- Contents and structure of MSD: CEN/TS 15722 (EN 15722)
- Functional requirements concerning eCall: EN 16072
- High-level application protocol for eCall: EN16062
- Requirements for the transmission of MSD: ETSI TR 22.967, TS 22.101
- Method used to transmit MSD (modem): ETSI TS 26.267, TS 26.268
- eCall flag: ETSI TS 24.008, table 10.5.135d
- In band modem according to ETSI TS 26.267, TS 26.268, rel. 10.0.0 recommended
- MSD according to EN 15722 (June 2011) – includes also the format of the location data
- Request Send MSD - every IVS shall implement the functionality to re-transmit the MSD on PSAP-Request (START) and then re-open the voice communication, but PSAP are free to use this feature
- SIM/USIM with roaming capability

4.3.4 In-vehicle devices' periodic inspection

The IVS for any vehicle is a complex system in the vehicle which has to interact with the outer world (mobile network, PSAP). The lifetime of a vehicle is 15 years and longer and all components are designed to be maintained during the lifecycle. Typically, the driver identifies a malfunction and asks the garage to fix it or gets information via the on-board diagnostics identifying a component does not work.

For eCall, the challenge is that technically the world will change rapidly and the IVS still has to work not only within the vehicle but to continue to establish a voice connection via a mobile network to a PSAP.

The world will change during the vehicle lifecycle, and even worse, the IVS is expected to operate in a "sleeping" mode but in case of an incident the IVS shall work without any issues immediately. Therefore a check of the IVS during the periodic technical inspections (PTI) is required.

Given the diversity of periodical technical testing procedures across Member States, and the need for mutual recognition of vehicle inspections between Member States, the European Commission is seeking to harmonize PTI testing and in particular the exchange of PTI test data.

It is expected that the on-going studies being performed by the Commission will result in:

- a PTI electronic platform, similar to or combined with EUCARIS database, to facilitate the exchange of data between Member States;
- central recording of vehicle type approval, PTI Certificates of Conformance and vehicle registration details.

As the objective of the PTI for IVS is to validate functionality but not specific detailed behavior, a straightforward approach is recommended not measuring conformity or performance of the IVS.

Within the PTI, a test eCall shall be initiated manually in accordance with the manufacturer's instructions and the test environment to a dedicated test PSAP in order to avoid any threat that a test eCall might be regarded as a real emergency in a PSAP.

In the PTI, the correct encoding of the MSD with the required information will be evaluated and a bi-directional voice communication established. If both steps are passed the test was successful and will be documented as part of the PTI. The detailed procedure is documented in the TR PTI eCall version 100.

If for any reasons the harmonized PTI will not be adopted in time, Member States are recommended to include the above described procedure into their national PTI regulation.

4.3.5 Business models and financial issues related to in-vehicle systems

The OEM in-vehicle system undoubtedly has a central role within the overall eCall service chain.

It presents the starting point in every equipped vehicle, from where an 'eCall' emergency call will be generated, either automatically or manually triggered, and from where the vehicle will establish a wireless mobile communication connection to the most appropriate PSAP. The question how eCall functionality will be realized in the individual vehicle and how the architectural concept of the in-vehicle system will look like, will be subject to product design and is left to the decision of the vehicle manufacturers.

The EeIP Task Force OPEN has concluded in their final report, that eCall in-vehicle system options will follow one of the approaches presented in Figure 5. The question, whether eCall

as a service respectively in-vehicle systems used for eCall may serve for a (positive) business model depends on the architectural approach chosen by the vehicle manufacturer.

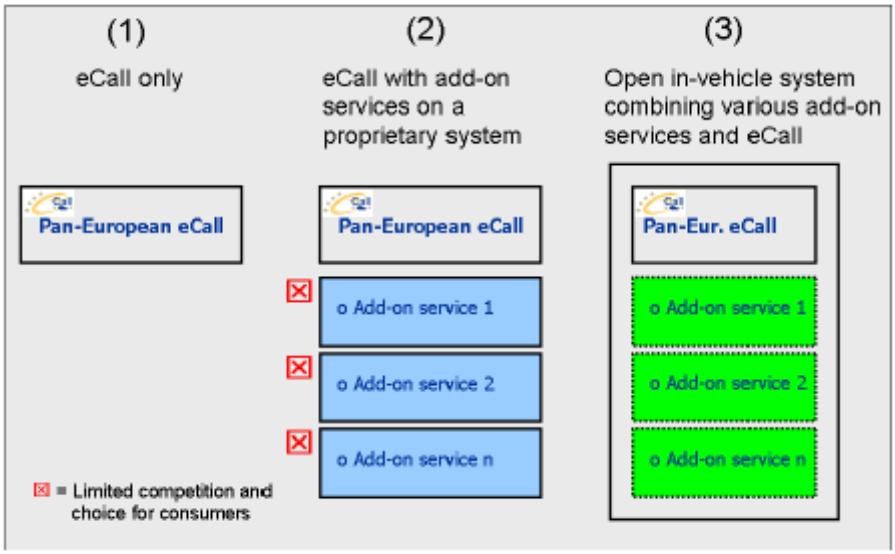


Figure 5: Possible options for OEM in-vehicle systems (EeIP 2011)

Option (1): eCall only

'eCall only' means stand-alone eCall and is not designed to provide additional services. 'eCall only' just fulfills the legal requirements. As pan-European eCall is a free public service, there is no commercial business model for any stakeholder. Some stakeholders (e.g. vehicle manufacturers) have pointed out occasionally, that "eCall is positive per se, when governments would share their social cost savings with other stakeholders".

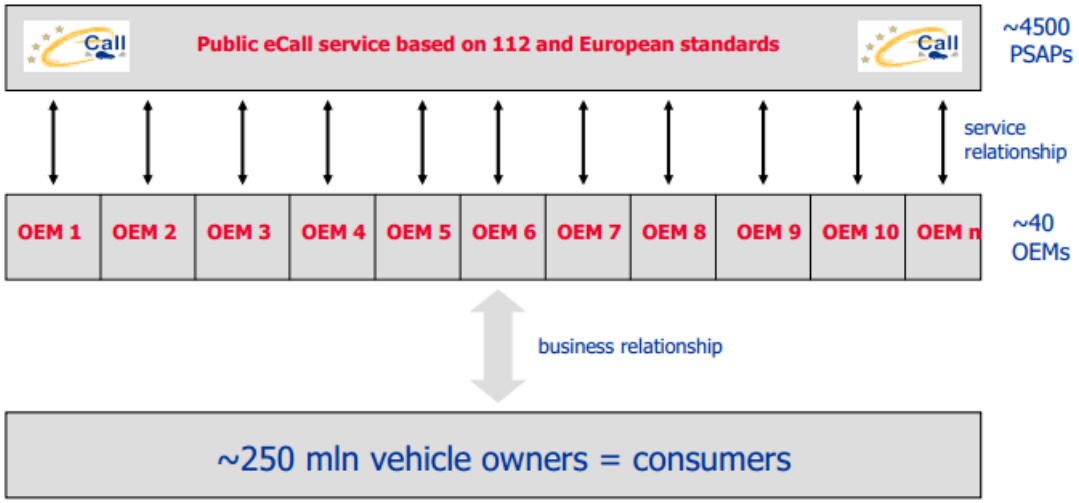


Figure 6: Option 1 – eCall only

Option (2): eCall with add-on services

Besides pan-European eCall there are additional value added services offered by vehicle manufacturers (only), which have selected and contracted service providers, which render the OEM services to end customers. In that business model, service providers act on behalf of the vehicle manufacturers, based on a B2B business relationship.

Examples for additional OEM service propositions are TPS eCall, breakdown assistance, remote diagnostics, real time traffic information, Pay as You Drive or Pay how you Drive insurance schemes or Stolen Vehicle Recovery services.

These services may be offered (and subscribed to) separately per service or as a bundle besides pan-European eCall. These services may run on the eCall in-vehicle system or an extended in-vehicle system. Aftermarket vendors cannot offer their own services on the built-in vehicle systems, hence they need to offer dedicated retrofit solutions which customer has to buy at additional cost. The number of service providers is more or less identical with the number of vehicle manufacturers, because they are related to closed B2B relationships.

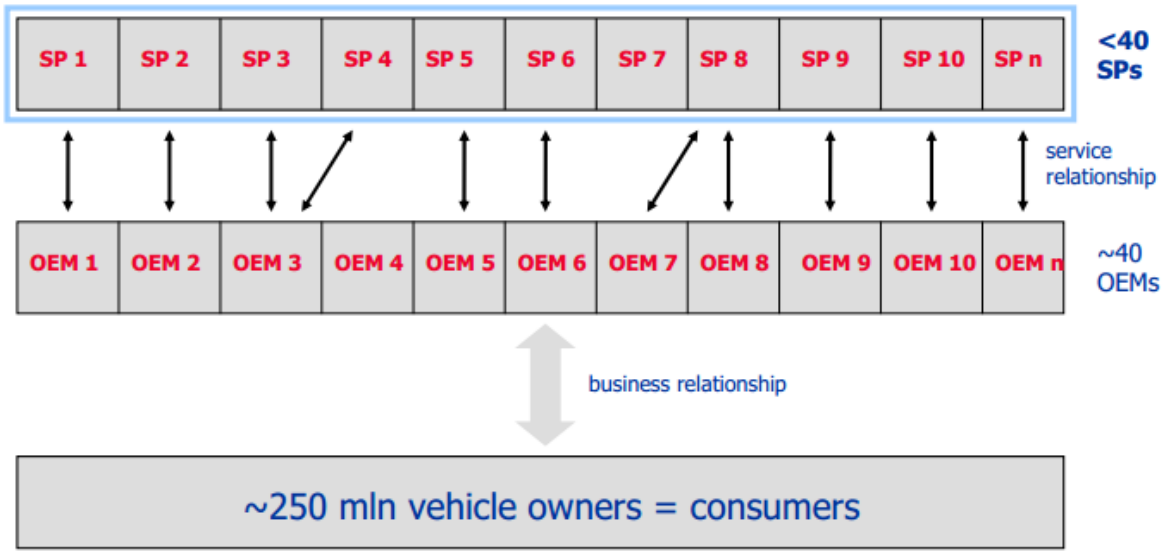


Figure 7: Option 2 - eCall with add-on services on a proprietary system

Option (3): In-vehicle system combining various add-on services and eCall

Besides pan-European eCall there is a variety of services offered by commercial and non-commercial service providers, which are usually known by end-users and can be freely chosen and changed by them. Open business relationships exist between vehicle owners and vehicle manufacturers but also between vehicle owners and independent service providers. The business relationships exist usually on an n-to-n basis. The number of services providers is significantly greater than the number of vehicle manufacturers since there is an open market not limited to B2B relationships only.

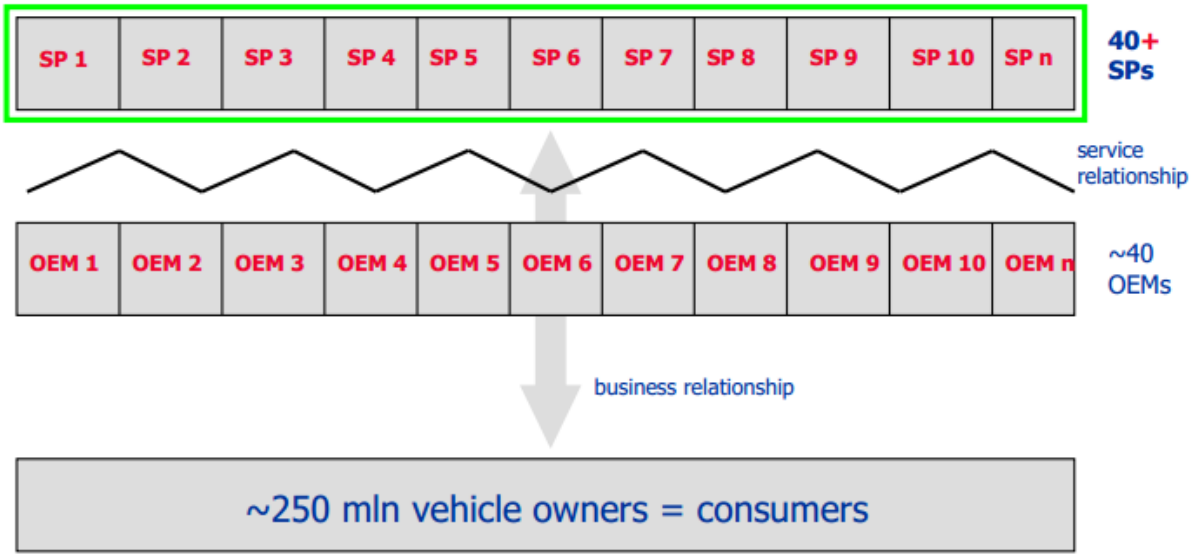


Figure 8: Option 3 - Open in-vehicle system combining various add-on services and eCall

Conclusion:

Looking at stand-alone eCall, add-on services are not likely to have a positive impact since there is no commercial business case for eCall on its own. However, they may potentially have positive impact on the telematics business case as a whole.

eCall could be used as a base to enter a potentially lucrative telematics market (iCar Support 2012). The deployment of the pan-European eCall service has the potential to boost the overall telematics market (EeIP 2011).

After all, it is up to the stakeholder organizations within the eCall supply chain to define and decide their individual strategies associated with eCall deployment in order to find and realize their own positive business case.

The more 'open' (however secure) the access to OEM in-vehicle platforms will be for independent service and application providers, the larger are the market opportunities and chances to the benefit of the overall economy. Open in-vehicle platforms potentially provide a higher service variety, more flexibility, attractiveness and more choice for customers.

On the other hand, hundreds of thousands of downloadable apps could be counterproductive to road safety, so a balance needs to be found.

It should be noted that the vehicle type approval specifications now permit the fitment of a TPS eCall system providing that eCall based on 112 is always present. The finer detail of how this will be achieved still needs to be published.

Aftermarket products

There is a significant potential for aftermarket product/system vendors, since the European aftermarket is seen huge (approx. 250 million vehicles without eCall system). With respect to product design, eCall aftermarket devices can either be composed of pan-European eCall service, stand-alone or combined with value added services, or of a TPS eCall service usually combined with value added services offered by the same vendor.

There are still different barriers identified for the use of aftermarket devices related to the generation of false calls, quality of installation, adherence to published standards and testing and certification issues, where the main challenge may be the certification and standardization of interfaces. The correct functionality of the IVS cannot be fully guaranteed without an appropriate installation of the vehicle.

4.3.6 Value added services

The relationship between pan-European eCall, value added services and the in-vehicle system has been described in the previous section.

Definition

A value added service is a service that supplements other services (here called basic services for differentiation) or products to increase the value or benefit of the basic services or products. Its functionality can go far beyond the possibilities of the basic services or the service composition.

With regard to eCall, the pan-European eCall service can be understood as the basic service, with a targeted availability, interoperability and continuity across EU-28 and beyond.

Any service which potentially supplements, enhances or adds any value to this basic service (from user point of view) can serve as a value added service. Examples of this include but are not limited to TPS eCall, post-incident management, breakdown assistance, PAYD insurance, stolen vehicle recovery, Traffic Information Generation etc. The decision whether a value added service is accepted and perceived as useful, is down to the (service) market and made by the users. Like in many other areas of life and economic sectors, the decision of the end user decides about success or failure of products

In the past, years several works and studies have dealt with the question whether value added services (or simple additional services) could increase the benefit and acceptance of pan-European eCall. Most of the studies came to the conclusion that customers would like to have eCall in their (new) car, but don't want to pay for it as accessory equipment. Taking this into consideration, the rationale to add further services in the car besides eCall, can be seen as a reasonable strategy to enhance customer awareness and willingness to buy in respect to in-vehicle telematics systems and OEM-offered service bundles.

The approach of presenting services in bundles can contribute to the acceptance of this basic service and other value added services which can be selected on top of the same in-vehicle equipment. In this way, eCall can act as a catalyzer of the other additional services.

One reason, why commercial telematics service bundles in the past have not gained sufficient customer acceptance and significant market penetration, could be the fact that, customers have rather insufficient choice between different services/applications and service providers accordingly. This may change in the near future when in-vehicle systems become 'open', meaning accessible for alternative (independent) service providers next to car manufacturers. To achieve an open but secure system, a standardization of vehicle data and communication interfaces becomes prerequisite, which is not yet supported by all car manufacturers. Meanwhile, independent operators and aftermarket vendors have raised this issue and the intrinsic requirement for further standardization out of eCall and called up European legislators to clarify access to in-vehicle systems for all market participants on a fair and non-discriminatory competitive basis (Figure 9).

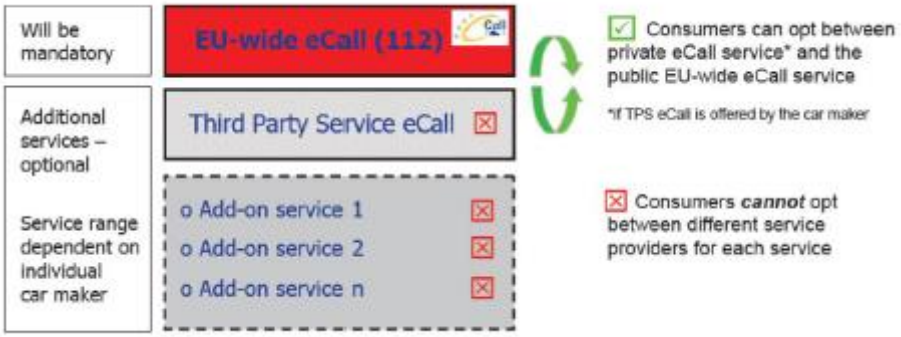


Figure 9: EU-wide eCall, value added services and consumer choice (EeIP 2011). Functional model

4.4 Upgrading Mobile Networks for the transmission of eCall

4.4.1 Relevant stakeholders for Mobile Network Operators

The relevant stakeholders are Mobile Network Operators (MNO) and MNO suppliers. Mobile telecommunications network operators have the obligation to handle eCalls as any other TS12 emergency call, including the caller line identification (Where available) and caller location information, and supporting the 'eCall flag' as well as giving the same priority and reliability as any other emergency call through their core network. Responsibility for processing eCalls and routing them to the correct PSAP always lies with the network serving the vehicle at the time of activation. As important player in the eCall service value chain, MNO should be Members of the eCall National Platform and address the following aspect of the eCall service, i.e. technical upgrades and liaison with other stakeholders. The first aspect includes designing a plan to implement the eCall discriminator (eCall flag) in their mobile switch centre (MSC) of their networks, and also agreeing with public authorities on the eCall discriminator implementation plan. The second one includes liaising with civil protection authorities, cooperation with the automotive manufacturers and considering any variation beyond pan-European eCall as a commercial offer.

4.4.2 MNOs related legislation

In 2009, GSMA formally expressed, on behalf of its members, its support and commitment to collaborate with other stakeholders to realise the pan-European eCall service by signing a Memorandum of Understanding with the EC. Importantly, eCall:

- Supports commercial opportunities for: Third Party eCall Services and SIM issuance.
- Supports a single harmonised solution for interoperability, minimum cost and availability of service.

- Limits liability for placing eCalls, to the same level of those for existing emergency calls.

A European Commission Recommendation was then issued to MS for MNO eCall deployment (C(2011)6269 Final - 8th September 2011) requiring:

Implementing the eCall discriminator “flag” in all networks (consolidated in 3GPP standard as part of Release 8)

- Routing eCalls to the Public Safety Answering Points
- Handling eCalls as any other 112/E112 emergency call

As a matter of fact, MS situation vary in what kind of national process there is for implementation of eCall in the mobile networks. This same recommendation also cites Member States to take care the following aspects related to the deployment of the eCall in their national telecommunication networks:

Define Emergency Call infrastructure to receive the eCalls

- Communicate the most appropriate public safety answering point to route eCalls
- Report to the Commission on the implementation status

4.4.3 Requirements for MNO upgrading

The main functional requirements for Mobile Network Operators are presented below.

eCall establishment

To initiate an eCall the IVS eCall activation function shall request the Network Access Device (NAD) to initiate a call set-up to the network with a request for a Teleservice 12.

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.

eCall discriminator (the eCall Flag)

In the call set-up message the IVS NAD shall set the "Service Category" information element (IE) in accordance to ETSI TS 122 101 (Release 8 or later). The purpose of this eCall 'flag' is to enable a serving Mobile Switching Centre (MSC) that supports this functionality, to differentiate between speech only Teleservice 12 emergency calls (112 or E112) and eCalls. Additionally, the MSC may also be able to discriminate between manually initiated eCalls and automatically initiated eCalls. The eCall flag may be used to route eCalls to a dedicated

PSAP operator. ETSI TS 122 101 provides a description of the "eCall flag" and specifies the mandatory inclusion of the MIeC or AieC identifiers in the call set-up message.

eCall routing to PSAP

On receipt of the TS12 emergency call request, the mobile switching centre (MSC) in the network shall route the call to the most appropriate PSAP. The MSC shall make use of the "eCall flag" in the call setup message to route the eCall to a designated eCall capable PSAP. The network provider shall route eCalls to separate PSAP connections (telephone lines) compared to normal 112 calls, if this is required by individual PSAP.

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

In Belgium, for instance, Orange is able to send the eCalls to one PSAP, not to different PSAP. However this would be possible if different PSAP are hidden behind the same destination number (load sharing or distributed by a central PSAP based on received info such as location or calling number). In any case Orange will be not able to route these eCalls based on the calling number. Furthermore Orange can only translate eCall flag in Huawei to one number only. Mobistar network cannot route eCall flag to different PSAP. eCall flag routing pattern cannot be compared to emergency routing which varies depending on the call origin. The routing mechanism is totally different. Huawei MSC detects the eCall flag (no matter what number is dialled) and route the call to a predefined number only.

Provision of positioning information

MNO (mobile network operator) provides the results of the network positioning of the IVS which made the E112 call.

References to standards - functional requirements concerning eCall: EN 16072

4.5 Upgrading PSAP to receive and handle eCall

4.5.1 Relevant Stakeholders for PSAP

There are three relevant stakeholders identified for Public Safety Answering Point (PSAP): PSAP themselves, emergency services, and PSAP suppliers. The PSAP operational models vary from country to country and, in some Member States, also between the different regions. Therefore, the PSAP representatives should be member of the Member States eCall National Platform and they should influence the decision by the Public Authorities on the type of eCall architecture that will best satisfy the local emergency organisations specificities.

Although the type of architecture will be defined nationally by the Member States and the national/local PSAP, the selected eCall emergency organisation should guarantee the eCall minimum operational requirements as defined in the standard Pan-European eCall Operating Requirements – EN 16072. Once the PSAP physical architecture is decided, the Public Authorities should provide the Mobile Network Operators with the boundary areas of the PSAP that will receive the eCalls, as well as their E.164 phone numbers, in order that the MNOs can route the eCalls to the most appropriate PSAP.

The PSAP who will receive the eCall emergency calls may have to undertake a series of technical upgrades, e.g. equipment of a server with in-band modem ability to receive eCalls and extract/translate the MSD, software definition, and integration of MSD data in the PSAP operational software. Besides, several procedural upgrades to enable the correct handling of the eCall emergencies may also have to be dealt with. Some procedural upgrades need to be considered are for example: operational procedures for handling eCalls, designing of training programs for PSAP operators, and transfer the call and data to PSAP2 procedures in case of intermediate (filtering) PSAP.

4.5.2 ITS directive and other EU regulations/Legislation

Implementation of eCall in PSAP is within the scope of the European ITS directive (Directive 2010/40/EU on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport).

- DECISION No 585/2014/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 May 2014 on the deployment of the interoperable EU-wide eCall service. According to the decision “Member States shall deploy on their territory, at least six months before the date of application of the Regulation of the European Parliament and of the Council concerning the type-approval requirements for the deployment of the eCall in-vehicle system and amending Directive 2007/46/EC and in any case no later than 1 October 2017, the eCall PSAP infrastructure required for the proper receipt and handling of all eCalls”.
- COMMISSION DELEGATED REGULATION (EU) No 305/2013 of 26 November 2012, supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the harmonised provision for an interoperable EU-wide eCall, This Regulation lays down the specifications for the upgrading of the Public Safety Answering Point (PSAP) infrastructure required for the proper receipt and handling of eCalls, in order to ensure the compatibility, interoperability and continuity of the harmonised EU-wide eCall service.

Other relevant European level regulation and documents are listed below.

- COM(2005) 431 final: The 2nd eSafety Communication "Bringing eCall to Citizens" - COM(2006) 723 final: "Bringing eCall back on track - Action Plan" (3rd eSafety Communication).
- COM(2009) 434 final: ‘eCall: Time for Deployment’.
- Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive "Working document on data protection and privacy implications in eCall initiative" - Article 29 Working Party, 1609/06/EN, WP 125).

4.5.3 Relevant Pan EU eCall Standards

Operating requirements

- CEN EN 16072 -Relevant Pan EU eCall Standards

Communication at functional level between IVS and PSAP

- CEN EN 16062 - High level application requirements
- CEN EN 15722 - MSD specification

In Band modem communication between IVS and PSAP

- 3GPP TS 26 267
- 3GPP TS 26 268

4.5.4 PSAP architecture and eCall

Organisation of PSAP is highly specific to Member State. When planning eCall deployment, one has to decide which PSAP will handle eCalls. Implementation of eCall has to meet the relevant functional and performance requirements. Major changes to the PSAP structure are usually not needed.

Several implementation options may be possible:

One level type and eCall routed as any other call

112 calls are handled by civilian operators. The operators are highly trained and handle both 112 call-taking and intervention resources dispatch.

In some cases police, fire and rescue and medical specialists are available to support the call takers. The same PSAP is in charge of all tasks: classification of calls, data collection and dispatching the intervention resources to the incident. eCall can be routed similarly as any 112 call to this type of PSAP (Figure 10).

Figure 10: Filtering in stage 1 PSAP and resource dispatching in stage 2 PSAP

A two level organisation: there is an independent organisation in charge of first reception of the call and then the call is forwarded to the most appropriate local emergency response organisation. Or the 112 operator is in charge of the classification of the call and makes a parallel dispatch to the most appropriate EROs. In some cases police, fire and rescue and medical specialists are available to support the call takers. There can be also variations where different rescue organisations are in the same room (Figure 11).

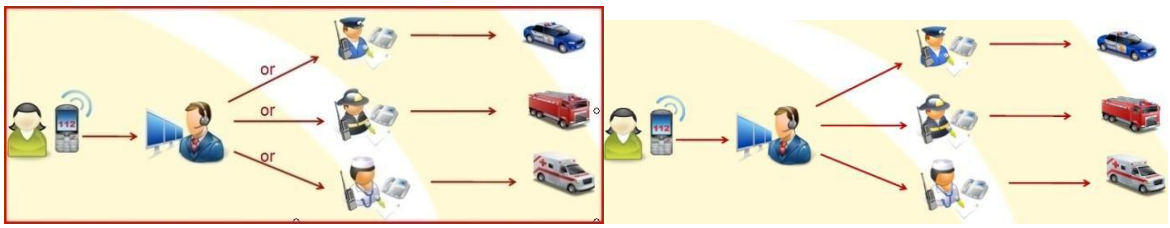


Figure 11: A two-level organisation

As a variation, different regions can be interconnected, so if there is no free operator available, the call can be redirected to another centre (Figure 12).

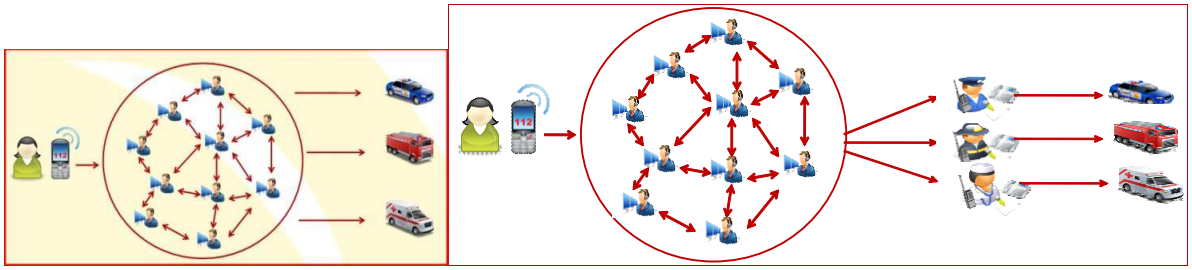


Figure 12: Interconnected regions

With these multi-layered and in separate regions operating PSAP's the better way is also to make a certain routing rules for eCall (Figure 13). E.g. all types of eCalls are routed to a PSAP only dedicated to eCalls. eCall is identified in the mobile network with the eCall discriminator and it is routed to the PSAP which is dedicated to eCalls. Or manually triggered eCalls and automatically triggered eCalls are routed to different PSAP (it can be the same PSAP for 112 calls e.g. dedicated manual eCall PSAP can be the same as 112 PSAP)

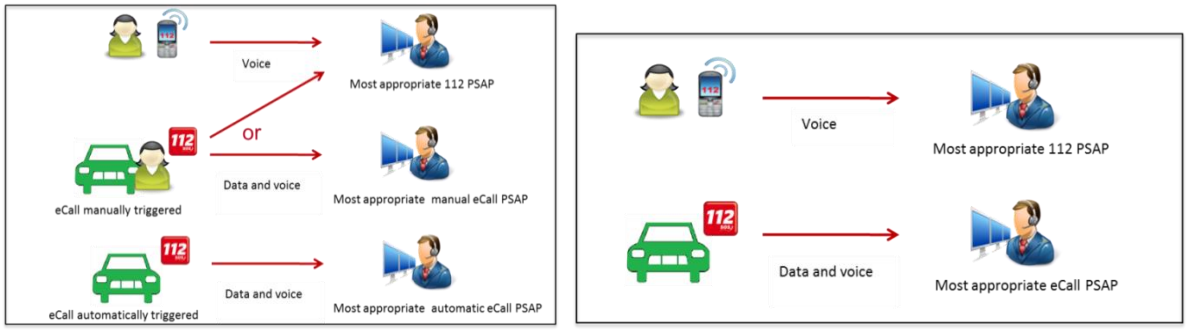


Figure 13: Examples of routing rules

MODEL 1: eCalls routed as 112 calls. The most appropriate PSAP receives 112 calls and eCalls.

MODEL 2: all types of eCalls are routed to a PSAP only dedicated to eCalls. 112 calls continue to be routed to the 112 PSAP.

MODEL 3: manually triggered eCalls and automatically triggered eCalls are routed to different PSAP (it can be the same PSAP for 112 calls e.g. dedicated manual eCall PSAP can be the same as 112 PSAP).

MODEL 4: all types of eCalls are routed to a PSAP upgraded to receive eCalls. (eCall router PSAP) and consequently eCalls are rerouted to the most appropriate PSAP, (e.g. following the same logic as for regular calls to 112.

4.5.5 The requirements for eCall system in PSAP

The main eCall PSAP requirements are given in Commission Delegated Regulation (EU) No 305/2013 of 26 November 2012, supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the harmonised provision for an interoperable EU-wide eCall:

1. Member States shall ensure that any eCall PSAP is equipped to handle eCalls and receive the MSD originating from the in-vehicle equipment according to the standards 'Intelligent Transport system - eSafety – Pan European eCall-Operating requirements' (EN 16072) and 'Intelligent transport systems – eSafety - eCall High Level Application Requirements (HLAP)' (EN 16062).

2. The eCall PSAP shall handle eCalls as expeditiously and effectively as any other call made to the single European emergency number 112. The eCall PSAP shall process eCalls in line with the requirements of national regulations for emergency call processing.

3. The eCall PSAP shall be able to receive the data contents of the MSD and present them to the eCall PSAP operator clearly and understandably.

4. The eCall PSAP shall have access to an appropriate Geographical Information System (GIS) or an equivalent system allowing the eCall PSAP operator to identify the position and heading of the vehicle to a minimum degree of accuracy as defined in EN 15722 for the MSD coordinates.

5. The above-mentioned requirements shall enable the eCall PSAP to provide location, type of eCall activation (manual or automatic) and other relevant data to the appropriate emergency service(s) or service partner(s).

6. The eCall PSAP (initially receiving the eCall) shall establish audio communication with the vehicle and handle the eCall data; if necessary, the eCall PSAP may reroute the call and MSD data to another PSAP, emergency control centre or service partner according to national procedures determined by the national authority. Rerouting may be done via data or audio connection, or, preferably, both.

7. When appropriate, and depending on national procedures and legislation, the eCall PSAP and appropriate emergency service(s) or service partner(s) may be granted access to the characteristics of the vehicle contained in national databases and/or other relevant resources, in order to obtain information that is necessary for dealing with an eCall, notably to allow the interpretation of the Vehicle Identification Number (VIN) and the presentation of additional relevant information, particularly vehicle type and model.

General requirements

To be "eCall enabled", a PSAP needs to be equipped with the necessary hardware and a software application that can receive, process and display the MSD contents to its operators. This could either be a dedicated eCall application or integration in the existing PSAP application. An eCall enabled PSAP shall conform in all respects to the high-level application protocols. The eCall flag makes it possible that the eCalls are routed to a dedicated number which will be created. This way, the PSAP can distinguish the eCalls from the e112 call.

Each PSAP should be able to decide which data it will display to its operators. However, this software/system should at least:

- warn the operator about a new eCall arrival through visualisation or audio. eCall can be automatically received due to the auto answer function;

- MSD data presentation;
- warn the operator about the availability of the audio link with the vehicle;
- provide a call-back capability;
- provide a new MSD requirement application user interface;
- provide an ability to clear-down the eCall.

Event visualization to the PSAP operator

The form of new event data shall include minimum the “telephone detail” call information and the MSD.

A PSAP case leading software can decide user interface and which graphical way the MSD will be displayed to its operators, but the eCall case page shall show the data included in the MSD in a clear and understandable way.

In respect of interpreting the VIN content of the MSD, the PSAP needs to be equipped with a VIN decoder.

PSAP operator user interface

In order to allow the PSAP operator to establish the audio link as soon as possible ensuring this way the shortest possible processing time, the IVS shall never attempt to re-send the MSD unless it has been requested to do so via a "SEND MSD" request.

The user interface shall be displayed in the eCall case page to allow the PSAP operator interaction with IVS while observing the eCall handling process flow. This interface can be designed at the convenience of the PSAP, but shall allow at minimum three basic functionalities, MSD reception, request SEND MSD and PSAP call back.

For the event that the MSD is successfully received, the system acknowledges the MSD, and moves directly to voice contact with the occupants of the vehicle.

Audio link to vehicle occupants

If the caller is able to speak, the call is handled as a normal 112 call.

eCall clear-down

On receipt of the MSD and/or completion of the telephone conversation with the vehicle occupants, the PSAP operator shall clear-down the eCall. Depending on the context (see below), the call may be cleared down by either hanging up in the normal way or by sending a clear-down instruction to the IVS.

- After the IVS has received the LL-ACK or T5 - IVS wait for SEND MSD period or T7 - IVS MSD maximum transmission time ends, the IVS shall recognise a normal hang-up from the network. Furthermore the IVS shall clear-down the call.

- After the PSAP has sent the LL-ACK or T4 - PSAP wait for INITIATION signal period or T8 - PSAP MSD maximum reception time ends and the IVS receives a AL-ACK with status = “clear-down”, it shall clear-down the call.

The IVS shall not attempt an automatic redial following a call clear-down by either of the above two methods.

Following call clear-down by the PSAP the IVS NAD shall remain registered on the serving network and available to receive calls from the PSAP and rescue workers for a minimum period as defined in EN 16072.

The eCall only IVS network de-registration fall-back timer (DFT) shall be reset following call clear-down to control the maximum time that the IVS stays registered on the network (T10 - IVS NAD (eCall only configuration) network De-registration Fall-back Timer (DFT)).

Following acceptance of an eCall by the PSAP systems, but for which the eCall could not be processed (e.g. call was dropped), then the PSAP operator may attempt to call back into the vehicle, but if this is done shall first allow the IVS sufficient time for automatic retries) as described in EN 16072.

Following network de-registration the IVS shall go to standby mode and adopt the eCall "Inactive State" in accordance with the eCall terminal state machine procedures specified in ETSI TS 124 008.

PSAP call back

The PSAP operator shall be able to initiate a call back using the PSAP application system (e.g. call back application user interface) or directly dialling the number using a conventional phone as defined in EN 16072.

The sequence shall be that:

- operator activates the call back application user interface/dials the number;
- telephone system processes the call;
- IVS automatically shall answer the call (as described in EN 16072. The IVS shall provide audio and/or visual feedback to the occupants that a call has been successfully established;
- operator handles the case;
- operator clears down the call.

Rerouting to another PSAP/emergency control centre

Different eCall architectures are foreseen and, in some architecture, rerouting to another PSAP or emergency control centre may be necessary. The PSAP who initially receives the eCall shall process the data included in the MSD, establish the audio communication and handle the call; if appropriate, the receiving PSAP may reroute the call and MSD data to another PSAP or emergency control centre according to procedures determined by the responsible authority. This can be done via data or audio connection, or, preferably, both.

The eCalls present the same routing difficulties across borders as any other 112 emergency calls. It can occur that the MSD and the voice call are received by a PSAP which is not responsible for handling this emergency. Effective rerouting of the emergency data and voice is the responsibility of PSAP, as determined by the national authority.

Recording of event data to PSAP information system

According Commission Delegated regulation (EU) No 305/2013 both the raw MSD received with the eCall and the MSD contents presented to the eCall operator shall be retained for a determined period of time, in accordance with national regulations. Such data shall be stored in accordance with Articles 6, 13 and 17 of Directive 95/46/EC.

The data related to the emergency eCall recorded to the PSAP information system set includes information on the E112 call itself, results of the risk assessment and actions taken by police, rescue and ambulance services.

Provision of information to TMC and other public authorities

The PSAP which received the emergency call informs TMC (traffic management centre) and other public authorities about the incident.

Request for and reception of supplementary information

PSAP may retrieve supplementary information related to a vehicle or user of the vehicle from a service provider mentioned in the MSD received. The information received from the service provider is stored in the PSAP information system and presented in a form understandable to a human user.

This feature may be standardised in future but it is not included in current specifications of pan-European eCall

References to standards:

- Contents and structure of the MSD: CEN/TS 15722 (EN 15722)

- Functional requirements concerning eCall: prEN 16072
- High-level application protocol for eCall: prEN16062
- Requirements for the transmission of MSD: ETSI TR 22.967, TS 22.101
- Methods used to transmit MSD (modem): ETSI TS 26.267, TS 26.268
- eCall re-send MSD is an mandatory feature
- eCall call-back is an mandatory feature
- Clear Down – it is necessary to distinguish between clear-down message and clear down as termination of a call

Example of the process of eCall reception and handling as PSAP operator's work flow

The following text describes the operating sequence of the PSAP operator during the eCall reception and dispatch and also the main differences between an ordinary 112 and eCall dispatch.

E112 call

An operator receiving an E112 call will only have available voice contact with the caller and the presumed location provided by the mobile network operator.

eCall

In addition to the voice contact, the operator receives more information in the form of a minimum set of data (MSD) which gives precise **caller identification, event location, vehicle direction, more accurate event classification**. This data enables the implementation of automatic processes for quick evaluation and dispatch (automatic classification, is it automatic/manual/test call, automatic matching caller position with event position, automatic regionalization (based on event location and classification – correct rescue forces unit). The Operator needs to be trained for the situation when only the MSD is presented on operator's screen.

eCall reception, visualization and event form opening

eCall can be received manually by the operator or automatically due to the auto answer function. Then there are different implementation practices, e.g.:

a) On the operator screen the calling number and eCall icon is displayed. The operator opens the screen data

b) With answering the call, the event form opens automatically on the call taker screen.

Special acoustic notification can also be configured.

Event form

Event form displays telephone details and decoded MSD fields. Optional data entry fields for additional event and caller information could be available.

The location and vehicle direction are handed over to the GIS client. GIS displays these data and recent vehicle location.

Proposal of data interpretation

The operator is notified of eCall data quality and credibility by means of key MSD value (automatic activation, test call, trusted position). If the event cannot be confirmed by voice communication with passengers, the interpretation is as follows a) eCall was activated automatically – it is a probably traffic collision b) eCall was activated manually – it could either be a traffic collision or another type of incident c) eCall is test call – event classification is predefined as technological test d) in the event that both automatic and manual activation occurs, it can signal an error in the MSD communication e) if the positional data's credibility is compromised, then the automated receipt of eCall is halted

Process automation

The operator can take control of all automated processes

Automatic matching caller position with event position

This functionality allows the caller's position to be graphically displayed via a map. The location is based on either GPS or mobile network position identification.

Proposal for automatic classification functionality

System automatically set up predefined classification „traffic collision “for all rescue forces (Fire Rescue, Ambulance, Police). System is also able to set-up predefined classification as a “technological test”.

Proposal for Automatic regionalization

If the caller position is matched with event positioning, the system determines the regionalisation rule for the road (road + km + direction) that has been found as probable road where vehicle was moving. In case that the rule doesn’t exist or such a road is not found, the system takes a nearest urban area accordingly to GPS position and offers a regionalisation rule position based on the GPS coordinates and the urban locality.

GIS visualization

Call taker application sends position and direction information to GIS and optionally the recent two vehicle positions.

Manual classification and regionalisation

In the case that the process of automatic classification is deactivated or not implemented, the operator selects the classification manually from the menu.

Event position determination

By means of line topography if a probable road is known

If a probable road is not found, then the event position is determined as the call position point + urban area, to which the call position point belongs – it means determination of the location with the help of address topography

Additional information

If vehicle occupants can communicate, the operator completes the following information. (communication level (communicates / doesn’t communicate), call back number, other remarks…)

Event saving and dispatch

The operator saves an event and operator manually or the system automatically sends the data record to the Emergency Control Centre system of rescue forces to enable dispatch.

Request SEND MSD

Possible cases are a) Operator evaluates the data in the MSD and finds that it is inadequate, or requires updating (corrupted data, the position is marked as unreliable). b) Operator notifies the caller that voice communication will be interrupted. c) Operator presses "Request MSD" button. >> In call sub-form a running MSD query is signalled. >> The call is automatically routed to the IVR (disappears from the phone software) >> after the MSD is received, the call is routed back to the operators workplace, where the call was originally handled - in SW phone call is ringing. >> this call is indicated by the Call Agent as a call from the previously adopted and broken eCall >> data from the IVR is processed by eCall Centre module meanwhile, this module informs dispatching applications which reads the updated data >> operator will answer call automatically – thus voice communication with the caller will be restored d) Operator notifies the caller in need of assistance that voice communication has been restored.

PSAP Call-back

This is a situation where the call is interrupted or there is need to call the vehicle back. If the operator uses the PSAP call back function (i.e. for call back is used a number which comes from the initial call) he/she will be able to request the delivery of the MSD. Description: a) Operator uses the option from the context menu item and chooses the "Call back" option. b) After creating a connection the, application automatically connects an outgoing call to the event. c) The operator has the possibility to request the re-sending of the MSD by the IVS) MSD received will be added to the original call.

4.5.6 Vehicle Identification Number

The fifth block of the Minimum Set of Data transmitted with an eCall is the Vehicle Identification Number (VIN). The role of this Vehicle Identification Number is to advise the emergency services of the make, model and colour of the affected vehicle. This is important for the emergency services to plan their actions to locate the correct vehicle and to distinguish between two separate calls from equipped vehicles.

The VIN represents an alphanumeric code assigned to a vehicle by the manufacturer in order to ensure proper identification of every vehicle. According to the COMMISSION REGULATION (EU) No 19/2011 of 11 January 2011, each vehicle needs to have an assigned VIN. The VIN is marked on each vehicle when the vehicle leaves the production line and the manufacturer has to ensure the traceability of the vehicle by these means over a period of 30 years.

The VIN consists of three sections:

- the world manufacturer identifier (WMI);
- the vehicle descriptor section (VDS);
- the vehicle indicator section (VIS).

The WMI consists of a code assigned to the vehicle manufacturer to enable him to be identified.

The VDS consists of six alphanumeric characters, capital roman letters or Arabic numerals, which serve to indicate the general characteristics of the vehicle.

The VIS consists of eight alphanumeric characters, capital Roman letters or Arabic numerals, of which the last four consist of digits only.

In order for the PSAP and emergency services to access the information from the VIN, they need to have a VIN decoder that can provide all the data in a recognizable format. A task force of the European eCall Implementation Platform was in charge of investigating the initial maintenance scenarios and to recommend the infrastructure solution and the maintenance procedures ensuring that up-to-date VIN data are available to all PSAP in Europe to manage

eCalls. In 2009 this task force delivered a final report that identified the following two scenarios:

Scenario 1

This scenario is described by the following Figure 14.

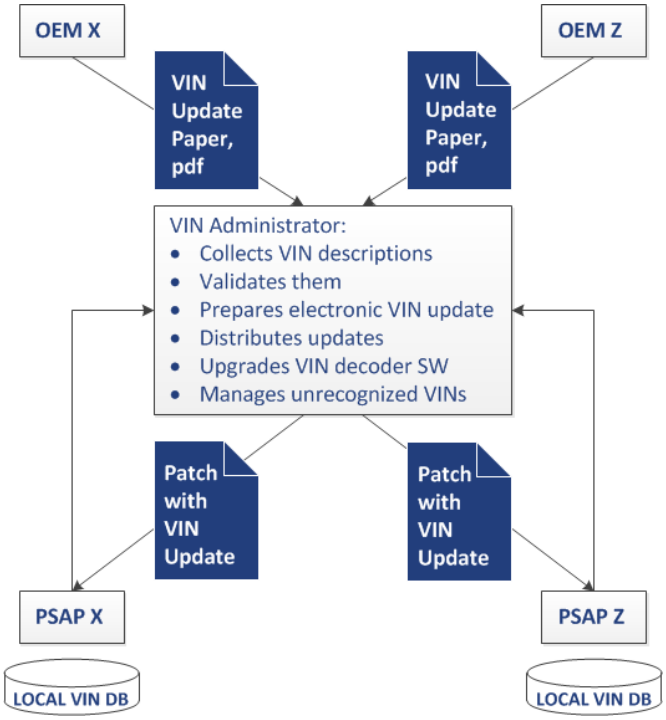


Figure 14: VIN updates (Scenario 1)

This scenario supposes that a central VIN administrator is in place. This administrator is the central point responsible for collecting raw VIN data, producing electronic VIN updates and distributing them to the PSAP.

The VIN administrator would likely be an entity established by the European Commission.

In this scenario, VIN data can be provided to this administrator in any format (fax, .pdf, Excel document etc.) by the OEMs. The VIN administrator would contact OEMs on a regular basis, possibly with the support of the OEMs associations ACEA, KAMA and JAMA, and request VIN updates. VIN DB updates will be sent to each PSAP on a regular basis and VIN is processed at the PSAP level. The administrator would also act as a central contact point for PSAP in case of issues with the VIN decoder or with unrecognized VIN formats.

Scenario 2

In this scenario a VIN decoder in the form of a web service is made available to all PSAP 24 hours a day 365 days a year. The VIN decoder is hosted on a platform available through secure connection to all PSAP. PSAP do not need to integrate the VIN decoder SW into their IT infrastructure but only need to integrate a web service into the PSAP operator SW tool.

The VIN DB is maintained centrally. Alike scenario 1, VIN data can be provided to the platform administrator in any format (fax, .pdf, Excel document, etc.) by the OEMs. The VIN administrator would contact OEMs on a regular basis, possibly with the support of the OEMs associations ACEA, KAMA and JAMA, and request VIN updates.

This approach is represented in Figure 15.

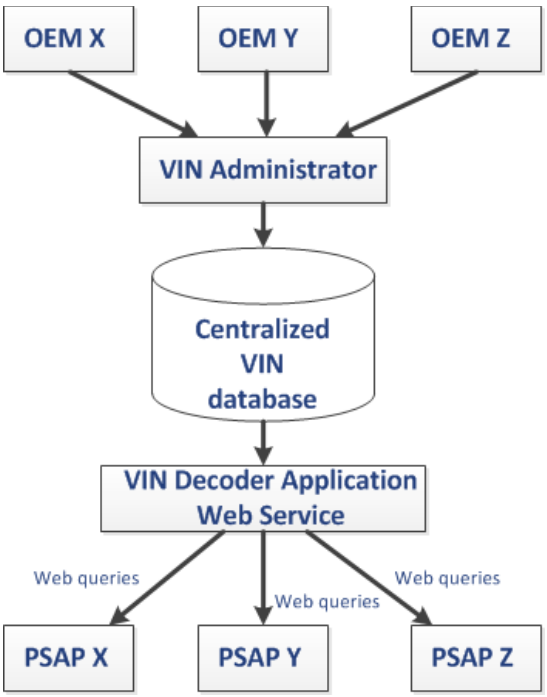


Figure 15: VIN decoder in the form of a web service (Scenario 2)

Scenario 3

VIN data can be provided by third parties under commercial agreement. Those parties are, for instance, providers of claim solutions that offer solutions aiming at standardizing repair and insurance claim process. Their main clients are insurers, repair shops and independent assessors. They maintain VIN database to identify the correct vehicles.

Those organizations could provide an on-line VIN decoder using a downgraded version of their VIN DB upon approval of OEMs.

EUCARIS

Another possible solution for decoding the VIN is EUCARIS. A complete description of the system is reported in Chapter 4.6.

4.5.7 Benefits for PSAP

An eCall is an emergency call and should be treated in exactly the same way. The operational processes for a PSAP operator will not considerably change because of the

introduction of eCall. The operator still has to assess the call and to decide on appropriate action by the emergency services based on the available information. The difference is that this information will be more timely, detailed and accurate:

- Not just speech, also data
- Immediate determination of the exact location and less time will be lost by emergency services while looking for the incident
- Valuable information for the emergency services:
- location
- car brand/type/colour
- fuel type
- number of passengers
- information on dangerous goods (in near future)
- additional information a TPS might have (i.e. impact and severity of the crash)

Implications of eCall for the operating procedures:

- Location is always known; does that mean going after every call (i.e. silent calls)? Research France: 50% unjustified interventions (Source: European eCall implementation platform 27th October 2012). Protocols needed how to handle in case of a silent call how to determine whether it's a real or false call.
- How to cluster different calls (eCalls, telephone) to the same incident? (technical challenge).
- Emotional impact on operators. Operators may be confronted with drivers who don't know that they have called and suffer from severe injuries, or are trapped in a burning car.

Although the operational process won't change considerably, the operators will need adapted work instructions and additional training.

4.5.8 Third party services supported eCall and 112-eCall

What is the difference between Pan European eCall and TPS eCall?

The TPS eCall service has existed for over 10 years. It is offered mainly by the more expensive car manufacturers and often part of value added services, like b-Call (breakdown services) and track & trace in case of theft. It is offered to the customers at no additional costs or a subscription fee has to be paid.

Not only car manufacturers but also retrofit eCall suppliers are offering eCall services.

As with Pan-European eCall the TPS eCall is a combination of speech and data and the calls can be triggered automatically as well as manually. The transmission of speech and data is not based on common standards but is TPS specific.

In case of an emergency call the TPS can inform the emergency services. The TPS often has a lot of incident data that can be of great value for the emergency services.

Some Member States have asked for changes in the proposed EC regulation, to allow data transmission from TPS to PSAP. This will only be feasible when these data will be standardized; a PSAP cannot adapt its systems and procedures to all different TPSs and a TPS cannot adapt theirs to all different PSAP.

For TPS-eCall the standard 16102 'Intelligent transport systems – eCall – Operating requirements for third party support' applies. To cover the issues regarding PSAP/TPS the 9th European eCall Implementation Platform meeting from April 2013 decided to install a Taskforce TPS.

Figure 16: Pan-European eCall and

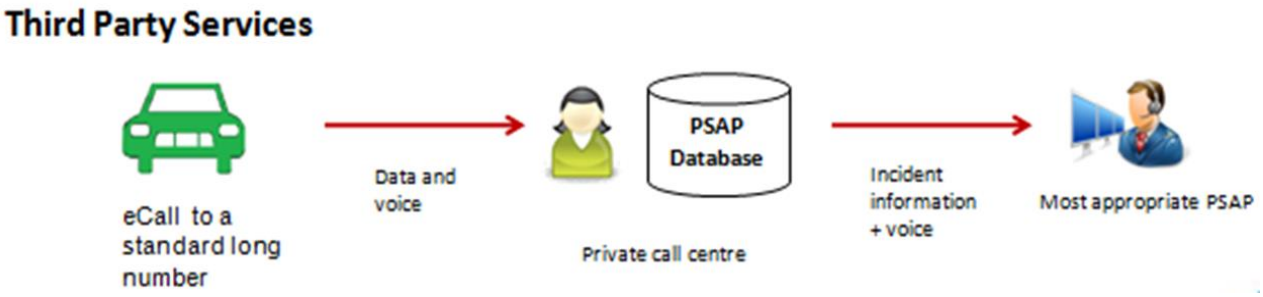


Figure 17: TPS-eCall

A comparison between pan-European eCall and TPS-eCall is presented in Figure 17 and Table 2.

A TPS-eCall provider can provide eCall Data to a PSAP, including but not limited to MSD, via an electronic interface, if supported at the PSAP.

A standardised interface for this purpose is detailed in EN 16102.

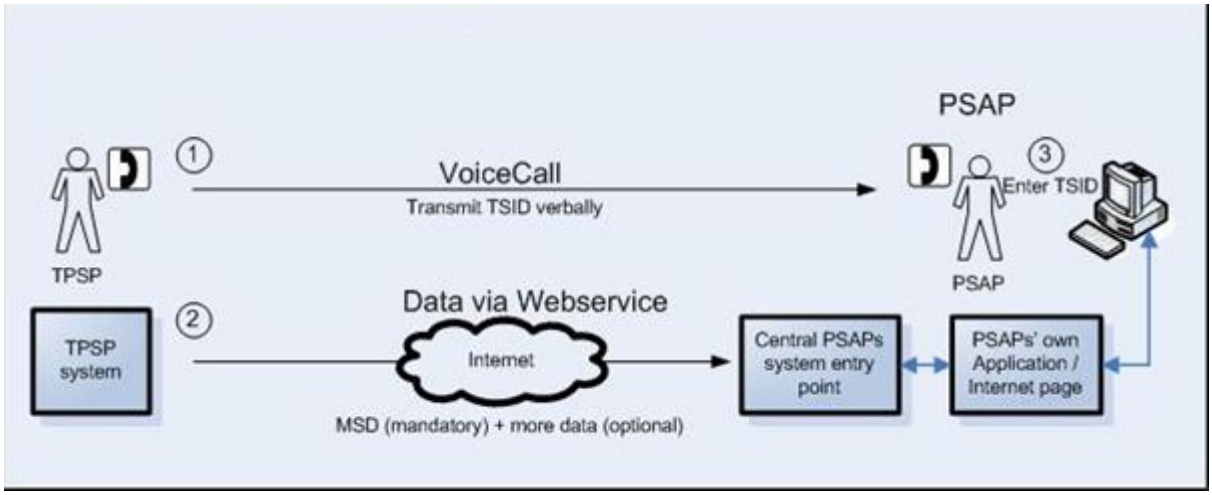


Figure 18: Data available via electronic interface

Depending on the national PSAP infrastructure, this interface might be provided to a central access point handling many PSAP, or direct to the responsible PSAP.

Data available via electronic interface (Figure 18) as detailed in EN 16102 - Implement the standardised data interface for receiving a TPS-eCall set of data (TSD). This includes the MSD as in the 112 based eCall.

Table 2: Comparison table of the main differences between public eCall and TPS eCall

	Pan European eCall	**TPS eCall**
Purpose/service	Only emergency calls	Combined with other value-added services (i.e. track and trace, B-call)
Mandatory	Yes (automatic + manual). MS has to accept	No, optional MS may decline TPS eCalls
Type of communication	Voice + MSD, in band	Service provider specific
Destination	Local, fixed in national routing schemes MNOs must implement (national law)	Not specified; TPS specific
Data	Only MSD according to the standards	MSD and additional data (not standardised (TPS specific)
Priority	Handled as normal 112 emergency call with priority on the networks	Handled as an any other non-emergency call (no priority on the networks)
Traceability	Registered 1 hour after eCall end or ignition turned off (16072; 7.17.2)	As much as GSM if SIM/USIM configures 'eCall and commercial service'

4.6 EUCARIS

4.6.1 Technical implementation of the eCall connection

The European CAR and driving license Information System (EUCARIS) is a unique system that provides opportunities to countries to share their car and driving licence registration information and/or other transport related data helping to fight car theft and registration fraud. EUCARIS is not a database but an exchange mechanism that connects the Vehicle and Driving Licence Registration Authorities in Europe.

The following countries currently exchange vehicle and driving licence information based on the EUCARIS Treaty: Belgium, Cyprus, Estonia, Germany, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, Romania, Slovakia, Sweden, The Netherlands and the United Kingdom (incl. Gibraltar, Isle of Man, Guernsey, Jersey and Northern Ireland).

EUCARIS has developed a platform designed for queries based on VIN number extracted from an eCall (eCall EUCARIS). Inquiries on license numbers are also served. Using this query the emergency services can not only check the national VIN database, but also the national VIN databases of all other countries that use eCall EUCARIS.

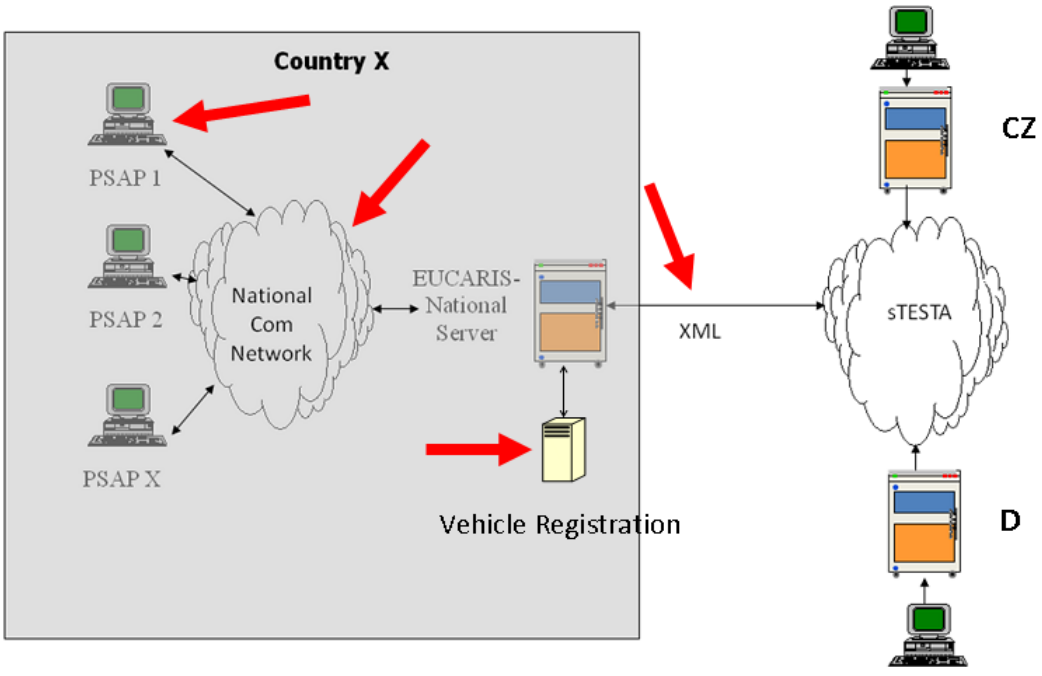


Figure 19: EUCARIS platform

The information that is exchanged through eCall EUCARIS consists of:

Vehicle country
Registration number
Vehicle make
Vehicle commercial name
Vehicle type variant
Vehicle type version
Vehicle type approval
Vehicle European union category code
Registration date
Vehicle registration date country
Wheel base
Vehicle type of body work code
Vehicle type of body work description
Vehicle number of doors
Vehicle color code
Vehicle color description
Vehicle number of axles
Vehicle axle seq number
Vehicle axle max mass
Vehicle max mass tech permitted
Vehicle max mass permitted whole
Vehicle mass in service
Vehicle number of seats
Vehicle number of cylinders
Vehicle capacity
Engine fuel code
Engine fuel description
Engine max power

Table 3 EUCARIS Fields

eCall EUCARIS fields visible in PSAP operator application are optional. According to the specific country design some fields could be always visible, the rest only on operator request.

In order to use the EUCARIS for eCall a Member State shall develop**:**

- New eCall message and web service;
- Inquiries on VIN (fully automated) with broadcasting to all connected EU-countries;
- Web Client for inquiry on license number (manual procedure);

- (Optional) Standard software for secure connection of the eCall organizations with RA's (secure tunnel over internet)

Pilot Countries for eCall EUCARIS are Germany, Finland, Italy, Netherland, Romania, Sweden and Czech Republic. In 2013 the number of Pilot Countries has increased to 16.

EUCARIS is used by a large number of European countries for the cross-border exchange of transport related information. The application has been developed by the non-profit EUCARIS organization (a cooperation of the registration authorities of vehicles and driving licenses of a series of EU and non-EU states), originally aiming to support the registration authorities of the participating countries in their fight against vehicle crime and fraud, within the legal framework of the EUCARIS Treaty.

Each Member State is responsible for its own vehicle registration. EUCARIS merely connects these registrations and is responsible for routing, logging and securing the international part of the communication. Member States are responsible for the security within their own domain.

In recent years EUCARIS has become available for other parties as well. Police organizations use EUCARIS within the framework of the Prüm Council Decisions to exchange information on insurances, vehicles and their owner/holders.

Technical Background

Member states exchange XML messages by directly sending them to the recipient, using a peer-to-peer network model.

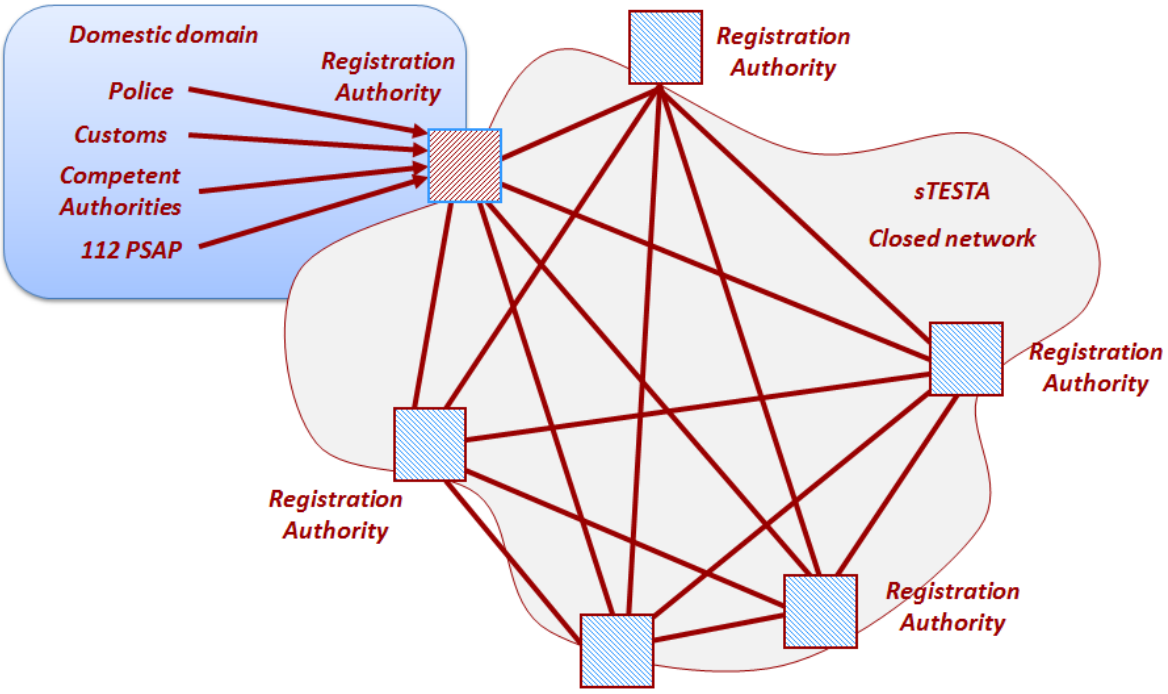


Figure 20: EUCARIS architecture

The National Contact Point for EUCARIS (usually the Vehicle Registration Authority) of a Member State is connected to the network used for the message exchange (sTESTA). The XML messages exchanged between the Member States are secured by XML signing using an X509 certificate and encrypted by using TLS. Once a message is received, EUCARIS checks the XML message on integrity and authenticity, and routes the XML message to the correct destination within the member state. Secure data transport from EUCARIS to the national authorities using the information (and vice versa) is the responsibility of the organization hosting EUCARIS.

There is a solution available for Member States who do not have any framework, standards or requirements for secure messaging between domestic organizations. This solution is called “The EUCARIS Secure Tunnel” and is described in this chapter.

Connected Countries & organizations

The use of EUCARIS is mandatory for EU countries as a consequence of the Prüm Council Decisions and the CBE Directive. By the end of 2014 all member states are expected to be connected. The following organizations are connected to EUCARIS.

Country	Organisation
Austria	Bundesministerium für Inneres
Belgium	Federale Overheidsdienst Mobiliteit en Verkeer (DIV)
Bulgaria	Министерство на вътрешните работи
Croatia	Ministry of Interior
Cyprus	Department of Information Technology Services - Ministry of Finance
Czech Republic	Ministry of Transport
Denmark	Rigspolitiet
Estonia	Estonian Road Administration
Finland	Hallinnon tietotekniikkakeskus (HALTIK)
Finland	Finnish Transport Safety Agency (Trafi)
France	Business Unit Ministères et Projets de l'Etat - CNT
France	Ministère de l'Intérieur
Germany	Kraftfahrt-Bundesamt (KBA)
Greece	Directorate of Road Traffic
Hungary	Közigazgatási és Elektronikus Közszolgáltatások Központi Hivatala (KEKKH)
Ireland	DTTAS
Italy	Ministero delle infrastrutture e dei trasporti
Latvia	Ceļu satiksmes drošības direkcija (CSDD)
Lithuania	REGITRA
Luxembourg	Société Nationale de Circulation Automobile (SNCA)
Luxembourg	Police Grand-Ducale
Malta	Transport Malta
Norway	Norwegian Public Roads Administration
Poland	Ministerstwo Spraw Wewnętrznych
Portugal	IMTT - Instituto da Mobilidade e dos Transportes Terrestres
Romania	Ministerul Afacerilor Interne
Slovakia	Ministerstvo vnútra Slovenskej republiky

Slovenia	Ministrstvo za notranje zadeve
Spain	Ministerio del Interior
Sweden	Transportstyrelsen
Switzerland	ASTRA
The Netherlands	Dienst Wegverkeer (RDW)
United Kingdom	Driver & Vehicle Licensing Agency (DVLA)

Table 4 EUCARIS Contact points per MS

4.6.2 Requirements

Organizational

Countries that intend to use the EUCARIS application are welcome to become a full member of the EUCARIS community, but may also connect as, so called, third parties. There is no obligation to sign or adhere to the EUCARIS Treaty.

Third parties only have to sign a Declaration of Endorsement (DoE), indicating that they accept the Rules of Procedure of EUCARIS and will provide and process data in compliancy with the EU data protection regulations, as referred to in the EUCARIS Treaty. Furthermore they accept, by signing the DoE, the financial consequences.

Financial

For each connection to EUCARIS a yearly general fee has to be paid, plus an amount for the development and maintenance of the specific functionalities of EUCARIS that are used. The exchange of information is free of charge, regardless of the volume of the exchange (number of messages).

Since the development and support of the eCall functionality has been financed by the EC, there are no other additional costs.

4.6.3 Implementing the EUCARIS eCall services

Provision of eCall Vehicle data

The EUCARIS eCall services are typical cross sector services, where the provider of the information and the consumer are completely different authorities or (public) organizations. The providers of the data are normally the national registration authorities in the participating countries, whereas the consumers are the PSAP.

Although from a technical viewpoint it is not impossible that a country would retrieve eCall information from other countries without providing any data itself, it seems reasonable to ask for reciprocity.

Extension of the EUCARIS application

In order to process eCall information the registration authority, which is normally the National Contact Point (NCP), must extend the EUCARIS application with the eCall plugin to be able to deal with eCall specific messages, i.e. to respond to eCall requests from abroad, and to forward requests from the national PSAP(s) to other countries, if necessary.

Access to the vehicle registration

Furthermore the registration authority must develop an eCall legacy service which connects the local vehicle registry to EUCARIS and gives access to the technical vehicle data, for searches both on VIN and on license number. The eCall vehicle data set contains information that is generally available in the EU member states and has added value for rescue teams.

To speed up development it is possible for registration authorities to configure (temporarily) the EUCARIS eCall extension in such a way that it consumes the EUCARIS VHInfo services instead of the specific eCall services (which contain a few more data). In many Member States this enables the quick provisioning of the basic vehicle data, without any substantial effort from the side of the registration authorities.

Use of the eCall data

In order to be able to retrieve eCall data a series of conditions has to be fulfilled:

Requests from the PSAP

The NCP must publish and secure the EUCARIS eCall services while the PSAP must be able to consume these services. The EUCARIS Public Services support SOAP / XML messaging over HTTP.

In order to retrieve the eCall Vehicle data the PSAP has to develop an interface between its eCall processing application and EUCARIS. An incoming VIN from an eCall device may be processed immediately in a fully automated way and be forwarded to the registration authority.

A vehicle license number however will probably need some checks by the operator to prevent unnecessary inquiries after a series of witness calls concerning the same vehicle, or after an inappropriate manual call.

National connection between PSAP and NCP

To be able to request vehicle data from other EUCARIS member states, at national level a network connection between the PSAP and the NCP has to be established. Any connection (e.g. a national network or a secure connection over the internet) will support the secure transport of XML messages.

The EUCARIS organization offers a 'Secure Tunnel' which is free to use and able to secure EUCARIS eCall access and data over any network (including internet) to speed up development.

EUCARIS Secure Tunnel

The primary purpose of the EUCARIS Secure Tunnel is the safe transport of EUCARIS messages between organizations within the domestic domain using public networks, in this case between a PSAP and a EUCARIS server hosted by another organization (NCP or EUCARIS Provider).

The EUCARIS Secure Tunnel is based on a set of security requirements, which can be implemented using open standards and widely available techniques. The EUCARIS Secure Tunnel is available in two software components (client and server), which support the implementation of the secure tunnel. The EUCARIS Secure Tunnel is available with no additional costs and resolves a possible security hurdle and therefore might significantly speed up the implementation of EUCARIS in the eCall process.

EUCARIS request

As a process step in handling the emergency call, the PSAP sends a request for vehicle data to its domestic organization hosting the EUCARIS application. The actor making the call might be a natural person – e.g. an officer working at the 112 Emergency Dispatch Center – using the EUCARIS web client or a customized client. On the other hand, the actor could be a software component of the 112 Emergency Dispatch Center.

It is either possible to make a request by VIN, or to make a request by license plate number plus country code. The decision on what type of request to make is made by the actor. The request by VIN can be a Multi Country Inquiry (MCI) or a request to a specific country. When sending a request using MCI, EUCARIS determines which countries are supporting and are authorized to answer eCall requests, and aggregates all received response into one single response message.

A EUCARIS eCall response message consists of vehicle technical data and vehicle signals (specifically stolen, export, wrecked, invalid, plate stolen). These signals are relevant because they may indicate that the provided information is possibly unreliable and belongs to

another vehicle than the vehicle involved in the eCall because of fraud or an error. Next to this, if there is a reason to suspect that the data might be inaccurate, the Member State providing the data can indicate possible unreliability by adding one or more messages to the vehicle result.

The figure below gives an overview of the eCall chain, and the communication between the 112 Emergency Dispatch Center and EUCARIS.

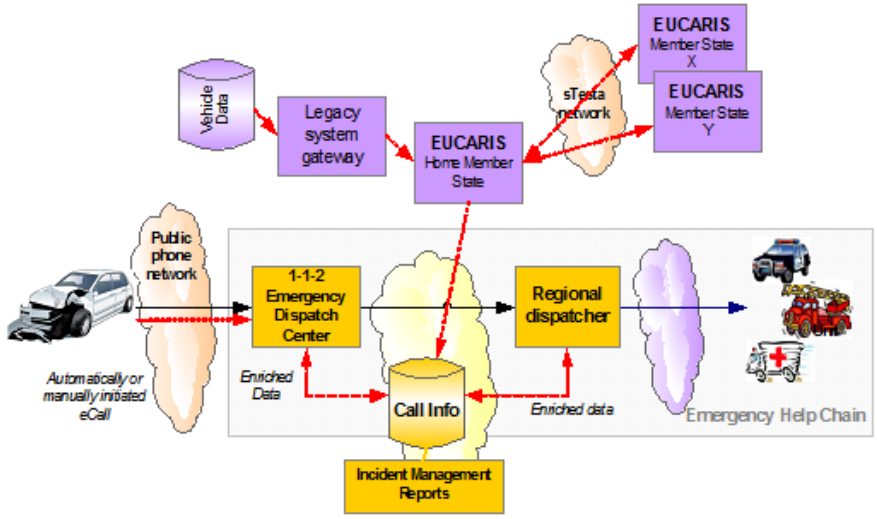


Figure 21: Communication between 112 and EUCARIS

Optimizing the process

Although every Member State is free to choose its own specific EUCARIS implementation in the PSAP data aggregation process, EUCARIS Operations advises to adopt the following process optimizations:

1. Since most eCall requests will involve domestic vehicles, the vehicle data will be found in the domestic vehicle registration. To gain speed and also to minimize the load on the international EUCARIS network it is therefore advised to query the domestic vehicle registration prior to other EUCARIS member states. It is possible to request the domestic vehicle registration using EUCARIS if the NCP has implemented a legacy service for eCall.
2. Perform a Multi Country Inquiry (broadcast) using EUCARIS to find vehicle registrations in other EUCARIS Member States only if no actual vehicle registration is found in the domestic vehicle registration. A Multi Country Inquiry to all EU countries may be expected to take around 10 seconds.
3. Due to export a vehicle can be found in multiple registrations over the connected Member states, but only the actual registration is considered as relevant. Which

registration is the actual one can be determined by using registration dates combined with vehicle signals (like export, scrapped or invalid).

EUCARIS is able to supply software components that support this optimization process, called the *eCall Message Handler*.

Acceptance procedure EUCARIS - eCall

The full implementation of EUCARIS in the EU Member States requires that the EUCARIS eCall services and both the connected client application and the connected legacy service providing the eCall information are tested with the application at RDW in The Netherlands. Test scripts, test tools and a permanent test environment are available at RDW. The procedure ends with a formal acceptance of the implemented services by EUCARIS, which guarantees the integrity of the data exchange. Because of this procedure separate testing with other countries is not necessary.

Configuration updates

After acceptance EUCARIS takes care of an update of the EUCARIS configuration in the already connected Member States, especially to add the address of the new State and to include the mutual authorizations.

4.7 Barriers to EUCARIS system connection

The following table summarizes the status of connection to the EUCARIS system and, if relevant, the main barriers encountered by HeERO2 Member States.

HeERO2 MS	Barrier(s)
Belgium	Calling the 112 means calling the fireman. Firemen are connected to the police and the police are connected via DIV to the EUCARIS Network.
Bulgaria	Bulgaria plans to connect to the EUCARIS database.
Denmark	Denmark has four “opt-outs”. One of these makes it “illegal” for Denmark to connect to the EUCARIS system.
Luxembourg	The plan is to connect to the EUCARIS system by the end of the 2014. The necessary access to EUCARIS is very complex and a solution has not been not found. EUCARIS support available in Lux, Webinterface for eCall router needs to be implemented – will be postponed for the final solution.

Spain	The Spanish eCall architecture has not been decided yet. This means that it is still not definitive whether an Intermediate PSAP will be deployed or if the eCall will be sent directly to the regional 112 PSAP. The decision on the eCall architecture in Spain will have a direct impact on the access to the EUCARIS database. Specifically, an intermediate PSAP is placed in the Madrid Traffic Management Centre and will mainly deploy the national Spanish vehicle database owned by DGT. For non-Spanish vehicles, the EUCARIS database will be deployed. However it has not been decided whether the connection to the EUCARIS database will be established directly from the eCall decoding software installed at the PSAP (whether this will be centralised at the Intermediate PSAP or will be implemented at each regional PSAP systems) or via an interface from the National Spanish database (that is, that EUCARIS would "feed" the National Spanish vehicles database from which vehicle data based on the VIN is currently obtained, as in the HeERO2 tests).
Turkey	EUCARIS is the system which shares the vehicle information between member states. It has not a common database but when a member state searches information of a vehicle this system search the answer from the other member states databases. It is a kind of data base sharing system. In Turkey, the National Police is responsible for this and keeps this vehicle information on its servers. At the beginning of the project Turkish members thought that it won't be easy to connect a system since Turkey is not an EU member, so we said that we will not use EUCARIS in the Turkish pilot.

Table 5 Barriers for EUCARIS implementation

4.8 Solutions to eCall deployment barriers

This chapter provides the solutions to eCall deployment barriers encountered by the HeERO2 countries or likely to be encountered during implementation and operation of eCall.

The summary of barriers and related solutions mentioned in this chapter takes into account the contents of HeERO2 deliverable D6.2 Barriers and solutions to the implementation of the eCall. The summary includes solutions to the barriers which are considered most significant, are most likely to be encountered and are relevant to member state level.

Barrier	Solution(s)
There is no full support from, different stakeholders.	- Completion of European level regulation which mandates implementation of eCall in PSAP, communication networks and new type-approved vehicles.
Retrofit IVS will require a legal framework	- Provide development guidelines for retrofit IVS products; this could be a task of the EeIP task force "RETRO". - Monitor the status of retrofit IVS products and consider actions, if significant challenges or risks are encountered.

Barrier	Solution(s)
	- Continue development of IVS certification scheme.
Too many and too extensive standards	- Introduce a centralised approach, through a third party, that is in charge of the certification and standardisation. - Create a summary so that operators can have a clearer overview of the existing standards.
Procurement procedures are too complex	- Introduce call for tenders to select the best PSAP technology provider. - Governments need to simplify procurement procedures. - All the MS PSAP should be conform to eCall specification (i.e. conformity assessment)
There is no regulation on the implementation of eCall Discriminator (eCall Flag).	- Introduce regulation on the implementation of eCall for MNOs to implement the eCall Discriminator (eCall Flag). - Introduce Minimum network coverage (i.e. on main roads). - Make eCall with the designation of TS12 to work across all networks irrespective of which network the SIM is registered to.
Lack of commitment of IVS developers due to perceived lack of business case (waiting for a clear decision or government subsidies).	- Complete the European level regulation which mandates implementation of eCall in PSAP, communication networks and new type-approved vehicles.
PSAP in a member state have very different technical infrastructure	- Analyse the architectural and deployment options available building on the experiences from HeERO and HeERO2 projects. - Centralisation of reception and handling of eCall to a few key PSAP – at least as an interim solution. - Development of a national eCall roadmap or a national eCall implementation plan.
PSAP in member states need updates which may be difficult to complete until 1st October 2015 (now 2017)	- Use temporary arrangements to have eCall available in a situation in which all PSAP have not been updated yet (for example, routing all eCall to one PSAP equipped with eCall) - Define the schedule of deployment and the actions required in a national eCall roadmap or an implementation plan. - Increase the awareness of stakeholders on member state level on the options available for implementation of eCall and the related benefits and costs. - Results for HeERO and HeERO2 projects will support deployment of eCall in shortest possible time. - Monitoring of eCall deployment based on the European ITS directive. - Call for tenders to be put in practice to select the best PSAP technologies. - Use existing 112 PSAP for eCall.
Route manual and automatic eCall to correct places (transmission to the correct PSAP).	- Define call routing in a national eCall implementation roadmap or eCall implementation plan - Exchange the IVS number between call centres in the same manner as the MSD. - Share updated information between PSAP. - Allow PSAP architecture to handling both Pan EU eCall and TPS eCall. - Use dedicates training manuals linked to a generic manual and training manuals produced in HeERO 2.
All the staff in PSAP have not been trained to handle eCall	- Train PSAP staff. - Temporary arrangements to have eCall available in a situation in which all PSAP have not been updated yet (for example, routing all eCall to one PSAP with trained

Barrier	Solution(s)
	staff) - Use dedicate training manuals linked to a generic manual and training manuals produced in HeERO 2.
Silent calls	- Define appropriate call handling procedures at member state level. - Use of information available via voice connection (background noise etc.). - Utilisation of information available in MSD. - Use of network based positioning to validate the location of the caller (available for all E112 calls).
Operational questions in call handling (noise, silent calls, queuing of calls, answering and eCall with failed MSD transmission etc.)	- Define appropriate call handling procedures at member state level (use the guidelines from EeIP and results of the HeERO and HeERO2 projects).
Dormant SIM	- Introduce a clear and unique standardisation process on dormant SIM.
Weaknesses in IVS implementation	- Development of certification scheme for eCall IVS - Development of certification scheme for the components implementing the eCall in-band modem. - Introduce regulations on vibration testing, electronic test or temperature of eCall devices to allow eCall devices to have minimum requirements and to be more reliable. - Continuation of the eCall test-fest events - Further analysis of the weaknesses identified but not analysed in detail in HeERO project. - Perform eCall end-to-end tests on member state level to ensure correct functioning and reliable operation of eCall.
Problems with mobile network coverage or signal strength	- Monitor the service quality of E112 emergency calls; analyse the status of national regulations concerning the coverage of the mobile networks and handling of 112 calls, and implement changes if necessary. - Introduce regulations to ensure minimum network coverage for eCall, (i.e. coverage ensured on the main roads). - Clarify funding aspects before the introduction of legislations on network coverage. - Set up a consortium of different countries and different MNOs who are capable and willing to roll out the eCall flag in the different countries with adjacent geographical areas.
False eCall generated by mobile phones which erroneously activate eCall flag	- Documentation of the erroneous operation of the mobile phones affected by the problem and contacting the equipment manufacturers.
MSD transmission is not always successful	- Development of guidelines on the service quality acceptable for eCall service. - PSAP uses the voice connection to communicate with vehicle occupants. - Take into account the possibility that the MSD transmission fails in operation of eCall and related guidelines. - Carry out further analysis on correlation of the outcomes of individual MSD transmissions during the same call. - Development of certification scheme for eCall IVS. - Development of certification scheme for the components implementing the eCall in-band modem. - Perform eCall end-to-end tests on member state level to

Barrier	Solution(s)
	ensure correct functioning and reliable operation of eCall. - Carry out further analysis of the factors which contributed to MSD success rate in the HeERO pilots to increase the reliability of MSD transmission.
When several Filtering Instances are operational, a selection should be made by the Mobile Number Operator (MNO) as to which Filtering instance receives which eCall.	- In crossborder situations, define the destination PSAP or destination filtering instance where the calls have to be transferred.
The lack of a defined trigger for automatic eCalling beyond the airbag deployment is perceived as a serious barrier to the successful development and operation of aftermarket IVS devices.	- Do not rely eCall on the impact detection system of the vehicle. - Perfectioning the IVS inertial system that should be highly integrated with the GPS in the device.
Definition of the standard for integration of dangerous goods information into eCall	- Integration of standard information for dangerous goods and provision of dynamic information on the type and quantity of load.
Consumers or the media confuse eCall with other in-vehicle emergency call services	- Educate car users on the functionality and correct use of eCall; public awareness campaigns organised by member states with support of EC and EeIP
Misuse of eCall	- Educate car users on the functionality and correct use of eCall; public awareness campaigns organised by member states with support of EC and EeIP
Users' concerns of privacy violations and risk of supervision and tracking of individual vehicles	- Educate car users on the functionality and correct use of eCall; public awareness campaigns organised by member states with support of EC and EeIP
There is no full support from, different stakeholders.	- Completion of European level regulation which mandates implementation of eCall in PSAP, communication networks and new type-approved vehicles.
Retrofit IVS will require a legal framework	- Provide development guidelines for retrofit IVS products; this could be a task of the EeIP task force "RETRO". - Monitor the status of retrofit IVS products and consider actions, if significant challenges or risks are encountered. - Continue development of IVS certification scheme.
Too many and too extensive standards	- Introduce a centralised approach, through a third party, that is in charge of the certification and standardisation. - Create a summary so that operators can have a clearer overview of the existing standards.
Procurement procedures are too complex	- Introduce call for tenders to select the best PSAP technology provider. - Governments need to simplify procurement procedures. - All the MS PSAP should be conform to eCall specification (i.e. conformity assessment)
There is no regulation on the implementation of eCall Discriminator (eCall Flag).	- Introduce regulation on the implementation of eCall for MNOs to implement the eCall Discriminator (eCall Flag). - Introduce Minimum network coverage (i.e. on main roads). - Make eCall with the designation of TS12 to work across all networks irrespective of which network the SIM is registered to.

Barrier	Solution(s)
Lack of commitment of IVS developers due to perceived lack of business case (waiting for a clear decision or government subsidies).	- Complete the European level regulation which mandates implementation of eCall in PSAP, communication networks and new type-approved vehicles.
PSAP in a member state have very different technical infrastructure	- Analyse the architectural and deployment options available building on the experiences from HeERO and HeERO2 projects. - Centralisation of reception and handling of eCall to a few key PSAP – at least as an interim solution. - Development of a national eCall roadmap or a national eCall implementation plan.
PSAP in member states need updates which may be difficult to complete until 1st October 2017	- Use temporary arrangements to have eCall available in a situation in which all PSAP have not been updated yet (for example, routing all eCall to one PSAP equipped with eCall) - Define the schedule of deployment and the actions required in a national eCall roadmap or an implementation plan. - Increase the awareness of stakeholders on member state level on the options available for implementation of eCall and the related benefits and costs. - Results for HeERO and HeERO2 projects will support deployment of eCall in shortest possible time. - Monitoring of eCall deployment based on the European ITS directive. - Call for tenders to be put in practice to select the best PSAP technologies. - Use existing 112 PSAP for eCall.

Table 6: Solutions to eCall deployment barriers

5. Guidelines for new emerging topics eCall implementation and operation

5.1 eCall for Truck and Dangerous Goods

TRUCKs and dangerous goods eCall service description

The European Parliament has asked the European Commission to investigate extending the scope of the eCall legislation to other vehicles such as long distance coaches and freight vehicles. A possible roadmap would be to start with potentially problematic transports on a voluntary basis and/or together with paperless transport.

For this reason the HeERO2 project focused their work on eCall support for the handling of dangerous goods transports, coupled with the existing work carried out in HeERO 1

The requirements:

How can the 112 centre get the necessary information about potentially dangerous goods that might be loaded onto a vehicle that has just reported an incident via the eCall service?

Currently the only information the 112 centre receives with the eCall is the Minimum Set of Data (MSD), containing “emergency relevant” information.

Additional data in the MSD

It was envisaged from the start of the HeERO2 project that there would be a need for additional data about heavy goods vehicle loads which can be classed as dangerous goods. The MSD can be extended with using an optional set of (well defined) data that does not exceed the available number of bytes.

At the time of writing at least two applications for Optional Additional Data are recognised:

- Embedding information about the load of commercial vehicles – this usage has been defined in EN16405 [2] (currently in CEN ballot)
- Embedding GLONASS extended incident information – this usage has been defined by GLONASS

MSD data structure

The MSD structure is well defined in EN15722 [1] and will not be discussed here other than to be shown in the figure below, which outlines the basic structure of the MSD:

MSD				
msdVersion	INTEGER (1..255)	-	M	
msd				
msdStructure				
optionalAdditionalData			O	
oid	RELATIVE-OID			
data	OCTET STRING			

Figure 22: Basic Structure of the MSD

The main goal of EN15722 in respect to Optional Additional Data was to make sure that different applications could use the available space as optimally as possible, and at the same time to make sure that interoperability was secured. This has resulted in the Optional Additional Data component in the MSD consisting of two elements:

- The Object Identifier (OID), which references the contents and definition of the data
- The data itself

In this way any definition can be made for any use of additional data. The receiving PSAP can recognise what data is sent, decide whether it can decode the data and (if so) decode and use the information provided.

Methods of embedding relevant data

To embed information about the load of commercial vehicles the data part of the Optional Additional Data can be used in two ways:

- it could contain the all relevant data that needs to be transferred to the emergency services
- it could contain a reference to an external source where the relevant data is held– in this case the OID could also be used to define a method to retrieve the data from the specific source

To retrieve information from an external source a key must be used to identify the vehicle. Such a key might be embedded in the Optional Additional Data. A simple means would be to use the license plate of the vehicle. The eCall MSD does not provide this information. The only identifying information for the vehicle is the Vehicle Identification Number (VIN) which is unique.

Using the European Database EUCARIS

Some PSAP systems use EUCARIS to determine the vehicle type, make and colour. This lets the emergency services identify the vehicle that sent the eCall more easily. Retrieving the license plate of the vehicle is part of the standard EURCARIS query.

Optional Additional Data Registry

In order to facilitate the referencing of the meaning and definition of data an Optional Additional Data Registry is of great importance. EN15722 envisages the existence of such registry, but does not define it. As the need for such registry is recognised, the following steps are currently foreseen:

- The OID is used to determine meaning and encoding of the optional data.
- A (public) register is set up, that lists the OID together with the definition of the data
- A registration procedure is set up, to ensure additional data is both functional and correctly defined
- PSAP can choose to implement registered definitions in order to ameliorate the emergency process

How the additional data can be used for handling of dangerous goods and the ways to code this into an MSD will be explained using the following two real life examples.

Example 1: Use of additional data in hazardous goods transport (Dutch trial)

In the case of an incident it is vital to give the emergency services direct access to information on the nature of the goods aboard the vehicle(s) involved. It also provides a cost efficient way to fulfil the demands from emergency services about the availability of transport data in case of an incident which is currently hindering the implementation of paper-less transport. This can be done either by including the data into the eCall message or by providing references to external data base already in use in the logistic chain.

The first approach has the benefit that all data is available to the emergency services immediately. No external referencing is necessary; however space for this information is limited. Only simpler bulk transports (e.g. a gas tanker) have less complex freight data small enough to fit into the basic eCall message.

It is a downside; however, that additional development is necessary to get this information inside the MSD.

Using an external reference might be more cost effective as no (or only limited) extra cost is necessary for database development. The way to reference the external data depends on the method that has been used within the external database.

Several European Projects are working on the topic of tracking and tracing of dangerous goods. In most of the proposed solutions the information about the loaded goods of a transport is stored in a database. The transporters are equipped with a tracking device that provides the current location of the transport to the services at specific time periodic. Unfortunately these databases all have different user interfaces and access procedures. This makes it impossible for public safety services to

- Be certain to find the right database that contains the relevant information for a transport;
- Be able to access the database and retrieve the information.

Both of these blocking points can be resolved using Optional Additional Data. It can contain a reference to an external database, preferably the link to a web service of the database, per vehicle. This web service has to provide a standardised interface that allows the PSAP SW to retrieve the necessary information about the loaded dangerous goods. The details for the implementation of this web service and the security procedures to avoid unauthorised access are not defined yet.

Several keys can be used to access such a web service. A key can be part of the Optional Additional Data, but given the current mode of operation the licence plate number of the vehicle involved in the incident is a more appropriate key.

An existing implementation makes use of the truck licence plate as a key to retrieve the data from an existing paper-less transport process. The emergency services can use this key and the given web address together with the prescribed access method to access the freight data and all the relevant logistic data such as product name, factory, shippers details and more.

The additional data concept based on web services can be used to access a dangerous goods tracking service called DG-Trac. The DG-Trac service is used to track transports of medical items such as blood samples or pharmaceutics. These items could provoke serious health risks for emergency workers and people should they be implicated in an incident. The DG-Trac service can provide real-time location of the dangerous goods, the type (UN-number) and the quantity, as well as other vital information. This would be very important information for emergency services to have when they have to handle an incident concerning this transport.

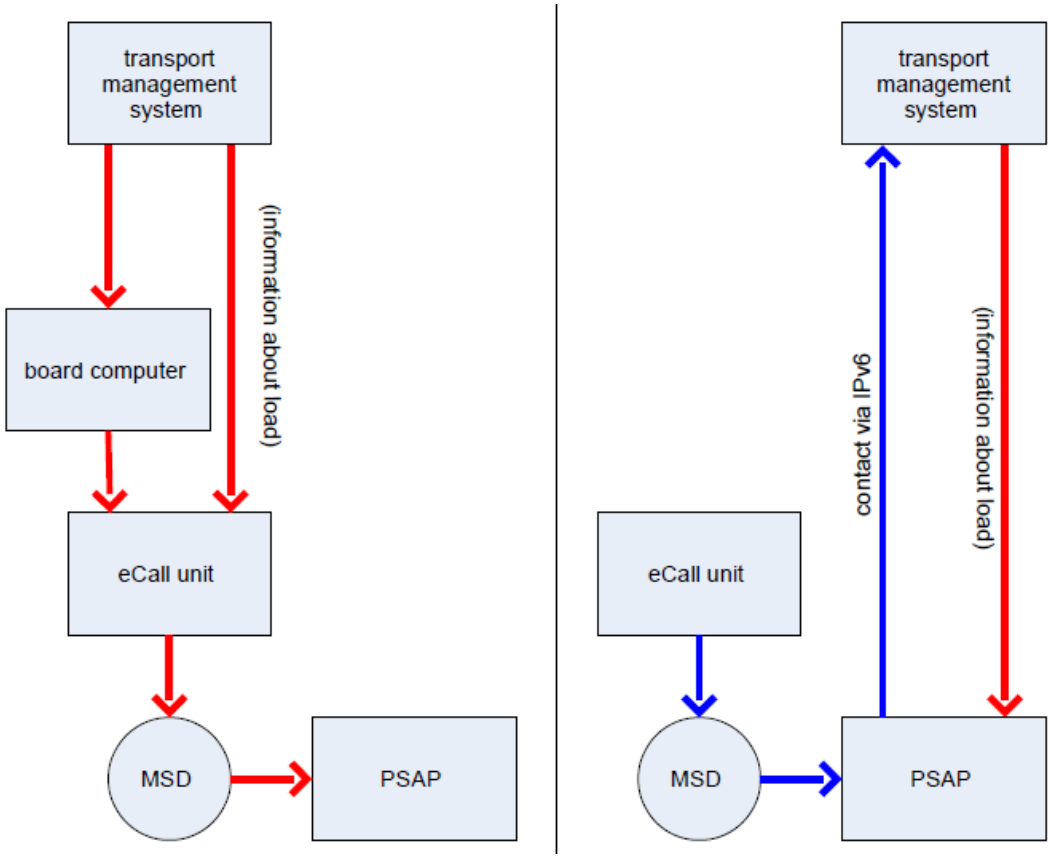


Figure 23: The Options for Extra eCall message information

Example 2: Transport of medical goods (Luxembourg trial)

To link the information of the DG-Trac service and the eCall the additional data of the MSD is used. In the additional information a link to web service of the DG-Trac service is stored and the OID corresponding to the web service.

When an eCall is issued by the transporter of the dangerous goods, the additional Information is also transmitted to the PSAP application in the Call server. The PSAP application finds that there is an additional link to a dangerous goods tracking service in the OID. The application will call the DG-Trac web service and provide the licence plate number of the transporter as a parameter. The licence plate number is derived by combining the standard MSD information from eCall and information from the EUCARIS database.

As a result of this call to the web service the application receives detailed information about which dangerous goods are loaded in this transport. This information can then be provided to the operator to help them to decide on the necessary actions.

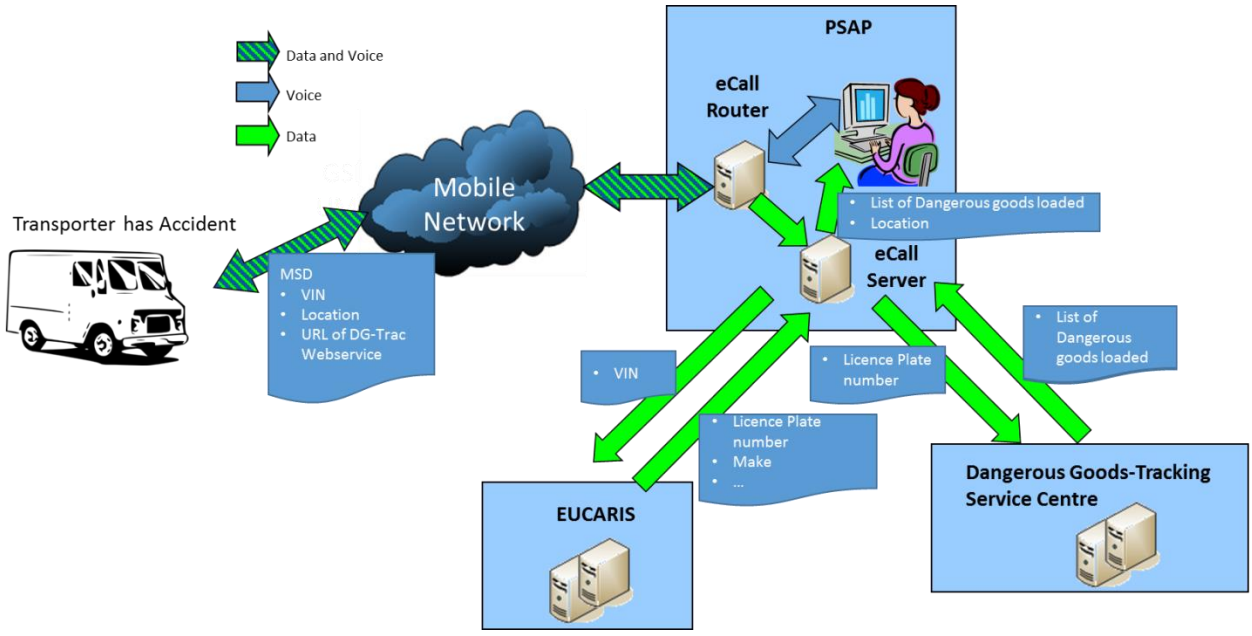


Figure 24: Data flow from a vehicle involved in an incident to the PSAP operator

Truck and dangerous goods eCall service key actors and stakeholders

The following major stakeholders and key actors have been identified:

- Direct Users (directly benefitting from the service)
    - Senders/Receivers of dangerous goods
    - Logistic companies
    - Public safety services
- Indirect Beneficiaries (indirectly benefitting)
    - Insurance companies
    - General public
    - Regulators

- Dangerous Goods Tracking Service Providers

Direct Users

Senders/Receivers

The sender is responsible for setting the transport chain in motion and normally for choosing the transport methodology, the packaging, the labelling and marking for their goods.

The receiver is the recipient at the intended final destination and in some cases may be the instigator of the transport (e.g. ordered goods for example organs for transplant).

It is the responsibility of the sender to choose the means and the logistic company that allows the tracing and tracking of the transport. When the tracking has to be done at unit level the sender/receiver has to install the necessary means for this tracing.

In current European legal environment the sender is not obliged to use a service for tracking dangerous goods transports. Therefore it is a goal of the dangerous goods tracking services to offer the sender/receiver advantages that will support their decision to use a tracking service. Support of European eCall will be one of the advantages.

Logistic Companies

Logistic companies are the main stakeholders for the tracking service. Without the support and the involvement of logistic companies the tracking services are not possible. Logistic companies organise the transports and are – beside to the senders and consignees - responsible to comply with the regulations for dangerous goods transports. It is therefore very important for the project to have their support. A survey conducted by the HeERO2 project shows that unfortunately logistic companies are very reluctant in supporting general tracking services. The main reason stated is information privacy. If the logistic companies are not forced to support the eCall dangerous goods mechanism either by their customers (the sender) or by the EU regulation, they will not support this.

Public Safety Services

The view of the public safety users is that effective management of an event involving hazardous materials requires the receipt of information about the event and its circumstances on one hand and on the other hand quick access to information about the specific hazardous materials in question.

The public safety users will be the main beneficiaries of the eCall dangerous goods service. The service will provide them access to all available information about dangerous goods transports in their area.

Indirect Beneficiaries

Insurance companies

An interesting indirect beneficiary can be insurance companies that ensure the transport of the medical goods. Today dangerous goods transport have higher insurance rates than normal transport. Discussions with representatives of insurance companies show that there is some interest in the tracking and tracing of dangerous goods' transports. There is the possibility that the insurance company could introduce special rates for tracked transports similar to the special car insurances of cars with tracking devices against theft. This reduced rate could be an incentive for the users.

General public

The general public is a main beneficiary in case of incidents. When the emergency services are informed automatically about an incident of a transporter of dangerous gods and receive immediately all necessary information about the goods and how to handle it, the emergency service can react much faster than today and reduce possible effects of the dangerous good on the environment or the inhabitants living near by the incident.

Dangerous goods tracking service providers

A central part of the overall service is the service provider. They are responsible for the implementation of the service and its operation. They have to ensure a 24h/7 service availability based on a service level agreement with all users.

The service provider will establish contracts and service level agreements (SLAs) with all the other stakeholders in order to provide the required services and to ensure the legal and privacy requirements.

Dangerous goods tracking service providers are very important stakeholders that need to provide the web service interfaces to their tracking service. Tracking services provide no or only proprietary interfaces to external systems. A new Dangerous Goods Tracking service for the medical sector called DG-Trac will be implemented in Luxembourg as result of an ESA project. This service will provide the standardised interfaces defined for eCall handling of dangerous goods transports.

Truck and dangerous goods standards

Accord européen relatif au transport international des marchandises dangereuses par route
The major framework that covers the transportation of dangerous goods is the "Accord européen relatif au transport international des marchandises dangereuses par route" ("ADR") of 30/09/1957. The latest revision was agreed upon in 2010 ("ADR 2011") and may be found at: http://www.unece.org/trans/danger/publi/adr/adr2011/11contentse.html.

This international framework offers possibilities for the participating countries to establish to a certain extent different rules to ADR or to adopt them at different dates.

Where Luxembourg and Germany are concerned and with regard to the scenarios 1 – 2 (S1 – S2) the current ADR-regulations are not altered in any way. Concerning scenario 3 (S3), Germany has modified the regulations for national and certain international transports (see below). Transports between Germany and Luxembourg nevertheless have to follow ADR, due to the fact, that Luxembourg has not signed that special multilateral agreement (M232 to ADR) yet.

ADR offers a classification list ("UN-numbers") with specific information on the dangers of a (chemical) substance, its labelling and packaging regulation etc.

ADR regulations have to be observed (and often checked) by all the parties which may be part of a shipment of a DG.

MSD Standard

Relevant for the definition of the MSD is EN15722. This standard will be adapted to include the concept of the handling of additional data.

Standard for external source handling

When the proposed enhancements of the MSD standard EN15722 are accepted a further standardisation effort is needed to standardise the interfaces to the external sources. This standardisation has to include how 112 centre applications have to interpret the information provided by the additional data of the MSD and how they have to access the web service.

This effort will need substantial discussion with 112 centre SW vendors and dangerous goods tracking service providers. This effort was not foreseen in the HeRO2 project.

Relevant Stakeholders for truck and dangerous goods In-Vehicle System

The main stakeholders for the in-vehicle system for dangerous goods handling are

- the on-board unit manufacturers
- the logistic companies

Manufacturers of on-board units

The manufacturers of eCall IVS that should be used in dangerous goods transporters need to support the enhanced additional information concept.

In addition they have to provide a user interface that allows the owner of the transporter to change the data in the additional information field.

As described above the additional information field of the MSD can contain following data relevant for dangerous goods handling:

- information about the dangerous goods that are loaded
- a link to the transport documentation in PDF form
- a static link to a web service providing the current status of the loaded goods

There are two interfaces that need to be considered:

- user interface for data that has to be updated for every transport (case 1 and 2)
- user interface for data that only needs to be updated when the service provider is changed (case 3)

User Interface – update every transport

- If the owner of the transporter opts for option 1 or 2 for handling the dangerous goods information in the MSD, the IVS has to provide a user interface to update this information by the driver or the administration system of the logistic company. This interface needs to be defined in the standard. It also create questions like, who is allowed to change the information, how to ensure the accuracy, how can security and privacy be ensured etc.

User Interface – update when web service provider is changed

- This user interface is only needed, when the owner of the transporter is changed or the owner selects a new service provider for the dangerous goods handling information. This intercase can be a simple web interface that allows to update the information in the IVS occasionally. Security and privacy aspects need to be taken into account like the previous user interface.

EU regulation for truck and dangerous goods In-Vehicle systems

- The EU regulation for IVS and especially the MSD is found in EN15722 as described in chapter 0

Certification of truck and dangerous goods In-Vehicle Systems

- Certification and inspection have to be handled in the same way as standard eCall devices will be certified and inspected. No additional rules are needed.

Truck and dangerous goods In-vehicle devices' periodical inspections

Certification and inspection have to be handled in the same way as standard eCall devices will be certified and inspected. No additional rules are needed.

5.2 Retrofit devices

This chapter reflects the current situation and considers information generated as a result of previous HeERO2 activities and up-to-date information provided by the EeIP RETRO Task Force

Retrofit devices standards

In case of standardization, EeIP RETRO Task Force proposes to refer to existing standards.

A set of standards from CEN and ETSI are providing the requirements for the Pan-European eCall services. The following figure shows where these standards are applied in the eCall chain. The retrofit device should comply with the standards defined for the IVE.

However, clear requirements, standardization and procedures for certification are still missing with respect to retrofit devices.

No recommendations or guidelines exist for crash test or for the installation of retrofit devices by skilled people. There should be a certification or warranty on airbag functioning and clear regulation on liability issues. There should be an independent body that certifies retrofit devices.

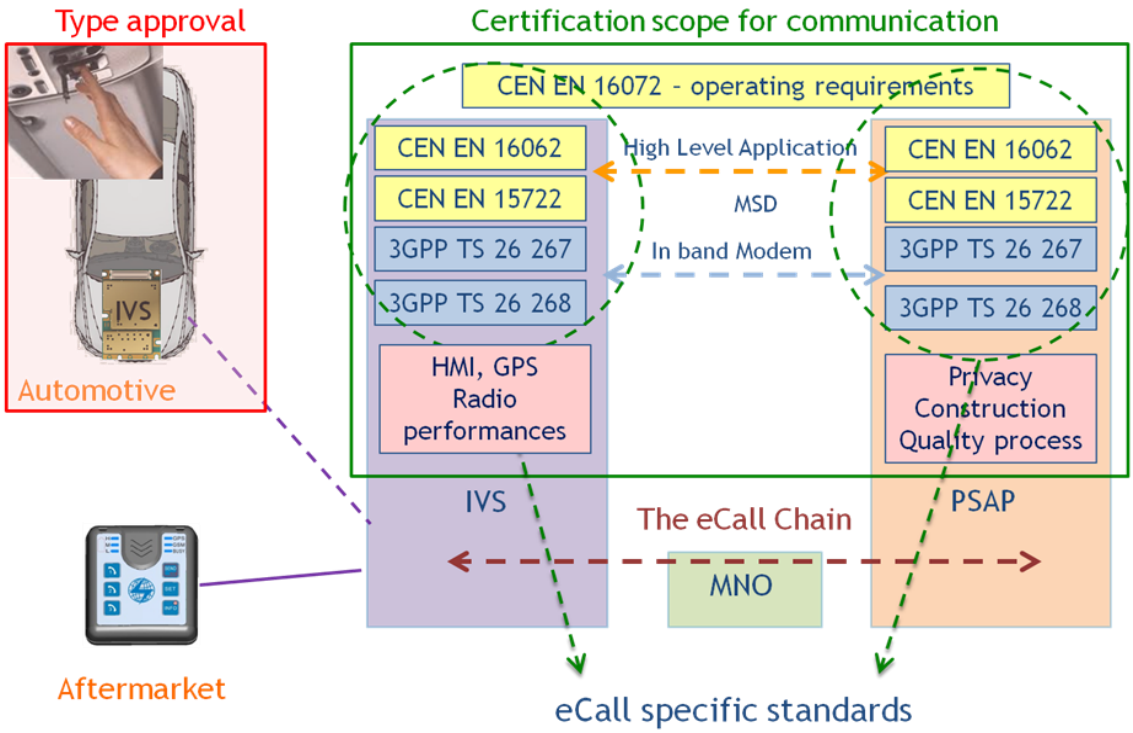


Figure 25: Standards for IVE

Relevant Stakeholders for retrofit devices

This section intends to provide an overview of the main categories of stakeholders related with eCall IVS retrofitting:

- In general terms, it could be stated that the identified IVS manufacturers can have a two-fold approach (making embedded or retrofit versions of the IVS solution) on some occasion. It is obvious that one key stakeholder is the IVS manufacturer itself.
- Of essential importance is the OEM, who play a clear role as the manufacturers of the vehicles where the devices will be retrofitted
- Dealers are also represented in this group, considering the role they can play in the distribution (and possible) installation of the retrofit devices
- Professional certified installers and workshops, which will take care of the installation of the devices and periodical inspection of them.
- Competent authorities, who might carry out enforcement activities to check a series of issues in order to make sure that the device is correctly installed and works correctly (maybe by means of on-the-spot stops and controls to the vehicles)
- Insurance companies which might have a role in the definition of some of the aspects related with regulation and certification of IVS retrofitting, as far as liabilities in case of malfunctioning of the system and its consequences are concerned
- Service providers, making use of a multipurpose IVS (also including eCall functionalities) which is retrofitted in the vehicles for different services.
- Other devices manufacturers: other type of devices manufacturers not initially contemplated as in-vehicle systems might also be represented in this group, particularly, Smartphone manufacturers or PND manufacturers, considering the penetration rate of these devices and the possibility to consider them as eCall retrofit devices.
- Others, for example, the developers of software managing eCall in the “other devices” subject to be considered for retrofitting, as in the case of the developers of Apps managing the eCall function in Smartphones.
- Drivers: they have the final decision to retrofit their vehicles (unless they are obliged by regulation).

EU regulation for retrofit devices

At present, there is a clear need concerning regulation for the use of retrofit devices for eCall.

First of all, the regulatory framework should clearly define what can be considered a retrofit device (for eCall purposes) and state the requirements expected from it in terms of technical aspects and robustness.

Regulation must be also put in place concerning liability aspects. For example, retrofit on-board devices need to have access or connection to specific in-vehicle systems/interfaces (e.g. CAN bus) for specific purposes. Generally, OEMs will not be open to let an external device to connect to specific in-vehicle systems and this might have an impact on safety aspects, for example in case of failure of the system, if the IVS is series equipment, the car manufacture has responsibility. In the case of retrofit devices, it is not clear who has the liability. Moreover the correct functionality of the IVS cannot be fully guaranteed without an appropriate installation on the vehicle.

In general there is no relation between the vehicle manufacturer and the company installing the IVE. The installation of retrofit device should be performed by skilled people. However standards, requirements or guidelines are missing.

In this sense, having no guarantee on how the installation process is carried out can lead to a liability gap which needs to be clearly analysed and specific regulation also supported by appropriate standardization and certification activities is to be put in place.

Solutions to barriers

The following table summarises the barriers and possible solutions to them

Barrier	Solution(s)
Radio and GNSS signal in retrofit devices is a problem. The correct functionality of the IVS cannot be fully guaranteed without an appropriate installation in the vehicle.	- A possible solution would be to offer a discount for vehicle insurance if the retrofit device is installed by a certified company. - Retrofit devices are almost 100% autonomous (with exception of the power supply). Their connection and interaction to vehicle's electronic devices and control units is limited. Challenges lie mainly in achieving a very robust design capable of delivering the required functionalities in extreme conditions, which is at the same time universal enough to allow fitting in all passenger car makes and models. Each car manufacturer has different communication systems. Therefore the challenge is to have a number of configuration templates such as different combination of retrofit device and vehicle models.
Standardization and certification	- Definition of clear requirements, standardization and procedures for certification - No recommendations or guidelines exist for crash test or for the installation of retrofit devices by skilled people. There should be a certification or warranty on airbag functioning and clear regulation on liability issues. There should be an independent body that certifies retrofit devices.
Legislation and regulation	- Liability aspects should be clarified. - The retrofitting market will need a legal framework capable of defining exactly what a retrofit device is and its requirements in terms of technical aspects and robustness. Strict regulations are also

Barrier	Solution(s)
	necessary. All that in turn could lead to an increased public acceptance level of eCall system.
Design and requirements. Standardization	- Clear requirements, standardization or procedures for certification represent up to now deployment challenges for retrofit devices - The location of the unit should be analysed in terms of vehicle impact thus considering the construction year of the vehicle which has an influence on the performance

Table 7 Solutions to Barriers

6. Implementation plans for eCall in HeERO2 countries

6.1 Belgium

Plans for eCall implementation in Belgium

The focus of the pilot is to test and specify the role of the filtering instance.

In Belgium there is not a roadmap for eCall implementation. However discussion are currently undergoing to connect private eCall to the European eCall and to identify under which framework the filtering instance will operate.

The activities necessary for eCall deployment consist of looking at the procedures at PSAP level. More specifically the development of guidelines for the certification of the filtering instance and the conditions to be fulfilled by the entity that will be in charge of the filtering are at stake.

The Ministry of Internal Affairs is responsible for the planning of eCall implementation in Belgium. Other public agencies involved in the deployment of eCall are:

- Internal Affairs department – responsible of the public and private security so that of the PSAP emergency service;
- Health department that is in charge of public health issues;
- Mobility department - to connect the traffic management centres and the type approval of eCall;
- Federal police - responsible for the operations of the PSAP;
- BIPT Belgium, the Institute for Post and Telecommunication - in charge of the regulative organization of telecommunication.

In Belgium a PSAP at ASTRID and a filtering instance at Touring Club Royal de Belgique are installed, connected together and tested

The workflow will be as follows:

- The car initiates an eCall (manual or automatic).
- The Mobistar network (pilot GSM network in HeERO2 Belgium) will distinguish the eCall flag and will deliver the call to a special number of the filtering entity.
- The PABX of the filtering entity routes the call to the eCall modem, which will decode the MSD and file it in a database.
- After finishing the decoding, the call is transferred by modem, via the PABX to an operator at the filtering entity.
- The operator of the filtering entity (Touring Club Royal de Belgique for the HeERO2 pilot) will receive the call and determines if the call is genuine and worthy of being transferred to the PSAP. If so, he enriches the data, puts it in the database and transfers the call to the PSAP.
- The XML is pushed to the database at ASTRID (Service provider of PSAP).
- The operator in the PSAP takes the call and talks to operator of the filtering entity
- In a pick list, the PSAP operator can see which eCalls have been sent electronically in the last 15 minutes, talking with the filtering entity, the PSAP picks the right event.
- The Call is transferred and the PSAP talks to the caller in the car. The PSAP has the MSD info and the intake of the filtering entity available.
- The PSAP further handles the call like any normal emergency 112 call and uses the extra information available in the eCall system provided by the minimum set of data

To transfer the information from the filtering entity to the PSAP (actually, the central servers which serve all 11 PSAP in Belgium) the protocol of third party service providers is used (EN 16102). This has two advantages:

- A Standard is already worked out in detail.
- PSAP are also ready to handle third party private eCall.

Currently eCall is not implemented but only tested in the context of HeERO2 project. The test will consist of eCall IVE, eCall filtering instance and PSAP emulations.

After the conclusion of the project there is no plan for new projects on eCall. However the possibility to be involved in new projects or to organize new testing activities on eCall is under discussion among the Belgian partners.

Plans for testing and piloting

The planned schedule for eCall deployment in Belgium is presented inTable 8.

	Start (mm/yyyy)	End (mm/yyyy)
Member state level political decision to implement eCall (start: start of administrative processing of the decision, end: final approval of the decision)	1/2013	Maybe 2017
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	2013	Depend on final approval decision (2017)
Implementation of eCall reception and processing capabilities in PSAP (start: start of implementation, end: implementation of eCall in all PSAP has been completed)	2013 one psap capable of receiving ecall	2017
eCall roll-out (start: start of service availability to general public, end: day of the availability of eCall in the whole territory of the member state and including all MNOs)	Not decided	Not decided

Table 8: Planned dates for eCall deployment - Belgium

The Ministry of Internal Affairs lead and coordinate the test site in Belgium.

In Belgium there are three mobile networks: Orange (Mobistar), Proximus and KPN. Only Orange, as part of the Heero2 project, has implemented the eCall discriminator in one quarter of the country. Moreover there are no plans for the PSAP to have capabilities to receive and process real eCalls.

The organisations relevant to eCall deployment in Belgium are:

Companies: Alcatel-Lucent, Assuralia, Astrid, Auto Radio Centre (ARC), bvba, Bam, Belgacom, BIPT-IBPT, BIVV/IBSR, BMW Group, Belux, Corona Direct, EC-ITS, EdelWISE, ERTICO - ITS Europe, Ethias, European Datacomm, Febiac, Ford, GM Europe, Hewlett-Packard, IBM, ITS.be, Key Driving Competences, KPN Group, Mobistar, Multicap, Namahn, Nimera, Mobile ICT, Oktopus, RAM Mobile Data, Testronic Laboratories, TomTom, Touring, Transics, Transport & Mobility Leuven (TML), Ubidata, VAB.

Public authorities: Federale Politie, FOD Binnenlandse Zaken, SPF Affaires Intérieures, FOD Mobiliteit en Vervoer, SPF Mobilité et Transports FOD Volksgezondheid, SPF Santé

Public Région de Bruxelles-Capitale, Brussels Hoofdstdelijk Gewest, Service Public de Wallonie (SPW), Vlaamse Overheid.

The eCall implementation in Belgium depends on the decision from the Government. However the existence of private calls which are connected to the PSAP is the most important enablers in Belgium and this is also the focus of the filtering instance.

6.2 Bulgaria

eCall system in Bulgaria

The eCall system in Bulgaria, follows the existing and operating E112 system, pilot is centralized, all eCalls (data and voice) are routed to a central PSAP located in Sofia, and then can be forwarded to the Emergency Agencies (Police, Fire Safety and Protection of Population Directorate, Emergency medical care centres, Executive Agency Maritime Administration and Mountain Rescue Service).

Currently there is no ITS action plan in Bulgaria and no specific contents have been determined, yet. Also, there is no adopted roadmap for eCall implementation on a country level, yet. The project HeERO 2 is the first step in that direction.

Bulgarian Association Intelligent Transport Systems Sdruzhenie (ITS Bulgaria)

The Ministry of Interior of Republic of Bulgaria appointed ITS Bulgaria to be a member state leader for Bulgarian HeERO Pilot site project. In its role as a member state leader ITS Bulgaria is responsible for organization of the monthly meetings of the Bulgarian partners, monitor the progress in Bulgarian pilot site so that it follows the work plan agreed with the WP leaders; coordinate the pilot site work across all work packages; coordinate production of WP deliverables inputs from Bulgarian pilot site; report on the progress achieved in Bulgaria
Ministry of Interior of Republic of Bulgaria, via Directorate “National 112 system” and Directorate “International Projects”

As the eCall is an additional service supplied by the NESSEN 112 and according to the law the responsibilities for its construction, maintenance and development is to the National 112 System, the upgrade of PSAP (Centres’ 112) for deployment of eCall is also responsibility of MoI via Directorate National System 112, with the following main tasks:

- organization and implementation of a procedure for the supply of hardware equipment in regional centres 112 ;
- providing conditions for installation, setup, testing and commissioning of the supplied equipment.

Enterprise Communications Group OOD

Enterprise Communications Group OOD, the former of Siemens Enterprise Communications EOOD, is a Premium Certified Distributor of Unify GmbH & Co. KG (former Siemens Enterprise Communications Gmbh) for the territories of Bulgaria and Macedonia, which is the highest possible partnership level. The company operates with goods originally manufactured by Unify (former Siemens) and other renowned manufacturers and partners in Europe and Bulgaria. Enterprise Communications Group OOD is a system integrator which maintains constantly high quality of the provided services, including warranty

and post-warranty maintenance of the installed systems. The company provides 24 hours hot-line service support and has established service emergency call centre for immediate response 24 hours, 7 days a week for the integrated systems. Enterprise Communications Group OOD employs mainly specialists in the ICT field, servicing the new implementations and the installed capacities, consultancy, project management, finances, accountancy, logistics, supply and sales.

Main tasks Enterprise Communications Group in HeERO 2 pilot project are to coordinate and contribute Implementation (WP2), Operations (WP3) and Evaluation (WP4) activities related to PSAP test environment in Sofia.

Mobiltel EAD

Mobiltel, part of Telekom Austria Group, is the leader on the Bulgarian telecommunications market with nearly 20 years history. The company provides fixed and mobile services, broadband Internet and digital TV to over 4 million customers. Mobiltel plays an important role in driving the country economy with investments over BGN 2.5 billion. The company is among the biggest donors, supporting many social and cultural causes of national importance. Mtel is a strong supporter of the eCall initiative due to its strong social responsibility.

Prior to deploying the eCall functionality there was a workaround solution developed by Mobiltel as the eCall flag was planned for end of 2013.

Since the end of 2013, Mtel has successfully deployed the software upgrade of the MSC (Mobile Switching Centre), which includes the new “eflag” functionality and all MNO eflag related tests have been performed successfully.

Icom Ltd.

Icom’s main role in HeERO2 pilot project is the role of an IVS supplier for retrofit devices, carrying our R&D activities for creating of a low-cost IVS for retrofit installation in used vehicles.

Icom is the largest manufacturer of GPS-based telematics devices in Bulgaria with an ISO/TS 16949-2009 certified production site for design and production of telematics devices for the automotive industry. ICOM is a leader on the SEE regional products and services market for GPS vehicle tracking and vehicle fleet management. Icom has its own proprietary advanced telematics and LBS platform EuroGPS eVehicle and is the largest telematics service provider (TSP) in Bulgaria and the region with more than 30,000 vehicles in service.

The IVS used in HeERO2 is an adjusted version of ICOM’s main fleet management AVL module EuroGPS SmartTracker ALM-3A, with modifications to comply with the eCall requirements.

The Technical university of Sofia is appointed a team of specialists to represent it as a partner in the Bulgarian Pilot site. Its role is developing an IVS device with which to perform laboratory and field tests in order to assist in the configuration and testing of the Sofia PSAP center as well as the implementation of the eCall flag by Bulgarian MNOs. Another obligation of TUS is to perform special test sessions to collect logs and compile KPI values.
At the moment in Bulgaria there are three MNO: Mobiltel (Mtel), VIVACOM and Globul. Two of them – Mobiltel (Mtel) and VIVACOM – have implemented the eCall Flag. For the third MNO expectation is that the eCall Flag will be implemented until the end of 2014. At the end of 2014 a fourth MNO is expected to begin to operate in Bulgaria, even though at the moment there is no further information if they will be able to handle the 'eCall discriminator' in their network by 31st December 2014.

All official documents in Bulgaria related to ITS deployment are binding in case of a change of the political framework. There are no legislative elements in Bulgaria that would prohibit the adoption of the EU legislation in ITS area.

The EU ITS Directive is transposed in Bulgaria in two phases. The main part of the Directive is transposed through Law amending the Road Transport Law (into force since 14 December 2012); the second phase is through "ORDINANCE OF THE TERMS AND CONDITIONS FOR deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other transport modes" (into force since 29 January 2013).

The Minister of Transport, Information Technology and Communications coordinates the activities for the deployment and use of Intelligent Transport Systems in the field of road transport and for interfaces with other transport modes.

To support the activities of the Minister of Transport, Information Technology and Communications, a Council for Intelligent Transport Systems has been established. Members of the Council are representatives of the Ministry of Transport, Information Technology and Communications; the Ministry of Regional Development, the Ministry of Interior and the Ministry of Economy, Energy and Tourism, appointed by the respective Ministers; also representatives of the Road Infrastructure Agency, Bulgarian Institute for Standardisation; Commission for Consumer Protection; Commission for Personal Data Protection; National Association of Municipalities in Republic of Bulgaria, appointed by the respective managers.

By decision of the Council thereto working groups may be created, to address specific problems and tasks.

The rules concerning the implementation and use of Intelligent Transport Systems in the field of road transport and interfaces with other modes of transport is determined by Regulation of the Council of Ministers.

In Bulgaria the commercial and private initiative is regulated by the PPP law which was adopted on 1st January 2013. This law regulates the conditions and procedures for the implementation of public-private partnership (PPP).

The implementation of PPP complies with the principles publicity, transparency, free and fair competition, non-discrimination, equal treatment and proportionality. As a result of the implementation of the PPP Act expectations are to address the budget gap facing both state and local government and public legal entities in which these bodies have predominant participation or control and also to create conditions for the involvement of private partners in areas that are traditionally responsibility of the public authorities, thus to make use of private resources, knowledge, skills and experience in the public interest.

The Bulgarian National pilot realization is divided in two stages - before and after eCall Flag implementation, eCall test environment – PSAP application integration and connection to EUCARIS or local VIN database.

In Bulgaria there are three MNOs:

- MTEL
- GLOBUL
- VIVACOM

MTEL has already implemented the eCall flag since mid January 2014. However there is no information on the intention of the other two MNOs to implement the eCall flag.

The eCall test environment is available in Sofia from May 2014. The eCall service will be fully operational in 2015.

The identification of public safety answering points expected to have the capabilities to receive and process eCalls are subject of national eCall implementation roadmap.

The organisations that have been working with eCall are:

- One of the main tasks of the **Ministry of Interior** is to provide public access to emergency services through National Emergency Call System using European Emergency Number 112. The formal framework of the MoI obligations and functions concerning National Emergency System with single European Number 112 (NESSEN 112) is defined in the Law of NESSEN 112. This law defines the structure and functions of the National Emergency Call System with a single European number

112, the responsibilities for its construction, maintenance and development, and the rights and obligations of citizens in using the single European emergency number 112. NESSEN 112 provides citizens on the territory of the Republic of Bulgaria, continuous, rapid and free access to emergency services for assistance in an emergency to protect the life, health, security and their property. Directorate National System 112 System - MoI accepts, processes and registers emergency calls to the EEN 112 and exchanges information with emergency services (Police, Fire Safety and Protection of Population directorate, emergency medical care centres, executive agency Maritime Administration, and Mountain Rescue Service). Control over the implementation of the law has been performing by the Minister of Interior.

  - According to the Law amending the Road Transport Law (into force since 14 December 2012), to support the activities of the Minister of Transport, Information Technology and Communications in the field of deployment of ITS, a Council for Intelligent Transport Systems shall be established. Chairman of the Council is Minister of Transport, Information Technologies and Communications and the Deputy Minister of Interior is one of the vice chairmen.

- The **Council for Intelligent Transport Systems** supports the Minister of Transport, Information Technology and Communications in the implementation of his powers; prepares and adopts a National Action Plan for deployment and use of intelligent transport systems and interfaces with other transport modes and monitor its implementation; discusses and prepares a report on the progress of the national activities and projects regarding the priority areas for the use of specifications and standards for intelligent transportation systems; makes proposals for changes in the legal regulation on deployment of intelligent transport systems; makes proposals to the Minister of Transport and Communications on the effective implementation of legislation related to deployment of intelligent transport systems; gives opinions on legislation related to intelligent transport systems; discusses other issues, related to deployment of intelligent transport systems.

- The **Ministry of Transport, Information Technology and Communications**, is the institution that prepares the guidelines and policies in the transport sector, following European trends in the development of Intelligent Transport Systems (ITS) and aims to contribute to the implementation of short and long term objectives of promoting the implementation of ITS in Bulgaria. Its responsibility is the coordination of activities in the deployment and use of Intelligent Transport Systems in the field of road transport and for interfaces with other transport modes. An obligation of the Minister of

Transport is the cooperation with the Member States of the European Union in priority areas as far as there are no relevant specifications adopted. Another responsibility is the establishment of a Council on ITS as an advisory body to the Minister of Transport and Communications to prepare a national plan for the deployment of ITS in Bulgaria.

- The **Communications Regulation Commission (CRC)** implements the state sector policy in the field of telecommunications and postal services. CRC is a specialized independent state authority, entrusted with the functions of regulation and control over the carrying out of the electronic communications. In the context of equity and transparency and in compliance with the Bulgarian legislation, CRC strives to promote the competition of the telecommunications markets in the country. The national regulator proceeds, aiming at the increase of the sector investments, the new communications technologies' development and the protection of the end-users in Bulgaria.
- **ITS Bulgaria** is an independent, voluntary non-profit organisation, created as part of the European ITS Associations framework. The founding members of ITS Bulgaria are manufacturers, suppliers, and contractors of travel and hardware accessories for the implementation of ITS solutions, Universities. Honourable members are the Ministry of Regional Development and Public Works, Road Infrastructure Agency. ITS Bulgaria works as an instrument for solving problems in the transport sector and for the effective and coordinated realization of various ITS projects, developed in collaboration with the Bulgarian Government and local municipal administrations. It stimulates collaboration with similar international ITS organizations for exchange of experience and proclamation of European and international best practices and implemented ITS solutions.
- **Ministry of regional development** is the national managing authority and contact unit for the operational programme "Regional Development" and territorial cooperation programs. Within the priorities of this ministry are:
- The construction and maintenance of the technical infrastructure related to improvement of transport accessibility and integrated management of water resources;
- The effective and efficient use of funds of the European Union and strengthening the confidence of European partners.
- **Road Infrastructure Agency** is a part of the Ministry of Regional Development, it is responsible for:

- Maintenance of the national road network;
- Information on the current state of the road network;
- Vignettes and road fees;
- Issuance of permits for special use of the roads by driving the heavy and oversized vehicles;
- Register of persons and firms performing roadside assistance;
- Certificates for roadside assistance;
- Permits for special use of roads by construction and operation of facilities advertising;
- Permits for special use of roads by construction and operation of commercial roadside facilities and road links to them;

	Start (mm/yyyy)	**End (mm/yyyy)**
Member state level political decision to implement eCall (start: start of administrative processing of the decision, end: final approval of the decision)	No information	No information
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	01.2014	12.2014
Implementation of eCall reception and processing capabilities in PSAP (start: start of implementation, end: implementation of eCall in all PSAP has been completed)	Not started (pilot implementation)	2017 (pilot completion 12.2014)
eCall roll-out (start: start of service availability to general public, end: day of the availability of eCall in the whole territory of the member state and including all MNOs)	Not started	2017

Table 9: Planned dates for eCall deployment - Bulgaria

Standardization documents

The Bulgarian Institute for Standardization (BDS) is the national executive body for standardization in the Republic of Bulgaria. BDS develops, accepts and approves Bulgarian standards and other standardization documents, participates in the work of international and European organizations for standardization, as its main target is to defend the Bulgarian interests in that sphere.

The Secretariat of TC 97 “Intelligent Transport System and Logistics” is responsible for development, acceptance and approval of the Bulgarian, European and International standards and other standardization documents in field of Intelligent Transport Systems.

The “ORDINANCE OF THE TERMS AND CONDITIONS FOR deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other transport modes” lays down the conditions and procedure for the deployment and use of Intelligent Transport Systems in the field of road transport and for interfaces with other transport modes. It implements the requirements of the EU ITS Directive. The deployment of applications and services in Bulgaria is carried out in accordance with the European Commission's specifications for applications and services on Intelligent Transport Systems and adopted by standards bodies. Specifications for applications and services on Intelligent Transport Systems, adopted by the European Commission and the standards adopted by the relevant standardization bodies are provided for use in the priority areas and priority actions defined by the EU ITS Directive.

Measures for public awareness

There is a public campaign regarding eCall connected to the participation of Bulgaria in the second stage of the HeERO2 project. The eCall services occupied an important part of the regional conference "Digital Agenda for Europe 2012: Reality or still a challenge" in Sofia. As a whole the general public is not aware of the exact meaning of ITS, nor of the benefits it could bring to their lives and safety.

Next steps

According to the Bulgarian legislation responsibility for the development of the framework in field of ITS, in particular eCall, is to the Council for Intelligent Transport Systems, which prepares and adopts a National Action Plan for deployment and use of intelligent transport systems and interfaces with other transport modes and monitor its implementation; makes proposals for changes in the legal regulation on deployment of intelligent transport systems; makes proposals to the Minister of Transport and Communications on the effective implementation of legislation related to deployment of intelligent transport systems; gives opinions on legislation related to intelligent transport systems; discusses other issues, related to deployment of intelligent transport systems.

In Bulgaria there is no any national eCall implementation roadmap but there are plans to develop one following the HeERO 2 project.

PSAP upgrade next steps for eCall implementation in Bulgaria:

- Upgrade pilot eCall service in Centre 112 Sofia in the productive PSAP in accordance with the terms of real start of eCall in EU
- eCall flag to be implemented in productive environment for all MNO's in the territory of Republic of Bulgaria
- Connections with national operational VIN database, respectively eCall EUCARIS productive data base
- SW/HW upgrade for redundancy in PSAP in Ruse
- Upgrade all PSAP in Bulgaria with extended IVS functionalities (MSD extended) of eCall for Truck and Dangerous Goods and Power 2 Wheeled Vehicles
- Expand workflow regarding Emergency agencies (interconnection, training for staff)
- Performing crash tests
- PSAP Data integration (with TPS providers, Dangerous Goods register etc.)
- PSAP Conformity Testing and certifying
- PSAP compatibility eCall service with IMS G4 networks

6.3 Denmark

There are four MNOs and three PSAP in Denmark and the goal is to make the eCall fully operational as soon as possible. That is to make the PSAP ready to be able to go live December 2014 and make the MNO ready in good time before eCall becomes mandatory, so new national tests can be carried out, before eCall-capable cars are driving on the Danish roads.

In 2014 Danish eCall is going through a "Proof of Concept"-testing through the participation in HeERO2. The PoC is based on PSAP upgrading their test-environment and having prototype IVS in 10 cars, manually calling the PSAP with a long number (TS-11 calls).

Plans for eCall implementation in Denmark

The Danish Parliament decided in 2009 to fund an upgrade of the Danish PSAP to be ready to receive eCalls.

In 2013 a steering committee was formed with representatives from:

- The Danish Transport Agency (chair). They have the primary national funds for eCall implementation and are the present key drivers for eCall implementation
- Danish Police. They own two of the three Danish PSAP
- Copenhagen Fire Brigade. They own one of the three Danish PSAP
- The Danish Business Authorities. They have the regulatory role towards MNOs

The steering committee was formed to conduct the PoC, through the participation in HeERO2.

Early spring 2014, the first PSAP in a full test environment was implemented, and testing commenced.

The present plans are to finish the PSAP upgrade by December 2014. At that time, plans for the following years are to be drafted.

With regards to MNO, there has been a legislative analysis stating, that in accordance with Danish law, the MNOs are obliged to implement the eCall discriminator. The Danish Business Authorities are in dialogue with the Danish MNOs, and they have formed a Coordination Task Force involving the four MNOs and later on the PSAP owners.

	Start (mm/yyyy)	End (mm/yyyy)
Member state level political decision to implement eCall (start: start of administrative processing of the decision, end: final approval of the decision)	2009	?? 08/2015
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	08/2014	?? 08/2015
Implementation of eCall reception and processing capabilities in PSAP (start: start of implementation, end: implementation of eCall in all PSAP has been completed)	05/2013	12/2014
eCall roll-out (start: start of service availability to general public, end: day of the availability of eCall in the whole territory of the member state and including all MNOs)	?? 01/2016	?? 02/2016

Table 10: Planned dates for eCall deployment - Denmark

Exact timing for the eCall discriminatory implementation at MNOs depend on the outcome of the debate in the Council regarding timing for making eCall mandatory in new types of vehicles.

6.4 Luxemburg

MNOs in Luxembourg

In Luxembourg there are four MNOs:

- Post Luxembourg
- Orange
- Vodafone
- LOL Mobile

Post Luxembourg leads the work in implementing the eCall discriminator flag which was successfully updated into their network of switches at the end of the summer in 2014.

Emergency calling in Luxembourg

The single pan-European emergency number 112 is operational in Luxembourg, but it is not the only emergency number in use. The police handle the calls made to 112 as well as 113.

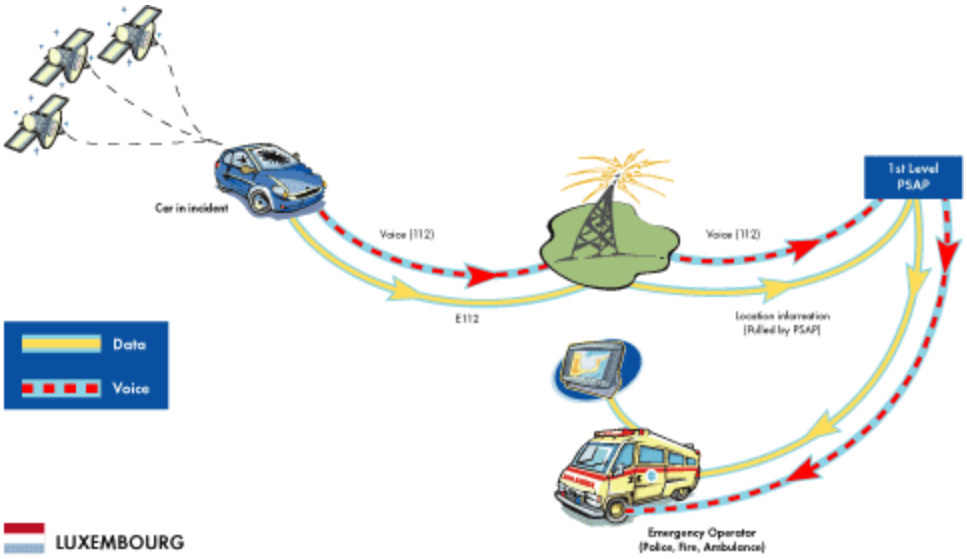


Figure 26: Luxembourg's proposed eCall flow

Luxembourg only has one level 1 PSAP that handles all emergency calls and dispatches the emergency service vehicles. As the system overview illustrates below, the location information provided by the network is pulled by the PSAP. Furthermore, the location information from the incident is available in the emergency vehicles in which it can be visualised on a map.

The workflow will be as follows:

- The car initiates an eCall (manual or automatic).

- An MNO transfers the enriched (with MSD) call though the nearest MSD (pilot is POST Luxembourg network in HeERO2 consortium), which will distinguish the eCall flag and will deliver the call to a special server within the Luxembourg PSAP.

- The server will detect the eCall and direct to an operator in the PSAP who will receive the voice call as well as the information in data form (MSD) at their station. The operator in the PSAP takes the call and can call back the calling vehicle if desired using the OECON Server Software interface.

- The PSAP further handles the call like any normal emergency 112 call and uses the extra information available in the eCall system provided by the minimum set of data

There is also the possibility that the PSAP may be able to enrich the MSD data from the eCall by linking to the EUCARIS database. EUCARIS is the European CAR and driving license Information System. It is an information exchange system that provides an infrastructure and software to countries to share, among others, their car and driving licence registration information helping to fight car theft and registration fraud. EUCARIS is developed by and for governmental authorities and is able to support all kinds of transport related information exchange based on treaties, directives, bi- and multilateral agreements. This lien is currently under discussion to ensure any implementation would satisfy Luxembourg's strict data privacy laws.

Implementation Roadmap for eCall in Luxembourg

In Luxembourg there is no official road map available. However unofficial documents are available for internal planning.

In Luxembourg, there is one organisation that is part of HeERO2 implementation project. It is made up of Hitec Luxembourg s.a. a leading engineering and software development firm, POST Luxembourg, the biggest MNO and the Luxembourg PSAP itself. This organisation will prepare the official guidelines for implementation of eCall within the context of the project.

An important decision that will be made during this period is who will eventually be responsible for the overall implementation of eCall in Luxembourg.

eCall Implementation Testing in Luxembourg

An eCall test implementation is currently running in Luxembourg. It was installed at the end of 2013 and has been used for specific tests since that date. Additional tests are planned for the period September/October 2014 after the upgrade of all the MSDs is completed.

The test set up consists of an eCall Router from German company OECON that is capable of simulating the PSAP receiving environment. The OECON eCall Router has been part of the Luxembourg eCall installation since April 2013 but was upgraded from a router to a full eCall simulator solution in early 2014.

The eCall simulator is a powerful tool for validation and conformity checks of eCall components. It can be configured as a PSAP or IVS simulation and will perform the supplied test cases defined by CEN in a TTCN/3 compatible Integrated Development Environment. The eCall simulator is a joint product of Testing Technologies and OECON and takes advantage of the proven TTworkbench as a tool for test execution. OECON's proven eCall components guarantee best results on the eCall technology and protocol side

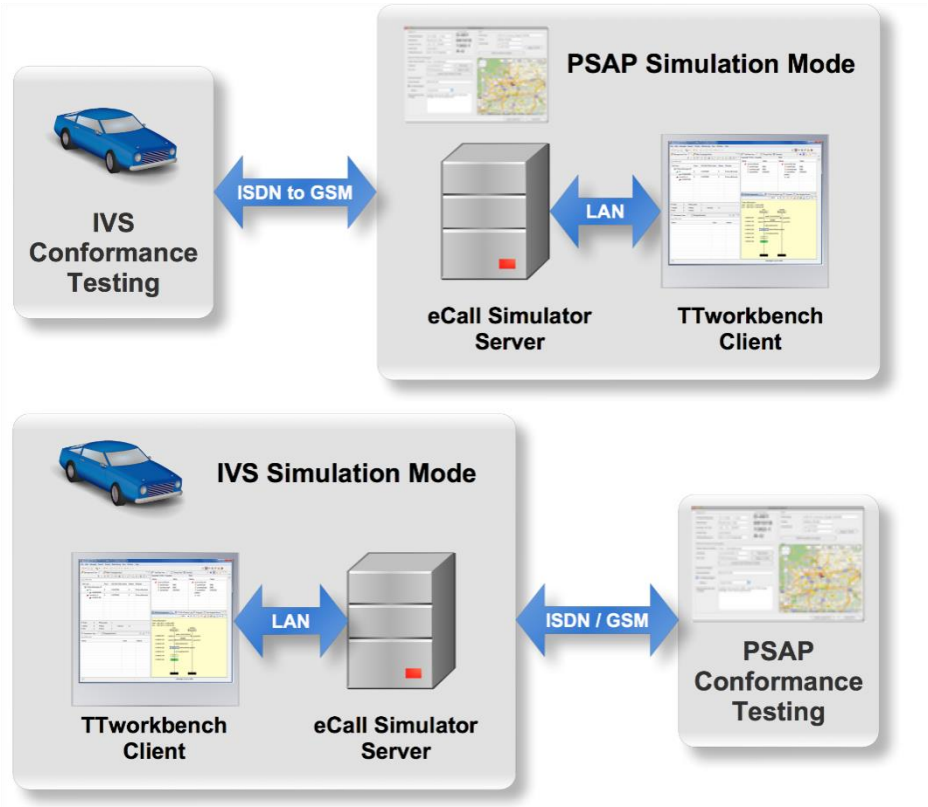


Figure 27: OECON eCall Simulation Architecture

During the eCall test phase, the Luxembourg team has taken advantage of the simulator's internal Web interface to manage incoming eCalls. A specially developed DTMF interface allows the handling of special operations for example "Retransmission of the MSD".

Luxembourg's PSAP will be completely modernised in 2015 and this OECON eCall Router solution will be integrated into the PSAP software solution that will be chosen to be used in Luxembourg.

Tests made under the aegis of the HeERO2 Project were held in the second quarter of 2013 and are planned again for the latter half of 2014.

The Luxembourg HeERO2 team is working with several IVS suppliers and will test their devices to check their compatibility with the networks that are available in Luxembourg. There are different elements of the tests that need to be covered for the networks, such as the different (and sometimes competing) levels of power between networks and separate sites, routing configurations, and upgrades to networks.

During 2014/15 the eCall centre in Luxembourg will be upgraded and decisions are still to be made as concerns certain procedures and the new software for 112 that will be implemented. The 112 centre understands that this software must be able to handle eCalls and by the same standard the tests and solutions that are currently being worked on as part of the HeERO2 project must be able to be integrated into whatever software is selected. European eCall will only be completely implemented when this software is installed and tested.

The Government is responsible for the testing and for the large scale implementation. The Ministry of interior will administrate the services and the security aspects.

	Start (mm/yyyy)	**End (mm/yyyy)**
Member state level political decision to implement eCall (start: start of administrative processing of the decision, end: final approval of the decision)	No information	No information
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	1.6.2014	For EPT 31.08.2014 For others not known
Implementation of eCall reception and processing capabilities in PSAP (start: start of implementation, end: implementation of eCall in all PSAP has been completed)	A new PSAP SW with eCall capability will be selected and implementation begun before the end of 2015. The Call for tender was issued in early 2014	No information
eCall roll-out (start: start of service availability to general public, end: day of the availability of eCall in the whole territory of the member state and including all MNOs)	No information	No information

Table 11: Planned dates for eCall deployment – Luxembourg

6.5 Spain

In Spain there are four MNOs:

- Telefonica
- Vodafone
- Orange
- Yoigo

At this stage none of them has implemented the eCall discriminator.

Telefonica is the only MNO involved in the HeERO2. However the implementation of the eFlag is not previewed in the HeERO2 framework.

HeERO2 pilot project is currently evaluating the feasibility of an Intermediate PSAP to filtering eCall to the final 112 PSAP. When HeERO2 project will finish, definitive Spanish eCall architecture (using or not Intermediate PSAP) will be decided.

Owing to the complexity of the PSAP architecture in Spain, the decision was taken not to implement the eCall flag which will be mandated across Europe but instead to investigate the provision of an intermediate PSAP to manage the complex nature of 112 in Spain.

After HeERO2 project, with definitive Spanish eCall architecture, DGT will agree with the Spanish MNO regulator the protocol to regulate the deployment of eCall discriminator by all the MNOs.

In Spain there are different organizations working on eCall. Some of them are competent entities in the area such as DGT or 112 PSAP; others are MNOs, public and private organizations, technology providers and users representatives.

The organizations working in HeERO2 are: ITS Spain, CTAG, RACC, Telefonica, Ericsson, Ficosa, GMV, CARTIF, SICE, NZI, CEIT, DGT and regional112 PSAP.

Interest in eCall has been expressed from companies such as automobile clubs, Ford (OEM), system integrators and other companies providing telematics services.

There is an interest to use insurance companies for the deployment of eCall. Insurance companies would like to provide additional services and have shown interest in the HeERO2 pilot. Other actors interested in eCall are: car leasing companies, different stakeholders with other competencies.

After the conclusion of HeERO2 project, there could be an assessment of the pilot potential changes. Maybe there will be an intermediate pilot but it is not sure yet.

The political decision will trigger and accelerate the implementation of eCall at PSAP level.

Moreover other aspects that may modulate the eCall implementation are the eFlag introduction.

The final implementation of eCall needs specification of protocols for eCall management.

DGT, acting as an intermediate filtering instance, is working with the regional112 PSAP to specify a specific protocol for the eCall management.

The main enablers for the eCall implementation in Spain are the availability of solutions at IVS and PSAP levels that can facilitate the deployment and the awareness for the support of eCall. Moreover there is a strong expectation concerning the business related aspects.

Standardisation framework could contribute to the implementation of eCall in Spain.

Administration of eCall deployment in your country

Span has already decided the eCall support and deployment but definitive architecture for eCall deployment will be not decided until the end of HeERO2 pilot project.

The entities involved in the eCall implementation are: DGT, the regional 112 PSAP, the DG Protección Civil), Subdirección General de Redes y Operadores de Telecomunicaciones (management of MNO related issues).

The final responsibility to harmonize eCall is of DGT. Concerning the specific role, DGT has to decide and to contribute to harmonize the procedures to be followed.

Plans for eCall implementation

A roadmap for eCall deployment has been agreed at political level. The road map includes a set of clear technical and political steps:

- Decision already taken on eCall support and deployment from the signing eCall MoU and the support of all the European approaches for eCall deployment
- Decision already taken to participate in HERO2 pilot project in order to evaluate the feasibility of an intermediate PSAP
- Already created first technical (and financial) document with the possible final eCall Spanish architecture basically including or not an Intermediate PSAP
- Final decision on Spanish eCall architecture to be taken at the end of HeERO2 project
- Agreement with the Spanish MNO regulator for the protocol to be used in order to regulate the deployment of eCall discriminator by all the MNOs

PTW will be not included in the road map although they will be the main aspect of the pilot. With reference to PTWs there are many open points to be clarified especially before being able to propose a road map. First of all, the certification framework should be defined. It would define how the automatic eCall can be triggered or where to install the retrofit device which might affect the vehicle itself.

In Spain the identification of the key elements that will define the roadmap is currently under discussion. The identification of the key elements is the result of a political decision. Moreover, some aspects such as the protocol to be followed by the operator in the filtering centre have to be harmonized with the regional 112 PSAP.

Another aspect which will be fixed is the flow of information during the call. The Spanish partners are implementing the pilot with a particular flow but there are multiple stakeholders to be taken into account. More specifically the different position of 112 centres and the different ways they are considering the 112 call makes the eCall implementation complex.

Current situation of 112 emergency call centres (112 centres) in Spain

Four of the Spanish regional 112 PSAP are already involved in HeERO2 project and doing tests in the HeERO2 framework. A date flow has been agreed for this phase mainly related to those cases (manual or automatic eCalls) when the information must be filter first by the Intermediate PSAP. A final architecture for eCall deployment will be agreed at end of HeERO2 project and a final decision on data flow will follow. This will be the base for eCall deployment in 112 PSAP.

Status of eCall implementation

The last test will be early November

	Start (mm/yyyy)	**End (mm/yyyy)**
Member state level political decision to implement eCall (start: start of administrative processing of the decision, end: final approval of the decision)	01/2013	12/2014
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	12/2014	12/2015
Implementation of eCall reception and processing capabilities in PSAP (start: start of implementation, end: implementation of eCall in all PSAP has been completed)	01/2015	10/2017
eCall roll-out (start: start of service availability to general public, end: day of the availability of eCall in the whole territory of the member state and including all MNOs)	06/2015	10/2017

Table 12: Planned dates for eCall deployment – Spain

6.6 Turkey

There are three mobile network operators in Turkey: TURKCELL, VODAFONE and AVEA. In the Turkish pilot, the eCall flag has been implemented and tested only on TURKCELL network in Antalya. But after the pilot, it may take 6 to 8 months to implement eCall flag to its whole network. The other two operators are not included in the pilot and implementation program for them has not been planned yet. Also, currently MNOs have no central switch firmware that supports eCall flag.

There was no need for additional HW but a new SW had to be implemented on the TURKCELL side. TURKCELL's current test system in Istanbul has also been used for eCall flag related IVE-MNO-PSAP integration tests, before field tests took place in Antalya.

The Turkish eCall pilot PSAP will be receiving and processing eCalls in April, 2014. However, currently there is no central switch firmware for the mobile network which supports eCall flag discrimination. According to Turkcell; Ericsson has announced that the release date of the first central switch firmware which supports eCall flag discrimination is at the end of 2014. Deployment plan and methodology of eCall support in all PSAP will be decided after the pilot results.

Pilot eCall system is currently under development and testing phase. The organisations working about eCall are:

- Ministry of Interior: MS Leader
- Aselsan: PSAP solution
- Turkcell: MNO
- Tofaş and Renault: IVS providers
- Türk Telecom: FNO

There are also some private companies working on IVS development.

Field tests will take place in Antalya Province. For pilot implementation, there is no significant barrier. In deployment, especially for make using IVS devices mandatory, EU legal obligations will be the driving force.

The most important actors for eCall deployment in Turkey are:

- Ministry of Interior
- Ministry of Transport
- Maritime Affairs and Communications

- Information and Communications Technologies Authority

Administration of eCall deployment in your Turkey

In Turkey there has not been any political decision on the implementation of eCall. The public agencies involved in the deployment of eCall are: the Ministry of Interior that is in charge of the deployment of the Project, the Ministry of Transport, Maritime Affairs and Communications will supporting the deployment and the Information and Communications Technologies Authority will also supporting the deployment.

The Ministry of Interior is Member State Leader and Project coordinator of the Turkish Pilot and will take the main responsibility of the eCall deployment and testing.

Plans for eCall implementation

A National Road map is being developed with the results of the Turkish pilot and also with the European Regulations. The Ministry of Interior is responsible for the planning of eCall implementation in Turkey.

	Start (mm/yyyy)	End (mm/yyyy)
Member state level political decision to implement eCall (start: start of administrative processing of the decision, end: final approval of the decision)	11/2014	12/2015
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	05/2014	12/2018
Implementation of eCall reception and processing capabilities in PSAP (start: start of implementation, end: implementation of eCall in all PSAP has been completed)	05/2014	12/2018
eCall roll-out (start: start of service availability to general public, end: day of the availability of eCall in the whole territory of the member state and including all MNOs)	12/2014	12/2018

Table 13: Planned dates for eCall deployment – Turkey

6.7 Actions on the European level

The main focus of the roadmap is on the deployment of eCall in EU member states. Therefore, only the most important actions on the European level are included in the roadmap. The status of eCall regulation and future plans are documented in HeERO D6.2 (Öörni and Brizzolara 2014). The report also provides an overview of eCall standards.

EC recommendation 2011/750/EU sets the recommended last date for implementation of eCall discriminator in mobile networks. This date (31st December 2014) has been marked in the roadmap together with a reference to the recommendation.

The eCall IVS has been assumed to be mandatory on new type-approved vehicle models after 1st October 2015. This date has been marked in the roadmap diagram.

6.8 eCall implementation roadmap

The eCall implementation roadmap for countries involved in HeERO is presented in Figure 28.

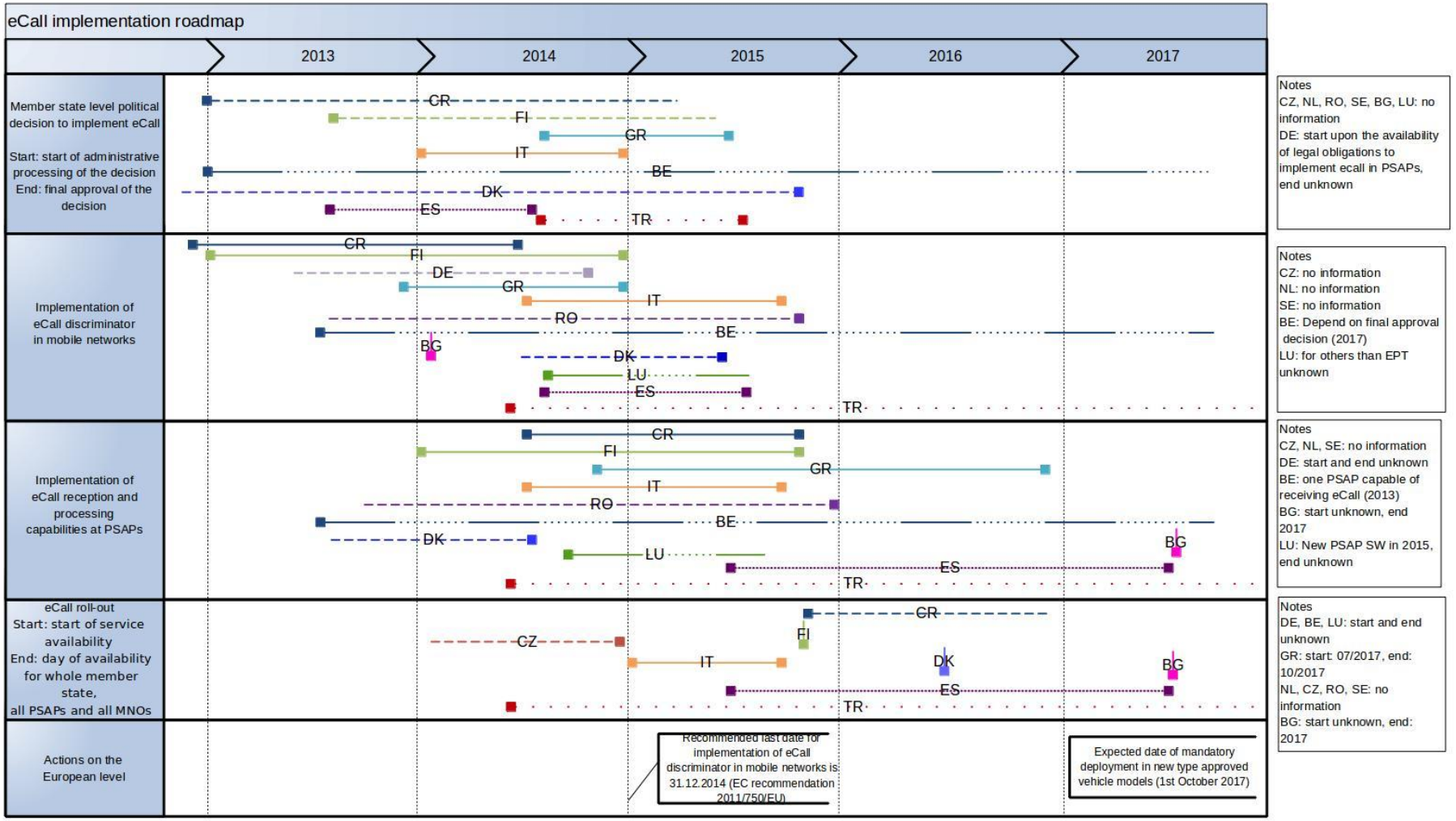


Figure 28: eCall implementation roadmap for HeERO countries

6.9 Next Generation eCall

eCall's technology is now based on circuit switched emergency call and an in-band modem which was conceived for GSM (2G) and UMTS (3G) networks. In future networks, i.e. LTE (4G-only) and UMTS-PS (3.5G), no circuit switched emergency calls will be available.

Vehicles have a lifespan of more than15 years and even if circuit switch emergency call may be supported in mobile networks for a long time, due to legacy handsets and regulatory needs, a next generation technology for eCall should be considered.

ETSI published a Technical report "TR 103 140 V1.1.1" with the conclusions of the investigation made by the specialist task force STF 456 about the migration of eCall transport over IP Multimedia Subsystem (IMS). The objectives of this document is to perform a study and derive recommendations concerning migration from 2G/3G to 4G based eCall Systems fulfilling all requirements set up for circuit switch eCall.

7. Conclusions

7.1 eCall implementation roadmap for Europe

Discussion of results

The roadmap presented in Figure 28 is an update of Figure 29 of D6.4 of HeERO1 in which the timelines for HeERO2 countries' plans for eCall implementation are inserted. The information needed to complete the roadmap has been collected using the same questionnaire that has been prepared by HeERO1 participants. The questionnaire is reported in Annex A and it includes the table that HeERO2 participants have filled in.

Like in HeERO1, the dates for the implementation of eCall mostly depend on political decisions. This is the main reason of why the participants did not provide exact information on the dates for implementation. For instance in Bulgaria, the decision on eCall implementation depends on the preparation of a National implementation roadmap and HeERO2 represented the first effort for the realization of a National eCall plan.

With reference to the PSAP upgrade, the participants did not have a complete overview of the full implementation at country level. For instance in Luxembourg new software has been installed in the EPT PSAP at the end of HeERO2 project that is December 2014. Therefore the impact of PSAP upgrade needs to be evaluated.

In other countries, where the architecture of emergency services is more complex such as in Spain, the start and end dates for PSAP have been provided although the full national architecture has been not decided yet.

Concluding remarks

The report has provided a complete roadmap for eCall implementation for the HeERO countries. The planned schedule for the various phases of eCall deployment could be summarised for Denmark and Spain. In Luxembourg new software has been installed in 2015 but the full implementation is unknown. In Bulgaria the start for the full implementation in not known but the full implementation is expected by the end of 2017. Finally in Turkey the full implementation is expected in 2018.

As expected, the European Parliament decided that EU member states have to install the necessary infrastructure to receive and handle all eCalls no later than October 1st 2017. Vehicle makers will be required to fit eCall systems to new types of M1 and N1 class of

vehicle after the 1st March 2018[1]. Therefore, it is recommended to update the roadmap with new information on Member States plans related to eCall accordingly with these new deadlines. It is also recommended to continue monitoring the deployment of eCall as a part of the monitoring process based on the European ITS Directive.

7.2 Guidelines for eCall deployment

The document has provided guidelines for implementation and operation of pan-European eCall. The guidelines included in the document have taken into account the documents of the HeERO project and the results of HeERO2 project. The general sections on PSAP, MNOs and IVS have been updated by HeERO2 partners based on the project results.

The intended audience of the guidelines are the stakeholders intending to implement eCall in EU member states. For this reason, recommendations and guidelines relevant only on the European level have either been excluded or reviewed only shortly.

[1] This information was announced after the HeERO2 technical review but clarified the issue concerning eCall fitment for IVS.

8. References

Nick Sampson, David Williams, ETSI TC MSG, Standardization Activities on eCall within ETSI and 3GPP, update for EeIP meeting#12, 14/05/2014

DECISION No 585/2014/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 May 2014 on the deployment of the interoperable EU-wide eCall service

Andy Rooke, D3.10b- Report on eCall Deployment Status, iMobility Support, 28/07/2014

9. Annexes

Annex A: Questionnaire form used to collect information from HeERO2 pilot sites

Annex A: Questionnaire form used to collect information from HeERO pilot sites

Plans for eCall implementation

1. Is there a national eCall implementation roadmap for your country?

   If a roadmap is available, please provide it with the answers to the other questions. If no roadmap is available, please describe:

   - Activities seen necessary for eCall deployment (names of activities and their planned starting and ending times)

   - Responsibilities: Which organisation is responsible for the planning of eCall implementation in your country?

   - Public agencies involved in the deployment of eCall? What are their roles?

   - Operation arrangements: how eCall is actually implemented?

   Please detail your answer (at least 1500 words).

   R:

2. Status of the piloting activities: Will there be a pilot or a field operational test of eCall after HeERO before the actual implementation and roll-out of the service?

   Please detail your answer (at least 300 words).

   R:

3. Have some of the stakeholders (authorities) taken the main responsibility of the eCall deployment and testing before large scale roll-out of the service?

   R:

4. Please fill in the following table. The table is a high-level description of various tasks related to implementation of eCall in member state level.

	Start (mm/yyyy)	**End (mm/yyyy)**
Member state level political decision to implement eCall (start: start of administrative processing of the decision, end: final approval of the decision)		
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)		
Implementation of eCall reception and processing capabilities in PSAP (start: start of implementation, end: implementation of eCall in all PSAP has been completed)		
eCall roll-out (start: start of service availability to general public, end: day of the availability of eCall in the whole territory of the member state and including all MNOs)		

Status of eCall implementation

MNO

1. How many MNOs are operating their own mobile networks in your country?
   R:

2. Which of them have already implemented the eCall discriminator (ETSI TS 124 008, table 10.5.135d)?
   R:

3. Are the remaining operators planning to implement the eCall discriminator? When do they expect it to be available?
   R:

4. Are there any specific barriers to implementation of the eCall-discriminator in your country?
   R:

5. Have the mobile network operators named any specific contact persons for matters related to eCall?
   R:

PSAP

6. When are the public safety answering points (PSAP) expected to have the capabilities to receive and process eCalls? (according to standards related to pan-European eCall)?
   R:

7. What is the current level of eCall capability and competence in your country? Which organisation(s) have been working with eCall and how (e.g. by following the HeERO project, testing eCall in-vehicle systems, etc.)?
   R:

8. Do you see any significant barriers which may delay the implementation of eCall in PSAP in your country?
   (Refer to the information provided for D6.2 if you don't want to add any additional points)

R:

9. What are the most important enablers for eCall in your country?
   (Refer to the information provided for D6.2 if you don't want to add any additional points)

   R:

10. Do the PSAP organisation/organisations have a contact person or contact persons for matters related to implementation of eCall?
    R: