D6.4 Implementation roadmap and guidelines for eCall deployment in Europe

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Control sheet

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Terms and abbreviations

Terms

TERM	DEFINITION
112	Single European emergency call number 112 (ETSI TS 122 003)
Call clear-down	Termination of call and freeing up of line (usually achieved by hanging up the receiver or pressing 'end call' or similar on screen)
Cellular Network	*Wireless communications network* consisting of multiple adjacent access points (cells) with the capability of homogeneous transfer of a communications session instance to an adjacent cell without significant interruption to the session
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 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

Abbreviation	Definition
API	Application Programming Interface
CEN	Comité Européen de Normalisation
CIP	Competitiveness and Innovation Framework Programme
DoW	Description of Work
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
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
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

SIM	Subscriber Identity Module
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
VIN	Vehicle Identification Number
VoIP	Voice over Internet Protocol
WAN	Wireless Area Network

1 Introduction

1.1 HeERO project

HeERO is a pre-deployment project for pan-European in-vehicle emergency call system eCall. The main objectives of HeERO project have been to validate the standards or pan-European eCall and to support the deployment of the service. Earlier work packages of HeERO have been responsible for planning national eCall pilots, implementing them and evaluating them using a set of common key performance indicators. These results will be used to provide recommendations for eCall operation and implementation and guidelines for deployment of eCall in the member states

1.2 eCall deployment

In total, nine countries involved in the HeERO project (Croatia, Czech Republic, Finland, Germany, Greece, Italy, The Netherlands, Romania and Sweden) have implemented and evaluated an eCall pilot. At present, two countries are at least partly ready to start the operation of eCall (CZ and RO), but many of them are still preparing the roll-out of the service. In addition to countries involved in HeERO, there are also other member states in which the deployment of eCall is necessary for achieving pan-European coverage of the service and continuity of service in Europe.

First, there is a clear need to get an overview on the eCall deployment plans in the member states involved in HeERO and the actions implemented or being planned. This objective can be answered by creating an implementation roadmap for eCall. Second, the information included in the roadmap can also be used as input when planning coordinated eCall deployment in Europe, and it can act as an enabler for continuity of service and selection of measures suitable for accelerating deployment.

An implementation roadmap for an ITS service typically presents the actions required to achieve a functional service implementation as well as the temporal dimension of actions required. Usually, it also presents the stakeholders which are or will be involved. At present, there is no single and universal definition for a technology roadmap or the road-mapping process (Lee, Kim and Phaal 2012, Kappel 2001). In other words, the roadmaps are different in some aspects in different industries.

The member states responsible for deployment of eCall need also clear guidelines focusing on questions related to implementation and operation of eCall. There is a need for a separate

guidelines document written for member states intending to implement eCall because the results of the HeERO project are documented in several deliverables of which many are quite long. In other words, there is a need to provide information on eCall implementation and operation in a summarised and non-fragmented manner.

1.3 Structure of Document

This deliverable D6.4 is one of the final deliverables of HeERO project. It gathers the experiences of HeERO piloting into a Guidelines and best practises for stakeholders in new eCall projects and deployment. D6.4 is part of the work of WP6 Deployment enablers. The overall aim of WP6 is the analysis of eCall enablers and barriers and the description and/or planning of certification processes in Member and Associated States (figure 1).

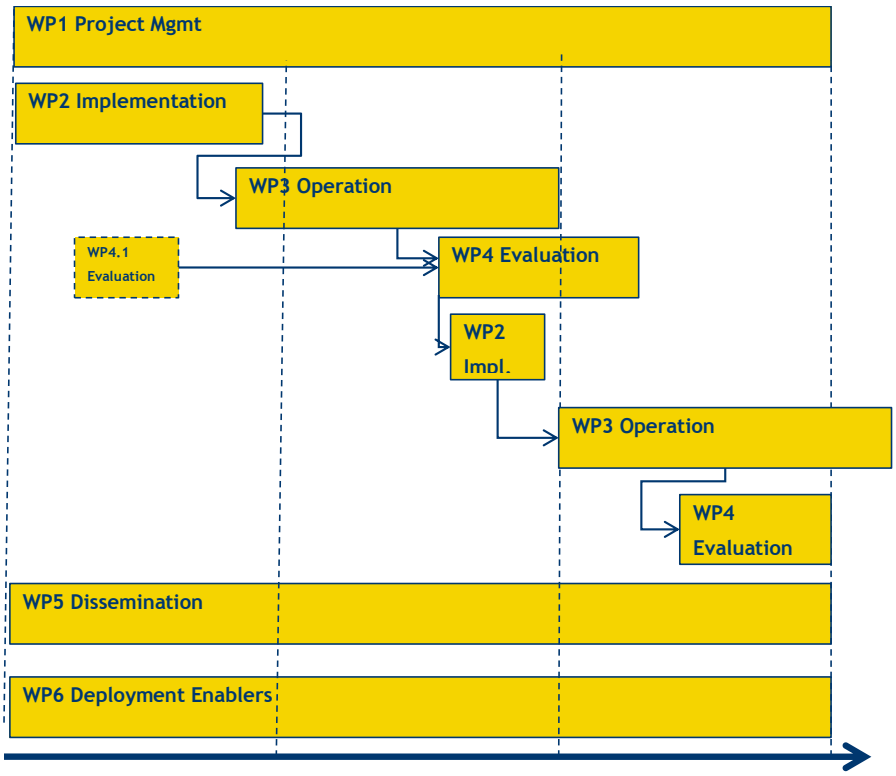

Figure 1: HeERO project structure

1.4 HeERO Contractual References

HeERO 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 270906 and project duration is 36 months, effective from 01 January 2011 until 31 December 2013. It is a contract with the European Commission, DG CONNECT.

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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 addresses:

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2 Objectives

2.1 eCall implementation roadmap for Europe

The first main objective of the study is to create an eCall implementation roadmap for the member states involved in the HeERO project. The objective of the implementation roadmap is to describe the actions necessary to achieve deployment of eCall in the member states involved in HeERO.

The roadmap covers both activities on European level and in the member states and the whole service chain from IVS to PSAP. The activities being carried out on European level such as standardisation of eCall, plans for regulation and activities of the European eCall Implementation Platform (EeIP) have been presented in deliverable D6.2 of HeERO (Öörni and Brizzolara 2014). For this reason, the main focus of the eCall implementation roadmap is in the actions planned and being carried out by the individual HeERO countries.

2.2 Guidelines for eCall deployment

The second of the main objectives of the study is to provide guidelines for eCall deployment. The aim of the guidelines is to provide information on implementation and operation of eCall in a summarised and non-fragmented manner and to present solutions to barriers for eCall deployment. The expected audience of the guidelines are stakeholders in countries intending to implement eCall.

3 Methods

3.1 Overview

The relations between elements of HeERO work package WP6 are illustrated in Figure 2.

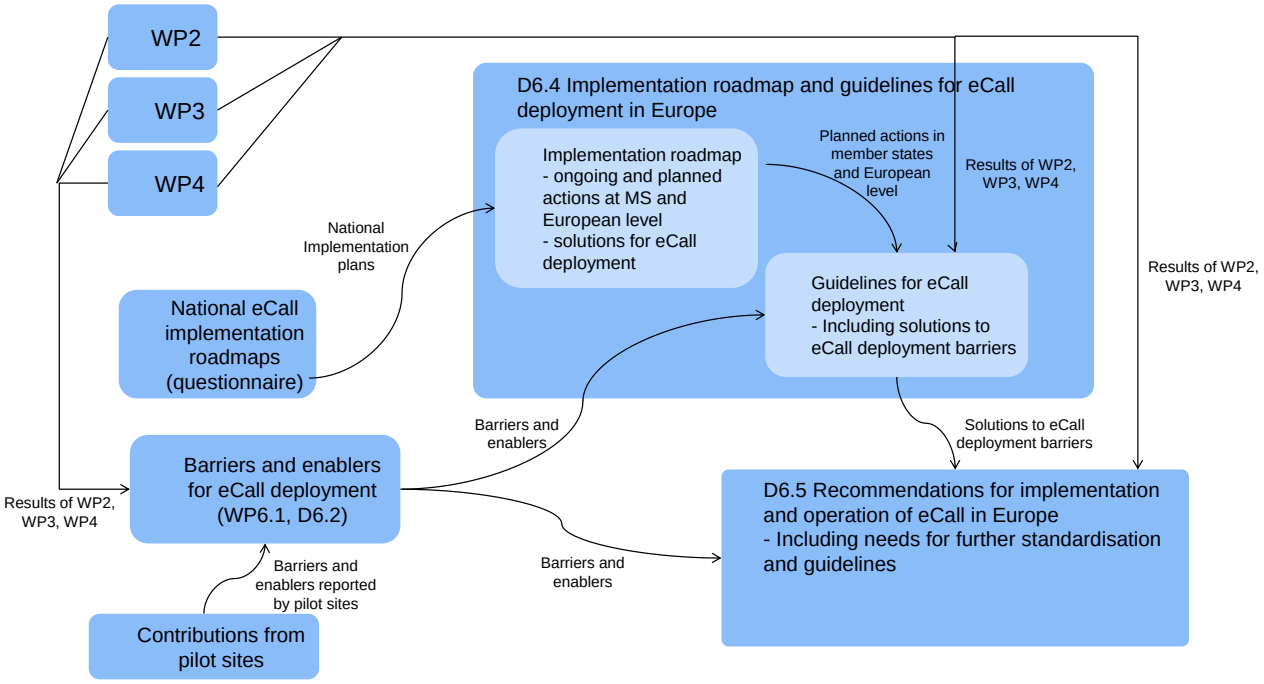


Figure 2: Elements of HeERO WP6

The eCall implementation roadmap presented in this deliverable is based on the inputs collected with a questionnaire from HeERO pilot sites. The barriers and enablers for eCall deployment are summarised in HeERO D6.2 and used in this deliverable as background for developing guidelines for eCall deployment. The guidelines also take into account the results of other HeERO work packages and the actions identified in the eCall implementation roadmap.

3.2 eCall implementation roadmap for Europe

The actions required to implement eCall include actions on both European and Member State levels. The current status and plans for actions on the European level have already been documented in the HeERO D6.2 (Öörni and Brizzolara 2014) which describes the status of eCall standardisation, current status and plans for European level regulation and activities of the European eCall implementation platform. Therefore, the main focus of the roadmap is on the actual implementation of eCall which takes place in the member states:

implementation of eCall in mobile networks and PSAPs, plans for the roll-out of the service and related political decisions.

The information required to construct the roadmap was obtained with a questionnaire targeted to HeERO member state leaders. The questionnaire used for collection of information is presented in Annex A. In addition to the questionnaire, other HeERO deliverables and presentations (for example, Paris and Rooke 2014) and documents collected with targeted internet searches were used as supplementary material. Data collection with the questionnaire was done at the end of 2013 except for the Greek pilot site which updated its contribution after piloting activities in Greece were concluded.

The structure of the roadmap is presented in figure 3.

Figure 3: Structure for eCall implementation roadmap for Europe

The road-mapping process for eCall implementation roadmap for Europe is described in figure 4.

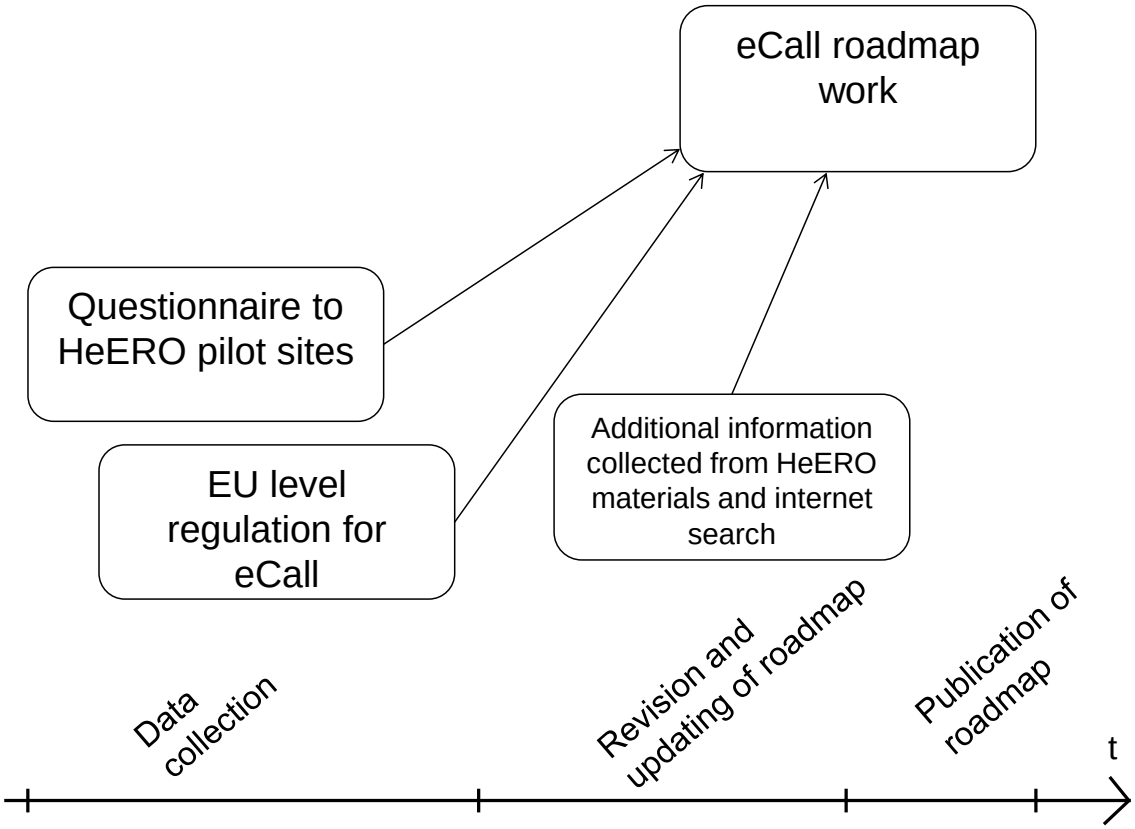


Figure 4: Road-mapping process (adapted from Öörni et al. 2013)

3.3 Guidelines for eCall deployment

The guidelines for eCall deployment are based on the results of the HeERO project documented in HeERO deliverables and presentations, other publicly available material on eCall and the recommendations given by the authors.

The guidelines have been organised into sections which provide a service description for eCall, describe the eCall service chain and its components (IVS, PSAP and mobile network), the role of the member state, European dimension of the service, eCall dissemination activities and solutions to barriers for eCall deployment. Finally, a summary of the guidelines is provided with a list of documents and web sites with further information on eCall.

The guidelines provide a summary of solutions to barriers for eCall deployment. The summary of barriers and the related solutions mentioned in the guidelines takes into account the contents of HeERO deliverable D6.2 (Öörni and Brizzolara 2014). The guidelines describe the barriers which have been encountered by the HeERO pilot sites and the barriers which are most likely to be encountered during the implementation and operation of eCall.

The main focus of the guidelines is on the barriers which are considered most significant, are most likely to be encountered by countries implementing eCall and are relevant on member state level. The scope of the guidelines covers solutions which can be implemented by an individual country intending to implement eCall. Challenges related to the long-term evolution of eCall and other emergency call services or challenges not relevant outside the HeERO project are outside the scope of the guidelines.

4 Guidelines for eCall implementation and operation

4.1 Service description

The deployment of the pan-European in-vehicle emergency service, eCall, will mitigate the consequences of road incidents in Europe. In case of a serious incident, the vehicle systems will automatically initiate a 112 call to the most appropriate Public Safety Answering Point (PSAP), which will establish a voice contact between the PSAP and the occupants of the vehicle, while, as soon as the connection is established, sending a minimum set of data (MSD) related to the incident including accurate location, time and direction of the vehicle to the PSAP (figure 5).

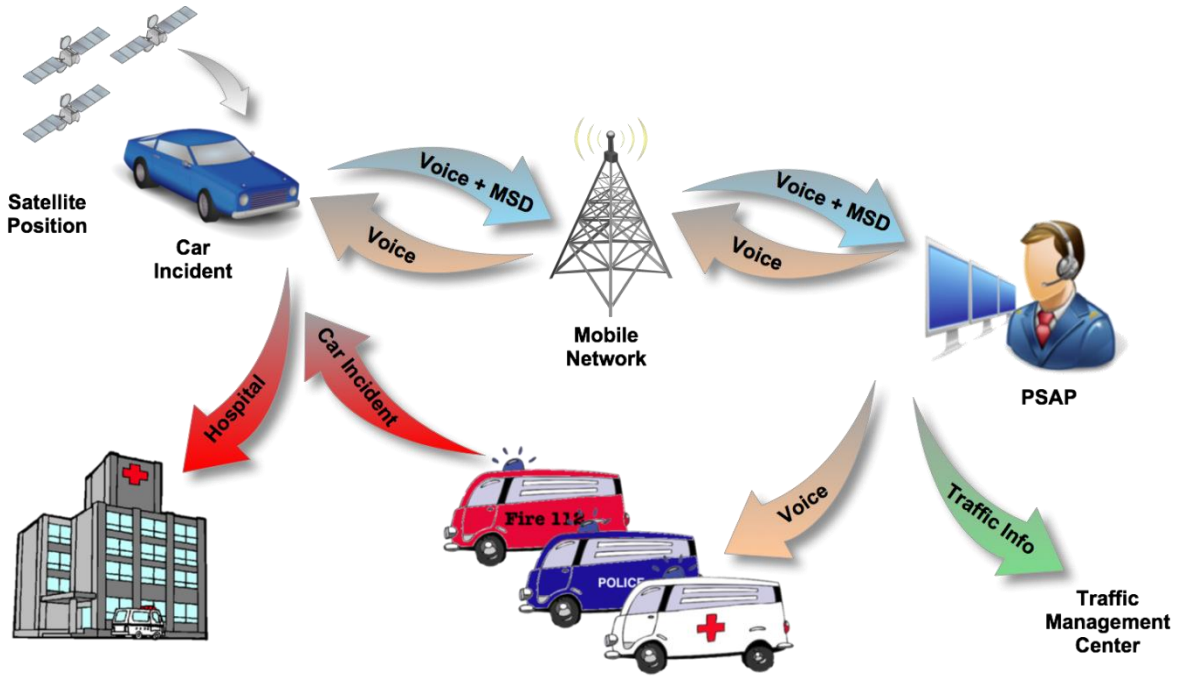


Figure 5: eCall service chain

The major benefit of eCall will be the reduction of the number of fatalities and the mitigation of the severity of injuries caused by road incidents due to faster arrival of the emergency services to the incident scene, due to immediate set-up of a voice call between the occupants of the vehicle and the emergency response centres operators and sending at the same time the accurate location of the vehicle by using satellite positioning and mobile communication capabilities.

Several national, European and international studies have estimated the possible impact of the introduction of the eCall service in all vehicles in Europe, which could led to up to 2,500 lives saved annually in Europe and a reduction of 10% of the severity of the injuries. eCall is

a pan-European service that is designed to operate in all European Member States and states associated. It is designed to work in all automobiles, irrespective of brand, country and actual location of the vehicle, and will be expanded to include HGVs and powered 2 wheel vehicles in the near future.

The main three duties are needed for the deployment of eCall:

I. Vehicle and equipment manufacturers are including an in-vehicle system into the vehicles capable of generating the Minimum Set of Data and triggering the eCall when an incident happens

II. Mobile Network Operators are transmitting the eCalls (both voice and data) to the Public Safety Answering Points (PSAPs) preferably as 112 calls with the help of eCall discriminator

III. Member States are upgrading their Public Safety Answering Points (PSAPs) in order to manage eCalls.

4.2 Service key actors and stakeholders

EU Commission (DG Move & Connect) & EU Parliament

European Commission has adopted several measures to ensure eCall deployment by 2015. 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 2015.

Standardization bodies

eCall standardization is part of ITS standardization and made by the European standards organizations CEN and 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 (PSAPs), 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.

4.3 European dimension

eCall is new telecommunication service of automatic notification of traffic incident to appropriate PSAP (Public Safety Answering Point), based on emergency call architecture 112 (2GPP TS 26.267). The service has been fostered and promoted by European Commission and is intended to become a national public service in all member states in 2015. eCall service is now in testing and validation phase by HeERO project. HeERO addresses the pan-European in-vehicle emergency call service "eCall" based on 112, the common European Emergency number. For three years (January 2011 to December 2013), the nine European countries forming the HeERO 1 consortium (Croatia, Czech Republic, Finland, Germany, Greece, Italy, The Netherlands, Romania and Sweden) carried out the start-up of an interoperable and harmonized in-vehicle emergency call system. eCall is based on existing 112 system and is triggered automatically by in-vehicle sensors, without user intervention, or manually, by vehicle occupants. The operation of the service requires certain modifications on mobile network, upgrade on existing 112 public safety answering point and fully functional IVS unit (In Vehicle System).

With eCall service, it is possible to achieve a certain improvement in road traffic safety. Traffic safety is linked to three key elements: driver, vehicle/road, and legislation and these actions are required to gain a finally goal which can be defines Vision Zero - zero fatalities and zero injures in road traffic.

4.4 eCall history

The main steps in eCall history starting from the beginning of this century are summarized briefly in this chapter. A summary of the different initiatives are depicted in Figure 6 and Figure 7 and take into account a wide range of initiatives.

E-MERGE (April 2002 - March 2004)

The E-MERGE project was launched with the aim of developing the pan-European harmonised in-vehicle emergency call service chain. The aim of the E-MERGE project was to develop an in-vehicle emergency call solution that will initiate a manual or automatic call from vehicle to PSAP (Public Safety Answering Point) in a fast and reliable manner, and that proper actions can consequently be taken to dispatch assistance to the vehicle. This harmonised in-vehicle system capitalises on and extends current 112 capabilities.

The objectives of E-MERGE are summarised below:

- coordinate efforts with other groups working to enhance emergency call capabilities (e.g. E112 and the eSafety initiative)
- define the public and private sector requirements needed to fulfil the goal of a pan-European emergency service chain, in particular focusing on the data that PSAPs want to receive
- finalise the specifications for the eCall message set, the routing of the eCall and the corresponding interfaces, thus encompassing all levels of the eCall chain (vehicles, telecom operators, PSAPs, service providers and emergency agencies such as police, fire, ambulance)
- select a protocol as the standard of choice for testing in-vehicle eCall
- finalise the road map to deployment and related aspects of the business introduction.

Duration and funding: April 2002 - March 2004, through the EC Information Society Directorate General. Consortium: ERTICO (coordinator), Association of Chief Police Officers (ACPO)UK, Cap Gemini, Ernst & Young, City of Milano, C.R.F. (Fiat), DTLR, GDV, GM OnStar (Opel), Mizar Automazione, PSA Peugeot Citroën, RACC, SEAT, SOS Alarm AB, Telmacon, VTD (Volvo) and as major subcontractors, KLPD (Dutch National Police) and Renault.

eCall Driving Group (Public entity)

The eCall Driving Group (as approved by the eCall DG on 2 June 2003 and the eSafety Steering Group of 16 June 2003) worked on an integrated strategy for Pan-European emergency services. These services were planned to build on the location-enhanced emergency services being implemented in the Member States on the basis of the recently adopted Recommendation on the implementation of E-112. Furthermore, these services will include provisions for more accurate location information and additional safety information.

In summary, the main focus areas of the eCall Driving Group were:

- Establishing and maintaining the definition of the eCall mission and of the end product
- Developing and maintaining the eCall “functional model”
- Developing and maintaining the eCall “operational model” and, for each of the eCall “constituencies”,
- Identifying the overall requirements
- Assessing the progress of the contribution

- Ensuring the coordination and exploitation of the results of the technical actions participating in the eCall "toolkit". Including the high level buying of eCall Within each "constituency" Globally (EU level)
- Reporting of actions to: The eSafety environment (Forum, Steering Committee, the European Commission) and Informs The eCall "constituencies" and Other institutions as needed (European Parliament, …)

Memorandum of Understanding (MoU) (from 2004)

- The eCall Driving Group released a Memorandum of Understanding (MoU) (released for signature 27 August 2004) that calls for stakeholders to actively investigate feasible and sustainable eCall solutions and potential business cases. The MoU lists the necessary arrangements for implementation of the eCall action plan and sets out the measures to be taken by the European Commission, Member States, automotive industry, telecoms and insurance industries.
- The MoU's key message is that eCall should work in any EU Member State and that eCall should be based on the single pan-European emergency call number 112.
- The current situation (2Q 2013) of the eCall Memorandum of Understanding: it has been signed by 22 Member States (two Member States have signed a formal Letter of Support), 5 associated countries and more than 100 organisations.

eCall Implementation Platform (2009)

The European eCall Implementation Platform (EeIP) is the coordination body bringing together all relevant stakeholders interested in the rapid implementation of the pan-European eCall. eCall is an eSafety technology that is promoted by the European Commission. The aim of eCall is to bring rapid assistance to motorists involved in a collision anywhere in the European Union. Many organisations are involved with the deployment of this technology across Europe, focusing on different aspects of eCall including in-vehicle systems, wireless data delivery, and Public Safety Answering Points (PSAPs).To harmonise the work of various stakeholders, the eCall Implementation Platform was set up in February 2009 at the initiative of the European Commission. It brings together all major stakeholders to synchronise the activities accelerating the deployment of eCall at national and European level. Participants involved in EeIP include the European Commission, the Member States, industry and other associations. The Platform is co-chaired by ERTICO – ITS Europe and a Member. The European eCall Implementation Platform builds on the previous work done by the eCall Driving Group, PSAPs Expert Group and the European Standardisation Organisations.

e-Call impact assessment study

The EC needed a new study to investigate market introduction, legal and liability issues and identify the costs and benefits. The specific objectives of this study were to:

- assess all impacts and benefits of eCall, also fully covering the indirect benefits due to reduced congestion, fewer secondary incidents, improved operations of rescue services, traffic management, national economy, etc.;
- assess all costs of eCall;
- assess all other key deployment issues related to eCall;
- to compare the three scenarios of do nothing/voluntary agreement/mandatory deployment with regard to their socio-economic profitability.

The longer term objectives of the work to the European Commission are to utilise the results in deciding on further steps to accelerate the deployment of pan-European eCall. In addition to this, the study provided help to inform decision making by other stakeholders in the eCall service chain. For example better and more up to date information on the costs and benefits of eCall is important, when communicating eCall to those Member States which are not yet committed to eCall deployment.

The organisations collaborating together on this project with TRL (coordinator) include; TNO - Netherlands, VTT - Finland, Ertico - Belgium, Inter-ut XXT- Hungary, eSafety Aware - Belgium, Vrije Universitiet – Netherlands

HeERO and HeERO2 Project

HeERO addresses the pan-European in-vehicle emergency call service "eCall" based on 112, the common European Emergency number. For three years (January 2011 to December 2013), the nine European countries forming the HeERO 1 consortium (Croatia, Czech Republic, Finland, Germany, Greece, Italy, The Netherlands, Romania and Sweden) carried out the start-up of an interoperable and harmonised in-vehicle emergency call system.

The second phase of the HeERO project - HeERO 2 - started on 1st January 2013 and will last 2 years. 6 new countries (namely Belgium, Bulgaria, Denmark, Luxembourg, Spain and Turkey) have joined the other 9 pilot sites of HeERO 1. Furthermore, other countries which expressed interest to become HeERO partners, but have not succeeded for several reasons,

became associate partners and obtained a status allowing them to benefit from the expertise of HeERO 1 and 2 but not granting them access to EC funding.

The HeERO consortium is currently testing and validating the common European eCall standards defined and approved by the European Standardisation Bodies.

The project is partially funded by the European Commission under the ICT PSP programme.

Legislative initiatives

The projects and initiatives related to eCall are summarised in Figure 6 and Figure 7.

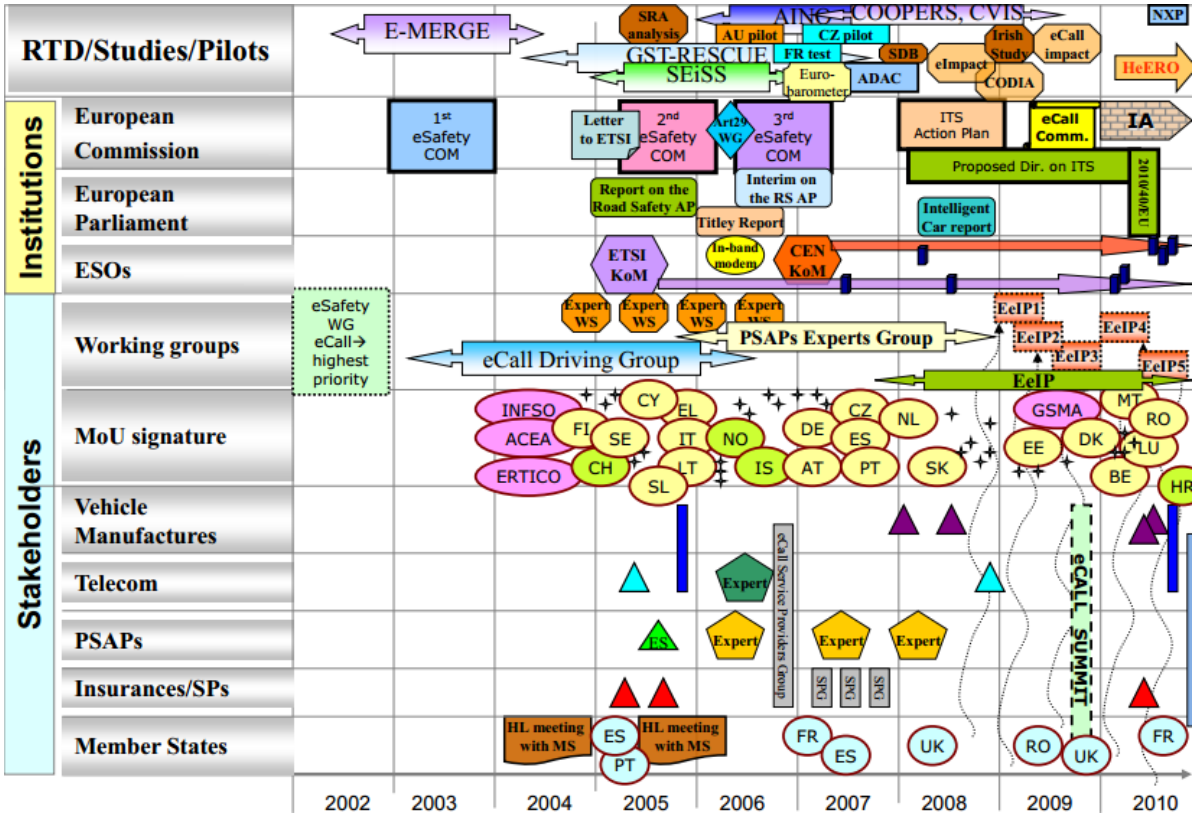
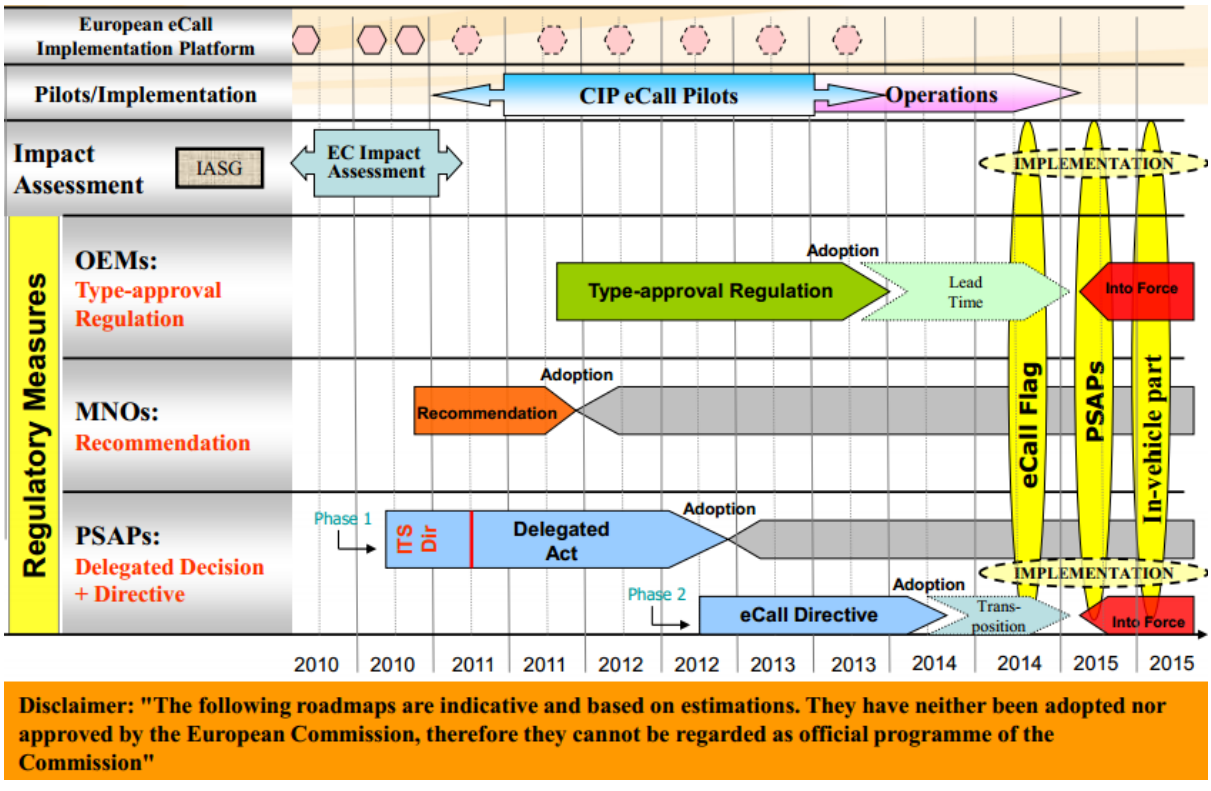


Figure 6: from Harmonised and interoperable EU-wide eCall (from EC presentation)



Disclaimer: "The following roadmaps are indicative and based on estimations. They have neither been adopted nor approved by the European Commission, therefore they cannot be regarded as official programme of the Commission"

Figure 7 eCall Implementation Timetable (from EC presentation)

4.5 Member States and local administrative actions

4.5.1 National platform

A Member State planning to implement eCall should first set up its National *eCall Platform* group. This National Platform should typically include representatives

- of all relevant Ministries which steer and supervise PSAP operators, rescue forces, transport, vehicle registration and inspection, interior issues, telecommunications, civil protection, health care etc. which are involved in the eCall service chain.
- Also it would be fruitful to involve commercial side of eCall service chain: automotive industry, vehicle trade/sellers, mobile telecommunication network operators, PSAP suppliers, vehicle inspection service providers etc.
- and the user organizations like automobile clubs etc.

The main responsibility of the National Platform is to create a eCall development group which together solves possible political, financial and concrete development challenges eCall system implementation is facing in the Member State.

4.5.2 Traffic management related to eCall

Road operators are responsible for the road safety and management of the road network they operate. They are also taking part in rescue and safety improvement procedures. Road operators have to keep continuous contact with other emergency services. Information sharing and data exchange between road operators and emergency service organisations should be well organised and defined. Incident location determination will be supported by the exact location of the incident provided by eCall. Using the telephone as the only means of communication may result in different interpretations, miscommunication and sometimes in conflicting information.

eCall will provide accurate and timely information to the road manager and to rescue services, but also enhance the traffic incident management process and therefore road safety.

The general benefits of eCall can be seen to be

1) faster response to the incident,

2) faster implementation of the Traffic Management Incident process,

3) reductions in secondary incidents

4) more accurate information.

5) increased information provided by the MSD

Road operator's Traffic Management Centre (TMC) can support the emergency operations by immediately checking on the location and other relevant incident information with their existing monitoring systems and informing the rescue organisations about the incident.

4.6 eCall service chain

Interoperable Pan European eCall service needs common standardized specifications and shared best practises in PSAP organisations and systems, communications systems and in-vehicle devices. The overall architecture and main stakeholders of eCall system are presented in Figure 8.

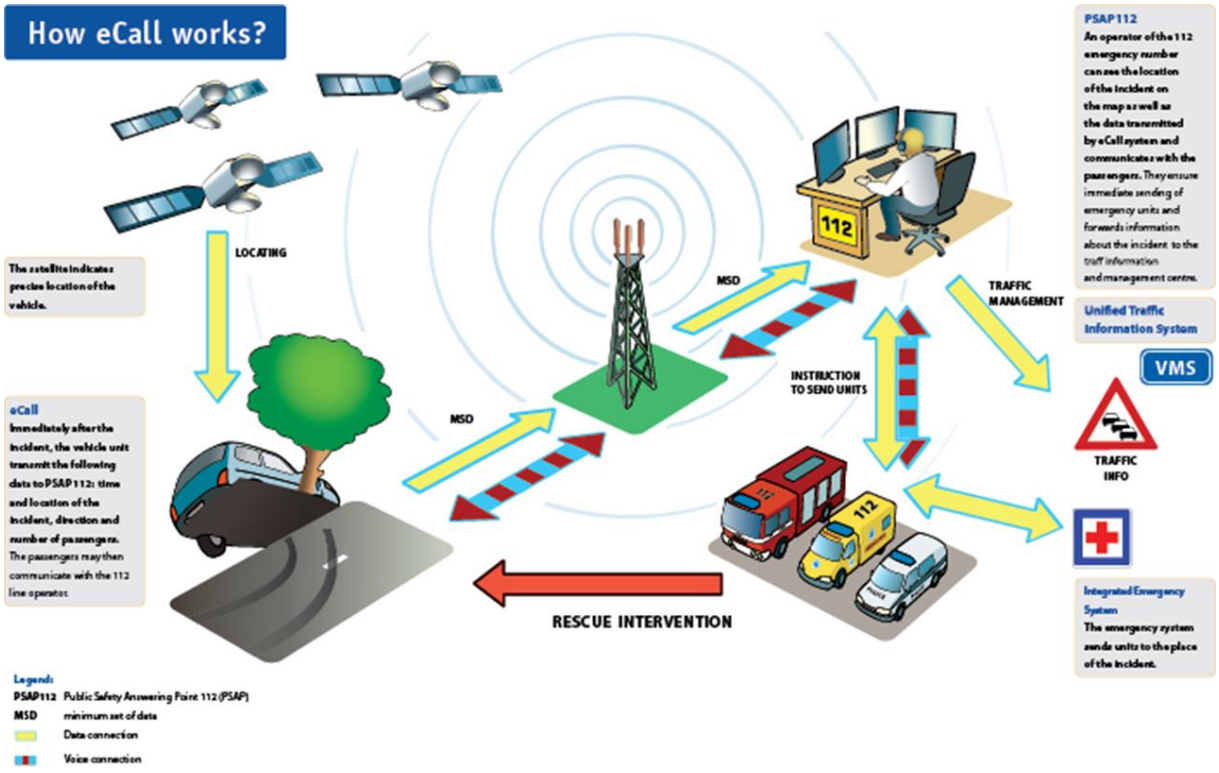


Figure 8: Simplified presentation of eCall architecture (HeERO 2014).

4.6.1 Standards

The most efficient way to address interoperability issues is to use agreed common standards. The European Standardisation Bodies CEN and ETSI have been working on eCall standards since 2004. The following technical and operational standards have been developed so far:

• CEN EN 15722: Intelligent transport systems - eSafety – eCall minimum set of data

This European Standard defines the standard data concepts that comprise the "Minimum Set of Data" to be transferred from an eCall equipped vehicle to a 'Public Safety Answering Point' (PSAP) in the event of a severe crash or emergency via an 'eCall' communication session.

• CEN EN 16062 - eCall- High Level Applications Protocols

This European Standard defines the high level application protocols, procedures and processes required to provide the eCall service using a TS12 emergency call over a public mobile communications network.

• CEN EN 16072 - Pan European Operational Requirements for Pan European eCall This European Standard defines the general operating requirements and intrinsic procedures for in-vehicle emergency call (eCall) services in order to transfer an emergency message from a vehicle to a 'Public Safety Answering Point' (PSAP) in the event of a crash or emergency, via an 'eCall' communication session and to establish a voice channel between the in-vehicle equipment and the PSAP.

• EN/ISO 24978 ITS Safety and emergency messages using any available wireless media - Data registry procedures

This European Standard defines a Standardized set of protocols, parameters, and a method of management of an updateable "Data Registry" to provide application layers for "ITS Safety messages" via any available wireless media.

• ETSI: In-Band modem transmission protocol

In-band modem solution was selected as the transport protocol of the eCall MSD transmission. It enables to use the voice channel of the 112/E112 calls to carry the MSD payload from IVS to PSAP. ETSI Technical specifications defining the protocol are ETSI TS 126 267, ETSI TS 126 268, ETSI TS 126 269 and ETSI TR & TS 126 969.

• ETSI: eCall discriminator

The emergency centres have to be able to identify the emergency calls coming from road vehicles. To this purpose the eCall discriminator has been specified within ETSI MSG/3GPP and is part of the Release 8 of the GSM Standard (TS 124 008). This discriminator (also known as eCall Flag) will differentiate the 112 calls coming from mobile terminals from the in-vehicle eCalls and also between manually and automatically triggered eCalls, allowing the design of a PSAPs which meets the national or local requirements in the best possible way. (HeERO D2.1 2011)

List of standards is available at the following links.[1]

http://ec.europa.eu/information_society/activities/esafety/ecallstandards/index_en.htm

http://ec.europa.eu/information_society/activities/esafety/doc/ecall/annex_standard.pdf

- CEN EN15722: Intelligent transport systems - eSafety - ECall minimum set of data
- CEN 16062 - eCall- High Level Applications Protocols
- CEN 16072 - Pan European Operational Requirements for Pan European eCall
- EN/ISO 24978 ITS Safety and emergency messages using any available wireless media - Data registry procedures
- 3GPP TS 24.008 - Mobile radio interface Layer 3 specification; Core network protocols; Stage 3
- 3GPP TS 22.101 - Service aspects; Service principles
- 3GPP TS 26.267 – eCall Data Transfer; In-band modem solution; General description
- 3GPP TS 26.268 – eCall Data Transfer; In-band modem solution; ANSI-C reference code
- 3GPP TS 26.269 – eCall Data Transfer; In-band modem solution; Conformance testing
- 3GPP TR 26.967 – eCall Data Transfer; In-band modem solution
- 3GPP TR 26.969 – eCall Data Transfer; In-band modem solution; Characterization report

4.6.2 Service chain

In the introduction to an European Standard, eCall was described as "an emergency call generated either automatically via activation of in-vehicle sensors or manually by the vehicle occupants (the eCall generator); when activated, it provides notification and relevant location information to the most appropriate Public Safety Answering Point, by means of mobile wireless communications networks and carries a defined standardised minimum set of data, notifying that there has been an incident that requires response from the emergency services and establishes an audio channel between the occupants of the vehicle and the most appropriate Public Safety Answering Point".

Pan-European eCall provides this functionality using a Circuit Teleservice TS12 supported by a Public Land Mobile Network (PLMN) (Teleservice 12/TS12) ETSI TS 122 003.

[1] Note that the standards referred to in this document are still evolving. The seminal standards documents should be referenced from the standards bodies themselves.

After the establishment of an emergency voice call (112/E112) between the vehicle and the Public Safety Answering Point (PSAP), the audio equipment comprising the microphone and loudspeaker in the vehicle is disconnected from the line whilst the MSD is transmitted, within the voice band to the PSAP data processing equipment. An indication shall be given to the occupants of the vehicle that an eCall is in progress. On completion of the MSD transfer, the in-vehicle audio system is reconnected to the line and a voice communication is established between the vehicle occupants and a PSAP operator.

The incident related information associated with the 112/E112 voice call, contained within the MSD, is made available to the PSAP operator in the manner decided locally. Following the initial resolution of the incident by the PSAP operator, the PSAP operator may clear down the call, however, the in-vehicle system (IVS) remains registered on the mobile network, for the period specified in EN 16072 to enable the PSAP or rescue services to recall the vehicle occupants.

The eCall service technical requirements, as they apply to the establishment of the TS12 emergency call and the transfer of the in-band data, are as specified in ETSI TS 122 101 and ETSI TS 124 008. These specifications also describe the use of the eCall discriminator by the mobile network which is needed to ensure the correct filtering and routing of eCalls to a designated eCall capable PSAP. The eCall in-band modem, used to transfer the MSD, is specified in ETSI TS 126 267 and ETSI TS 126 268. (D2.1 SoA 2011)

4.6.3 Interaction between emergency agencies

eCall must be handled in all different PSAP structures. The best practices for interaction between emergency agencies can be shared among the developers and operators of different European PSAPs. *112 Operations Committee* is dedicated to defining requirements and enhancing sharing of best practices on the whole 112 chain. The Next-Generation 112 Committee has started developing European standards for the IP-based emergency services.

4.6.4 Cross-border service

Cross-border service means the behaviour of the eCall in-vehicle system near the border if for example the strongest mobile network available is one operated in another member state then the one in which the vehicle is located.

Current experiences in dealing with cross-border emergency calls are available and appropriate procedures between the PSAPs in the two member states exist. These established processes will be used as well in cross-border eCalls.

Currently two options in dealing with cross-border eCalls are possible:

1. Option: The PSAP receiving an eCall and the position of the car will be automatically recognized from the MSD information. A cross-border eCall is identified and a voice contact will established. After the assessment of the situation then the eCall is forwarded to the most appropriate PSAP in the country of origin or, ideally in consideration of the optimal use of the assistance dispatch to the right service in the bordering country.

2. Option: Developed by OECON GmbH as a project partner in HeERO, the eCall Router technology represents a holistic solution for eCall deployment and also covers the cross-border issues. In this solution the eCall data (MSD, TPS, and car info) are centrally pre-processed through a router, and then automatically forwarded to the wrong PSAP. This PSAP may then transfer together with the voice call allows the already processed MSD to the eCall router on the other side of the border.

4.6.5 Interoperability

eCall shall be operational throughout all Member States in Europe. There will be plenty of manufacturers offering solutions to the automotive OEM in the production chain as tier 1 or tier 2 suppliers. In the Member States, a variety of suppliers will provide solutions to enhance existing PSAPs or equip new PSAPs with eCall functionality. Therefore, interoperability is one of the highest objectives for the successful operation of eCall throughout Europe to ensure that every IVS will interoperate properly with all PSAPs. As eCall is based on emergency calls via 112, the interoperability of the IVS with the mobile network can be assumed. The critical issue is the interoperability of the application, the MSD and the high-level application protocol (HLAP) implementations. There are two ways to validate interoperability, one is based on direct connectivity between manufactures the other on an in-depth validation of the implemented protocol.

Telecommunication interoperability events have proven their value to achieving interoperability in early stages of deployment. Manufacturers of equipment are meeting in one room with their equipment. They have directly the opportunity to connect their equipment with that of the other participants' one after the other. By this they experience directly if the interoperability between the two tested devices is given or identify issues and typically try to solve these issues directly to achieve interoperability. Therefore, it is strongly recommended that in the first years of deployment interoperability events is organized e. g. by Ertico to provide to manufactures the opportunity to optimize their implementation to achieve interoperability. The interoperability events will provide the opportunity to validate

interoperability between an IVS to a PSAP not taking into account the mobile network in-between.

The other approach is based on in-depth testing of the protocol stack with the respective standard, called end-to-end conformance tests. Opposed to the interoperability event, all cases defined by the standard shall be evaluated in the end-to-end conformance test. Therefore, these tests have to be done in a laboratory with dedicated test equipment, a simulator. Only a simulator allows to test case by case all aspects including error handling of the standard. For the application layer, the CEN TS 16454 describes the required end-to-end conformance tests. By a delegated regulation, the Member States are obliged to designate the authorities that are competent for assessing the conformity of the PSAPs to European standards. The member states shall also notify them to the Commission. A similar requirement for the IVS is missing so far. Therefore, this might be included in the type approval regulation or be part of the (voluntary) certification.

4.7 In-Vehicle systems for eCall

4.7.1 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.

4.7.2 EU regulation for In-Vehicle systems

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

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

4.7.3 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 PSAPs are flooded by calls not directly related to emergency intentionally (misuse). 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.

Therefore 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 fulfil all requirements of eCall. The HeERO projects have been tasked with providing the certification framework, and as such are currently working with the industry to provide the framework which will be provided as a deliverable in HeERO 2 in Q3 of 2014.

4.7.4 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).

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 fulfils 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 effect 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

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 9.

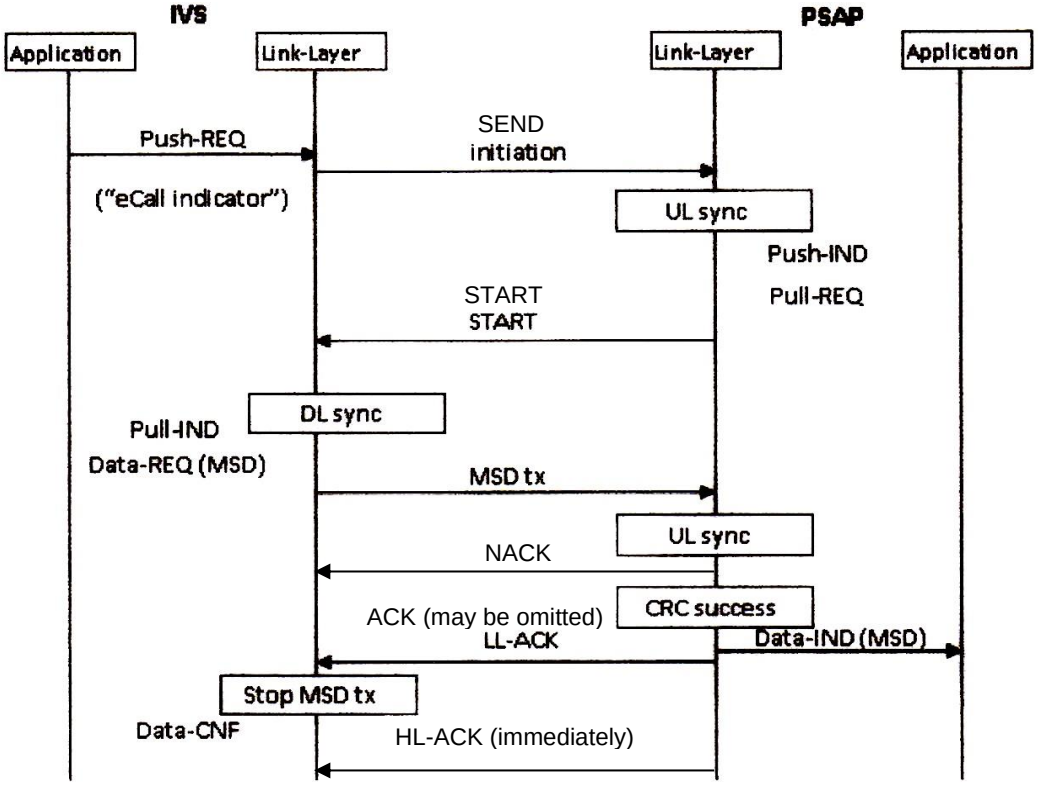


Figure 9: Data flow description (adapted from CEN 2011, Figure 6)

Sequence of steps:

- Send initiation signal (5 * "SEND" bursts) from IVS eCall modem to PSAP
- eCall modem synchronisation 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.

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 10).

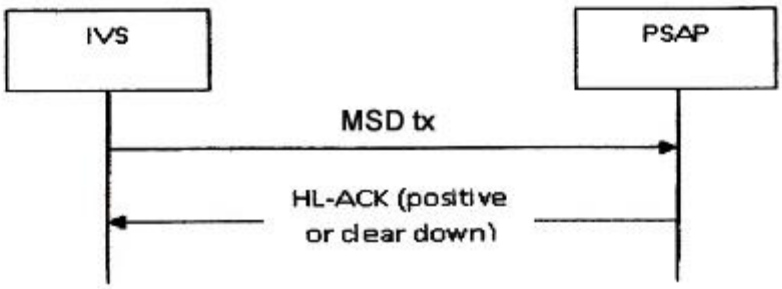


Figure 10: AI – ACK diagram (adapted from CEN 2011, Figure 4)

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 11).

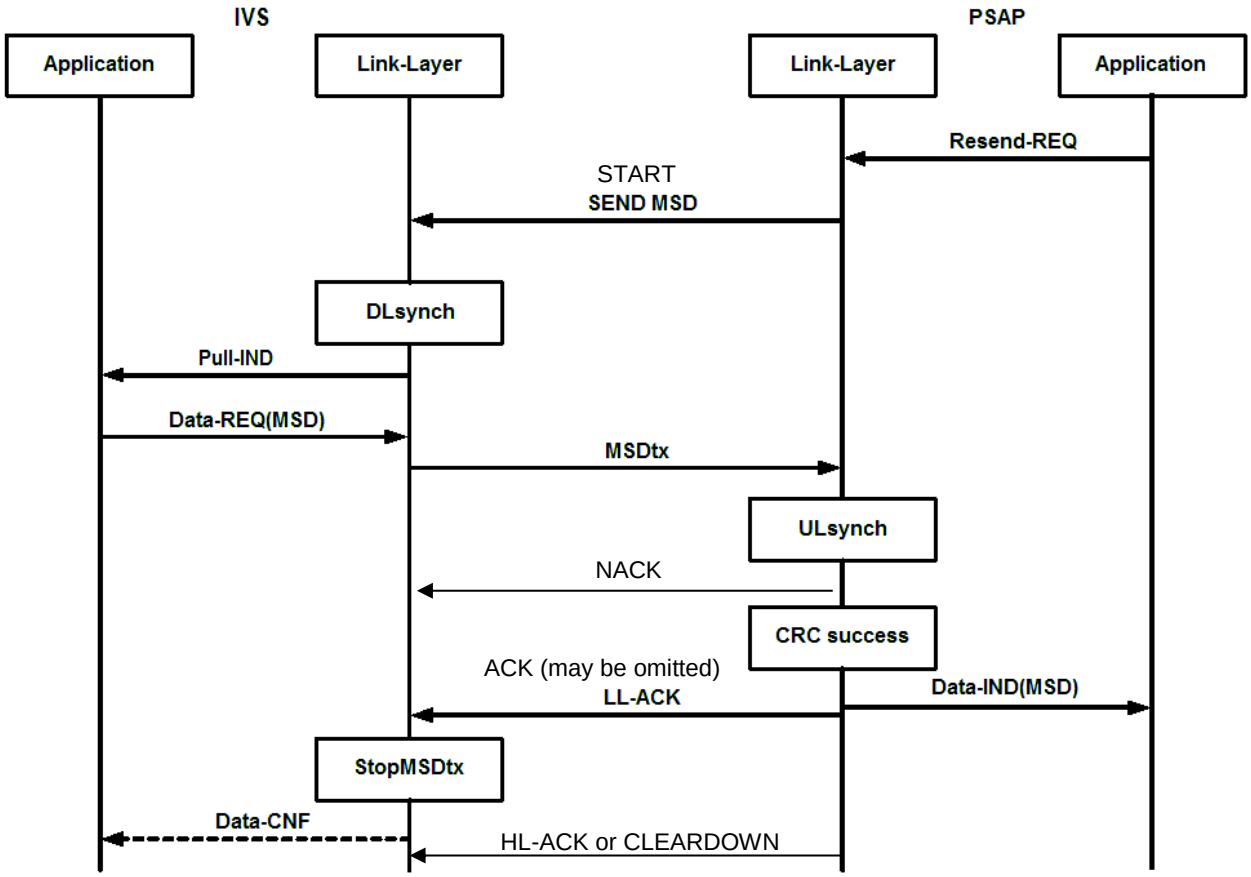


Figure 11: Send MSD diagram (adapted from CEN 2011, Figure 8)

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.

4.7.5 List of timers

The timers related to eCall session are summarised 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 manufacturer. 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 2 s 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, whist sending the INITIATION message, does not receive or recognise a valid "SEND MSD" message from the PSAP eCall modem within 2 s, 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 5 s 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 20 s 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 20 s 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 **IVS NAD (eCall only configuration) network De-registration Fall-back Timer (DFT)**	An IVS NAD configured to make eCalls and test calls only shall, following call clear-down and maximum expiration period of the De-registration Fall-back Timer (DFT) 12 h period, de-register from the serving network.	12h

Table 1: Timings - EN16062, Annex A (CEN 2011)

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 PSAPs are free to use this feature.
- SIM/USIM with roaming capability

4.7.6 In-vehicle devices' periodical inspections

The IVS 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 by the on-board diagnostics that a component does not work. For eCall, the challenge is that the outer 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 at the remote end. The outer world will change during the 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 periodical 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 harmonise 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 behaviour, 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 required to include the above described procedure into their national regulation.

4.7.7 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 12.

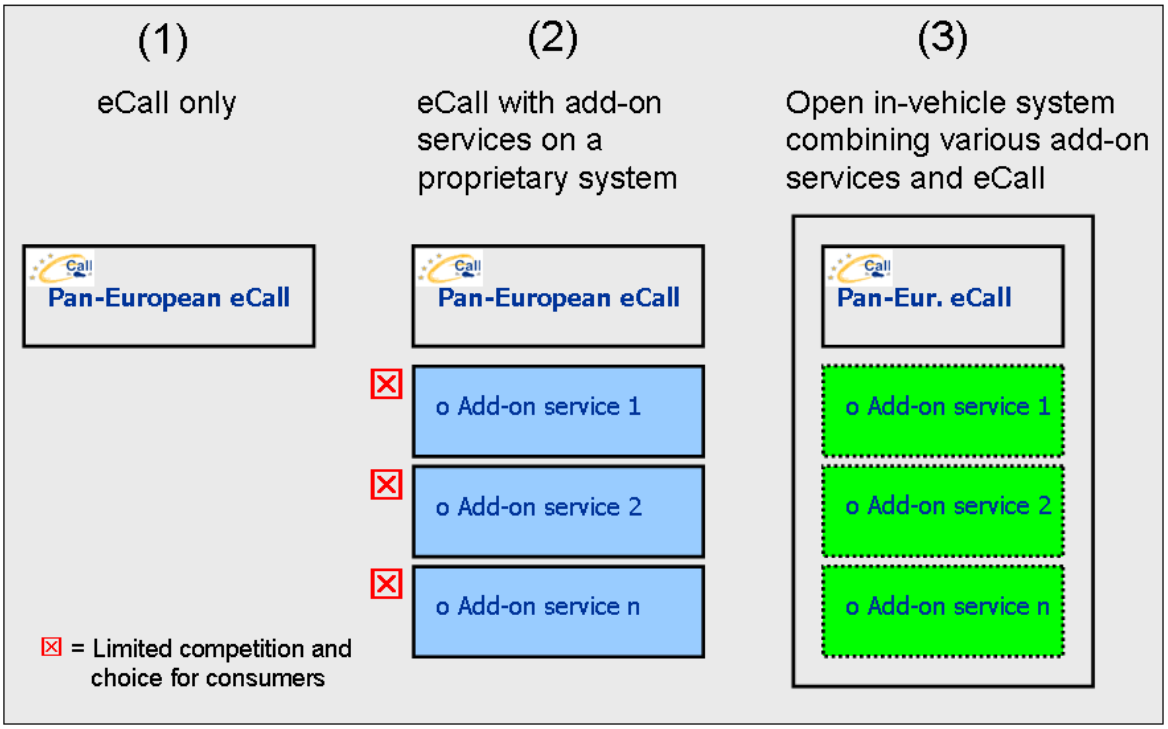


Figure 12: Possible options for OEM in-vehicle systems (EeIP 2011)

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.

Option (1): eCall only

'eCall only' means stand-alone eCall and is not designed to provide additional services. 'eCall only' just fulfils 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".

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 and real time traffic information. 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 can't offer own

services on the built-in in-vehicle system, hence they need to offer dedicated retrofit solutions which customer has to buy at additional cost.

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.

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 plain eCall. 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 organisations within the eCall supply chain to define and decide their individual strategies associated with eCall deployment in order to find and realise 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.

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. Unfortunately, aftermarket systems sometimes are deemed of inferior quality and less reliable than factory fitted systems. It is unquestioned that a missing access to the vehicle architecture (bus) constitutes another significant disadvantage.

4.7.8 Value Added Services

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

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[2]

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 value added service. Examples of this include but are not limited to TPS eCall, post-incident management, breakdown assistance 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 an 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.

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

[2] Source: Translation from German Wikipedia.

European legislators to clarify access to in-vehicle systems for all market participants on a fair and non-discriminatory competitive basis (Figure 13).

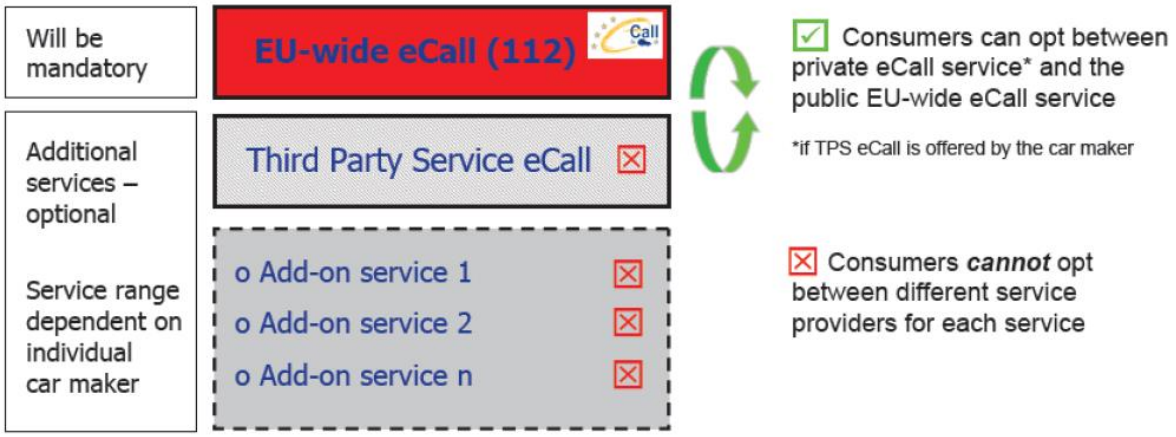


Figure 13: EU-wide eCall, value added services and consumer choice (EeIP 2011)

4.8 Upgrading MNOs for mediating eCall in communication networks

4.8.1 Relevant stakeholders for MNO

The relevant stakeholders are MNOs and MNO suppliers. Mobile telecommunications network operators have the responsibility to handle eCalls as any other 112/E112 emergency call, including the caller line identification 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, MNOs 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.

4.8.2 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 by 31 March 2012

Some examples for national procedures for implementation of eCall in mobile networks are presented below.

In Croatia MNO regulations are defined by the „Law on Electronic Communication". New proposal of the law is now in procedure which is expected to end by the end of July 2013th, and new rules on the single European emergency call number are expected at the beginning of 2014th. According to the proposal of these documents, MNO's obligations regarding eCalls are listed below.

Operators of public communications networks and publicly available telephone services must provide free calls for all users to the single European emergency number 112, as well as other phone numbers for access to emergency services in the Republic of Croatia in accordance with the Numbering Plan, and without the use of any means of payment from any telephone device, including all public telephones and devices for emergency calls from vehicles (hereinafter referred to as e-call).

The method and conditions of use of the single European emergency call number 112 and e-call, technical and other requirements for operators in fulfilling their obligations under the relevant central authority regarding the manner, form and deadlines for the submission of data and benchmarks of quality of service calls to 112 and e-call shall be stipulated in the ordinance issued by the Minister.

This article complements the obligations of operators of public communications networks and publicly available telephone services with respect to enabling free calls to the single European emergency number 112, as well as other phone numbers for access to emergency services in the Republic of Croatia, in a way that it encompasses and devices for emergency calls from vehicles (e-call). This provides the legal framework for the implementation of the functionality of the vehicle emergency call (e-call) at the national level, in accordance with the Commission Recommendation of 8th September 2011th to support e-Call calls on the EU to electronic communications networks for transmission of emergency calls in vehicles based on the number 112 (e-call).

Furthermore, operators are prohibited from collecting fees for calls diverted to other phone numbers used by emergency services, when such a redirection to the central body responsible for receiving calls to emergency services is in accordance with the law which regulates the protection and rescue services. The scope of Regulations by which the minister is responsible for electronic communications and authorized to regulate in detail the manner and conditions of use of the single European emergency call number 112, extends to emergency calls from vehicles (e-call).

In **Italy**, the initial eCall deployment has been coordinated at national level by involving in the national Pilot, being carried out in the frame of the HeERO contract, representatives of all the relevant stakeholders, including the major national fixed and mobile Telco operator. The agreement among the involved parties has been to select a real operational E112 PSAP and to upgrade it in order to receive all eCalls received during this pilot campaign generated in a specific geographical area and processed by the mobile network of the national MNO directly involved in the trial. The end-to-end network topology used in the Italian HeERO pilot has been selected to fully implement the real processing of the eCalls and their routing to the designated PSAP through the real operational mobile and fixed networks. This decision allowed the evaluation of the possible technical/practical issues to be faced when the full deployment will be mandated by the Italian government.

4.8.3 MNO network upgrading

The components of the Croatian eCall Pilot Architecture are presented in Figure 14.

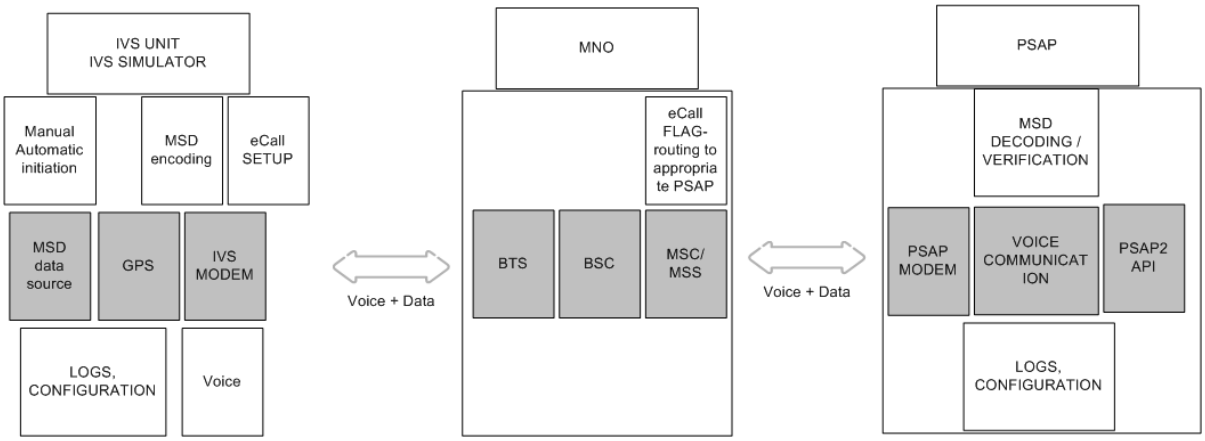


Figure 14: Simplified Fig Croatian eCall Pilot Architecture

Mobile network part of eCall pilot requires an appropriate patch to be applied on mobile switching centre (MSC) or mobile switching centre server (MSS) to enable proper identification and routing of eCall in addition to regular 112 call. All MNO equipment vendors should provide appropriate patches for eCall discrimination for all software releases which are operational within the MNO setup.

The actual deployment roadmap of the eCall from a Telco operator standpoint can be very specific for any Member State, but, in most of the cases can be considered as an additional step in the evolution of the public emergency call services on top of the legacy 112 voice service for fixed networks first and of the E112 extension to the mobile network domain, as show in the Figure 15.

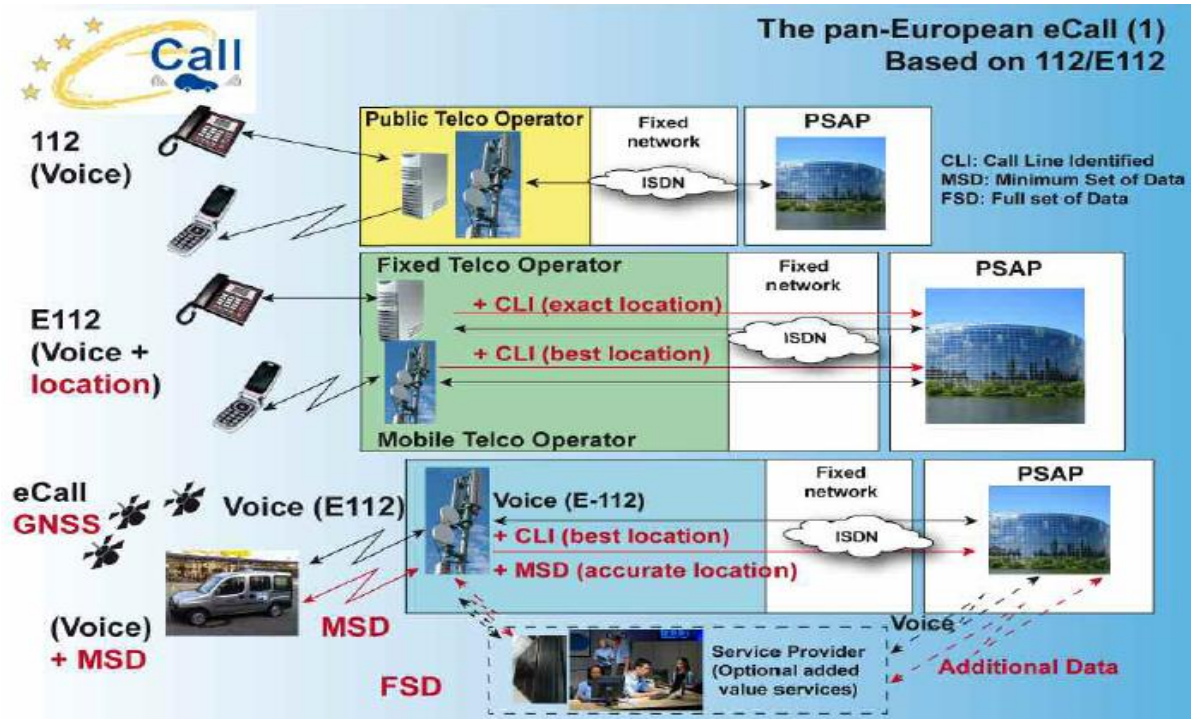


Figure 15: The pan-European eCall (1). Based on 112/E112

In Italy, the installation of the new features (i.e. patch to be installed in the designated MSC) for the processing of the eCall signalling in the mobile network (eCall discriminator flag) in an operational mobile network and the related routing to the designated PSAP has requested the execution of all the standard testing and validation procedures that any MNO utilizes as good practise when performing any update on its operational network. This included the successfully testing and validation of the “eCall flag” software performed, with the support of the selected supplier, initially in a controlled environment and finally in the actual operational one. This was a needed operational requirement aiming at guaranteeing the seamless availability of the mobile network during any phase of the HeERO pilot execution and proved successfully so demonstrating the feasibility of a reasonably quick national deployment as soon as the national government will mandate it.

4.8.4 Requirements for MNO upgrading

The main functional requirements for Mobile Network Operators are presented below. (HeERO 2011)

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 (Figure 16).

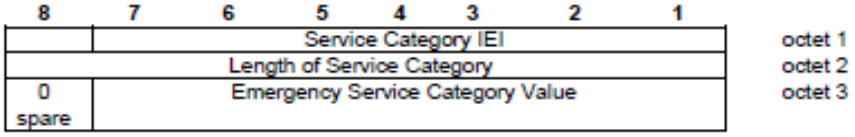


Figure 10.5.118d/3GPP TS 24.008 Service Category information element

Table 10.5.135d/3GPP TS 24.008: Service Category information element

Emergency Service Category Value (octet 3)
The meaning of the Emergency Category Value is derived from the following settings (see 3GPP TS 22.101 [8] clause 10):

Bit 1 Police
Bit 2 Ambulance
Bit 3 Fire Brigade
Bit 4 Marine Guard
Bit 5 Mountain Rescue
Bit 6 manually initiated eCall
Bit 7 automatically initiated eCall
Bit 8 is spare and set to "0"

Mobile station may set one or more bits to "1"
If more than one bit is set to "1", routing to a combined Emergency centre (e.g. ambulance and fire brigade in Japan) is required. If the MSC can not match the received service category to any of the emergency centres, it shall route the call to an operator defined default emergency centre.

If no bit is set to "1", the MSC shall route the Emergency call to an operator defined default emergency centre.
A mobile station initiating an eCall shall set either bit 6 or bit 7 to "1". The network may use the information indicated in bit 6 and bit 7 to route the manually or automatically initiated eCall to an operator defined emergency call centre.

Figure 16: eCall flag (ETSI TS 122 101)

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 PSAPs.

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

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

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

4.8.5 Benefits for MNOs

Being a public safety service that cannot be directly billed, the eCall cannot be considered useful to provide any direct economic benefit to the MNOs. Anyway, the gradual introduction of in-vehicle systems able to connect to the public mobile networks will likely support the creation of multi-application devices able to foster the “always connected vehicle” paradigm that will enable many different commercial VAS (value added services) specifically targeting the automotive market. In this scenario, the connected vehicle will likely become another element of the connected smart city and the M2M world.

4.9 Upgrading PSAPs for receiving and handling of eCall

4.9.1 Relevant Stakeholders for PSAPs

There are three relevant stakeholders identified for Public Safety Answering Points (PSAPs): PSAPs themselves, emergency services, and PSAPs suppliers. The PSAPs operational models vary from country to country and, in some Member States, also between the different regions. Therefore, the PSAPs 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 PSAPs, 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 PSAPs 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 PSAPs.

The PSAPs 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 PSAPs operators, and transfer the call and data to PSAP2 procedures in case of intermediate (filtering) PSAP.

4.9.2 ITS directive and other EU regulations/Legislation

Implementation of eCall in PSAPs 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). 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

4.9.3 EU 112 integration

eCall is an emergency service regulated on the European level, and it is based on the common European emergency number E112 (see the documents below):

COMMISSION DELEGATED REGULATION (EU) No305/2013 of 26.11.2012 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regards to the harmonised provision for an interoperable EU-wide eCall (the upgrading of emergency response centres by 2015C(2012) 8509 final of 26.11.2012…)

Proposal for a DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the deployment of the interoperable EU-wide eCall (COM(2013) 315 final)

4.9.4 *Different types of PSAPs and eCall – examples*

One level type and eCall routed as any other call

The 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 17).

Figure 17: Filtering in stage 1 PSAP and resource dispatching in stage 2 PSAPs

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 18).

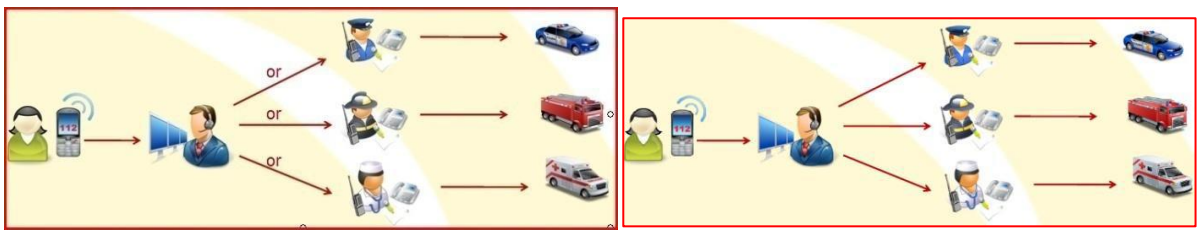


Figure 18: A two-level organisation

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 19).

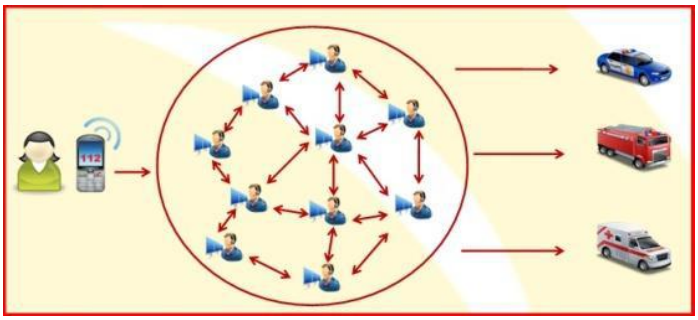


Figure 19: Interconnected regions

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 20). 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 PSAPs (it can be the same PSAP for 112 calls e.g. dedicated manual eCall PSAP can be the same as 112 PSAP)

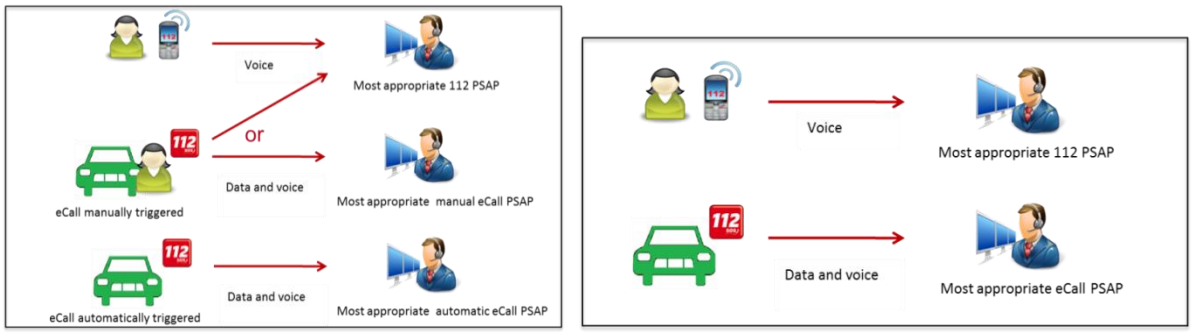


Figure 20: Examples of routing rules

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 PSAPs (it can be the same PSAP for 112 calls e.g. dedicated manual eCall PSAP can be the same as 112 PSAP).

4.9.5 The requirements for eCall system in PSAPs

The main eCall PSAP requirements are summarised below:

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.

The relevant functional requirements for eCall receiving in PSAPs are presented in (HeEROa 2011)

General requirements

eCall capable PSAP is required to be equipped with a software application that can receive, validate and display the MSD contents to its operator(s). This could either be a special eCall application or integrated in the PSAP's interface software.

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;
- show the data included in the MSD in an understandable way
- warn the operator about the availability of the voice call;
- provide a call-back capability;
- provide a new MSD requirement application user interface;
- provide an ability to clear-down the eCall.

MSD display to the PSAP operator

A PSAP can decide in 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 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 PSAPs, as determined by the national authority.

Recording of event data to PSAP information system

Recording of data related to the emergency call to the PSAP information system. This data 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 (HeERO 2012)

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 and visualization

eCall can be automatically received due to the auto answer function. On the operator screen the calling number and eCall icon is displayed. Special acoustic notification can also be configured.

Event form opening

The operator opens the screen the form for new event data entry the "telephone detail" call information and the MSD are displayed. 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.

Automatic classification

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".

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.

Manual classification and regionalisation
In the case that the process of automatic classification is deactivated, 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 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 are 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.d) MSD received will be added to the original call.

4.9.6 EUCARIS and VIN

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:

(a) the world manufacturer identifier (WMI);

(b) the vehicle descriptor section (VDS);

(c) 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 PSAPs 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 21.

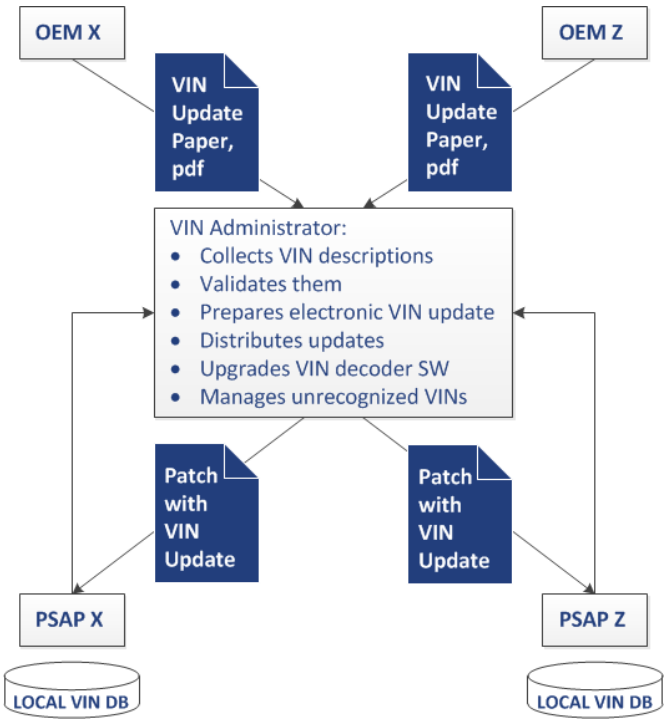


Figure 21: VIN updates (Scenario 1)

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 PSAPs.

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 PSAPs 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 PSAPs 24 hours a day 365 days a year. The VIN decoder is hosted on a platform available through secure connection to all PSAPs. PSAPs 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 22.

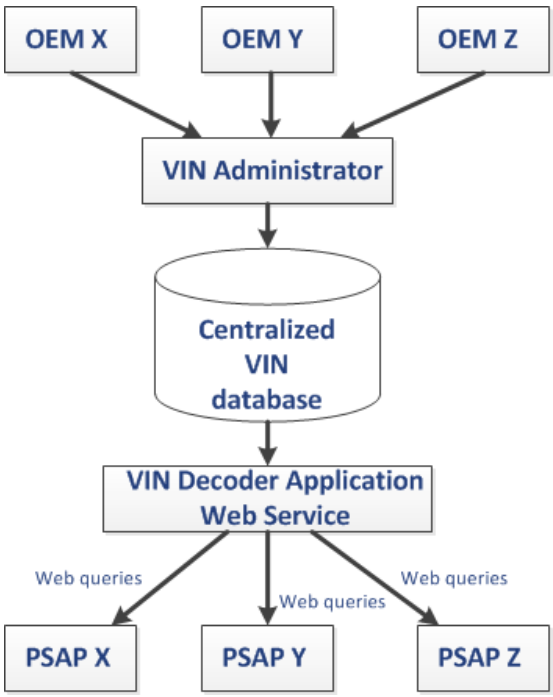


Figure 22: VIN decoder in the form of a web service (Scenario 2)

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. EUCARIS is the EUropean CAR and driving license Information System. It 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).

The information that is exchanged through EUCARIS consists of:

- Licence number
- Vehicle Identification Number (VIN)
- Document ID
- Registration date
- Additional identifying attributes like colour, make and commercial type of the vehicle
- All EU harmonized attributes that are indicated on the Vehicle Document

EUCARIS has developed a tool specifically designed for queries based on VIN number extracted from an eCall. 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 EUCARIS,

4.9.7 Business Models and financial issues related to PSAPs

Analysis of main costs for PSAPs

The marginal costs for each of the PSAPs duly equipped to handle 112 calls enhanced with location capabilities -E112- calls (obligation under the Universal Device Directive) cover the following:

- In-band modem server (from € 3,000 to € 20,000, depending on the expected number of eCalls)
- Software to decode the MSD and integration into the PSAP software
- Training of staff

Annual operational costs should be added to these costs. Where the eCalls will be received in a PSAP that also receives other emergency calls, the majority of these costs will be

subsumed within the normal operational costs. Otherwise they will depend on the number of operators needed to handle the estimated number of eCalls[3].

The estimated costs of upgrading PSAPs average around EUR 1.1 million per Member State[4]. This estimate derives from a cluster analysis based on the density of population of the country, incident typologies, road and emergency response infrastructures, and other general statistics. The cost in each country varies considerably depending on the number of PSAPs, but also on the technical solution chosen for upgrading the PSAPs. The experience from the HeERO pre-deployment pilot show that costs could be a lot higher for some Member States depending on the chosen solutions.

The HeERO pilot has helped to demonstrate that innovative solutions can reduce costs in

Comparison to the rather conservative approach followed in the eCall impact assessment, especially for those Member States where there are a large numbers of PSAPs.

4.9.8 Benefits for PSAPs

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)

[3] SEC(2011) 1019 final, Annex III

[4] SEC(2011) 1019 final, Annex XIV

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: Eur. 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.

4.9.9 Third party services supported eCall and 112-eCall

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

The eCall service already exists for over 10 years. It is offered mainly by the more expensive car manufacturers and often part of an offering 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 de proposed EC regulation, to allow data transmission from TPS to PSAP. This will only be feasible when these data will be standardised; a PSAPs cannot adept its systems and procedures to all different TPS-es and a TPS cannot adept theirs to all different PSAPs.

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, which will have to report at the 10th meeting in November 2013.

A comparison between pan-European eCall and TPS-eCall is presented in Figure 23 and Table 2.

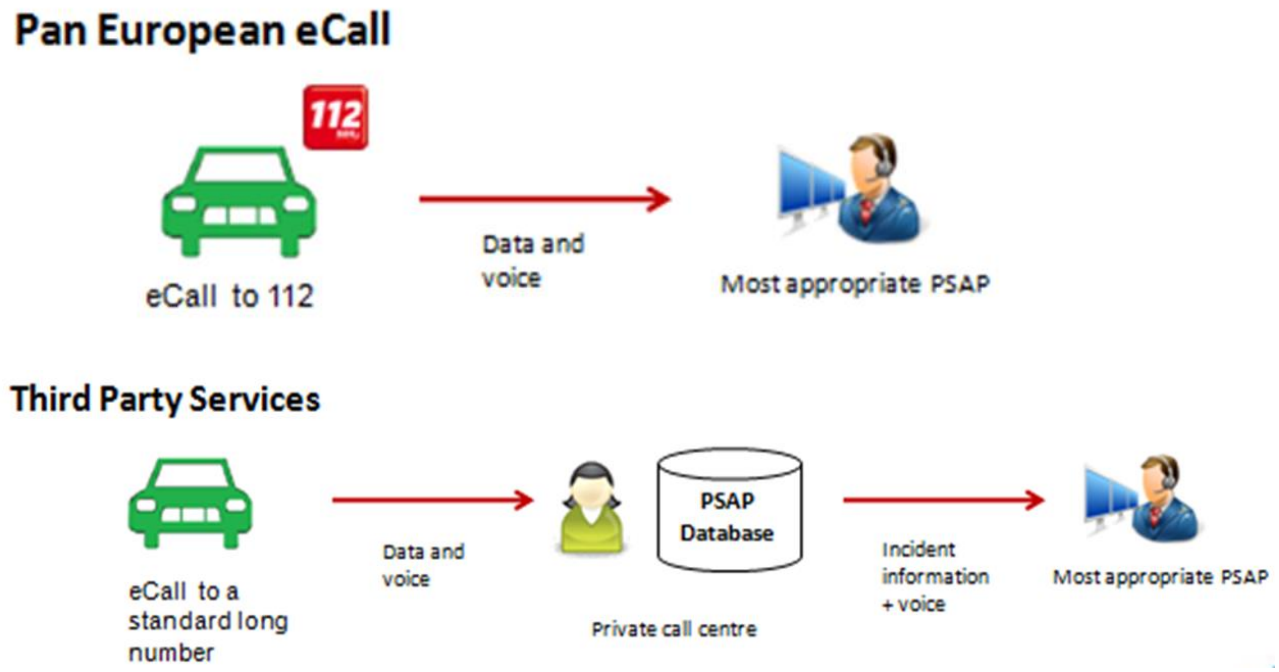


Figure 23: TPS eCall compared to public eCall (EENA)

	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'

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

4.10 Pan European eCall dissemination

4.10.1 Target

All citizens should be informed on Europe-wide eCall service existence and that all new cars will be equipped with it as of 2015. Drivers should particularly be aware of the existence of this safety equipment in their car and how it works.

4.10.2 Dissemination plan and channels to be used

In order to reach as many drivers as possible, several channels should be used to promote the eCall service.

Car manufacturers should be involved as much as possible. When one will buy a new car, he/she should be informed about the existence and the functioning of the eCall system.

Also, national information campaigns (press, social media) should be conducted at national level by public authorities in charge of road safety.

Driving schools may also participate to eCall education of future drivers. The each new driver will know how eCall works and when it should be used.

4.10.3 Timeline

HeERO pilots have already started to promote eCall at national level. All EU countries should start their campaign soon since first cars equipped with the eCall system will be on the road in less than 2 years.

Information campaigns should start even before the eCall system is mandatory. Citizens should be informed in advance of this new facility. Then it should be intensified some months before the first cars equipped with eCall be sold.

During the first years, basic information on eCall should be provided each time a new car will be bought.

4.10.4 Survey among PSAPs and vehicle owners in Netherlands

Establishing the level of support for eCall

Study

In November 2012 the TNS NIPO research bureau carried out a survey among emergency personnel and car drivers on behalf of the ministries of Infrastructure & the Environment and Security & Justice to establish the level of support for eCall. The group of respondents known as “emergency personnel” comprises 50 staff of the emergency centres of 112, the police, security regions and Rijkswaterstaat traffic centres. The group of respondents known as “car drivers” comprises 516 driving licence holders of 18 years or older, selected from a TNS NIPO database (TNS NIPOBase Consumer).

Familiarity and support

Only 3% of driving licence holders had previously seen, heard or read anything about eCall. Neither had there been any kind of publicity campaign for eCall. The emergency services had been informed about eCall through their superiors and 74% indicated that they were familiar with the system.

Following an explanation of eCall around three-quarters of both target groups came out fully in favour of the system, so there is clearly evidence of support for eCall. About a fifth of the car drivers and emergency service personnel participants in the study were also critical in part of the introduction of eCall while two-thirds of all the car drivers and emergency services personnel would be keen to have the eCall system in their cars now.

For the emergency services, the key to support is the speed at which they can get to an incident. Acceptance for a few emergency services personnel depends on the organisation, the number of requests for assistance and the clarity of the benefits of the system in relation to 112. Acceptance of eCall among the car drivers depends on privacy issues and costs.

Use of e-Call

Apart from the obvious moments when people make an emergency call, there are other less obvious situations such as those cited in the study, including: *a child with a broken arm in the car* or *a car driver with only damage to the bodywork following a collision*. Evidently in such cases some 5% to 7% of the car drivers might have made use of eCall. The emergency services would also expect this to be the case. The same applies, for just a few per cent, to the situations cited in the study: *a car driver is lost* or *a car is incorrectly parked*.

Other, less evident situations to make use of eCall are also generating requests for assistance although the study reveals that emergency services personnel do not automatically expect this in situations like: *car burglary the previous evening* (while 5% of the car drivers indicate they would use eCall to report this), *testing the eCall system* (4%), *breakdown in a parking area* (3%), *car won't start*, *driver is cut off by another car* and *another car driver is committing a traffic offence* (2%). These are relatively low percentages but in terms of the total number of car drivers, the number of requests for assistance could rise significantly.

The unnecessary use of eCall must therefore be avoided as much as possible, hence the need for clear communication to the public about eCall. How it works and in what situations it is permitted to actively seek contact with the emergency services via eCall.

4.11 Solutions to eCall deployment barriers

This chapter provides solutions to eCall deployment barriers encountered by the HeERO countries or likely to be encountered during implementation and operation of eCall. The summary of barriers and related solutions mentioned in this chapter (Table 3) takes into account the contents of HeERO deliverable D6.2 (Öörni and Brizzolara 2014).

The summary includes solutions to the barriers which are considered most significant, are most likely to be encountered and are relevant on member state level. The summary has its main focus on solutions which can be implemented by an individual country intending to implement eCall. Challenges related to the long-term evolution of eCall and other emergency call services or challenges not relevant outside the HeERO project are not included.

Barrier	Solution(s)
The awareness of decision makers on the impacts of eCall and potential implementation options is insufficient.	- Organise round table discussions and working groups on eCall - Study the implementation options available. Utilize the results of HeERO and HeERO2 projects, standards, and literature on the topic. - Disseminate information on the impacts of eCall. Utilize the materials provided by HeERO, HeERO2, eCall Implementation Platform, iMobility effects database (http://www.imobility-effects-database.org) and iMobility Challenge - Create and publish a national eCall implementation roadmap or implementation plan
It is difficult to assign responsibility for eCall in a complex administrative situation.	- Increase the awareness of key stakeholders on the implementation options available and the benefits and costs of eCall. - Completion of European level regulation which mandates the implementation of eCall in PSAPs, communication networks and new type-approved vehicles
There is no full support from all key stakeholders due to lack of legislative framework for eCall in member state or a legally binding decision to implement eCall.	- Completion of European level regulation which mandates the implementation of eCall in PSAPs, communication networks and new type-approved vehicles
Implementation of eCall affecting several players is a difficult organisational issue.	- Identify the organisation which monitors the deployment process and informally or formally takes responsibility for solving problems and keeping the process moving - Communicate the impacts and implementation options for eCall to the key stakeholders - Define the roles of the stakeholders in a national eCall roadmap or implementation plan
PSAPs have very different technical infrastructure.	- Analyse the architectural and deployment options available, utilize the results of HeERO and HeERO2 projects - Consider centralisation of reception and handling of eCalls to a few key PSAPs – at least as an interim solution - Develop a national eCall roadmap or implementation plan
It is difficult to complete the updates to PSAPs in time.	- Temporary arrangements may be used in situations in which all PSAPs are not yet ready to process eCalls (for example, centralised handling of eCalls in a few key PSAPs) - Define the schedule for deployment and the actions required in a national eCall roadmap or an implementation plan
There are organisational or technical changes in PSAPs simultaneously with eCall deployment.	- Temporary arrangements may be used in situations in which all PSAPs are not yet ready to process eCalls (for example, centralised handling of eCalls in a few key PSAPs) - Define the schedule for deployment and the actions required in a national eCall roadmap or an implementation plan
All the staff in PSAPs has not been trained to handle eCalls.	- Provide training for PSAP staff - Temporary arrangements may be used in situations in which all PSAPs are not yet ready to process eCalls (for example, centralised handling of eCalls in a few key PSAPs)
MSD transmission is not always successful	- Initiate a MSD retransmission when the first MSD transmission in the beginning of the connection fails. - Use the voice connection to communicate with vehicle occupants.

Barrier	Solution(s)
	- Perform end-to-end tests for the whole eCall service chain to ensure correct functioning and reliable operation of eCall. - Support development of certification scheme for eCall IVS and eCall in-band modem components. - Failed MSD transmissions should be taken into account when preparing guidelines for operation of eCall such as when developing call handling and risk assessment procedures for PSAPs.
Voice channel blocking time is longer than expected	- Reduce the number of link layer acknowledgements (LL-ACKs) transmitted by the PSAP after a successful MSD transmission.
Silent calls	- Define appropriate call handling procedures for silent eCalls. - Use the information available via voice connection such as background noise. - Use the information included in the MSD. - Validate the location of the caller using network based positioning available for all E112 calls.
False eCalls from eCall enabled vehicles	- Educate car users on the operation and correct use of eCall with information campaigns. - Support development of certification scheme for eCall IVS. - If necessary, implement validation of incoming calls before connecting them to a PSAP operator.
False eCalls generated by mobile phones which erroneously activate the eCall flag	- Document the erroneous operation of mobile phone models affected by the problem and contact the equipment manufacturers.
Weaknesses in IVS implementations	- Support development of certification scheme for eCall IVS and eCall in-band modem components. - Encourage participation in eCall interoperability events. - Perform end-to-end tests for the whole eCall service chain 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 mobile networks and handling of 112 emergency calls. Implement changes, if necessary. -
Mobile network echo cancellers have an adverse effect on MSD transmission.	- Analyse the effect of network echo canceller disabling tone on the reliability of MSD transmission. - Implement network echo canceller disabling tone in PSAPs, if the analysis shows potential for improvement.
Some public land mobile networks (PLMNs) have problems in handling long numbers of the SIM cards used by eCall IVSs.	- The problem can likely be solved with a software update of the mobile network affected by the problem Note: this is a problem with implementation of the standards of the mobile networks and not specific to eCall.
Consumers or the media confuse eCall with other in-vehicle emergency call services.	- Educate car users on the operation and correct use of eCall with information campaigns.
Misuse of eCall	- Educate car users on the operation and correct use of eCall with information campaigns. Note: procedures for dealing with abuse of emergency number 112 are specific to member state
Car users are concerned of potential for privacy violations, risk of supervision and tracking of individual vehicles.	- Educate car users on the operation and correct use of eCall with information campaigns.

Table 3: Solutions to eCall deployment barriers

4.12 Summary of Guidelines

Overview

Three main elements are needed for the deployment of eCall:

- Vehicle and equipment manufacturers should include an in-vehicle system capable of bundling the Minimum Set of Data and triggering the eCall
- Mobile Network Operators should transmit the eCalls (voice and data) to the emergency call response centres (PSAPs)
- Member States should upgrade their Public Safety Answering Points (PSAP) in order to manage the eCalls

IVS

Both the European Council and the European Parliament have indicated their support for mandatory implementation of eCall by 2015

It is strongly recommended to implement a (voluntary) certification scheme. Across Member States a diversity of periodical technical testing procedures exist. 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.

It is recommended that during the PTI, only the functionality of the IVS should be validated not measuring conformity or performance of the IVS.

Three possible options for OEM in-vehicle systems have been identified:

- eCall only (without any additional services)
- eCall with add-on services (add-on services offered by vehicle manufacturers)
- Combining various add-on services and eCall (add-on services offered by independent service providers)

Add-on services are not likely to have a positive impact since there is no commercial business case for plain eCall. However, they may potentially have positive impact on the telematics business case as a whole.

Mobile network

The mobile network operators are required to: implement the eCall discriminatory “flag” in all networks, route eCalls to the Public Safety Answering Points and handle eCalls as any other 112/E112 call.

Mobile network part of eCall pilot requires an appropriate patch to be applied to enable proper identification and routing of eCall in addition to regular 112 call. All MNO equipment vendors should provide appropriate patches for eCall discrimination for all software releases which are operational within the MNO setup.

The actual deployment roadmap of the eCall from a MNO’s standpoint can be very specific for any Member State, but, in most of the cases can be considered as an additional step in the evolution of the public emergency call services on top of the legacy 112 voice service for fixed networks first and of the E112 extension to the mobile network domain.

An eCall, whether generated automatically or manually, will normally be given the highest priority on the use of whatever wireless networks are used by the IVS, the same as for a regular 112 call.

Being a public safety service that cannot be directly billed, the eCall cannot be considered useful to provide any direct economic benefit to the MNOs. Anyway, the gradual introduction of in-vehicle systems able to connect to the public mobile networks will likely support the creation of multi-application devices able to foster the “always connected vehicle” paradigm that will enable many different commercial VAS (value added services) specifically targeting the automotive market.

PSAP

General requirements

The eCall standards cover all the specifications for the PSAP side of an eCall system. Even though every country will have a different approach while implementing eCall, each upgraded PSAP should be able to offer the following functionalities:

- warn the operator about a new eCall arrival;
- show the data included in the MSD in an understandable way
- warn the operator about the availability of the voice call;
- provide a call-back capability;
- provide a user interface for requesting an updated MSD;

- provide an ability to clear-down the eCall.

PSAP hardware and software upgrade

In order to be able to handle eCalls, a PSAP needs to be equipped with the necessary hardware and a software application that can receive process and make the MSD contents immediately available to its operators.

While the standards cover the functionalities that a PSAP should be able to offer, each PSAP is able to decide which data it will display to its operators.

Three basic models were identified for deploying eCall from the PSAP's point of view:

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 PSAPs (it can be the same PSAP for 112 calls e.g. dedicated manual eCall PSAP can be the same as 112 PSAP).

Operational upgrade

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.

The operational procedures for eCall will have to be tailored based on each country's existing procedures for handling 112 calls.

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

Implementation costs

The marginal costs for each of the PSAPs duly equipped to handle 112 calls enhanced with location capabilities -E112- calls (obligation under the Universal Device Directive) cover the following:

- In-band modem server (from € 3,000 to € 20,000, depending on the expected number of eCalls)
- Software to decode the MSD and integration into the PSAP software

- Training of staff

The estimated costs of upgrading PSAPs average around EUR 1.1 million per Member State.

4.13 Further information on eCall

Website links:

- eSafety: www.ec.europa.eu/esafety

- eCall Toolbox: www.ec.europa.eu/ecall

- ETSI: http://www.etsi.org/

- CEN TC 278: http://www3.nen.nl/cen278/

- List of standards updated:

http://ec.europa.eu/information_society/activities/esafety/doc/ecall/standards/annex_list_status.pdf

- iMobility effects database: http://www.imobility-effects-database.org

Other publications:

Öörni, R., Hautala, R., Hänninen, T. and Lumiaho, A. 2013. eCall Implementation Roadmap for Finland. 13th International Conference on ITS Telecommunications (ITST2013), 5-7 November 2013, Tampere, Finland.

Öörni, R. and Korhonen, T. 2014. eCall minimum set of data transmission – results from a field test in Finland. IET Intelligent Transport Systems, article in press. http://digital-library.theiet.org/content/journals/10.1049/iet-its.2013.0113

5 eCall implementation roadmap for Europe

5.1 Implementation plans for eCall in HeERO countries

5.1.1 Croatia

Plans for eCall implementation in Croatia

National protection and rescue directorate envisages the following plan for two county centres:

- Republic of Croatia consists of 20 counties

- 112 systems receives call on emergency number 112 number in 20 counties, annually 3 million calls received by PSAP

- Additional emergency numbers (192, 193, 194, 195 and 1987) are in use in the Republic of Croatia, which is in line with numeration plan

- Share of events in the PSAP regarding traffic related events, or traffic incidents is 19.000

Following the previous conclusions, NPRD is planning to implement eCall in County centre Zagreb for continental part of Croatia (City of Zagreb and 13 counties) and in County centre Split for the Adriatic region. (seven counties). So far, insufficient budget is allocated for these activities.

During the HeERO project (Harmonised eCall European Pilot) successful piloting was performed in County centre Zagreb, using the same platform and technology which is already in use in four county centres.

Future implementation of eCall in two county centres (Zagreb and Split) should consist of:

Phase 1 (eCall implementation at 1st level PSAP)

1. Implementation of novel telecommunication service for eCall in communication network of all operators in the Republic of Croatia.

2. Upgrade of existing system with eCall in line with European standards regarding eCall

3. County centres (Zagreb and Split) should have GIS (Geographic information system) and address book for all emergency services

4. Acceptations of standard operation systems for and action plan for eCall

5. Operators training

6. Following the acceptance of eCall in centre 112 it will be redirected to appropriate emergency services using voice communications in case of automatic or manual eCall initiation

Phase 2 (eCall implementation in 2nd level PSAP with MSD data transfer)

- Following the prerequisites (implementation of applications for integration with 112 system) from the ICT point of view in emergency services, MSD data transfer will be realised to emergency services (Police, Fire brigade, Ambulance, Maritime rescue coordination centre – MRCC and Road assistance).

Phase 3 (full integration)

- Integration of all emergency services into a single operational and communication centre for emergency calls

Responsibilities for related actions:

- Action 1 is under the responsibility of Ministry of Maritime Affairs, Transport and Infrastructure and is planned for Q1/2014.

- Actions from 2 to 6 are under the responsibility of NPRD and are planned for Q3/2015.

Plans for testing and piloting

Implementation of eCall in centres Zagreb and Split will be approached in line with the rules of ICT branch. Testing related to eCall basically includes the following activities:

1. Factory acceptance test which includes testing of full functionality of the system from the provider

2. Site acceptance test which includes testing of equipment at the location of the end user, following the piloting of the system for appropriate time period

3. Handover test which includes final test on the location following the successful realisation of previous activities, or eCall piloting.

The stated procedures have been completely followed and accepted during the pilot project HeERO which is in detailed stated below:

ECall pilot project has been started with the establishment of the laboratory environment, Successful testing in the laboratory environment has been finalised with factory acceptance test (March 2012).

Following the factory acceptance test, the installation of the eCall system has begun in Centre 112 in NPRD (DATUM). First level of piloting at the NPRD has been concluded in May 2012 with the Site acceptance test (1st level PSAP and part of 2nd level PSAP – Croatian Automobile Club and Fire brigade). The 2nd level of piloting has been concluded in September 2013 and has included both 1st level and all 2nd level installations (Medical emergency, Police, Croatian Automobile Club and Fire brigade).

Functional test of the system included an eCall test in real eCall service chain with the emphasis on the following:

- IVS system check considering the following:
    - Sensitivity of the sensor
    - precision of the location data (position and orientation)
    - reaction time (from the crash to the reception of eCall at the PSAP and MSD transmission including the realisation of voice communication)
    - Verification of voice transmission and data using PLMN and public telephony services (time for transmission of data for emergency services)
- Emergency services efficiency following the eCall procedure (Ambulance, Fire brigade, Police, Croatian Automobile Club)
- Content analysis of communication between NPRD and emergency services
- ECall functional test has been realised troughs the following scenario: Crash of the personal vehicle on second personal vehicle. Both vehicles have been equipped with the IVS unit and they have been expected to initiate eCall. Following the initiation and reception of eCall NPRD at County centre Zagreb is forwarding the incident data on emergency services (Ambulance, Fire brigade, Police) and they are reacting in real time and they arrive on incident site.

During the exercises observes were present on site to witness the crash, and to observe the reception of eCall from the operators side on centre 112 via video link. The whole event was shown to the participants of the exercise in real time and response from the emergency services was adequate for the drill, therefore from the moment of the crash to the arrival of the last emergency services 14 minutes have passed.

First results were presented after the test. The eight participants involved in the exercise were: Croatian Automobile Club, Ericsson Nikola Tesla, Police, Fire brigade, Ambulance, NPRD and representatives from national HeERO Consortium. The resources used for exercise were: 2 personal vehicles, 2 IVS units, 6 PSAP workstations and 2 devices for deceleration measurement. The vehicle speed prior to the crash (1 meter before obstacle) was 35 km/h. Prior the test, this solution has been tested with 6.000 eCalls in laboratory environment and 16.000 eCalls in real environment.

At members state level (Croatia), responsibility for ITS is belongs to the Ministry of Maritime Affairs, Transport and Infrastructure – Directorate for Transport Infrastructure. NPRD is responsible for 112 systems and for implementation of novel telecommunication service of automatic notification of traffic incident (eCall) toward the Centre 112.

The planned schedule for eCall deployment in Croatia is presented in Table 4.

	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)	MoU -12/2010 Law on electronic communication – OG 80/13	on-going
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	03/2012 –for HeERO pilot implemented at 2 MNO (Tele 2 & Vipnet) Q1/2103 - Prerequisites for eCall roll-out: New version of the Rules on the single European emergency call number	06/2014
Implementation of eCall reception and processing capabilities in PSAPs (start: start of implementation, end: implementation of eCall in all PSAPs has been completed)	01/2014 Depends on the available funds since NPRD doesn't have enough funds	10/2015
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)	10/2015	

Table 4: Planned dates for eCall deployment - Croatia

5.1.2 Czech Republic

Current situation of 112 emergency call centres (112 centres) in the Czech Republic

The single European emergency number 112 was introduced in the Czech Republic on the basis of Government Resolution No 391/2000 of 19 April 2000, as amended by Government Resolution No 350/2002 of 3 April 2002. Fourteen emergency call centres were put in place, and their test phase was completed in June 2004.

At the start of the project, the fire brigade, which was charged with operating the emergency call centres, set the main conditions that the new system for receiving and handling calls to the single European emergency number 112 had to meet:

1) Emergency 112 calls from landlines and mobile telephones are transferred to call centres by administrative region;

2) The system must ensure equal distribution of emergency calls to all operators and, if the operator for a certain area is unavailable, must ensure automatic transfer to the nearest available call centre;

3) The system must allow the caller to be identified and the place of the call and of the incident to be determined and located by GIS;

4) After having identified the caller, the operator must transmit the data concerning the incident to the appropriate units of the Integrated Emergency Response System in data strings, and if necessary set up a conference call with these units;

5) Operators must record and store all telephone communications, with recording equipment that allows calls to be assessed statistically with reference to archived data on previously resolved incidents and, if necessary, allows the recording to be exported.

During the implementation of the 112 project in 2002 – 2003, 14 emergency call centres were put in place in Czech regional capitals (see below for details), linked to each other through the voice and data networks of Telefónica Czech Republic and integrated into the internal network of the Ministry of the Interior. The 112 centres were brought into intensive use from 2004, and a year later Ostrava was the last area to launch the new system. Alongside the European emergency number 112, the national emergency number 150 (fire brigade) is also linked to the 112 system.

Emergency calls are directed to the 14 call centres located in regional fire service headquarters. The technology used in 112 emergency call centres links the three main components of the Integrated Emergency Response System: the Czech fire brigade, the Czech police and the ambulance service. This allows a rapid assessment of the situation and an immediate response by emergency services. Modern software also allows the address of a caller from a land line or the location of a mobile phone user to be determined, for example. 112 emergency call centres in the Czech Republic have voice and data connections to each other and are fully interchangeable. If the call centre in one region is overloaded or out of action, calls are automatically redirected to another 112 centre, with no discernible effect on the quality or speed of the response. This guarantees that callers will always get through.

Operators in the 112 emergency call centres are able to deal with calls not only in Czech, but also in English and German. They also have software support for other world languages. The proportion of calls in a foreign language is around 5 %, roughly 250 000 calls per year. (Note: Calls in Slovak are not considered to be in a foreign language.) Around half of these calls are in English, 30 % in German and 20 % in other languages, the two most frequent being Russian and Polish.

Telefónica Czech Republic has run the 112 emergency call centres in the Czech Republic since 2004. The service provided involves systemic integration of call centre technology and application support for dispatch centres, which form a single unit across the Czech Republic using the voice and data networks of Telefónica Czech Republic. The call centre ensures that emergency calls are transferred to the appropriate emergency service operator, who then uses the application superstructure to determine the location of the caller and the incident before transmitting this information to operational units of the Integrated Emergency Response System. These units then send personnel and resources to the location of the incident and give further instructions to the units on the ground.

List of eCall PSAPs and their geographical distribution, timetable for implementation in the next two years

In the initial stage, two technical nodes will be put in place to receive eCalls and two regional 112 call centres will be designated to respond to the calls. Considering the current modernisation of the 112 call centres' work and the implementation of a new system, the regional 112 centres that will receive eCalls have not yet been designated. eCalls from the whole of the Czech Republic will be transferred to these call centres, which will provide each other with functional back-up. Depending on the increase in market penetration of eCall units in vehicles, the number of designated call centres will gradually increase, the aim being for all regional 112 emergency call centres to be able to respond to eCalls. By 1 January 2015 at the latest, eCalls will be received and responded to throughout the Czech Republic.

5.1.3 Finland

Plans for eCall implementation

In June 2013, The Ministry of Transport and Communications in Finland published a report "eCall implementation roadmap for Finland" which describes the current state of eCall development in Finland and in EU. It also provides recommendations for the next steps in eCall deployment and the responsible stakeholders in Finland. The report was written by VTT and Ramboll Finland. The roadmap report is only in Finnish and it is available from The Ministry of Transport and Communications web site.

The most important stakeholders in deployment of eCall in Finland are the Emergency Response Centre Administration (ERC Administration), Finnish Transport Safety Agency and Finnish Communications Regulatory Authority. The administrative responsibility for eCall is shared between the Ministry of the Interior (MinInt), Ministry of Transport and Communications (MinTc) and Ministry of Social Affairs and Health (MinSoc).

The following main tasks with key stakeholders related to implementation of eCall in Finland have been described in the eCall roadmap, see Table 5.

Operational guidelines and training of PSAP staff => ERC Authority, Emergency Services College, Police College of Finland
End-to-end field tests as a part of implementation of eCall => ERC Authority, telecom operators, etc.
Implementation of eCall reception and processing capabilities in PSAPs => ERC Authority
Implementation and testing of eCall discriminator in mobile networks => telecom operators
Provision of guidelines and coordination of implementation of eCall in mobile networks => Finnish Communications Regulatory Authority
Guidelines for installation of eCall in-vehicle systems and their periodic technical inspection => Finnish Transport Safety Agency
Analysis of existing legislation and implementation of necessary changes => MinTc, MinInt, MinSoc
Communication related to eCall to citizens and stakeholder groups => MinTc, MinInt, MinSoc
Performance guidance of agencies working with eCall => MinTc, MinInt, MinSoc

Table 5: eCall implementation main tasks and key stakeholders in Finland

The new information system of Finnish PSAPs is under development and it was not available for testing within the schedule of the HeERO project. The eCall functionalities of the new information system should be tested once the system becomes available for testing and evaluation. These tests will continue at national level after the European HeERO project has ended. The Finnish Transport Safety Agency has already started the planning of the eCall end-to-end tests for the deployment in Finland. The end-to-end deployment tests will be done when all components of the eCall chain are ready including state-of-the-art eCall IVSs, mobile networks with eCall discriminator handling and new PSAP system with eCall handling functionality. The tests will cover the performance of the whole eCall service chain in systematic way with large geographic in Finland. The Finnish Transport Safety Agency has taken the main responsibility of the eCall deployment testing.

The plans for deployment of eCall in Finland are summarised in Table 6.

	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)	07/2013	on-going
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	2013	12/2014
Implementation of eCall reception and processing capabilities in PSAPs (start: start of implementation, end: implementation of eCall in all PSAPs has been completed)	01/2014	10/2015
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)	10/2015	10/2015

Table 6: Planned dates for eCall deployment - Finland

Status of eCall implementation

At present, there are three MNOs operating in continental Finland (Elisa, DNA and TeliaSonera), and one MNO on the Åland islands (ÅMT). Only one of them has implemented the eCall discriminator (Elisa), and the two other operators in continental Finland are planning to implement it by the end of 2014. The plans of Ålands Mobiltelefon operating on the Åland islands are currently unknown. One of the Finnish MNOs has raised the issue of implementation costs and the question who should pay for the update costs. All the three MNOs operating in continental Finland (Elisa, DNA, TeliaSonera) have named contact persons for matters related to eCall.

Finnish PSAPs are expected to have the capabilities to receive and process eCalls at latest in October 2015 when the new PSAP information system in Finland becomes available. At present, no specific barriers for implementation in PSAPs are foreseen.

The Ministry of Transport and Communications, the Emergency Response Centre Administration, Finnish Transport Safety Agency, Finnish Communications Regulatory Authority and the Ministry of the Interior have participated in the meetings of the Finnish HeERO consortium and other meetings related to eCall. During 2013, also INSTA, which is developing the new information system for PSAPs in Finland, has been actively following the HeERO work. In addition, VTT and Ramboll Finland have been involved in testing and consultation work related to eCall. Finnish eCall IVS prototype manufacturers Gecko and Indagon and mobile operators (ELISA, DNA, TeliaSonera) have been also involved in the process.

The most important enablers for eCall in Finland are the support of all authorities, agreed responsibilities and the national eCall implementation roadmap which has been completed recently.

5.1.4 Germany

A national eCall roadmap was prepared as an answer to the EC request. It was submitted in October 2013. Due to the distributed responsibilities with the authorities on local, federal and national level and between different ministries in Germany the eCall roadmap still contains many unsolved issues. With 250 PSAPs and over 100 different PSAP software applications, an eCall upgrade cannot be deployed as a standard software upgrade. Instead, many vendors of PBX and PSAP software may have to check whether and how their systems can be upgraded. PBX vendors have to implement the German special ISDN transmission for the eCall flag to route the eCalls internally. PSAP software vendors have to implement the new information into their systems (like opening a window with MSD data, database extensions,). Thus the national implementation plan does not show the right path to follow to upgrade, but includes the participants of the process and their activities required in the process.

Responsibilities:

- Federal Republic of Germany: Ministry of Transport (overall control and eCall on the car manufacturers' side), Ministry of Interior (PSAP) and Ministry of Economics (MNO)
- Federal States: 16 Ministries of Interior and Local Authorities for the PSAP upgrade)
- Emergency Call Expert Group: responsible for the PSAP upgrade and the technology decisions
- National eCall Implementation Platform: Coordination body consisting of the eCall stakeholders. Chaired by Ministry of Transport.

At present, there are no decisions on testing or piloting activities after the HeERO project until the roll-out of the service.

In current situation, no single stakeholder has the main responsibility of the eCall deployment and testing. The Ministry of Transport and Economics in Niedersachsen accompanied the HeERO activities, but so far no formal coordination has been established aside of the Emergency Call Expert Group. The existing plans for eCall deployment in Germany are documented in Table 7.

	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)	upon the availability of legal obligations to implement eCall in the PSAP	unknown
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	Unknown, but national obligation of MNO to implement by end of 2014	01.10.2014
Implementation of eCall reception and processing capabilities in PSAPs (start: start of implementation, end: implementation of eCall in all PSAPs has been completed)	unknown	unknown
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)	unknown	unknown

Table 7: Planned dates for eCall deployment - Germany

In total, there are four MNOs operating in Germany, but no one of them has implemented the eCall discriminator. However, no specific barriers for the implementation of the eCall discriminator have been identified, and it is expected to be available at latest on 1st October 2014.

There is currently no agreed or planned date for implementation of eCall in PSAPs. In other words, the level of eCall capability is very low. At this time, only one out of 250 PSAP is capable of receiving eCalls. The competence – on the other side – is very high. German

companies are selling eCall test equipment all over the world. The test centres at Yokogawa (YPR) and Nuneaton (MIRA) are using the German equipment. Five European countries use the German eCall technology developed in the last 4 years.

The barriers and enablers for eCall deployment in Germany have mostly been summarised in HeERO D6.2. The declaration of conformity is required prior to start of operation for every PSAP. At the time being, no process is established for this conformity assessment.

The most important first step is the legal obligation to upgrade PSAPs in order to provide eCall service. Only thereafter the budgets may be allocated and the tendering process will start. For the conformity assessment of the PSAPs the process has to be established and the respective assessment body has to be selected.

In addition to the questionnaire, information on the status of eCall in Germany was obtained from HeERO pilot sites compendium (Paris and Rooke 2014):

“After three years of HeERO, the situation in Germany is still unclear. On one hand the PSAPs know that eCall will be available in a few years, but on the other hand the political stage is not acting very strong. Still responsibilities are moving between different ministries, several players fear the loss of their existing business models (TPS, insurance companies) and some lobby organisations are working for, but some also against the introduction of eCall. Germany voted against the latest EU regulation directive with a statement that TPS services were not included in the specification. The German Bundesrat (a board consisting of the 16 different local governments) even voted to delay eCall as long as data security aspects would not be completely solve - not being aware of the detailed specification for the MSD.”

5.1.5 Greece

Status of eCall implementation

No national eCall implementation roadmap is yet available in Greece as an official document. Still, all authorities and stakeholders are keen to respect all recommendations by the EC and all deadlines set by relevant directives and guidelines. The current status of implementation is described below.

The PSAP acquired during the HeERO project is fully functional, capable to serve the whole country. The Ministry of Infrastructure Transport and Networks has already provided the system for use to the General Secretariat for Civil Protection (GSCP), which is the authority responsible for the 112 service in Greece. At the same time, the GSCP has issued a tender for the upgrade of the existing 112 service. The new 112 call centre covered by this tender

will be able to support eCalls. It is envisaged to integrate the eCall PSAP acquired within HeERO with the upgraded 112 call centre, in order to support eCalls nationwide. This tender is at its final stage of signing the contractual agreement. The delivery of the new 112 PSAP will be 19 months following the signature of the contract.

The GSCP is responsible for planning the eCall implementation. Other public agencies involved are all the emergency rescue services and the Ministry of Infrastructure, Transport and Networks. Apart from public agencies, the fixed line telecommunications operator and the MNOs are involved, since they should arrange for the eCall priority routing according to the eCall flag.

After the finalization of the phase 2 pilot tests, the eCall PSAP was transferred to the premises of the General Secretariat for Civil Protection, for the purpose of interfacing it with the future 112 PSAP and operated by the 112 call centre operators. These operators are GSCP personnel and have already been trained on the eCall PSAP that was obtained for the HeERO project. In full implementation, eCalls received by the PSAP will be forward to the adequate Emergency Rescue service. The call centre of the Emergency Rescue services will also run a client of the eCall PSAP application, so their operators will have immediately available all information for the specific eCall being forwarded. The call centre of the Emergency Rescue service will then inform the appropriate rescue team for the rescue operation and will monitor it. The eCall operator will be concurrently informed about the rescue operation, until the eCall is closed by one of the operators.

Considering the current status of eCall implementation and the final vision, the activities necessary for the eCall deployment are Ministerial Decrees for the operation of the eCall PSAP and the type approval of the IVS unit.

No field operational tests of the eCall functionality have been officially planned for the period after the completion of the HeERO project and until the actual implementation of the service (October 2017). Still, it is most rational that this will be planned under the responsibility of the GSCP.

Deployment of the eCall operation is under the responsibility of General Secretariat for Civil Protection (GSCP). The responsibility for the testing before large scale roll-out of the service is not yet assigned, but it can be rationally assumed that it will also fall under the GGSCP' s responsibility.

The schedule planned for eCall deployment is summarised in Table 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)	7/2014	6/2015
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	11/2013	12/2014
Implementation of eCall reception and processing capabilities in PSAPs (start: start of implementation, end: implementation of eCall in all PSAPs has been completed)	10/2014	12/2016
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)	7/2017	10/2017

Table 8: Planned dates for eCall deployment – Greece

5.1.6 Italy

At present, the eCall roadmap is not yet available. The process to analyse and choose the best architecture to integrate the eCall service into the actual EU112 service will start in 2014. The key stakeholder in this process will be the Ministry of Interior. The Varese setup will remain active after HeERO to allow national eCall tests and interoperability tests until the end of 2015 or to the roll-out of the national eCall service.

At present, there is a plan to establish a coordination group for eCall within the next two years. Two ministries – Ministry of the Interior and Ministry of Infrastructure and Transport – are aware of eCall and the HeERO project.

The expected schedule for the various phases of the deployment process is presented in Table 9.

	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)	01.01.2014	31.12.2014
Implementation of eCall discriminator in mobile networks (start: first MNO started implementation, end: all MNOs have eCall discriminator implemented)	01.07.2014	30.09.2015
Implementation of eCall reception and processing capabilities in PSAPs (start: start of implementation, end: implementation of eCall in all PSAPs has been completed)	01.07.2014	30.09.2015
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)	01.01.2015	30.09.2015

Table 9: Planned dates for eCall deployment – Italy

There are four MNOs operating in Italy, and only one of them has a local implementation of the eCall discriminator in Varese area. The Italian MNOs expect to have the eCall discriminator available before 1st October 2015, and no specific barriers for its implementation are foreseen. eCalls issues with MNOs are already addressed by the Department of Telecommunication of the Ministry of Economic Development.

At present, there is no clear statement yet on the first day of availability of eCall in Italian PSAPs. If the Varese PSAP is assigned the task to receive eCalls from the whole country, then this will mean that the PSAP is already capable. However, this will depend on the decision on the PSAPs architecture.

For the current level of eCall capability and competence, the Italian team sees itself in good position from technological point of view and its competence as high thanks to participation in HeERO. The Italian HeERO consortium involves an IVS manufacturer, car OEM (Fiat through CRF), PSAP supplier (Siemens involved via AREU). The Italian automobile club ACI can be used for disseminating information on the system. AREU, as a PSAP provider of Varese, represents a best practice in Italy for all the emergency agencies that operate in Italy.

The only significant barrier which has the potential to delay eCall implementation in Italian PSAPs is the decision about the general eCall PSAPs architecture. It is a political decision

and is strictly related to obtaining funding and government budget. At present, the Italian agencies responsible for implementation are under the spending review process.

The most important enablers for the deployment of eCall in Italy are the establishment of a coordination table among all the public administrations that are involved in the eCall deployment process, and the establishment of the NIP with the participation of all the private stakeholders.

At present, the PSAP organisations of Italy have no single contact person or persons for matters related to eCall. This is related to the fact the PSAP organisations are very fragmented in Italy; the contact person that by now can act as a reference for eCall is still in the Presidency of Council of Ministers, and even if this may change in the first months of 2014.

5.1.7 Netherlands

Current situation

The current situation can be described as an existing 112 emergency centre, able for call taking and dispatching speech. Location will be verified on 112 level. There is no data exchange with the regional Emergency Rooms. In one region there is a possibility to send data about the incident to the local TMC. This is a one-way data stream. There are 5 regional TMCs and one national TMC using the same incident logging system. One region is able to receive data from a regional emergency room. Also digital data can be received of the recovery contractors.

For the HeERO 1 one pilot there is a test system built for call taking and processing eCalls. This system works with the same phone application (Avaya) as the current production system in the 112 emergency centre. With TPS/OEM services are some agreements on direct transmission of eCalls to 112 by voice.

Future situation:

End state

- The Netherlands has implemented eCall in its emergency chain (112 and emergency control rooms)
- There is an operational alignment between emergency chain, road authorities, recovery contractors, TPS/OEM.

- HGV eCall is regulated in legislation
- eCall is part of a broader in-vehicle platform for all kind of services.

Before The Netherlands will have reached this end state, the following issues have to be dealt with:

- MNO networks will be changed to be able to operate with the eCall flag.
- The test system will be operationalised in the national 112 system
- eCall in the 112 system will be linked with the national emergency control room system
- The possibility to transmit and receive additional information about incidents and the road situation from TMCs (from several road authorities)
- A distribution application is operational to transmit the eCall information from eCall application to the relevant road authorities

Present developments:

Two important developments influence the implementation of eCall in The Netherlands:

- There is going to be one national emergency control room organisation with 10 multifunctional emergency control rooms. This means a reduction in emergency control rooms
- The present emergency control room system (called GMS) has reached the end of its life cycle and will be replaced with a new national system called NMS)

These developments coincide with the implementation of eCall but the timing is not in sync. The planning for eCall proposed by the EC (October 2015) will probably cause a phased introduction of eCall in The Netherlands before the above mentioned end state can be realised.

The proposed architecture for eCall makes a phased introduction possible and leaves room for different ways of routing the eCalls. In this way it The Netherlands will use the experiences gained in the starting years to optimise the use of eCall in the end state.

The decision on the implementation roadmap will have to be made by the responsible ministries the first quarter of 2014.

Routing scenarios

There is a great fear at the emergency control rooms of false eCalls. The statistics coming from the present TPS-eCall show that approximately 60% of the automatic eCalls and 90% of the manual eCalls may be false (non-emergency) calls. However it is questionable how relevant these percentages are, as the main purpose of a TPSP is to provide service to their customers and not to provide emergency help.

Moreover it will take 15 to 20 years before all cars will be equipped with eCall; in the beginning the penetration rate will be low, as will be the eCalls sent to the PSAPs. The experiences with eCall from the first period can be used to design the optimal way of processing eCalls by the emergency chain.

There are three basic routing scenarios:

1. All calls go directly to the most appropriate PSAP (Figure 24).

   There will be no filtering of calls; all calls (non-emergency included) will be routed to the most appropriate PSAP. This implies that all PSAPs must have sufficient capacity to handle the calls

Figure 24: Routing scenario 1: all calls go directly to the most appropriate PSAP

2. All calls go to a 1st level PSAP that will validate the calls and will only forward the emergency calls to the appropriate 2nd level PSAP (Figure 25).

   The 1st level PSAP will filter all calls. After validation only emergency calls will be routed to the most appropriate 2nd level PSAP. In this way the burden for these PSAPs will be relieved

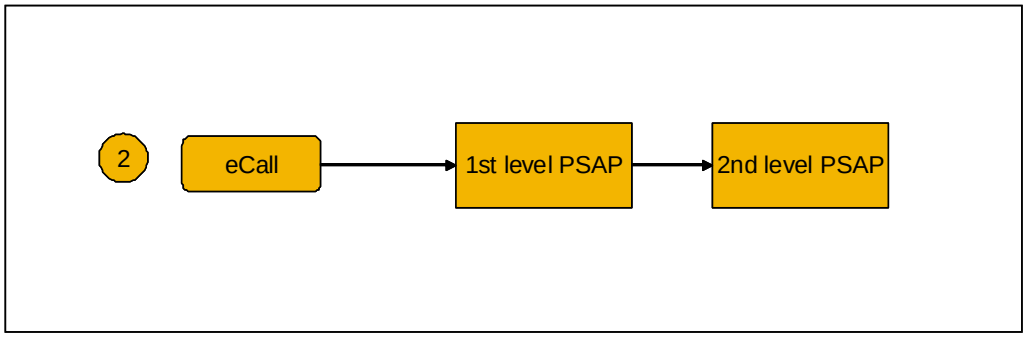


Figure 25: Routing scenario 2: all calls go to a 1st level PSAP that will validate the calls and will only forward the emergency calls to the appropriate 2nd level PSAP

3. All manual calls go to a 1st level PSAP and all automatic calls go directly to the most appropriate PSAP. There will be a distinction between manual and automatic eCalls (Figure 26). Because it is expected that most manual eCalls do not require emergency help, these calls will be routed to a 1st level PSAP that will validate these calls. The automatic calls will be routed directly to the most appropriate PSAP. This third scenario is a mixture of the above mentioned scenarios.

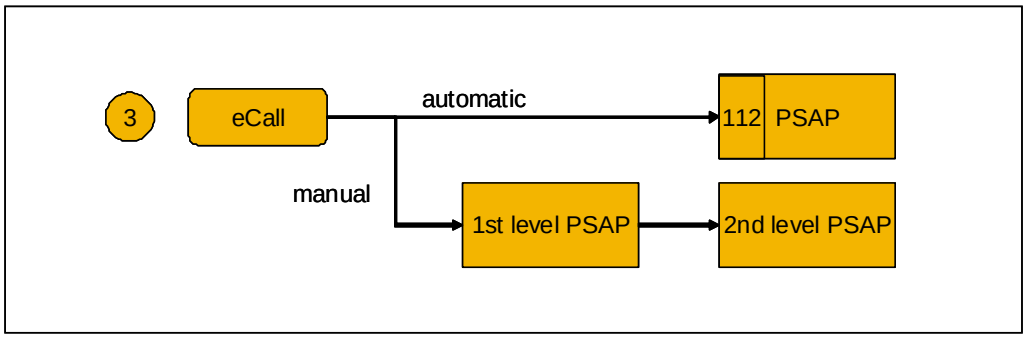


Figure 26: Routing scenario 3: all manual calls go to a 1st level PSAP and all automatic calls go directly to the most appropriate PSAP

The reception of TPS eCall is independent form the three scenarios (Figure 27). As the TPSP validates the eCall before forwarding, these calls could be routed directly to the most appropriate PSAP.

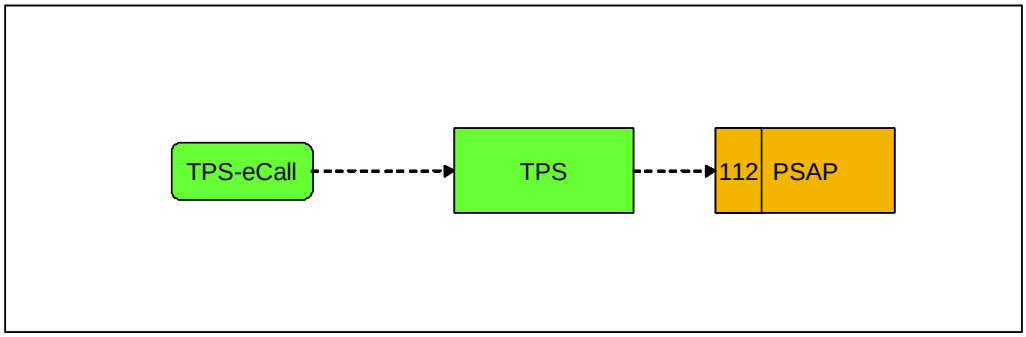


Figure 27: TPSP validates the eCall before forwarding

Phased introduction

As described above it is expected that the development of one national emergency control room organisation and the replacement of the present emergency control room system will cause The Netherlands to decide on a phased introduction of eCall (Figure 28) in order to be able to receive eCalls at the moment the EC regulation forces to do so. The full functionality of eCall will be realised at a later date.

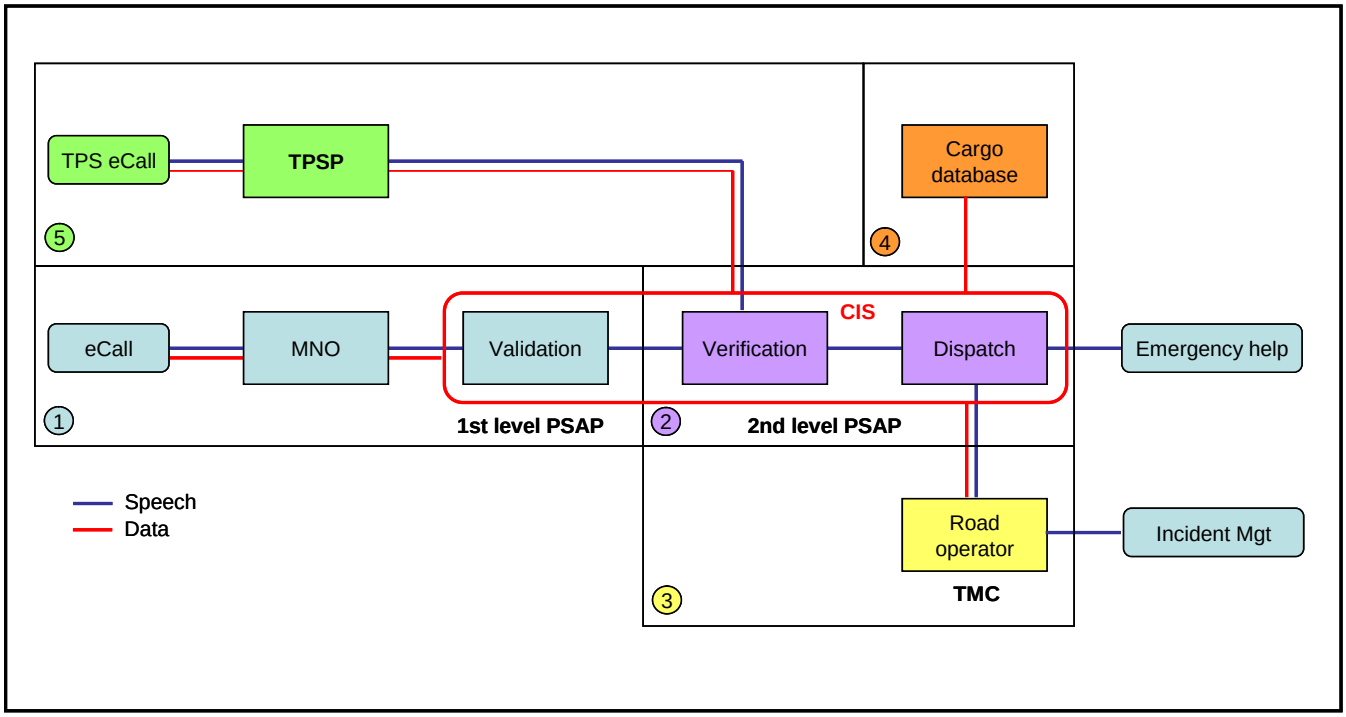


Figure 28: Phased implementation of eCall

Phases:

1. All eCalls will be sent to 1st level PSAP (routing scenario 1). Dependant of if the old emergency control room system (GMS) will be adapted to eCall or the decision will be

made to wait for the new emergency control room system (NMS), the MSD will be sent to the appropriate PSAP by voice.

The present modus operandi of the TPS-eCall will be continued

2. The 2nd level PSAPs will be upgraded in order to be able to receive eCalls

   Based on the experiences gained from the first phase it will be possible to decide on which routing scenario (1, 2 or 3) will be most appropriate for the Dutch situation, after NMS will be realised.

3. The link with the road operator will be established. The TMC will be able to receive the for Incident Management relevant eCall data from the Call Info Service (CIS). The TMC and 2nd level PSAP can communicate with each other
4. The information on hazardous goods will be included in the MSD. A link will be established between the CIS and a 'cargo database' where the data on hazardous goods will be translated into relevant information for the emergency services
5. The data link with TPS eCall to the PSAPs will be further investigated and implemented

The phases to reach the total functionality of eCall don't necessarily have to be executed in this order. The sequence will have to be decided on in Q1 of 2014. This decision will depend on the expected development of the national ECR organisation and the national ECR system. However, The Netherlands intend to - at least - execute phase 1 in order to comply with the European regulation to start with.

Testing and piloting activities before the roll-out of eCall

In the initial plans for the Dutch pilot site, the eCall functionality would be built on the development and test application (DTA) from the 112-system, because the operational 112-system can and may not be used for development activities. The DTA is supposed to be an exact copy of the operational system. Due to circumstances beyond the control of the Dutch pilot site, the DTA was not available and the project was forced to make use of a separate standalone test system, based on the operational 112 application and simulating the ECR system. With this test system the Dutch pilot has been testing the basic core functionalities of eCall (proof of concept).

Taking into account the results from the HeERO pilot, The Netherlands will start a new eCall deployment project:

- building the complete eCall system according to the functional design developed in the HeERO project on the DTA (the PSAP modem will be based on the latest available versions)
- testing of the new system
- migrate the tested eCall system to the operational 112 and ECR systems.
- realise the connection between emergency chain and road management as developed in the pre-deployment pilot.
- Stimulate the use of the HGV eCall standard for dangerous goods in the transport sector.

Due to the developments mentioned in the paragraph above it is to be seen how much of the present test system can be used for the deployment phase.

Apart from the eCall system, the MNOs will have to implement the eCall flag.

Piloting and field testing before rolling out the complete service is a standard activity in the realising new systems and procedures. The actual test plans for the different functionalities of the eCall service will depend on the chosen phasing of the implementation.

Roles of stakeholders

The main responsibility for the implementation of eCall lies with:

- Ministry of Safety and Justice for the 112 and ECR part
- Ministry of Infrastructure and Environment for Incident Management and Hazardous goods
- Ministry of Economic Affairs for the Telecom regulation with regard to the MNOs.

5.1.8 Romania

Information on eCall implementation plans in Romania was obtained from HeERO deliverable D5.4 (Paris and Rooke 2014).

From a technical point of view, all the Romanian PSAPs are ready to handle eCalls. A national commission has been formed that will certify the PSAP in the first part of 2014. Other activity that needs to be done before making the service fully operational is the training of the emergency agencies operators. While the 112 PSAP operators have already been trained, this wasn't done with the emergency agencies operators due to their number (a few hundreds). We expect to have this training done during 2015.

While the system is upgraded and in place, eCall flag must be implemented by all Mobile Network Operators in order to route the calls. Out of four existing MNOs at national level, one

has already implemented eCall at national level. Other have implemented the eCall flag in test cells or localized. The Romanian pilot site expects that the eCall flag will be implemented at national level before the deadline from October 2015.

After the end of the project, the system will remain installed and additional upgrades will be performed. We plan to continue the interoperability tests in 2014 and 2015 in order to assure the compatibility with other IVS units.

5.1.9 Sweden

The Swedish eCall team has been in discussions with decision-makers on the deployment of eCall in Sweden, and these discussions are expected to continue. At present, Sweden has no political decision on deployment of eCall or an implementation roadmap for eCall; and administrative process to make political decisions related to eCall has not been started. Swedish MNOs have not started the implementation of the eCall discriminator, and have published no plans to do so. At present, there are no agreed dates for upgrading Swedish PSAPs to be eCall ready. (Rydberg 2013)

At present, the deployment of eCall is under investigation by Swedish authorities (Paris and Rooke 2014).

The next actions seen necessary by the Swedish pilot team is to designate competent authorities for assessing the conformity of operations to European directives and standards.

If Sweden decided to implement eCall, the responsibility for eCall deployment would most likely belong to the Ministry of Enterprise or to Ministry of Defence. The other public agencies to be involved in the deployment of eCall are the Swedish Post and Telecom Authority (PTS), the Public Health Agency of Sweden (Folkhälsomyndigheten), Data Inspection Board, and Swedish Civil Contingencies Agency (MSB).

The Swedish Post and Telecom Authority (PTS) monitor the electronic communications and postal sectors in Sweden. The Public Health Agency of Sweden (Folkhälsomyndigheten) has been established on January 1, 2014 as a merger of the Swedish National Institute of Public Health (Folkhälsoinstitutet) and the Swedish Institute for Communicable Disease Control (Smittskyddsinstitutet). Most of the work concerning environmental health and the responsibility for the environment and public health reports at the National Board of Health and Welfare (Socialstyrelsen) will also be transferred to the new agency. The Public Health Agency of Sweden will also be responsible for privacy and data protection in the health sector. The Data Inspection Board is a public authority. Its task is to protect the individual's

privacy in the information society without unnecessarily preventing or complicating the use of new technology. MSB is the Swedish Civil Contingencies Agency. Its task is to enhance and support societal capacities and preparedness for and prevention of emergencies and crises. When one does occur, MSB support the stakeholders involved by taking the right measures to control the situation.

At present, there is no decision on piloting activities after HeERO, implementation of eCall in Sweden or the administrative responsibilities in case a decision is made to implement eCall.

There are four mobile network operators in Sweden. No one of them has implemented the eCall discriminator for commercial operations or decided to do so in future, but two of them have tested the eCall discriminator during the HeERO pilot. No specific barriers have been identified for implementation of the eCall discriminator, and all four operators have named a contact person for the matters related to the eCall.

The eCall technology has been tested through the HeERO project including the in-vehicle system, mobile networks, and PSAP. The following partners have been involved in piloting activities: MSB, Trafikverket, Volvo Cars, Actia, Ericsson, Carmenta, TeliaSonera, Telenor, SOS Alarm, Volvo AB, Telematics Valley, Wireless Car.

At present, no specific barriers which could delay eCall implementation in PSAPs are foreseen. The Swedish PSAP organisation has also named a contact person for matters related to eCall.

5.2 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.

5.3 eCall implementation roadmap

The eCall implementation roadmap for countries involved in HeERO is presented in Figure 29. The start and end times presented in the figure are based on the contents of Tables 4 - 9 and the text in chapter 5.1. Actions with either unknown start or end time have been marked with dashed line.

Some of the HeERO member states were not able to provide dates for the different phases of the implementation process. This was caused by two facts. First, all of the HeERO countries do not have a decision on member state level on the implementation of eCall (such as SE and DE). The deployment of eCall is currently under investigation in Sweden by the Swedish government.

Second, some member states are studying the possible implementation options but have not finalised their national implementation plans or national implementation roadmap (NL, DE). One of the HeERO pilots did not answer the questionnaire concerning eCall implementation plans (RO), but information on the planned schedule for eCall deployment was obtained from HeERO pilot site compendium (Paris and Rooke 2014). Romania has been reported to have completed the ICT infrastructure which allows the PSAP to receive and process eCalls (Romania Insider 2013).

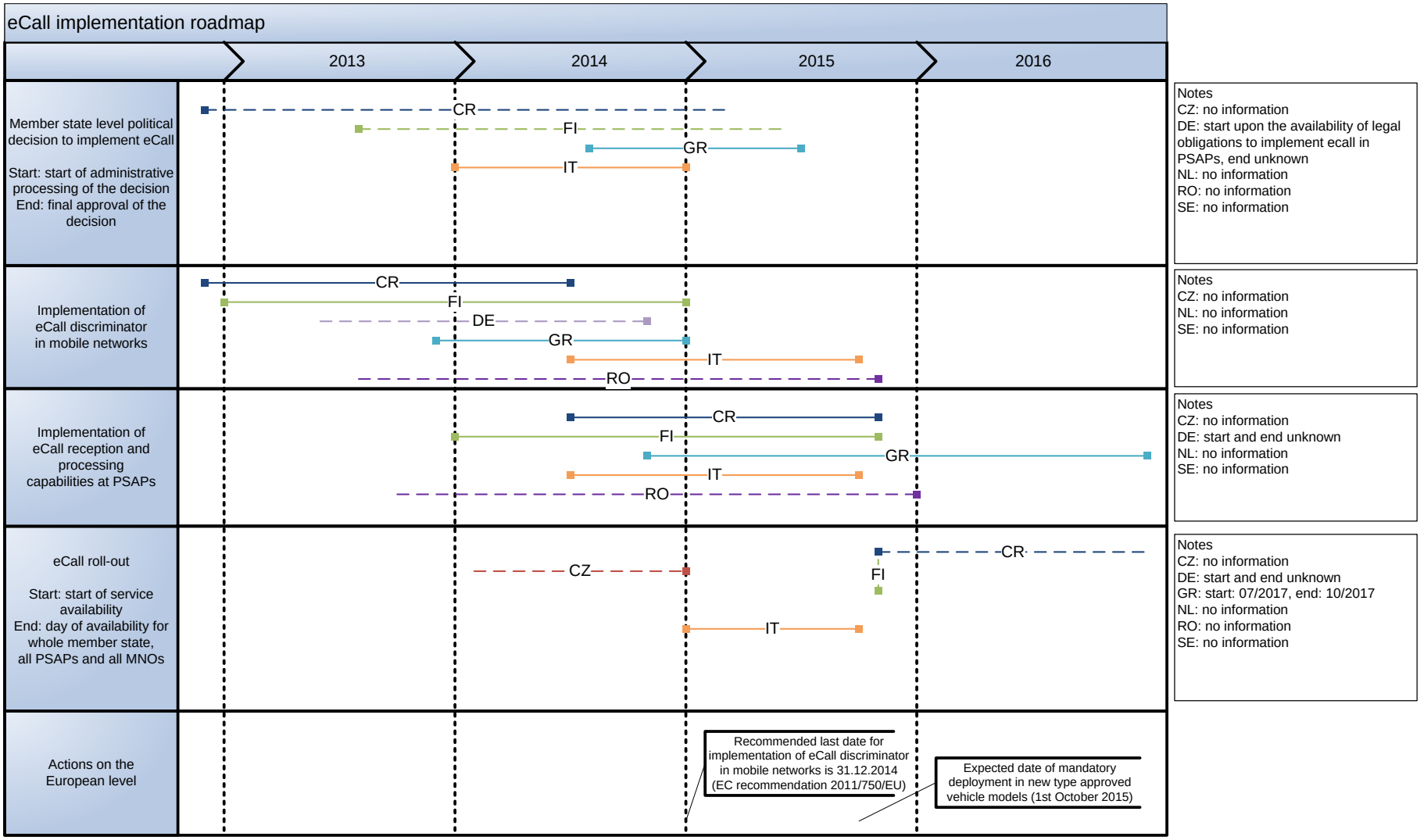


Figure 29: eCall implementation roadmap for HeERO countries

6 Conclusions

6.1 eCall implementation roadmap for Europe

Discussion of results

The roadmap presented in Figure 29 is based on information obtained from the HeERO pilot sites with a questionnaire and information available in HeERO pilot sites compendium (Paris and Rooke 2014). Using a questionnaire allowed collection of information in a structured manner. It was also less resource-consuming than the other methods available such as personal interviews of the pilot site leaders.

The start and end dates mentioned in the roadmap are mostly based on plans made within the HeERO countries. The realisation of the schedules will depend on factors such as political decisions on eCall, availability of funding on member state level and solving the challenges identified in D6.2 (Öörni and Brizzolara 2014) such as assigning responsibility for the service. This means that the roadmap does not guarantee as such that all the planned activities will be realised within the anticipated schedule.

Some of the HeERO member states were not able to provide dates for the different phases of the implementation process. This was basically caused by the lack of decision on member state level on the implementation of eCall (DE, SE) and the fact that some of the HeERO countries were still planning the service roll-out when data collection for the roadmap took place (CZ, NL).

The organisation of PSAPs is being changed in The Netherlands, and there is a plan to replace the current information system of PSAPs. Therefore, it was not possible to provide exact dates for the various phases of eCall deployment until the national eCall implementation roadmap has been completed. There are plans to make the decision on the implementation roadmap for Netherlands during the first quarter of 2014. Czech Republic has plans to implement eCall (Pichl and Urbánek 2013) but has not provided exact dates for the various phases of deployment.

The roadmap provided in the report covers only the HeERO countries and it reflects information available at the end of 2013 from the pilot sites except for the Greek pilot site which updated version its contribution after piloting activities in Greece were concluded. The roadmap covers actions implemented or planned in the HeERO countries and the most important actions on the European level.

Concluding remarks

The report has provided an eCall implementation roadmap for the HeERO countries. The planned schedule for the various phases of eCall deployment could be summarised for Croatia, Finland, Greece and Italy. Czech Republic provided the expected date of availability for eCall. Romania did not answer the questionnaire, but it has been reported to have completed the PSAP infrastructure required to receive and process eCalls and to have plans for eCall implementation. At present, the planned schedule for eCall deployment and the expected date of availability of eCall is unclear for Germany, Netherlands and Sweden. Two of these countries (Sweden and Germany) have no decision or plans to implement eCall at the time of writing.

It is likely that new information on the eCall implementation plans and roadmaps of HeERO and HeERO2 countries will appear over time during 2014 and 2015. Therefore, it is recommended to update the roadmap after the results of HeERO2 become available and the countries involved in HeERO provide new information on their plans related to eCall. It is also recommended to continue monitoring the deployment of eCall as a part of the monitoring process based on the European ITS Directive.

The results suggest that the continuity of service for eCall will be achieved gradually over time instead of at once. Two of the HeERO countries expect to have eCall available in their whole territory at latest on 1st October 2015 (FI and IT), one until the end of 2014 (CZ), one after 1st October 2015 (CR) and one after 1th November 2017 (GR).

6.2 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 but not the results of HeERO2. Updating the guidelines is recommended once the results of HeERO2 become available.

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.

7 References

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8 Annexes

Annex A: Questionnaire form used to collect information from HeERO 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 PSAPs (start: start of implementation, end: implementation of eCall in all PSAPs 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 (PSAPs) 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 PSAPs 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: