

D2.2 - eCall systems functionalities' specification



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TABLE OF CONTENTS

1	MANAGEMENT SUMMARY	6
2	TERMS AND ABBREVIATIONS.....	7
2.1	TERMS	7
2.2	ABBREVIATIONS	10
3	INTRODUCTION	13
3.1	PURPOSE OF DOCUMENT.....	13
3.2	STRUCTURE OF DOCUMENT.....	13
3.3	HEERO CONTRACTUAL REFERENCES.....	14
4	LIST OF STANDARDS.....	16
5	FUNCTIONAL ARCHITECTURE AND SPECIFICATION FOR EACH PILOT COUNTRY.....	17
5.1	BELGIUM	17
5.2	BULGARIA.....	20
5.3	DENMARK.....	24
5.3.1	<i>ECALL FUNCTION OVERVIEW</i>	<i>24</i>
5.3.2	<i>PSAP SUPPORT OF ECALL</i>	<i>25</i>
5.4	LUXEMBOURG.....	26
5.5	SPAIN.....	34
5.5.2	<i>ECALL CHAIN.....</i>	<i>35</i>
5.5.7	<i>112 SUPPORT OF ECALL.....</i>	<i>43</i>
5.6	GREECE.....	45
5.6.2	<i>PSAP FUNCTIONS.....</i>	<i>45</i>
5.6.3	<i>NETWORK FUNCTIONS.....</i>	<i>48</i>
5.7	TURKEY.....	51
5.7.1	INTRODUCTION	51
5.7.2	ECALL FUNCTIONS OVERVIEW	51
5.7.3	PSAP SUPPORT OF ECALL	52
5.7.4	NETWORK FUNCTIONS.....	53
5.7.5	IN VEHICLE SYSTEM FUNCTIONS.....	53
6	LITERATURE	53

Figures

FIGURE 1: STRUCTURE OF DELIVERABLES	13
FIGURE 2: ECALL DATA FLOW BELGIUM	17
FIGURE 3: TECHNICAL SCHEME	19
FIGURE 4: ECALL ARCHITECTURE	20
FIGURE 5: PSAP ECALL DISPATCHING	22
FIGURE 6: HIGH-LEVEL ECALL HANDLING PROCESS	22
FIGURE 7: LUXEMBOURG ARCHITECTURE	26
FIGURE 8: ECALL DATA FLOW (TAKEN FROM THE GERMAN SPECIFICATION)	28
FIGURE 9: LUXEMBOURG ECALL PSAP ARCHITECTURE	28
FIGURE 10: THE HANDLING OF DANGEROUS GOODS IN LUXEMBURG'S ECALL	32
FIGURE 11: THE HANDLING OF CROSS-BORDER ISSUES IN LUXEMBURG'S ECALL	33
FIGURE 12: PSAP RESPONSIBILITIES	35
FIGURE 13: PROPOSED ARCHITECTURE TO HANDLE ECALL MESSAGES IN SPANISH PILOT	35
FIGURE 14: P2W ECALL DEVICE	37
FIGURE 15: MNO NETWORK PROCESS	38
FIGURE 16: OPERATIONAL STEPS OF PSAP OPERATORS	41
FIGURE 17: ADDITIONAL INTERMEDIATE PSAP FUNCTIONS. TRAFFIC INCIDENT MANAGEMENT PROCEDURES	43
FIGURE 18: PSAP DISPATCHING PROCESS	44
FIGURE 19: DIAGRAM OF UPGRADED PSAP TO SUPPORT ECALL	45
FIGURE 20: ECALL HANDLING PROCEDURE	47
FIGURE 21: ECALL ROUTING	49
FIGURE 22: ECALL FLOW SCHEMA	52

Tables

TABLE 1: PARTICIPANTS IN ECALL CHAIN	36
TABLE 2: EXECUTE TRAFFIC INCIDENT MANAGEMENT PROCEDURES	42
TABLE 3: TS12 DESCRIPTION	48
TABLE 4: EMERGENCY SERVICE CATEGORY BITS	49

1 Management Summary

Road fatalities in the EU-27 have fallen by 43% between 2010 and 2001, when the European Commission published its White Paper on European Transport Policy. The European Road Safety Action Programme and the Intelligent Car Initiative have had a significant impact on this positive development, and are expected to continue in the medium term to produce further benefits towards the vision of zero road fatalities.

However, with around 1.15 million serious traffic collisions causing around 31 000 deaths and more than 1.5 million injured in 2010 on European roads, for an estimated cost to the society of about EUR 160 billion, further action is required.

The pan-European in-vehicle emergency call, 'eCall', is estimated to have the potential to save up to 2 500 fatalities annually in EU-27 when fully deployed, to reduce the severity of injuries, bring significant savings to society in healthcare and other costs and reduce human suffering.

The HeERO2 project will prepare, carry-out and coordinate eCall pre-deployment pilots at European level taking into account the approved standards.

The overall project objective is to prepare for the deployment of the *necessary infrastructure* in Europe with the aim of making the Pan-European in-vehicle emergency call service eCall a reality.

The implementation of the in-vehicle emergency call service eCall at European level should take into account two major conditions on which its successful operations will depend:

- a) **Interoperability and cross border continuity:** the possibility for any vehicle from any European country travelling across Europe to use the eCall service in case of a serious collision should be a service key driver. The interoperability issue covers not only the technical solution but also operations aspect.
- b) **Harmonisation:** the eCall service can work properly across Europe only if developed in a harmonised way in the different countries, still respecting the different national implementations. The use of 112/E112 represents the first steps of this harmonised approach.

HeERO2 phase 1 has issued an exhaustive state-of-the-art analysis in the area of 112 resp. E112 calls identifying all necessary system implementation steps with a focus on:

D2.2 - eCall systems functionalities' specification

- in-vehicle system equipment interface
- telecommunication infrastructure (specifically 112/E112 related parts)
- PSAP infrastructure

This analysis issued the Hardware (HW) and Software (SW) set-ups needed at different HeERO Phase 1 pilot sites and gathered the initial background information for the definition of steps leading towards the eCall standards implementation. On this basis, the In Vehicle System, 112/E112 and PSAPs needed upgrades have been defined for HeERO Phase 1 member states.

Based on this analysis, this document describes how PSAPs will operate in the Member States after eCall systems has been installed.

2 Terms and abbreviations

2.1 Terms

TERM	DEFINITION
112	single European emergency call number supporting Teleservice 12 (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	<i>wireless communications network</i> 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
CSC	Customer Service Centre
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 <i>vehicle occupants</i> ; when activated it provides notification and relevant location information to the most appropriate <i>Public Safety Answering Point</i> , by means of <i>mobile wireless communications networks</i> , carries a defined standardized <i>minimum set of</i>

D2.2 - eCall systems functionalities' specification

	<i>data</i> (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 <i>Public Safety Answering Point</i>
eCall generator	occupant of a vehicle or equipment within a vehicle that has caused to trigger an <i>eCall</i> 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 <i>eCall</i> to a designated PSAP
eCall In-band Modem (eIM)	Modem pair (consisting of transmitters and receivers at IVS and PSAP) that operates full-duplex and allows reliable transmission of eCall Minimum Set of Data from IVS to PSAP via the voice channel of the emergency voice call through cellular and PSTN networks.
eCall service	end-to-end emergency service to connect occupants of an affected vehicle to the <i>most appropriate PSAP</i> via an audio link across a PLMN together with the transfer of a <i>minimum set of data</i> to the PSAP
eCall transaction	establishment of a <i>mobile wireless communications session</i> across a <i>public wireless communications network</i> and the transmission of a <i>minimum set of data</i> from a vehicle to a <i>public safety answering point</i> 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
eIP	eCall Implementation Platform
emergency control centre	unit which deals with emergency calls and which has the capacity to consider professionally the need for response, and which has the provision to mobilize the needed resources to deal with the emergency in question
eSafety	European Commission-sponsored forum to improve safety for European citizens
in-vehicle equipment	equipment within the vehicle that provides or has access to in-vehicle <i>data</i> required for the <i>minimum set of data</i> and any other <i>data</i> that is to be sent as part of or complementary to the <i>minimum set of data</i> to effect the <i>eCall transaction</i> via a <i>public mobile wireless communications network</i> providing a link between the vehicle and a means of enacting the <i>eCall</i>

D2.2 - eCall systems functionalities' specification

	<i>service via a public mobile wireless communications network</i>
in-vehicle system (IVS)	<i>in-vehicle equipment</i> together with the means to trigger, manage and effect the <i>eCall transaction</i>
Minimum Set of Data (MSD)	standardized <i>data concept</i> comprising <i>data elements</i> of relevant vehicle generated <i>data</i> essential for the performance of the <i>eCall service</i> [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 <i>mobile wireless communications network</i> with homogeneous handover between <i>network access points</i>
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
Teleservice 12	emergency service supported by PLMNs
TPSP	third Party Service Provider
TPS-eCall	Third Party Services supporting eCall. In these cases, the vehicle dials a private number to contact a call centre, which filters the call and transmits the MSD and the call to the Public Safety Answering Points in case of emergency.
vehicle manufacturer	entity which first assembles the vehicle and provides <i>eCall</i> equipment as part of its specification and subsequently sells the vehicle directly or via an agent
VIN	vehicle Identification Number
vehicle occupant(s)	person(s) inside the vehicle

2.2 Abbreviations

TERM	DEFINITION
3G	Third generation mobile telecommunication system
3GPP	Third generation partnership protocol
ACK	Acknowledgement
AleC	Automatic Initiated eCall
AMR	Adaptive_Multi-Rate
ARQ	Automatic Repeat Request
AT	Attention (part of modem instruction to dial as specified in ETSI TS 127 007)
BCD	Binary coded decimal
BER	Basic encoding rules (ASN.1)
BS	Bearer Services
CAN	Controller-Area Network
CRC	Cyclic Redundancy Check
CTM	Cellular Text telephony Modem
eIM	eCall In band Modem
ETSI	European Telecommunications Standards Institute
FEC	Forward Error Correction
GIS	Geographic Information System
GMSK	Gaussian minimum shift keying (modulation)
GNSS	Global Navigation Satellite System
GSM	Global System for Mobile communications
HGV	Heavy Goods Vehicle
HLR	Home Location Registry
HMI	Human Machine Interface
HPLMN	Home Public Land Mobile Network
IAM	Immediate Alert Message

D2.2 - eCall systems functionalities' specification

IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IND	Indication
IVS	In-Vehicle System
LAN	Local Area Network
LTE	Long Term Evolution (of 3G UMTS access network)
MleC	Manually Initiated eCall
MSC	Mobile Switching Centre
MNO	Mobile Network Operator
MSISDN	Mobile Subscriber ISDN (integrated services digital network)
MSD	Minimum Set of Data (EN 15722)
NACK	Negative Acknowledgement
NAD	Network Access Device (e.g. a GSM or UMTS module)
NRN	Network Routing Number
P2W	Powered-two-wheel vehicles
PAN	Personal Area Network
PER	packed encoding rules (ASN.1)
PLMN	Public Land Mobile Network
PSAP	Public Safety Answering Point
REQ	Request
SIM	Subscriber Identity Module (GSM/3GPP)
SUT	System Under Test
TPS	Third Party Service
TPSP	Third Party Service Provider
TS12	Teleservice 12 ETSI TS 122 003
UML	Unified Modelling Language (ISO 15901)
UMTS	Universal Mobile Telecommunication System
USIM	User Service Identity Module

D2.2 - eCall systems functionalities' specification

VLR	Visited Location Register
WGS	World Geodetic System
WGS 84	World Geodetic System; issue 1984 (last revised 2004)

3 Introduction

3.1 Purpose of Document

This document will focus on the functional architecture and specification of all parts of the future public eCall service chain, which means the in-vehicle system equipment, telecommunication infrastructure (specifically 112/E112 related parts) and PSAP infrastructure for each pilot country.

The Implementation of eCall service has to fulfil several requirements for interoperable eCall system as described in Deliverable D2.1. This is one of the main goals of HeERO project. It is responsibility of each member state to prepare their implementation with respect to all required standards as is described in D2.1.

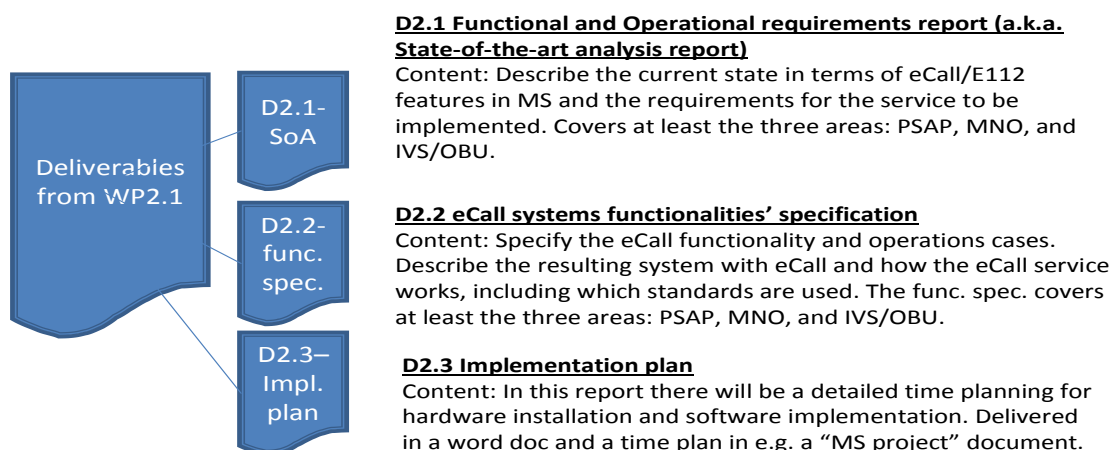


Figure 1: Structure of deliverables

3.2 Structure of Document

D2.2 first describes a list of mandatory standards related to eCall. The main chapter is dedicated to concrete descriptions of the required development and system architecture for each pilot site in the Member States.

D2.2 - eCall systems functionalities' specification

The last part of D2.2 is a table with matrix of standards which will be used in each pilot site to ensure that the consortium is able to reach interoperable system status across different test sites.

3.3 HeERO Contractual References

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

The Grant Agreement number is 325075 and project duration is 24 months, effective from 01 January 2013 until 31 December 2014. 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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European Commission
Communications Networks, Content and Technology
B-1049 Brussels
Belgium

By electronic mail: CNECT-ICT-PSP-325075@ec.europa.eu

4 List of standards

Mandatory technical standards:

- Technical Specification Group Core Network and Terminals; Mobile radio interface Layer 3 specification; Core network protocols; Stage 3 (Release 10) 3GPP TS 24.008 V10.0.0 (2010-09)
- In-band modem solution; General description (Release 10) 3GPP TS 26.267 V10.0.0 (2011-03)
- In-band modem solution; Conformance testing (Release 10) 3GPP TS 26.269 V10.0.0 (2011-03)
- In-band modem solution; ANSI-C reference code (Release 10) 3GPP TS 26.268 V10.0.0 (2011-03) + 26268-a00_ANSI-C_Source_Code.zip
- Intelligent transport systems – eSafety – eCall minimum set of data (MSD) EN 15722, June 2011
- Intelligent transport systems – eSafety – ECall high level application requirements (HLAP) prEN 16062, Date: 2010-09
- Intelligent transport systems – eSafety – Pan European eCall - Operating requirements EN 16072, Date: 2011 -07

Optional technical standards:

- PrEN 16102 - Intelligent transport systems – ECall – Operating requirements for third party support

Upcoming technical standards

- Changes to EN16062 (Revision started January 2013 by HeERO standardization task force)
- Changes to EN15722 (Revision started January 2013 by HeERO standardization task force)

5 Functional architecture and specification for each pilot country

5.1 Belgium

The Belgian implementation of eCall will be using a filtering entity. The functional flow looks like this:

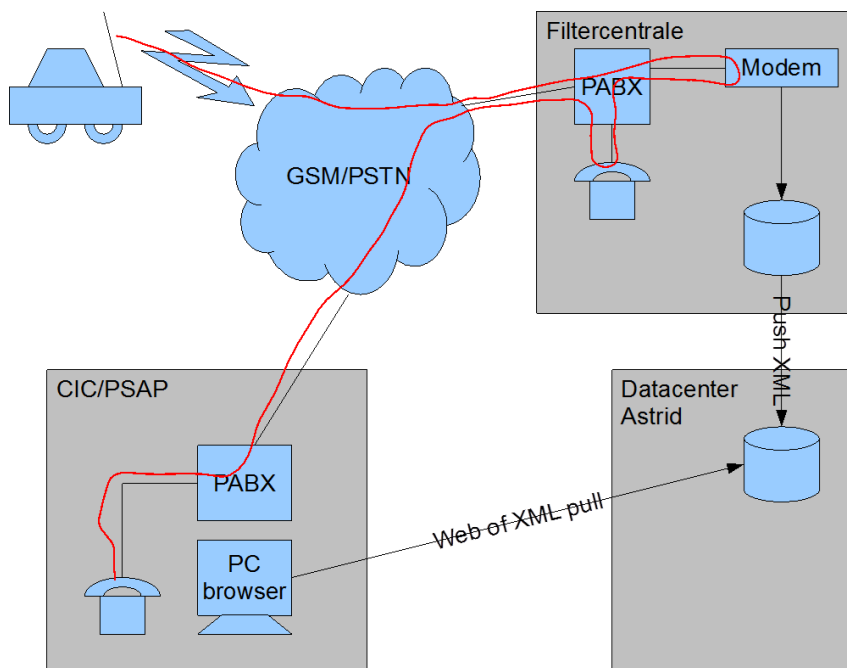


Figure 2: eCall data flow Belgium

The workflow will be as follows:

1. The car initiates an eCall (manual or automatic).
2. The Mobistar network (pilot GSM network in HeERO2 Belgium) will distinguish the eCall flag and will deliver the call to a special number of the filtering entity.
3. The PABX of the filtering entity routes the call to the eCall modem, which will decode the MSD and file it in a database.
4. After finishing the decoding, the call is transferred by modem, via the PABX to an operator at the filtering entity.
5. The operator of the filtering entity (*Touring Club Royal de Belgique* for the HeERO2 pilot) will receive the call and determines if the call is genuine and worthy of being

D2.2 - eCall systems functionalities' specification

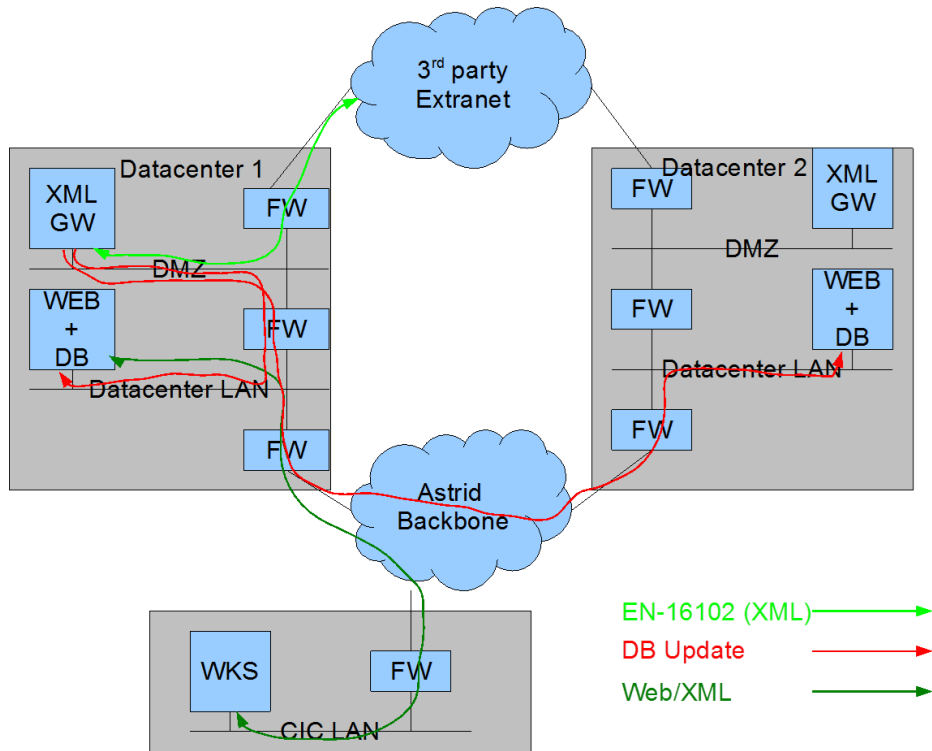
transferred to the PSAP. If so, he enriches the data, puts it in the database and transfers the call to the PSAP.

6. The XML is pushed to the database at ASTRID (Service provider of PSAP).
7. The operator in the PSAP takes the call and talks to operator of the filtering entity
8. In a pick list, the PSAP operator can see which eCalls have been sent electronically in the last 15 minutes, talking with the filtering entity, the PSAP picks the right event.
9. The Call is transferred and the PSAP talks to the caller in the car. The PSAP has the MSD info and the intake of the filtering entity available.
10. The PSAP further handles the call like any normal emergency 112 call and uses the extra information available in the eCall system provided by the minimum set of data.

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

1. A Standard is already worked out in detail.
2. PSAPs are also ready to handle third party private eCall.

The technical schema is as follows:



GW = Gateway

DB = Database

FW = Firewall

WKS = Workstation

CIC: Communication and Information Centre (i.e. The PSAP)

Figure 3: Technical scheme

As can be seen in the figure above, the setup is fully redundant. In the pilot phase the web interface of the database server will be used. The XML interface is reserved for future use. The servers will all be virtual VMware servers. The tests will be done using ASTRID's test centre, which is technically identical to the PSAP installations. This way, operational PSAPs are not disturbed by test calls.

5.2 Bulgaria

5.2.1 Introduction

In this chapter the high-level architecture and process description of handling eCall in the Bulgarian pilot is illustrated. A detailed description is given in the document “Technical Specifications for PSAP upgrade”.

5.2.2 eCall chain

The following Figure describes from a high-level perspective the architecture necessary to handle eCalls by the different parties who together make the eCall chain.

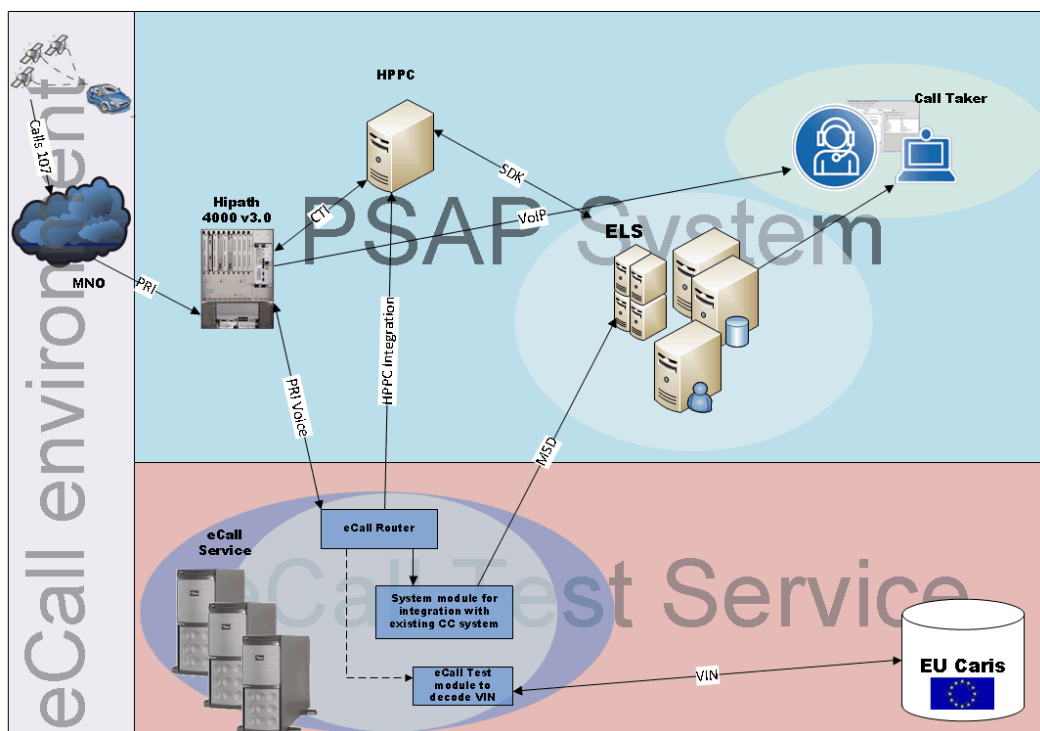


Figure 4: eCall Architecture

5.2.2.1 Establishing an eCall

1. The IVS (In-Vehicle System) initiates an eCall either as a result of an automatic activation (in case of a road incident which triggers the eCall) or manually by the vehicle occupant.
2. MNOs identify the eCall (manual and automatic) either through dedicated service number 107 or through eCall-Flag and route it to the pilot eCall PSAP.
3. The E-112 PSAP detects the eCall using the eCall flag (i.e. by analysing the dedicated service number) and routes the eCall to the eCall router.

D2.2 - eCall systems functionalities' specification

4. The eCall Router detects the MSD transmission request according to standards and ensures the MSD transmission.
5. The eCall Router invokes VIN-Decoder with the VIN data from the MSD and queries and “VIN database simulator” for detailed vehicle information (optional).
6. Once the MSD and optional vehicle VIN data are received, the eCall Router extends the eCall to the PBX which is now monitored by the ACD platform HPCC.
7. HPCC routes the eCall to an appropriate 112 call taker by utilizing existing call routing strategy.
8. Once the call taker accepts the call, eCall Router establishes the voice connection from IVS to the call taker.
9. Meanwhile the eCall data is passed to the CAD application via the “test platform data integration” system and the CAD application displays the eCall data to the same call taker workplace where the voice call has been forwarded. The vehicle/caller's location is now shown on the map
10. The call taker handles the eCall according to the approved procedures, described in p. 1.2.2.3 below.

5.2.2.2 Handling the eCall by the Emergency Control Centres

Each emergency service office has setup so called Emergency (First responders) control points.

Usually control points are located at administrative districts dispatching centres (Emergency Control Centres- ECC). Remote to NS 112 workstations are situated in 28 districts ECC in Police Department, Fire Brigade Department, Emergency Medical Help, and additionally in Ruse, Varna and Burgas in Marine Administration, and in Sofia- in Red Cross. On each of these workstations the Emergency case management –application and a client for IP telephony is installed. ECC have a direct access to information system of 112 centres. 112 centres and control points exchange information through existing information systems. Telephone connections are provided from each 112 centre to the control points in the corresponding area. For the purpose of HeERO the Pilot Site has used NS 112 IP NW and as a backup – fixed PSTN of the Bulgarian Telecommunication Company (BTC). PSAP's and first responders control points use the same software and share the same data base.

eCall processing in PSAP and ECC will follow the current workflow of voice call to E112 centres.

D2.2 - eCall systems functionalities' specification

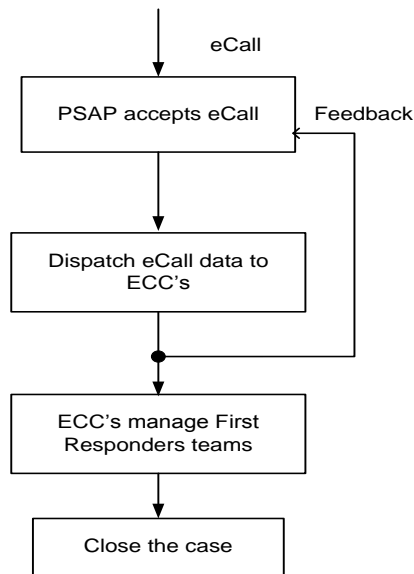


Figure 5: PSAP eCall dispatching

5.2.3 High-level eCall handling process

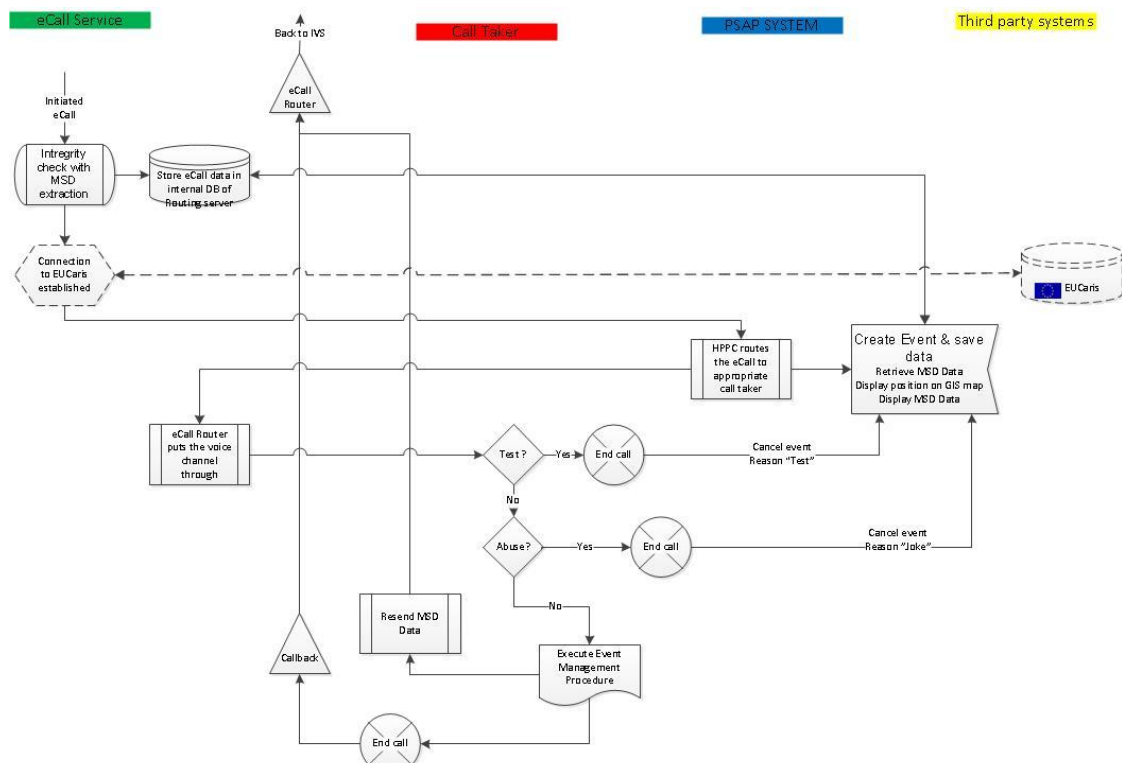


Figure 6: High-level eCall handling process

In Bulgaria there are three Mobile Network Operators that provide telecom services for mobile voice calls and data access:

- Mobiltel
- Vivacom
- Globul

D2.2 - eCall systems functionalities' specification

As HeERO2 partner Mobiltel will implement the eCall flag by the beginning of 2014. Till then in 2013 Mobiltel will provide workaround solution for test purposes, in coordination with the PSAP/112 and its principal Ministry of Internal Affairs (also a partner in the national HeERO2 effort).

The other MNOs currently do not participate in the HeERO2 activities.

5.3 Denmark

The goal of the Danish Pilot Site is to make eCall fully operational in Denmark, when the pilot is finished. At that time, the four Danish MNOs and the three PSAPs should be ready to receive eCall from any eCall equipment (IVS etc.), fulfilling the eCall standards.

In addition to the above goal, the Danish pilot will look into challenges regarding refitting of IVS-equipment, and on the basis of the pilot, and other HeERO experiences, formulate a number of regulatory recommendations regarding vehicle inspection.

5.3.1 eCall function overview

In the pilot the eCall functionality will first be tested with a long number (eight or ten digits) calling a test-system, and later on, the eCall functionality will be tested with E112 directly to the PSAP operators.

Function overview with long number

1. A test person manually initiates an eCall from a vehicle.
2. The IVS, with a normal SIM-card, calls a pre designated long number (not 112).
3. The call is received at a test environment in a pre-designated PSAP
4. The MSD is striped from the call
5. The test person receives a recorded voice response telling that the eCall-test with a long number has been received.

Function overview with E112

1. A test person manually initiates an eCall from a vehicle
2. The IVS with a dormant SIM-card finds a suitable mobile network and uses special features in the GSM-network for 112 calls
3. The mobile network routes the call to the nearest PSAP
4. The PSAP system recognizes the eCall, either because the Mobile Operator directs the call specifically, or because the call at the PSAP is recognized as an eCall by the eCall flag (to be decided).
5. The call is handled separated from other 112-calls, and the PSAP system strips the MSD and other data of the call and places the data on a server, and makes the 112-call available for an operator.

D2.2 - eCall systems functionalities' specification

6. When the operator at the PSAP takes/gets the call, the position will be shown on a map (as with cell-information today), and the rest of the MSD will be presented on the screen as text.
7. Optional (to be decided): The operator look up the VIN number in the Danish Registry for Motor Vehicles for further information or the system does it automatically, and represent the resulting information along with the rest of the MSD as text.
8. When the operator tells the caller, that he or she has reached 112, the caller identifies the call, as an eCall test call and when that has been acknowledged, the call is terminated by both parties.

5.3.2 PSAP support of eCall

In Denmark there are three PSAP operated by two different authorities. Two are operated by the National Police, and one is operated by the Copenhagen Fire Brigade.

The two organizations do not operate in the same way, but it is possible for the Copenhagen Fire Brigade to automatically push 112 emergency calls to the PSAPs operated by the Danish Police, when no operator will be able to handle the call.

The MSD information will be stored at the receiving PSAP only.

The eCall functionality will in the end be fully integrated in the running PSAP solutions, and will involve changes in the way calls are received, in the existing data-storage servers and in the way data are presented to the operator.

It will be the operator who decides what information from the MSD that will be passed on to the ECC.

In the pilot, a multiple number of IVS-fabricates will be involved to test for interoperability.

5.4 Luxembourg

5.4.1 Introduction

The European standard for eCall 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 an emergency, via an 'eCall' communication session and to establish a voice channel between the in-vehicle equipment and the PSAP.

The eCall is composed of three distributed main subsystems.

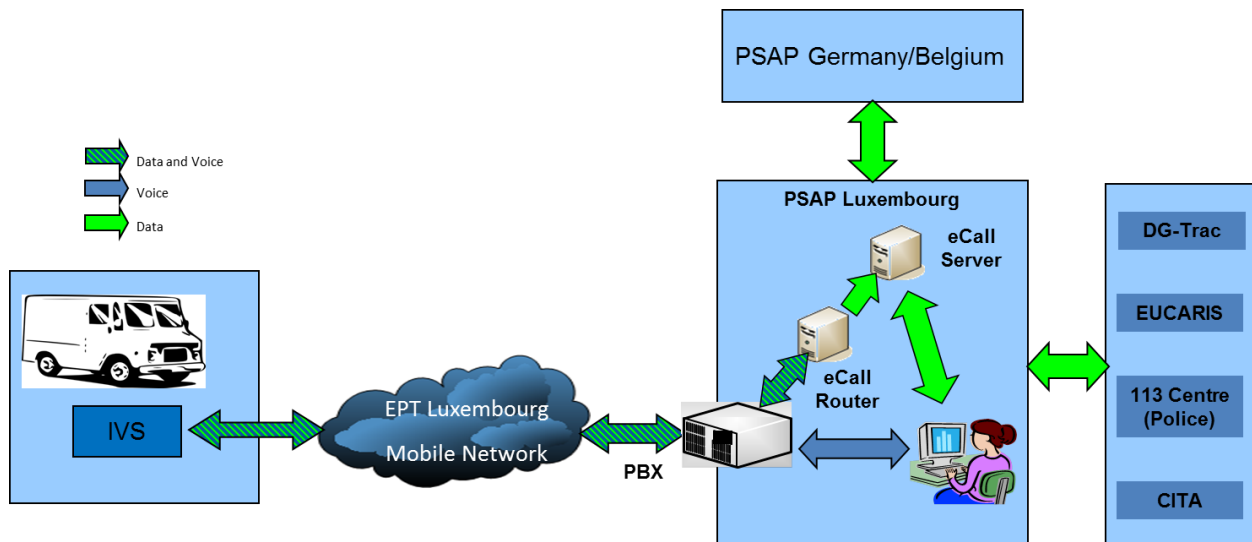


Figure 7: Luxembourg Architecture

- The in-vehicle system (IVS) is provided by the car manufactures FICOSA, NxP and Fujitsu Ten.
- The Mobile Network is provided by the Luxembourg Enterprise de Poste et Télécommunications (EPT).
- The Luxembourg PSAP is located in Luxembourg City and is handled by the Administration des Services de Secours (ASS).
- In addition there are interfaces to other services like
 - EUCARIS fore decoding the VIN
 - CITA (Luxembourg Traffic Management Centre)
 - 113 Centre (Luxembourg Police call-centre)

D2.2 - eCall systems functionalities' specification

- Dangerous goods tracking centre
- Interface to German and Belgium PSAPs for handling cross border eCalls

5.4.2 Overview of eCall functions

Under normal circumstances, the pan-European eCall service comprises of the following 9 steps.

1. Procedures following power-up of the in-vehicle system
2. Activation (of system)
3. Call set-up (including identifying call type, make call, network selection and registration, authentication, cell localization (by network), establish audio connection to PSAP modem server)
4. Minimum set of data (MSD) transfer (including disconnect microphone and speaker in vehicle of the line, send call tone, synchronize, request MSD, send MSD, error check) and link layer ACK (including stop MSD transmissions)
5. Application layer ACK
6. Establish audio link (including check audio link to vehicle occupants, MSD visualization)
7. PSAP interviews if possible, and acts on information
8. Incident resolution
9. Call clear-down

The following picture illustrates the data flow during the several operational steps.

D2.2 - eCall systems functionalities' specification

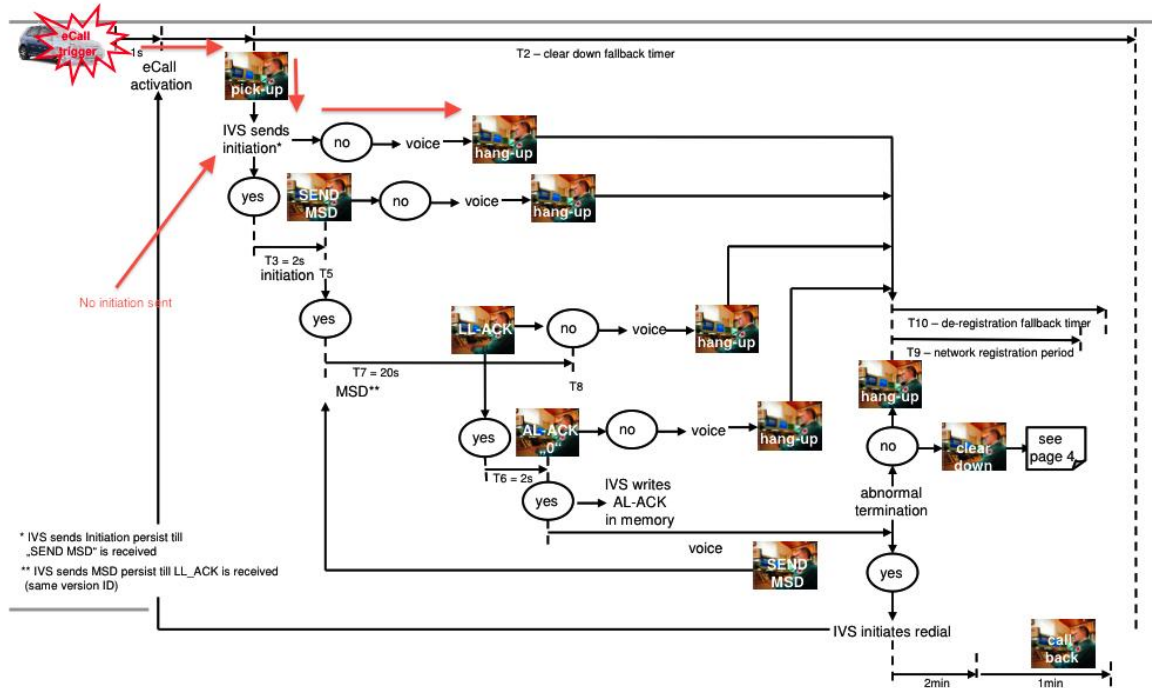


Figure 8: eCall data flow (taken from the German specification)

5.4.3 PSAP support of eCall

The eCall infrastructure will be implemented into the Luxembourg PSAP as shown in the following figure.

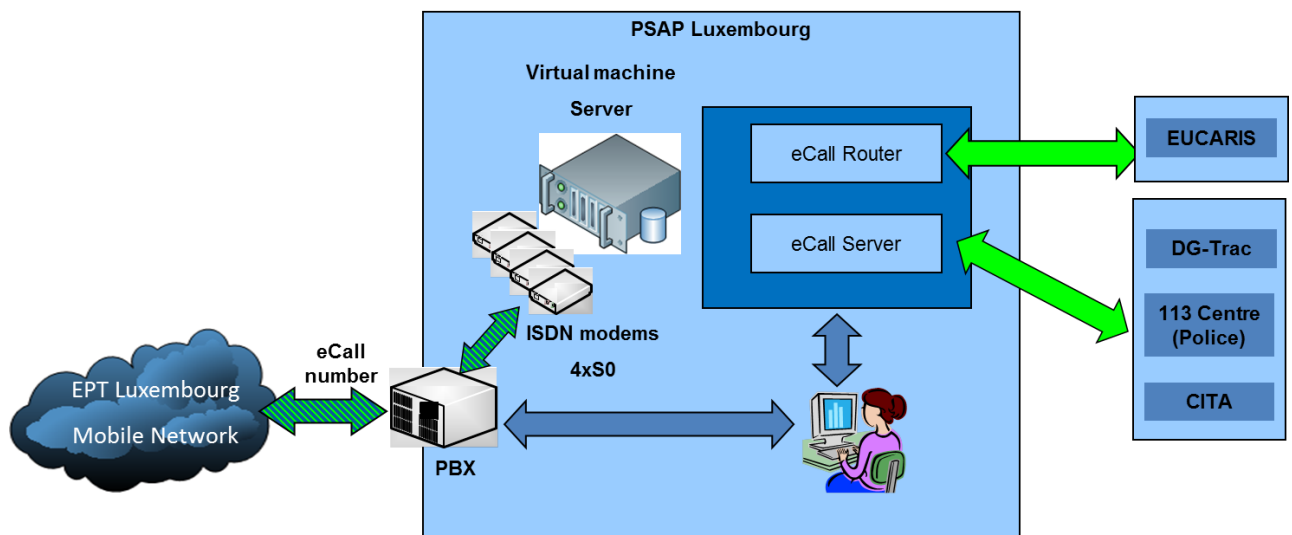


Figure 9: Luxembourg eCall PSAP architecture

The main components are:

D2.2 - eCall systems functionalities' specification

- PBX
- Server hosting virtual machines with ISDN modems
- eCall router
- eCall server

5.4.3.1 The PBX

The eCall is routed by the mobile network to a specific eCall 112 phone number. This phone number is an internal number of the PSAP PBX. As long as the eCall flag is not implemented into the EPT mobile network signal the IVS calls this number direct to allow the testing of the eCall flow. When the eCall flag is implemented in the mobile network signal the eCalls calling 112 are automatically routed to this special eCall subscriber number.

5.4.3.2 The server

The eCall router and the eCall server are virtual machines on a server running VMware located in the PSAP. The modem connection to the PBX is realised via 4 USB-ISDN modems. Only these USB-ISDN modems support virtual machines. 4 modems will be installed supporting 4 parallel calls at a time.

Every ISDN modem provides one S0 interface with two B-channels. The eCall router needs one B-channel for the incoming call and one B-channel for the connection to the operator. Therefore one modem with one S0 interface can only support one eCall.

5.4.3.3 The eCall router

The eCall router is based on the German eCall router provided by ITS Niedersachsen and OECON. It provides the following functions:

- Controlling and handling of the eCall interfaces
- Routing the voice part of the eCall to the 112 desk
- Extracting the MSD
- Decoding the VIN by sending the VIN to EUCARIS
- Providing the MSD and the decoded VIN information for the eCall server

To meet multi user requirements the eCall router uses client-server architecture. The server is Linux based and uses a few existing open source software components.

5.4.3.4 The eCall server

The eCall server provides the following functions:

D2.2 - eCall systems functionalities' specification

- User Interface (GIS)
- Checks with the DG-Trac service if dangerous goods are involved (see chapter 5.4.6)
- Interface to German and Belgium eCall for cross border eCalls (see chapter 5.4.7)
- Interface to the Luxembourg traffic management centre CITA and the 113 centre of the Luxembourg police (see chapter 5.4.8)

The eCall server is based on the Dynamic Information Sharing Platform developed by HITEC.

5.4.3.5 The sequence of eCalls

Below the usual sequence of events from the beginning of a call till the end is described. Depending on error conditions, system configuration and / or user interaction the sequence of events may vary.

1. IVS dials the number of the PSAP.
2. The call is transferred by the PSAP PBX to a free eCall router modem.
3. After the MSD transmission is completed the MSD is decoded.
4. The eCall router retrieves data from the VIN-decoder (National and EUCARIS)
5. The MSD and the VIN-decoder data are transferred to the eCall server. The eCall server analyses the MSD, retrieves the location of the caller and displays it on a map.
6. If the location is not within Luxembourg, the eCall is transferred by the eCall server to the country where the vehicle is located.
7. The eCall server checks with the dangerous goods service if the vehicle transports dangerous goods. If it is the case, the information which dangerous good is transported in the vehicle is displayed for the 112 operator.
8. The information retrieved is send automatically to the Traffic Management Centre and the Luxembourg 113 centre.
9. Simultaneously the eCall router establishes a new call to the operator phone. Note that the flow of audio data still includes the eCall router because according to the eCall HLAP it must be possible to request another MSD transmission any time while the call is active.
10. The operator's phone rings and after picking up the operator is able to talk to the vehicle passengers.

11. The call is terminated when either the operator or the IVS hangs up.

5.4.4 Networks functions

In Luxembourg, 3 mobile network operators provide their services for mobile phones and data access:

- LuxGSM, a 100 % EPT daughter
- Tango owned by Belgacom
- Orange owned by France Télécom

Currently, the situation regarding eCall is still unclear. LuxGSM plans to implement the eCall flag in 2014. The other operators will follow after LuxGSM supports eCall.

5.4.5 In-Vehicle System functions

The IVS' from FICOSA, NxP and Fujitsu Ten contain the following main function blocks:

- Network access device (NAD), GSM/GPRS
- GNSS: GPS receiver (positioning)
- Host CPU (host for telematics services including eCall application)
- Antenna system interfaces (MN and GPS)
- Vehicle interfaces (CAN, eCall trigger, push buttons etc.)
- Audio interface (microphone and speaker)

HITEC Luxembourg and EPT will install the systems into the cars. In total 7 cars will be equipped.

5.4.6 Handling of dangerous goods transport

Special attention will be given to the handling of dangerous goods transports and the integration of transporters. The Luxembourg partners and ESA are working together on a project with the goal to establish a tracking and tracing service for dangerous goods transports (DG-Trac service). Initially this service is focused on medical goods but is foreseen to be extended to all kinds of dangerous goods, specifically those with a UN categorisation. The server is planned to be available as prototype mid of 2014.

The eCall server of the PSAP will send the vehicle plate number determined by EUCARIS to the dangerous goods tracking service centre. The service centre checks if the vehicle has loaded dangerous goods and returns information about the type and volume of dangerous

D2.2 - eCall systems functionalities' specification

goods loaded in the vehicle to the eCall Server. The eCall server displays this information on a map.

The interface between the eCall server and the DG-Trac service will be based on standards developed by CEN TC 278 WG 15. It is the intention of the Luxembourg partners to implement the standards in the DG-Trac service as well as in the eCall server and test the functionality and practicability of these standards. Feedback to the standardisation bodies will be provided if necessary.

This concept was originally developed in the Dutch pilot site in HeERO1 and is being developed with the active support of CEN 278 WG15.

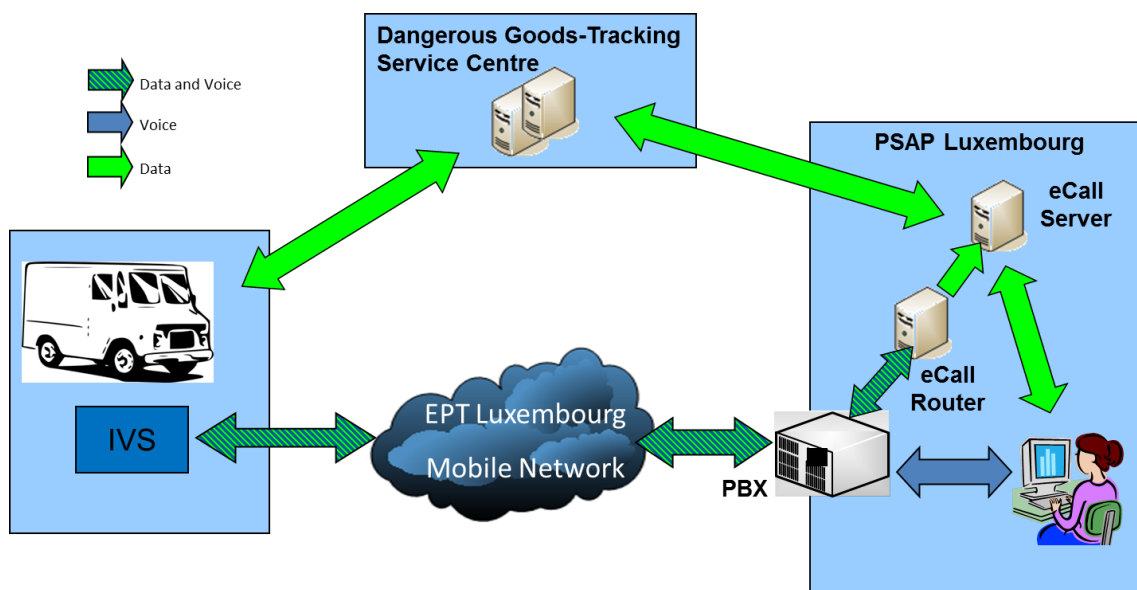


Figure 10: The handling of dangerous goods in Luxembourg's eCall

5.4.7 Handling of cross-border issues

Another aspect that is important to the Luxembourg pilot site is the testing of cross-border eCalls.

Many vehicles driving close to the borders, but still inside Luxembourg, will be connected to German, French or Belgian mobile operators. It must be ensured that, in case of an incident, the Luxembourg 112 centre is called and not the German, French or Belgium one.

The same applies for vehicles connected to the Luxembourg operator but driving outside the Luxembourg border. In this case the Luxembourg eCall server has to check which country the calling vehicle is located in. This check will be done based on the location provided in the

D2.2 - eCall systems functionalities' specification

MSD. If the vehicle is located outside Luxembourg the eCall and the MSD provided by the IVS will be rerouted to the correct designated 112 centre.

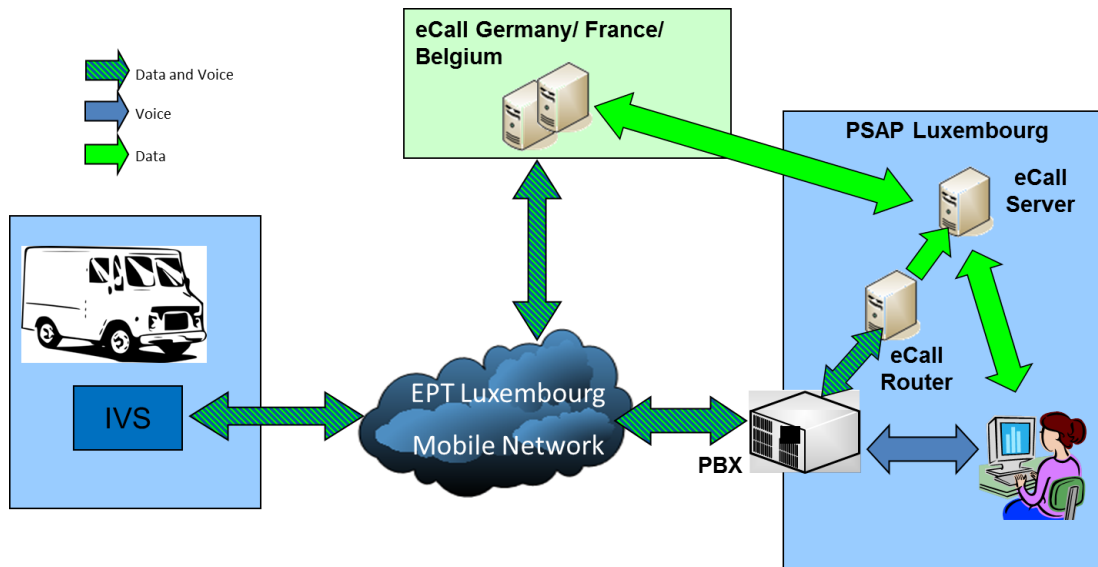


Figure 11: The handling of cross-border issues in Luxembourg's eCall

5.4.8 Interface to Luxembourg Traffic Management Centre (CITA) and Police

The Luxembourg PSAP has a data interface to the Luxembourg Traffic Management Centre and the Luxembourg 113 Centre of the police. The information about an incident is entered manually by the PSAP operator and sent to CITA and police for information only.

This interface is realised by a special server called "PC Class" located in the PSAP that interfaces with the CITA and the police network.

The interface to this server is a simple text message interface that is used today via a Linux application running at the PSAP operator's desk.

The eCall server will use this interface to send the information of an incident automatically to CITA and Police as information.

5.5 Spain

5.5.1 Introduction

The proposed European standard for eCall 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.

In this chapter we describe the high-level architecture and the process of eCall handling in the Spanish pilot.

For Spain, the eCall pilot will be defined by the following issues:

- Architecture based on an intermediate PSAP, hosted by Traffic General Directorate (DGT).
- Geographical scope: Four regions, which cover 31 % of the Spanish territory and 36% of total Spanish population, will be involved in the pilot implementation. These four regions are: Galicia, Castilla y León, Madrid and Comunidad. Valenciana.
- There will be 22 IVSs involved in the Spanish pilot: 12 IVSs in cars and 10 IVSs in P2W (geographically distributed as detailed in the map below).
- Direct interface between intermediate PSAP in DGT and the regional 112 PSAPs (one in each region).
- Testing of eCall behaviour in boundary regions.

D2.2 - eCall systems functionalities' specification



Figure 12: PSAP responsibilities

5.5.2 eCall chain

The following figure describes the architecture necessary to handle eCall messages with the different participants.

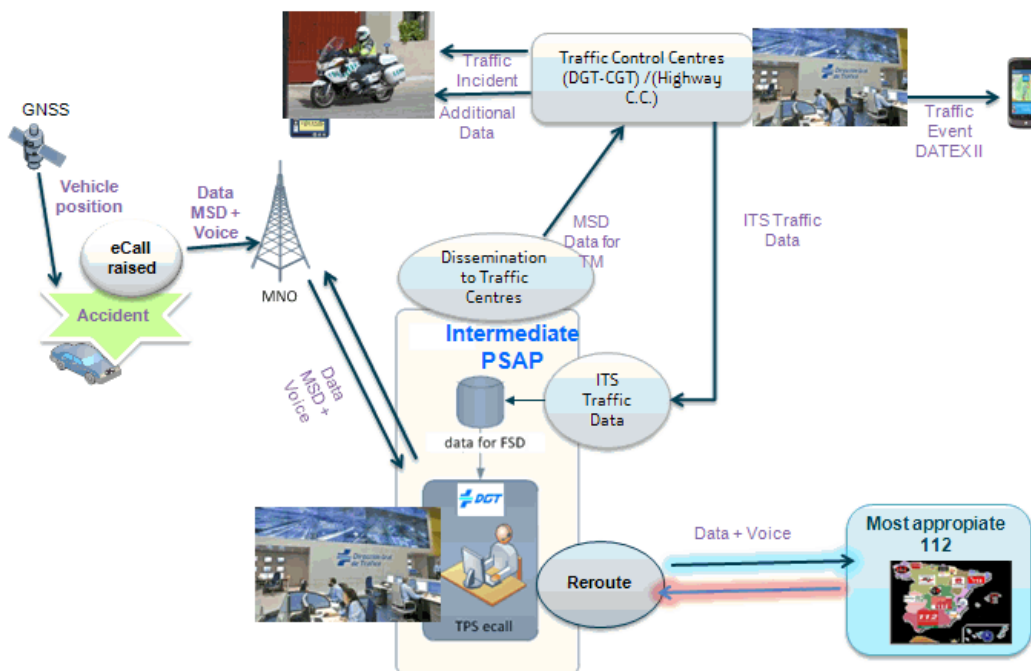


Figure 13: Proposed architecture to handle eCall messages in Spanish pilot

D2.2 - eCall systems functionalities' specification

The eCall chain of the Spanish pilot comprises the following (organizational) participants:

Participants	Description
IVS partners	Several IVS providers (CTAG, GMV, FICOSA and CEIT/NZI (P2W)) will offer devices to prove manual and automatic eCalls in different types of vehicles (cars and P2W vehicles).
MNO	One of the Spanish MNOs (Telefónica) will reroute the eCall from the MNO to the intermediate PSAP in DGT.
Intermediate PSAP	<p>The intermediate PSAP will be the PSAP that will manage every manual or automatic eCall. It will receive the information from IVS, add information from other sources (DGT information systems, operator interaction with vehicle, etc.) and differentiate between real and false emergency eCalls.</p> <p>The operators in the intermediate PSAP will decide whether the emergency is real or not (based in all the information received) and will transfer the information and the audio to the right regional 112 PSAP.</p> <p>This intermediate PSAP will be located on DGT's site and will be provided by Ericsson, Telefónica, SICE and GMV.</p>
Regional 112 PSAP	Four regional PSAP (one in each region). Each regional PSAP will manage the emergencies sent by the intermediate PSAP because these regional PSAPs have the resources (people, vehicles, etc) needed to solve any of them.

Table 1: Participants in eCall chain

5.5.3 IVS function

The Spanish eCall pilot will test several IVS technologies in order to verify the right behaviour of the whole pilot. Each technology will be provided by one specific member of the consortium and tested in one specific region, as follows:

- Four IVSs provided by FICOSA will be tested in Valencia.
- Four IVSs provided by GMV will be tested in Madrid.
- Four IVSs provided by CTAG will be tested in Galicia.

D2.2 - eCall systems functionalities' specification

No IVSs will be sited in Castilla y Leon region, but, during the tests, the IVSs from the adjacent regions (Madrid and Galicia) will move in the boundaries with Castilla y Leon to test boundaries decisions about regional PSAP assigned to an emergency call.

5.5.4 Additional functionality: P2W devices

The following figure illustrates the basic functionality of the on-board unit that will be implemented in the P2Ws of the HeERO2 Spanish pilot. The following steps of the eCall chain apply for this scenario as well.

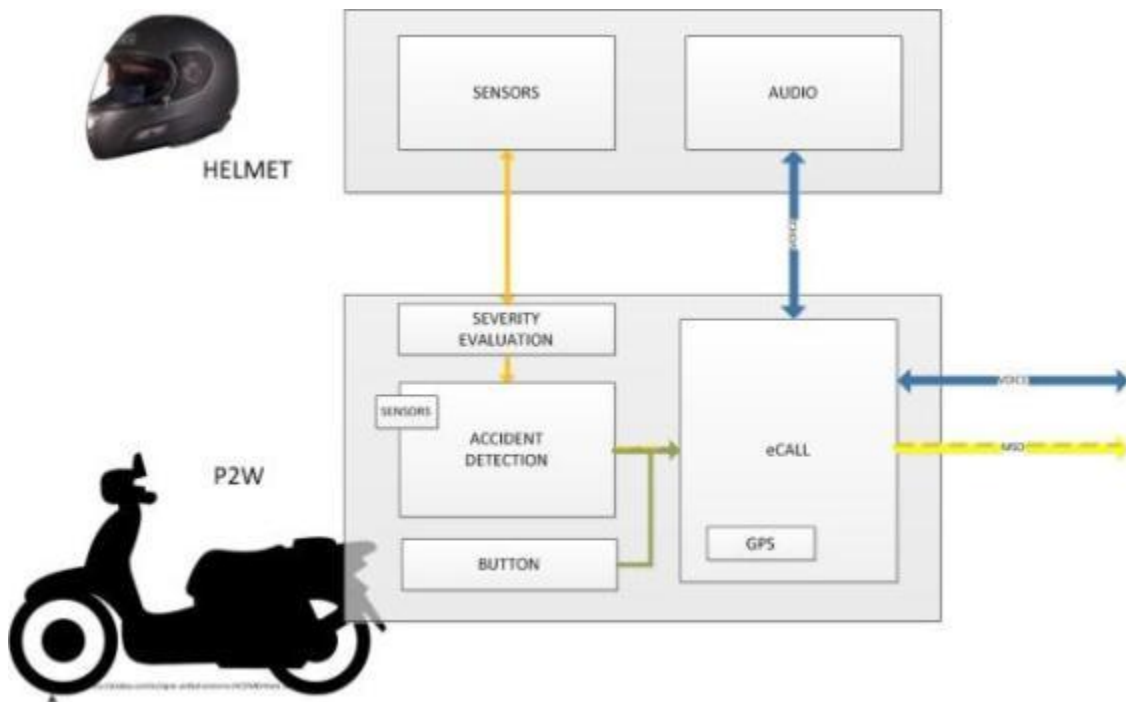


Figure 14: P2W eCall device

Physically, the P2W device is divided in two different components. The main component is located in the motorbike; in addition some components of the functionality are placed in the helmet. The sensors in the helmet allow completing the information to detect the incident. Moreover, the helmet includes a Bluetooth headset that allows audio communication.

The first step is the incident detection, which is established by the module within the P2W. Its main source of information is an IMU (Inertial Measurement Unit). This unit with 9 DOF (degrees of freedom) provides the data of acceleration, gyro and orientation. The information of the incident is completed by the evaluation of its severity. Considering that in a very high percentage of severe incidents there is an impact on the head, the helmet information may confirm the severity of the detected incident and, evaluating the helmet's sensors data, it is possible to assess the severity of the expected head injuries.

If an incident is detected, the detection module sends the call along with the incident's information. Another way to activate the emergency call is to push the eCall button. If an eCall is activated, the eCall module sets up the call and establishes the audio connection to the PSAP. The eCall module opens the audio channel between the PSAP and the

D2.2 - eCall systems functionalities' specification

motorcyclist via Bluetooth. After this, the MSD transfer with the information of the incident, its severity and its location starts.

For HeERO2, 10 P2W units will be used for eCall tests in Madrid and Comunidad Valenciana demonstration sites. For cross-border eCalls tests will be realized in the border region of Madrid and Castilla y León.

5.5.5 Network functions

The Spanish architecture of eCall services implies that the MNO should modify the network behaviour to discriminate between phone calls from an eCall device and from a non-eCall cellular phone.

In order to enable this discrimination, the network must provide the following functions:

1. Check any 112 call in the MSC / server network point to verify if any of the eCall discrimination flags (manual or automatic) is activated.
2. If none of the eCall flags is activated, route the phone call to the regional 112 PSAP responsible for the geographical location of the phone call.
3. If any of the eCall flags is activated, route the phone call to the intermediate PSAP located in DGT centre.

Furthermore the network must ensure that MSD arrives at the intermediate PSAP without any modification or loss of quality, i.e. no network element must modify (by filtering, attenuation, etc.) the eCall signal.

Below it is shown a diagram of MNO network process:

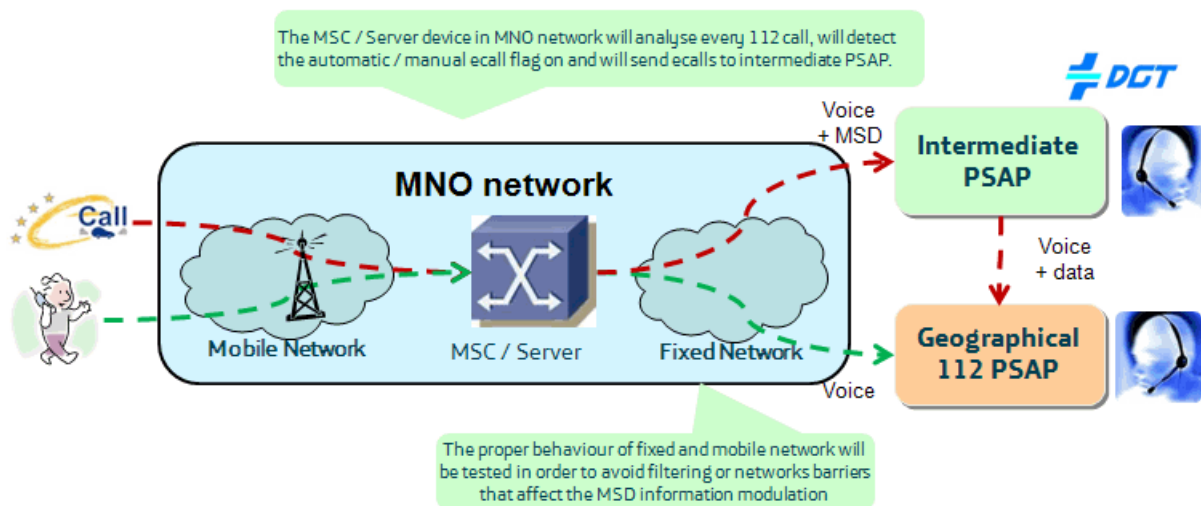


Figure 15: MNO network process

5.5.6 Intermediate PSAP functions

5.5.6.1 General overview of Intermediate PSAP

The intermediate PSAP in DGT is in charge of gathering the emergency calls coming from the IVS. It will perform a call-filtering process to select the valid eCalls, i.e. those that actually

D2.2 - eCall systems functionalities' specification

correspond to an emergency call. Previous to this filtering process, the intermediate PSAP will have decoded the data content (MSD) of the eCall.

The objective of the intermediate PSAP is to receive the eCall data and audio connection, include additional information of DGT Information Systems, decide the type of eCall (basically if it is a real emergency) and make the right decisions and actions about it. Basically there will be three different types of eCalls:

- False calls (jokes, errors, etc). The intermediate PSAP will record the information and will close them. No action will be required for these eCalls.
- Non 112 incidents (obstacles in the road, etc). The intermediate PSAP will execute the internal DGT procedures involving internal resources, etc to solve these incidents. No action will be needed in regional 112 PSAPs.
- 112 incidents (traffic incidents, fires, etc). The intermediate PSAP will transfer these calls as fast as possible to the most appropriate regional 112 PSAP, including all the information: MSD, vehicle information from DGT Information Systems, information recorded by the operator, etc.

5.5.6.2 Detailed Intermediate PSAP functions

The intermediate PSAP functions are:

1. Before the eCall is received, the MSD is decoded and verified and the eCall type (automatic or manual) is detected in a previous process.
2. Information received at the PSAP operators desktop
 - a. A visual and sound signal indicating the incoming eCall
 - b. An indicator about eCall type (manual or automatic) in order to proceed, if it is necessary, with a different protocol
 - c. Reception and visualization of MSD information
 - d. Visualization of the eCall GPS position (received in MSD) in a map provided by DGT GIS
 - e. Visualization of historical information of the ANI: previous eCalls, information given in previous calls, etc.
 - f. Information about the vehicle. This information will be received by DGT IISS, possibly by a web service request to ATEX (External Users Telematic Access).
3. Information Management
 - a. Voice communication between operator and vehicle occupants
 - b. Entry of additional information: health status of vehicle occupants, accurate information about the emergency, observations, etc.
 - c. Categorise the eCall: Assign the most accurate kind of eCall: joke, non-proper, traffic incident with / without hurt people, traffic incident with / without enclosed people, traffic incident with / without dead people, traffic incident with more than N people affected (N has to be defined), etc.
 - d. Assign a priority code to the eCall

D2.2 - eCall systems functionalities' specification

4. Information sent by PSAP to DGT IISS
 - a. eCall information about the incident will be sent to LINCE
 - b. eCall information about the incident will be sent to ARENA, which is the DGT database where incident records are stored
5. Recording and closing of non-proper eCalls
 - a. Define and assign the aim of the non-proper eCalls: joke, non-emergency call, non-proper call (i.e. asking for information, etc.)
 - b. Finishing the eCall
6. Transfer proper eCalls to the most appropriate geographical 112 PSAP
 - a. The intermediate PSAP system will propose, automatically, the most appropriate geographical 112 PSAP for the eCall.
 - b. The intermediate PSAP operator can decide to send the eCall to another geographical 112 PSAP. The intermediate PSAP system allows the operator to select another one.
 - c. The intermediate PSAP System will implement an interface with the selected 112 PSAP and will send the eCall information needed by the 112 PSAP for managing the emergency.
 - d. Automatic reception of new information about the emergency at the 112 PSAP.
 - e. Finishing the eCall

The following picture illustrates the operator work during the several operational steps.

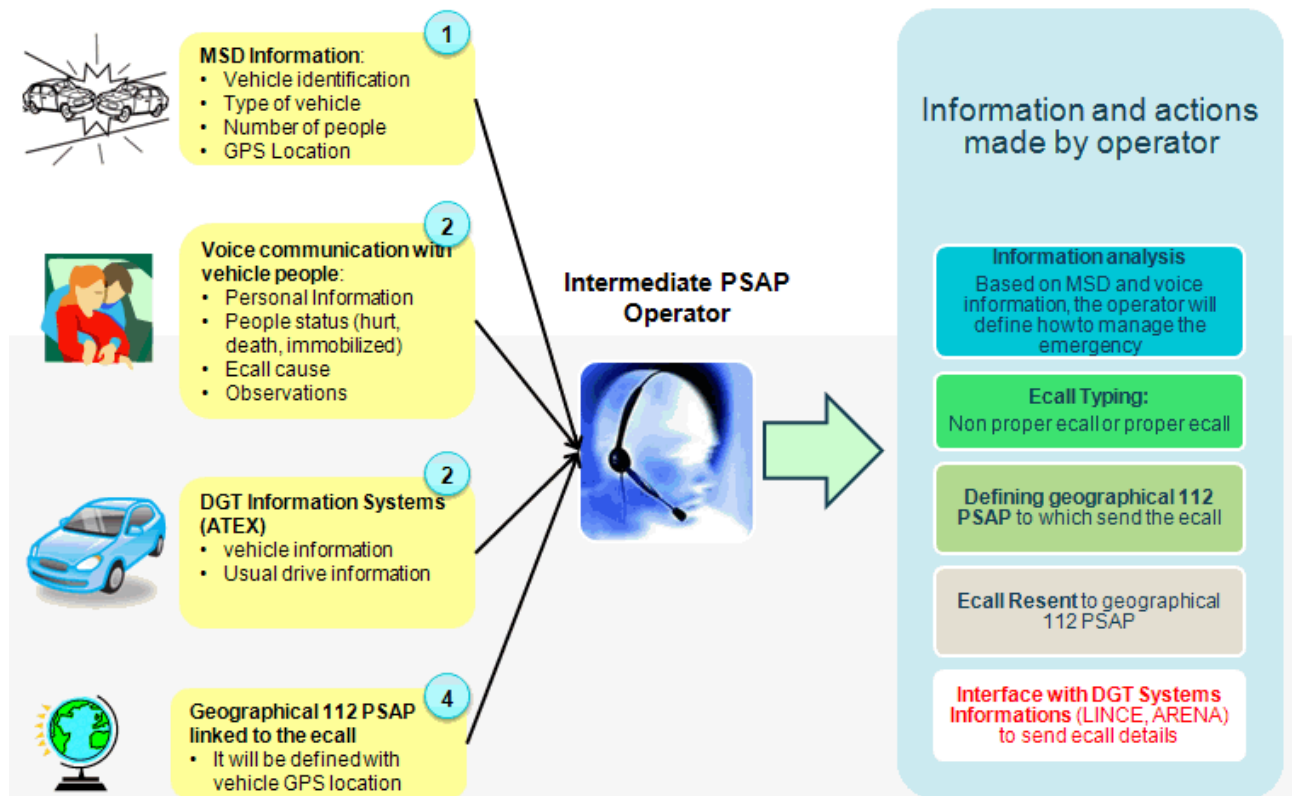


Figure 16: Operational steps of PSAP operators

5.5.6.3 Categorization of initial eCall types

The list below is a first proposal about the categorization of eCall types:

Non-proper call	non 112 incident	112 Incident
<ul style="list-style-type: none"> • Joke • Manual error (involuntary pushing the eCall button) • Automatic error (the vehicle sends an eCall without being in an emergency situation) • Other 	<ul style="list-style-type: none"> • Obstacle in the road • Information with interest for DGT • other 	<ul style="list-style-type: none"> • Clinical emergency • Fire • Security / Police Event • Traffic incident with / without hurt people • Traffic incident with / without enclosed people • Traffic incident with / without death people • Traffic incident with more than N people affected (N to be defined) • Other

5.5.6.4 GIS and other DGT Information Systems in eCall management inside the intermediate PSAP

The information related to an emergency (MSD, information about the vehicle in DGT Information Systems, entries of operators, etc.) will be used for the integration of the eCall in the Geographic Information System (GIS) of DGT, named GIS-GTM. For the concrete implementation of this integration, the MGIS client integrated in the GIS-GTM will be modified.

The MGIS is a thin client based on the ESRI ArcGIS software implemented in Java. This client will show the geo-referenced location of the eCall to the PSAP operator along with the information coming from the ATEX (External Users Telematic Access) system and with additional information added by the operator. To setup the geographic support to locate the vehicle involved in the eCall, the MGIS will be fed with cartographic data of the map services published by DGT. These map services will be called by the MGIS platform, and will offer information about the location as well as the alphanumerical information corresponding to the vehicle involved in the eCall.

Along with this integration, two others will be carried out. Firstly, the ATEX system will provide the information coming from the DGT Vehicles' General Registry (RGV) and complete the geographical information with alphanumerical data of the particular vehicle. This part of the intermediate PSAP will call the ATEX system's web services (WS) provided by

D2.2 - eCall systems functionalities' specification

DGT. This way, the information about the vehicle referred to in the MSD will be requested. This set of web services will deliver the information contained in the RGV. Once this information is collected, it will be shown to the PSAP operator through the interface provided by the MGIS.

The other service to which the intermediate PSAP will be connected is the ARENA DGT system (DGT incident database). In this case, the objective is the storage of the information related to the emergency call in case of an incident which has been confirmed by the eCall PSAP operator. All the information regarding the emergency call will be provided to the ARENA database. For this purpose, once the information of the MSD has been decoded and the vehicle's alphanumeric information has been obtained through the call to the ATEX system, the information of the eCall will be stored and the ARENA system may call for them for the insertion of the data in its database.

5.5.6.5 Additional intermediate PSAP functions. Execute Traffic Incident Management Procedures.

The PSAP-DGT operator interacting with PSAP system decides if an eCall should be sent to "Execute Traffic Incident Management Procedures" according to the following steps:

#	Description
1	eCall is registered in LINCE Application (Traffic Incident Management System).
2	<p>Dependant on whether the incident has been confirmed or not there are two different scenarios:</p> <ul style="list-style-type: none"> • Incident: The eCall is available for the ARENA application ("Incident Management Application") and it (COTA User) generates an "Incident Traffic Registration" on the LINCE application according to internal DGT Procedures. • No incident, but a traffic incident: A "Traffic Incident Registration" on the LINCE application is registered according to internal DGT Procedures.
3	The traffic incident resolution is managed according to DGT/ATGC current procedures using LINCE and/or ARENA applications.

Table 2: Execute Traffic Incident Management Procedures

The following figure illustrates the process involving the executing of Traffic Incident Management Procedures.

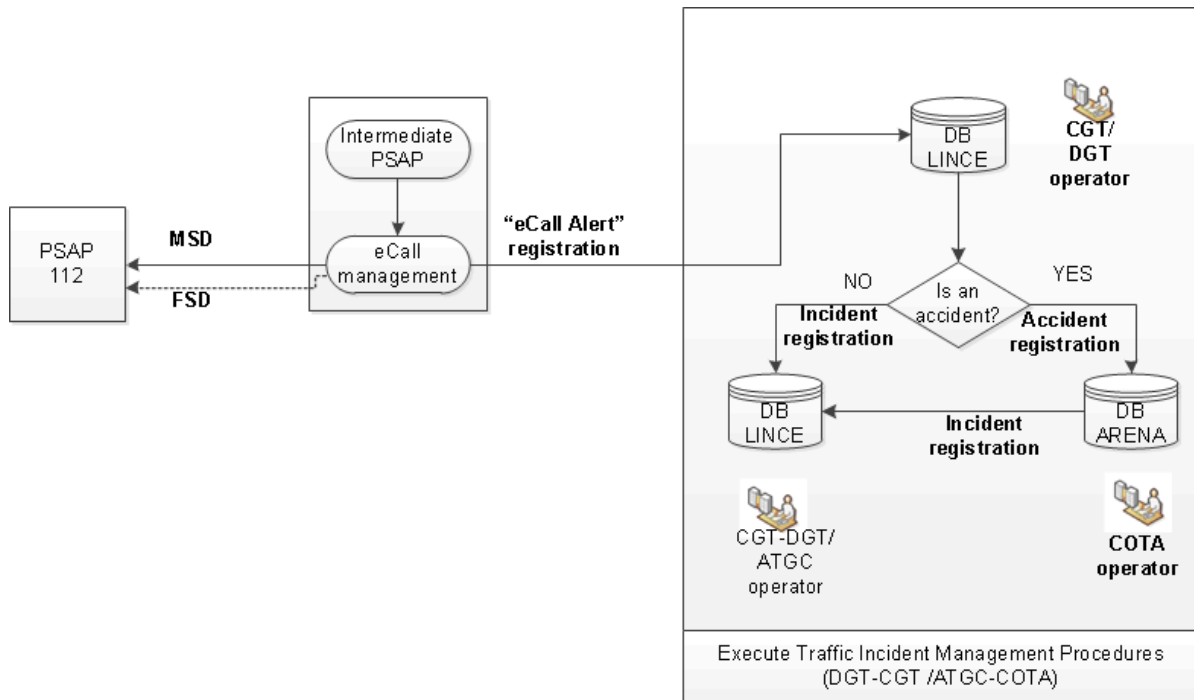


Figure 17: Additional intermediate PSAP functions. Traffic Incident Management Procedures

5.5.7 112 support of eCall

The integration between intermediate PSAP and regional 112 PSAP will be implemented in order to allow real emergency eCalls to be transferred from intermediate PSAP to the right geographical 112 PSAP.

It must be ensured that the emergency will be solved in the most appropriate regional 112 PSAP, because it is at this stage where all resources could be activated to solve the emergency.

Actually, each Spanish region has its own 112 service, with its particular protocols, procedures and systems to solve an incident. In the Spanish eCall pilot, a single interface will be defined in order to make sure the intermediate PSAP in DGT always sends the same information, no matter which geographical 112 PSAP is the recipient of the information.

The interaction between intermediate PSAP and the geographical 112 PSAPs includes the following transactions:

- Determine the right geographical 112 PSAP based on eCall location
- Transfer of MSD and additional information (from DGT IS and from operator interaction) to 112 PSAP
- Transfer audio communication to 112 PSAP

D2.2 - eCall systems functionalities' specification

- Receive information from the 112 PSAP about how the emergency is evolving

The integration between the PSAPs will be done using an integration bus that will offer functions of communication and information translation.

The following figure illustrates the process involving the incident management made in the 112 PSAPs.

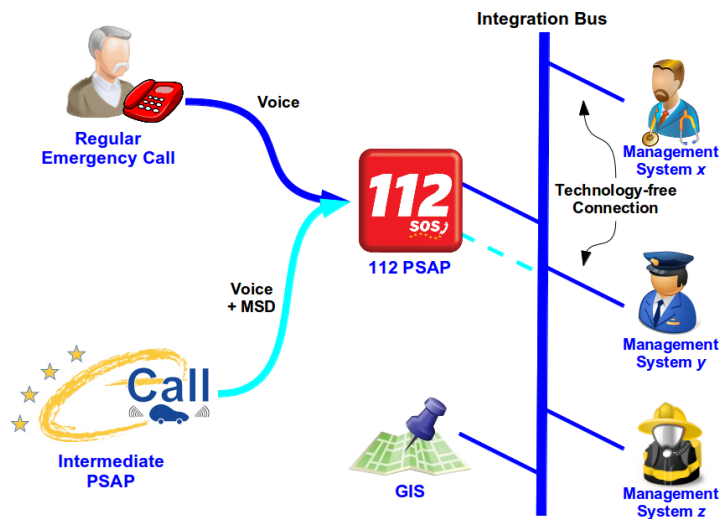


Figure 18: PSAP dispatching process

Even though it's not included in this pilot, it's important to indicate that Integration solution communicates with the necessary emergency service providers (e.g. law enforcement, fire response or emergency medical services) to attend the emergency situation.

The implementation of the integration solution depends on the regional 112 service. Some of the integration solutions will be based on web services and communication is performed via a XML message that is made up of different information segments.

5.6 Greece

5.6.1 Introduction

In the following sections the main functionalities of the PSAP, the network and the IVS for the support of the eCall pilot are presented.

5.6.2 PSAP functions

The main functional blocks of the eCall enabled PSAP that will be used in the HeERO project are presented in Figure 19.

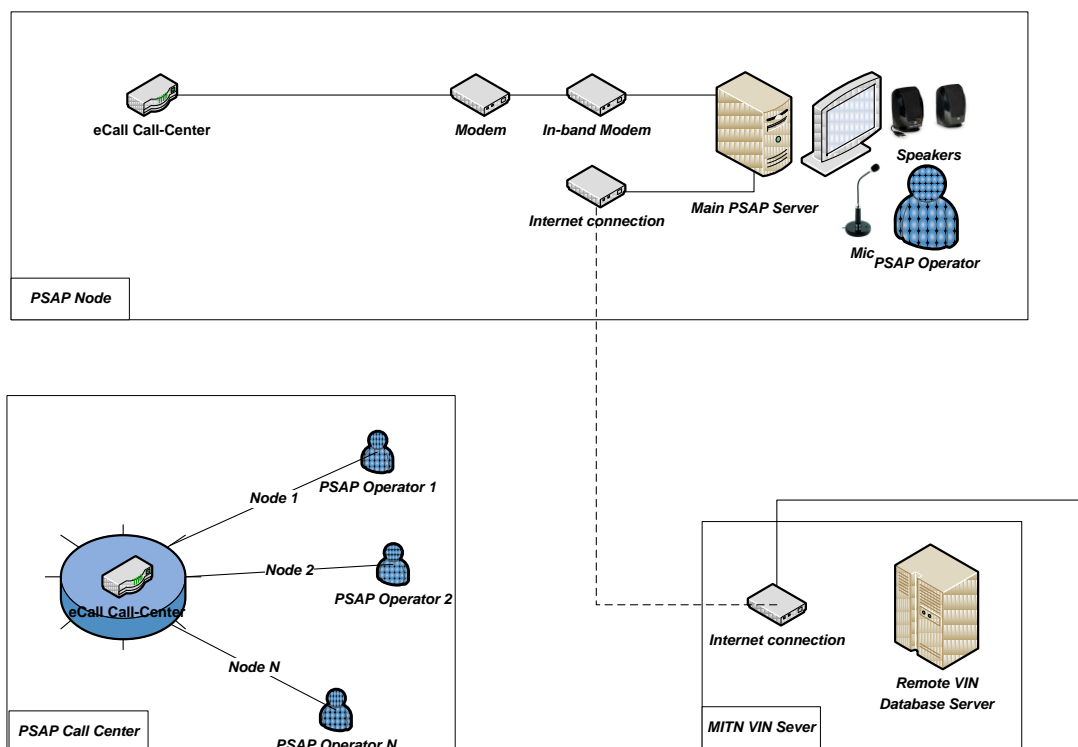


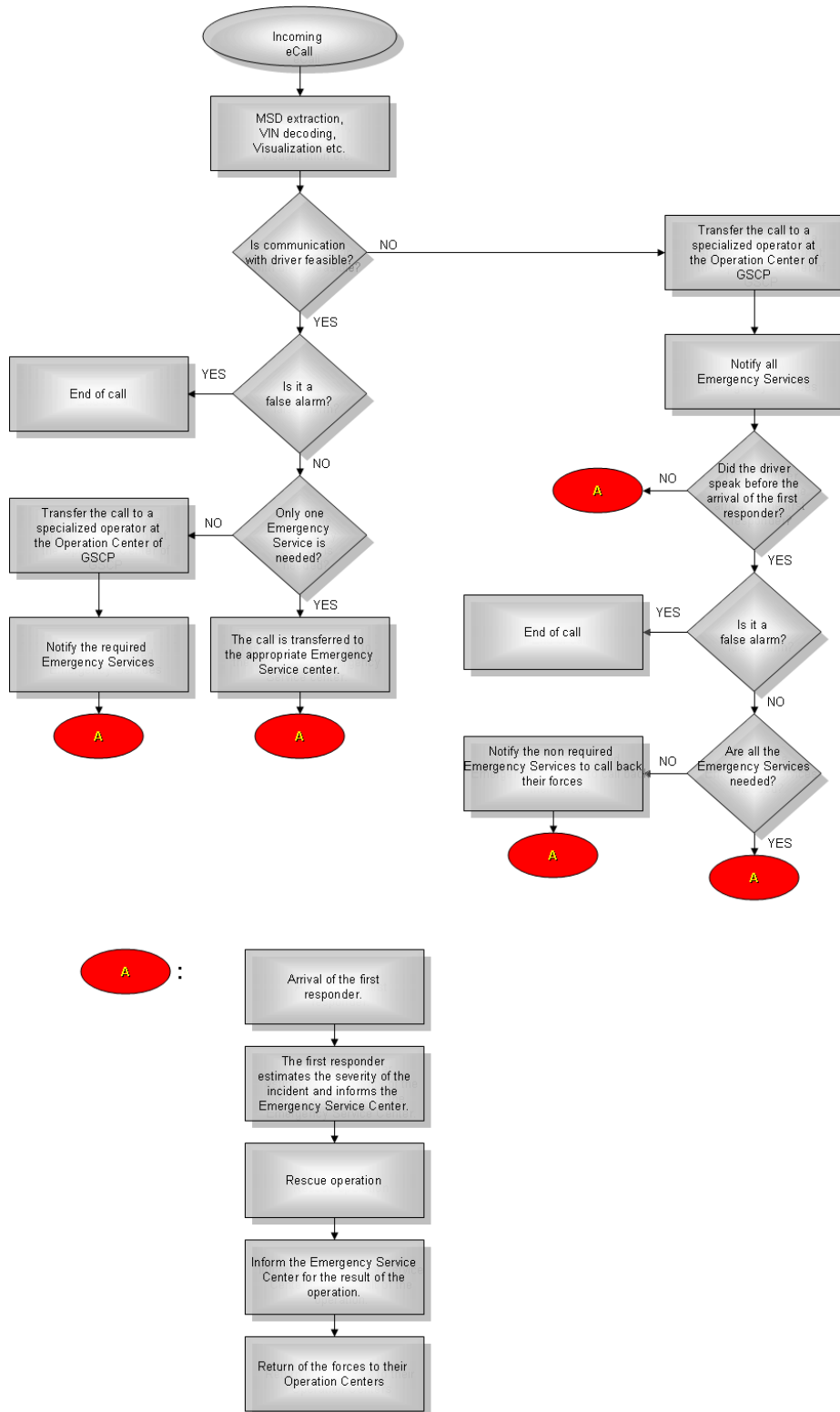
Figure 19: Diagram of upgraded PSAP to support eCall

Incoming eCalls are routed from the telephone network to the PSAP. The eCalls are accepted by the eCall call-centre and forwarded to the eCall modem to establish the communication link. Following to the link establishment the Minimum Set of Data (MSD) is sent by the In-Vehicle-System (IVS) to the PSAP. The MSD provides the VIN number of the vehicle, timing, direction and location of the incident. This information allows the PSAP to obtain precise vehicle model details due to the assistance of a VIN decoder and the visualization of the incident location. After the successful decoding of the MSD, a voice (audio) link is established to an available eCall operator.

D2.2 - eCall systems functionalities' specification

The normal procedure for handling '112' voice calls will be modified in order to support eCalls. The procedure that will support the handling of eCalls is presented in **Figure 20**.

D2.2 - eCall systems functionalities' specification



Note: The Emergency Service Center informs the Operation Center of GSCP (step 2) of the situation. The Operation Center decides if the forces sent to the incident are insufficient or surplus and calls for reinforcements or commands the return of some forces respectively.

Figure 20: eCall handling procedure

D2.2 - eCall systems functionalities' specification

5.6.3 Network functions

An eCall, from the network point of view, is a manually or automatically initiated emergency call (TS12) from a vehicle, supplemented with a minimum set of emergency related data (MSD). The description of a TS12 emergency call from 3GPP TS 22.003 is given in **Table 3**:

Teleservice 12, Emergency calls					
A T T R I	1. HLC	1.1 Type or user information		speech (with or without additional emergency related data)	
		1.2 Layer 4 protocol functions		-	
		1.3 Layer 5 protocol functions		-	
		1.4 Layer 6 protocol functions		-	
		1.5 Layer 7 protocol functions		-	
B U T E S	2. LLC	Inform transfer	2.1	2.1.1 Information transfer capability	speech (digital representation and may include emergency related data)
			2.1.2 Information transfer mode	circuit	
			2.1.3 Information transfer rate	not applicable for speech only call	
			2.1.4 Structure	not applicable	
			2.1.5 Establishment of connection	demand MO MT	
			2.1.6 Communication configuration	point-to-point	
			2.1.7 Symmetry	bidirectional symmetry (when present the data component may be a symmetric or an asymmetric bidirectional transmission)	
	Access at UE	2.2	2.2.1 Signalling access	manual	
		2.2.2 Information access (3GPP TS 22.001)	rate	full rate/half rate	
			interface		
	Inter- working	2.3	2.3.1 Visible network type	PSTN	ISDN
			2.3.2 National/Internat. interworking	national	
			2.3.3 Interface of TE to terminating Ntwk.	2 wire	4 wire
3. Gen	3.1 Supplementary service provided		3GPP TS 22.004 (see note 3)		
	3.2 Quality of service				

Table 3: TS12 description

The eCall includes data transmission along with voice transmission. Hence additional requirements have been identified in 3GPP TS 22.101 for the data transmission through the PLMN:

The 'service category' information element, defined in 3GPP TS 24.008, contains in its third octet the field 'Emergency Service Category Value'. The size of the 'Emergency Service Category Value' is 7 bits and the meaning of each bit is presented in Table 4.

Emergency Service Category	
Bit number	Meaning
1	Police
2	Ambulance
3	Fire brigade
4	Marine guard
5	Mountain rescue
6	manually initiated eCall
7	automatically initiated eCall
8	spare and set to "0"

Table 4: Emergency Service Category bits

The Mobile station may set one or more bits of the 'Emergency Service Category Value' to "1". If more than one bit is set to "1", according to the standard, routing to a combined emergency centre is required. If the MSC cannot match the received service category to any of the emergency centres, it shall route the call to an operator defined as default emergency centre. If no bit is set to "1", the MSC shall route the emergency call to an operator defined as 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 as emergency call centre.

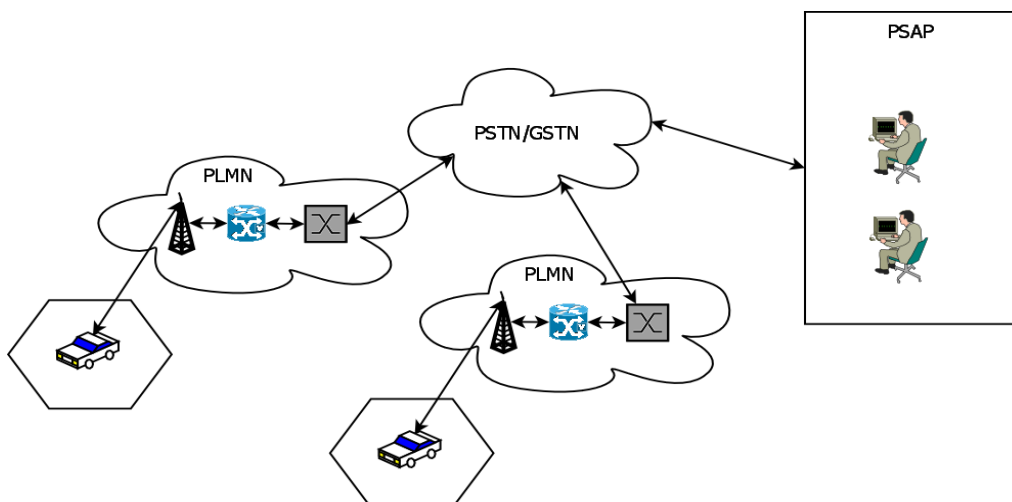


Figure 21: eCall routing

D2.2 - eCall systems functionalities' specification

In Greece there is one central '112' PSAP, operated by the General Secretariat of Civil Protection (GSCP). The PSAP manually dispatches the emergency calls to the fire brigade, police, etc. according to the specific requirements of each case.

For the purposes of the HeERO2 project the eCall will be implemented as a voice band modem call terminating at the eCall PSAP. The 112 call will be routed to the eCall PSAP, where the modem call will be terminated and the data part will be extracted and processed. Bits 6 and 7 of the 'Emergency Service Category Value' will not be used for the routing of the call through the network since on full deployment; every eCall will be routed to the single 112 PSAP which operates in Greece as it is depicted in Figure 21.

There are three (3) MNOs that provide their services in Greece:

- Cosmote
- Vodafone
- Wind

The participation of the MNOs in the HeERO2 pilot is not defined, since there is no consortium constructed, that would include at least one of them. Cosmote is the first MNO that has implemented the eCall flag, but only as a prototype. Further discussions are made to convince all MNOs to offer their full support in the implementation of the eCall flag. The Greek team hopes to bring at least one of them on board.

5.7 Turkey

5.7.1 Introduction

In this chapter we describe the eCall functions, PSAP support of eCall, network functions and IVS functions in the Turkish pilot 112 system. The IVS is provided by the car manufactures Tofas and Oyak Renault. The Transport Network is provided by FNO (Fixed Network Operator) Turk Telekom and MNO Turkcell. The Public Safety Answering Point (PSAP) system is provided by Aselsan Inc.

5.7.2 eCall Functions Overview

In our system, the IVS modules which are found in the vehicles trigger the eCall communication. The eCall that is generated by the IVS is forwarded to the GSM network. MNOs route this call through GSM network and pass it to the PSTN network. Here, the call is routed through PSTN lines and delivered to the *Call Manager* in the PSAP. Here, the call is transferred to IP domain in the PSAP. *Call Manager* demodulates the MSD data. This MSD data contains information about the vehicle, location of the vehicle and the status of the vehicle. The *Call Manager* forwards the incoming voice call to the *Call Taker Service* in the operator PC in SIP (Session Initiation Protocol) format and writes the MSD data to the database. The *Call Taker Application* in the operator PC requests the MSD data from the Call Manager. In the operator PC, MSD is displayed and the vehicle location is shown on the map. Also, the location of the vehicle can be queried from the MNO's location services. The flow of the eCall is summarized in the figure below.

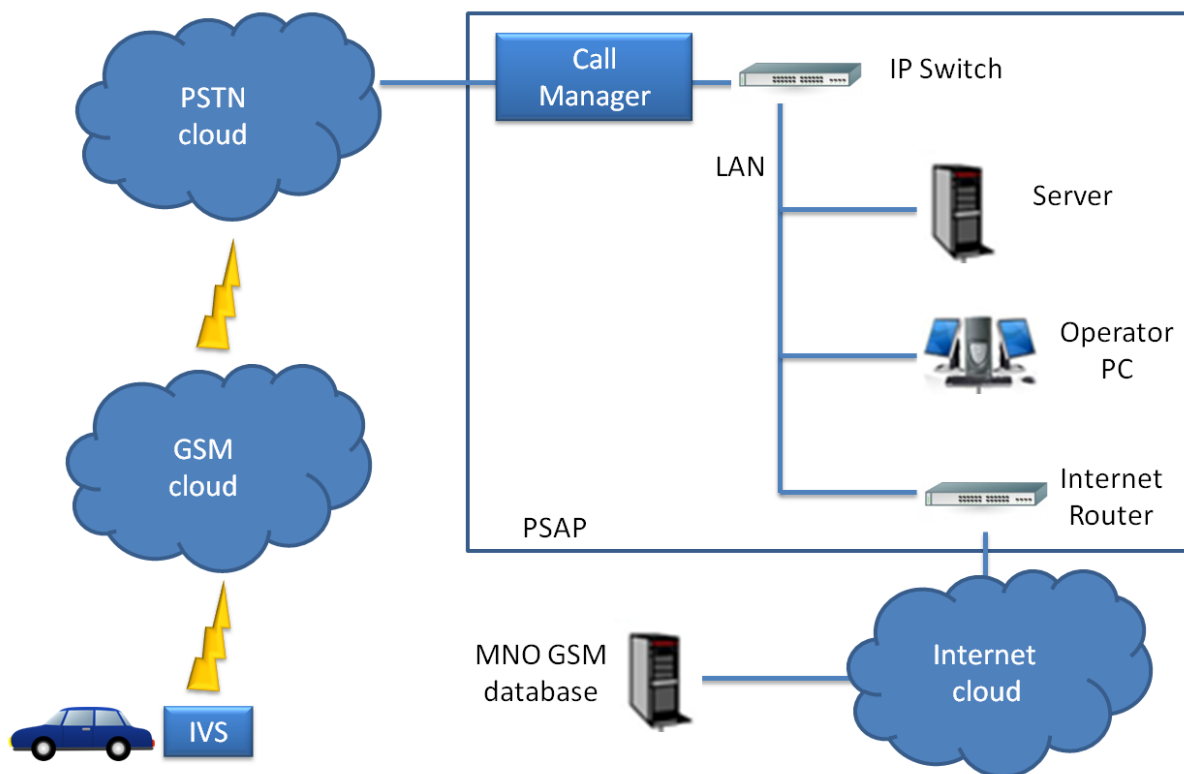


Figure 22: eCall Flow Schema

5.7.3 PSAP Support of eCall

The eCall PSAP will consist of a *Call Manager*, an IP switch, an internet router, a server and an operator PC. According to the required computational resources, additional servers may be added to the system and the number of the servers may be larger than one. Also, the number of operator PCs may be increased according to the project needs.

The *Call Manager* is going to be a group of services. Its main role is going to be the management and routing of the eCalls. It forwards the voice call to the operator PC in SIP(S) format. It writes the MSD data to the database. The *Call Taker Application* in the operator PC accesses the MSD data through the *Call Manager*. According to the project needs, the *Call Manager* may run on a standalone hardware or it may run on the server which already hosts *GIS Services* and the database.

The *IP switch* will be a COTS (Commercial Off-The-Shelf) component. It is required for the necessary network connectivity in the PSAP LAN.

The *Internet router* provides internet connection to the PSAP system. It is connected to the IP switch.

D2.2 - eCall systems functionalities' specification

The server will run a windows server operating system. It will host the *GIS Services* and a database. The *GIS Services* serve the map data to the operator PC. The *GIS Application* in the operator PC is the client of this service.

The operator PC will run a windows XP or windows 7 operating system. It will host the *Call Taker Application* and the GIS Application. There is a possibility that the GIS Application may be a DLL (Dynamic-Link Library) component of the Call Taker Application instead of being a standalone application.

5.7.4 Network Functions

Turkcell will discriminate eCalls from ordinary emergency calls and will perform number analysis. eCalls will have different called party numbers. So that Turk Telekom could route the calls to a specific eCalls PSAP.

Turk Telekom (TT) accepts eCalls from the GSM network at the interconnection point where the PSAP is located. In addition, the GSM operators use a different sending format (Called number format) for eCalls which includes a special emergency service number and suffix number. So, TT differentiates these calls from the other emergency calls and delivered to the PSAP by using the dedicated PRI ports. And also PSAP can discriminate the calls for each operator according to the suffix number.

5.7.5 In Vehicle System Functions

Oyak Renault is planning to use two prototypes of IVS. The first one is from Civitronic company who is involved in HeERO project for quite long time. The second one will be Renault SAS solution if its development will be completed for the tests.

TOFAS is planning to use an eCall solution by Magneti Marelli. As a result of cooperative studies carried out with CRF (FIAT Research Centre), alternative eCall solution could be considered during the life of the project. Two FIAT vehicles will be equipped with eCall Systems, expected models for the implementations are New Linea and Doblo, but will be decided according to MOI's feedbacks.

The IVS' functions are explained in D2.1 SOA Analysis.

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D2.2 - eCall systems functionalities' specification

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