



EENA Case Study

eCall implementation in Lithuania

PSAP, eCall Flag & TPSP eCall

Title	eCall implementation in Lithuania		
Version	1.0		
Revision date	08-12-2016		
Status of the document	Draft	For comments	Approved





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1 Executive Summary

In November 2015, the Emergency Response Centre (ERC), the Lithuanian National 112 Agency & Public Safety Answering Point (PSAP), upgraded two 112 PSAPs (in the cities of Vilnius and Klaipėda) to be able to handle 112-based eCalls.

This document depicts three main points:

- eCall upgrade of the 112 PSAPs;
- tests of the eCall flag functionality in Mobile Networks;
- ERC's relationship with commercial in-vehicle emergency call services providers (TPSPs).

2 Introduction

Article 3 paragraph 1 of the European Commission's Delegated regulation (EU) No 305/2013 requires Member States to ensure that any eCall originated by an in-vehicle equipment is handled according to the standards 'Intelligent transport system – eSafety – PanEuropean eCall-Operating requirements' (EN 16072) and 'Intelligent transport systems – eSafety – eCall High Level Application Requirements (HLAP)' (EN 16062). To achieve it, a public procurement procedure was carried out in 2014 with the aim to meet requirements of those standards.

The upgrade was implemented as part of 112 PSAP IT infrastructure modernisation under the EU Social funded project "Equipment of the regional units of the Emergency Response Centre with specialised hardware and software for emergency call handling, response and command and control" Ref. No. VP2-3.1-IVPK-03-V-01-007.

3 PSAP eCall upgrade

3.1 Emergency Response Centre's Organisation

The ERC has started its activities on the 2nd of October 2003 and it is a statutory body subordinate to the Ministry of the Interior. The ERC is a national emergency call handling organisation currently subordinate to the Fire and Rescue Department.

The main task of the ERC is to answer the emergency calls to the single emergency call number 112 that is used for reporting any offence ongoing, planned or committed, any risk to life or limb, health or safety, the environment, material, non-material or other values and, if necessary, for calling the appropriate emergency services.

Main functions of the ERC are to:

- answer emergency calls to the 112 number,
- take and assess the requests for emergency assistance, determine what emergency assistance the callers need (police, fire and rescue brigades, emergency medical service),
- provide emergency assistance (advice, explanations, instructions, etc.) by phone until the arrival of emergency services, if needed,
- inform the appropriate emergency services about the need of emergency assistance at the place of the emergency, i.e. prepare the emergency reports and transmit them to emergency services,
- increase public awareness on the number 112, its purpose and use, related features and future alterations, also giving explanations how and in what cases should or should not this number be used.

Principles of the ERC's services are:

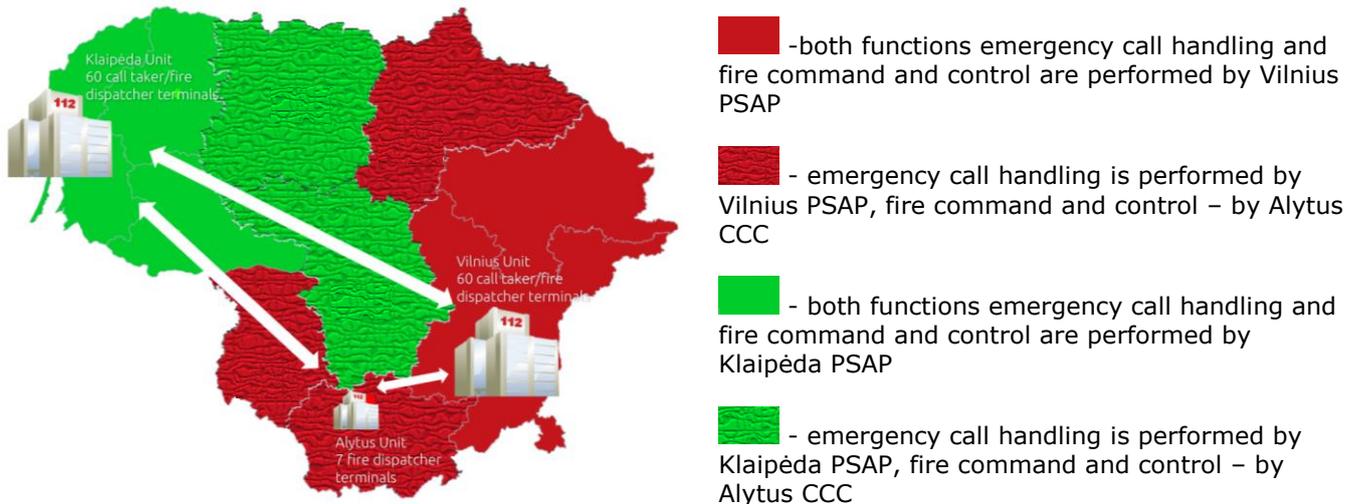
- permanent availability of services – the Emergency Response Centre accepts and handles emergency calls 24 hours a day and 7 days a week,
- rapidity – the Emergency Response Centre ensures immediate and appropriate response to requests for emergency assistance,
- professionalism – assigned tasks and functions are performed by the ERC officers who have been specially trained to handle emergency calls and who possess appropriate qualifications.





The ERC consists of two regional 112 PSAPs in Vilnius and Klaipėda and on Fire Command and Control Centre (CCC) in the city of Alytus. 112 PSAPs in Vilnius and Klaipėda performs emergency call handling function as well as fire command and control function. The CCC in Alytus performs only fire command and control function. Under the Law on The ERC both 112 PSAPs are authorised to assess police related emergency calls and to decide on whether police intervention is needed, however the final decision on police field unit dispatching is made by police dispatchers. Both ERC's 112 PSAPs also receive medical emergency calls that are transferred to medical dispatchers for further assessment. Explanation of functions of the ERC units is illustrated in Picture 1.

Picture 1. Functions of ERCs regional units



To illustrate the workload of the ERC PSAPs and CCC, some 2015 statistical figures are provided below:

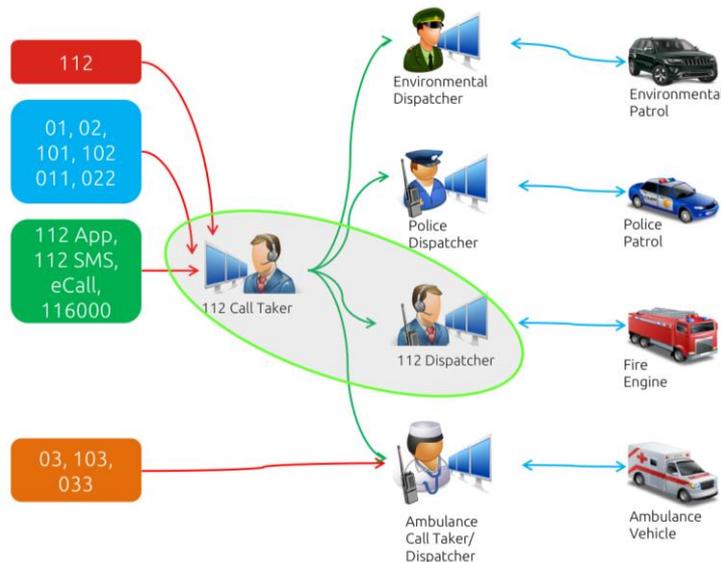
- Total of voice call contacts – 3.568.166;
- Total of responses (call transfers/dispatches) – 958.268:
 - Police – 508.352, (55%);
 - Ambulance – 365.103, (39%);
 - Fire – 37.084, (4%);
 - Environmental – 10.276, (1%);
 - Other – 5.968, (1%).
- Total of 112 SMSs received – 85.777:
 - Test SMSs – 35.040;
 - Real responses – 134.
- Total of contacts via 112 APP (GPIS 112) – 2.302:
 - Voice contacts – 183;
 - Text contacts – 2.119;
 - Real responses – 20.

3.2 Emergency Call Handling System

112 PSAPs receive emergency calls to number 112 as well as to old fire (01, 101, 011) and police (02, 102, 022) emergency numbers. Both PSAPs cooperate with the Environmental Agency's dispatch centre and are also authorised to handle eCalls. In addition, the 112 PSAP in Vilnius handles emergency requests sent via the smartphone application (GPIS 112) and 112 SMS and also serves as first link for missing children report line 116000. Emergency calls to old medical numbers are routed directly to 8 ambulance call centres which the ERC PSAPs also cooperate with on 24x7 basis. Scheme of countries emergency call handling system is illustrated in Picture 2.



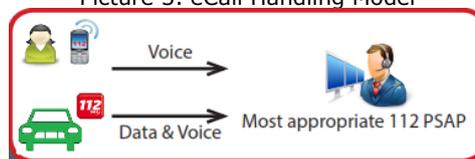
Picture 2. Emergency Call Handling System



3.3 eCall model

As it was mentioned in previous paragraphs of this document, two ERC PSAPs in Vilnius and Klaipėda are authorised to handle all 112 calls in Lithuania. Since the eCall upgrade of those PSAPs required relatively small investment in comparison with the development of a separate 112 eCall, both PSAPs were authorised to handle eCalls along with regular 112 calls (Model 1 in EENA “eCall fact-sheet”¹).

Picture 3. eCall Handling Model



3.4 Scope of the eCall Upgrade & Public Procurement

The definition of requirements for the public procurement for upgrading the PSAPs for eCall was based on the automatization of the eCall signal processing and the VIN extraction. It was also decided to integrate the eCall into the PSAP CAD interface, i.e. no separate application should be developed and used for this purpose. Such attitude and upgraded architecture allowed the creation of an integrated system that would provide eCall information to the call taker through a familiar interface. And this had as result a quicker assessment, it saved time and got a better response.

To ensure maximum competition, the public procurement procedure for PSAP eCall upgrade was split into two independent parts, specifically for:

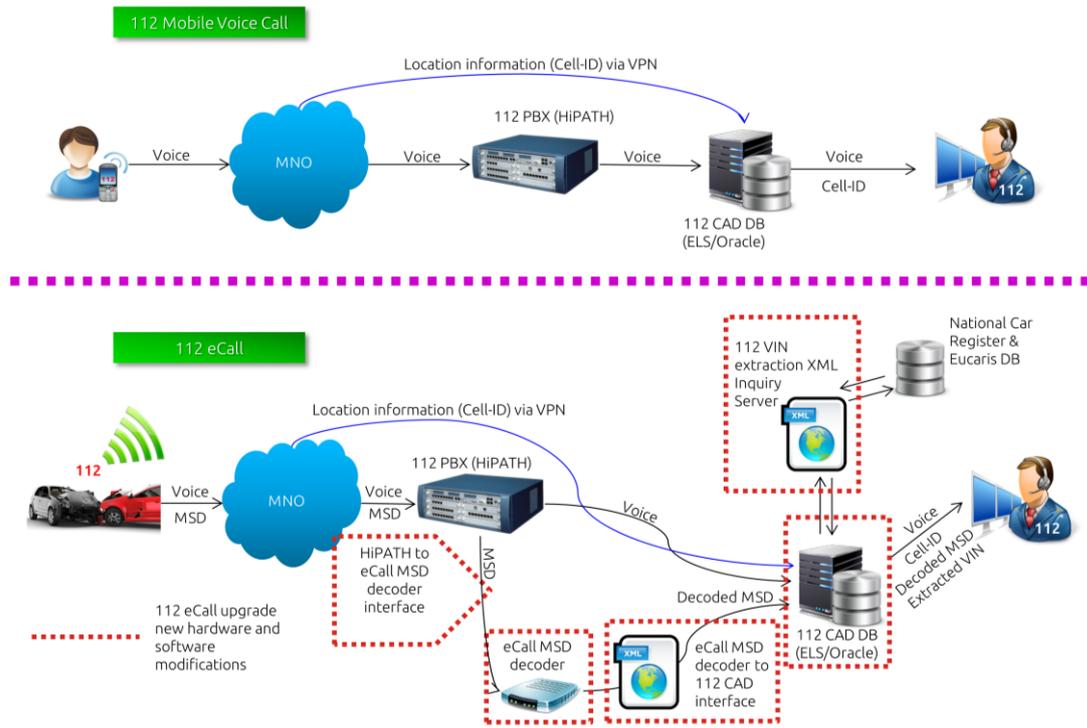
- ◆ modernisation and configuration services of ERC’s information system which in particular included:
 - upgrade of CAD software “Siveillance ELS Web” in order to automatically display eCall data in call taker’s workstations;
 - modernisation and configuration of the interface between the call distribution software “HiPath ProCenter V8 (Openscape Contact Center V8)” and CAD software “Siveillance ELS Web”;

¹ http://www.eena.org/download.asp?item_id=111

- development of the interface with National Car Register KETRIS, maintained by State Enterprise "Regitra", and EUCARIS.
- ◆ the upgrade (extension) of hardware which in particular included:
 - installation of the eCall decoders;
 - extension of ERC's PBX "Siemens HiPath 4000" to ensure compatibility with above mentioned eCall decoders;
 - configuration of the call distribution software "HiPath ProCenter V8 (Openscape Contact Center V8)" to ensure compatibility with above mentioned eCall decoders.

Differences between regular voice call and eCall as well as scope of the eCall upgrade are illustrated in Picture 4.

Picture 4. 112 Voice call, eCall and scope of the PSAP eCall upgrade



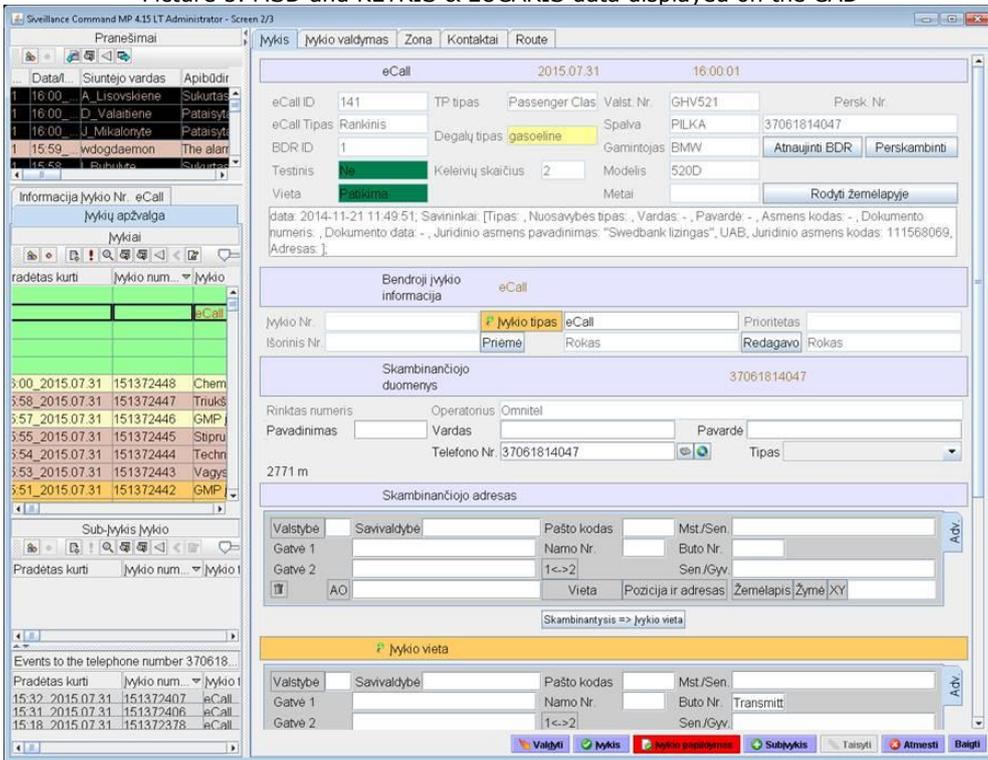
3.5 The interface with KETRIS & EUCARIS

In case an in-vehicle eCall is activated automatically or manually, the minimum set of data (MSD) is transferred to the 112 PSAP via the in-band voice channel. Among other pieces of information, the MSD also carries the Vehicle Identification Number (VIN). This number, if extracted appropriately, may provide additional information about vehicle. In order to gather this information, VIN inquiry/extraction interfaces with KETRIS (National Car Register, owned and maintained by State Enterprise Regitra) and EUCARIS data base have been developed and implemented.

The eCall reception process is automatic – after the MSD is decoded and put into the database, two VIN inquiries are triggered: one inquiry (XML) is directed to the KETRIS and another (HTTP POST) to Eucaris DB. If both databases return vehicle data, KETRIS data is displayed in the CAD as it bears more extensive portion of information. The screenshot of MSD and KETRIS & EUCARIS data displayed on the CAD is provided in Picture 5.



Picture 5. MSD and KETRIS & EUCARIS data displayed on the CAD



The screenshot displays the 'Sveillance Command MP 4.15 LT Administrator - Screen 2/3' interface. The main window shows an 'eCall' record for '2015.07.31' at '16.00.01'. Key data points include:

- eCall ID:** 141
- TP tipas:** Passenger Clas
- Valst. Nr.:** GHV521
- Persk. Nr.:** 37061814047
- Degalų tipas:** gasoline
- Gamintojas:** BMW
- Modelis:** 520D
- Keleivių skaičius:** 2
- Metali:** (field partially visible)

The interface also features a 'Bendroji įvykio informacija' section with fields for 'Įvykio Nr.', 'Isoninis Nr.', 'Prieimė', 'Rokas', and 'Redagavo'. A 'Skambinančiojo duomenys' section shows the phone number '37061814047' and 'Rinktas numeris' 'Operatorius: Omnitel'. The 'Skambinančiojo adresas' section includes 'Valstybė', 'Savivaldybė', 'Pašto kodas', 'Mst./Sen.', 'Gatvė 1', 'Gatvė 2', 'Namų Nr.', 'Buto Nr.', 'Sen./Gyv.', and 'Vieta'. A 'Įvykio vieta' section at the bottom contains similar address fields and a 'Transmitt' field.

3.6 eCall Modem/Decoder

Main functional and technical requirements to eCall Modem/Decoder were:

- Decoders shall be installed independently from each other in both Vilnius and Klaipėda PSAPs;
- Decoders shall be integrated into the existing/used ERC's information system hardware and software;
- Decoders' implementation shall not interrupt 24x7x365 operations of the ERC;
- Decoders shall be redundant – in case of failure of one decoder, back up decoder shall be activated automatically. In total, 4 decoders shall be installed– 2 in each PSAP;
- Decoders shall be compliant with eCall standards, listed in European Commission's Delegated regulation (EU) No 305/2013, and capable to decode in-vehicle MSDs;
- Decoders shall have open and documented interface for integration with emergency call handling systems.
- Decoders shall meet specifications of SOAP protocol and support XML data exchange via Web Services;
- Decoders shall provide decoded data in structured format as well as MSISDN number into ERC's information system;
- Decoders shall be installed into 19" rack and integrated with existing power supply units;
- Decoders voltage shall meet Lithuanian industrial frequency specifications (200 V, 50Hz);
- Existing Siemens HiPath 4000 Duplex PBXs shall be used for reception of 112 eCall. 112 eCall shall be routed to separate ISDN PRI numbers;



- 112 eCall shall be distributed to call takers the same way regular 112 calls are distributed using HiPath ProCenter V8 functionality providing one single que for 112 calls and eCalls based on skill based routing;
- No media converters shall be use to route eCall to decoders;
- Decoder in one ERC PSAP shall decode up to 8 simultaneous eCall MSDs.

3.7 Conformity assessment issues

Article 4 of the Delegated Regulation (EU) No 305/2013 regulates that Member States shall designate the authorities that are competent for assessing the conformity of the operations of the eCall PSAPs with the requirements listed in Article 3 and shall notify them to the Commission. Conformity assessment shall be based on the part of the standard 'Intelligent transport systems – eSafety – eCall end to end conformance testing' (EN 16454) that relates to PSAPs conformance to pan-European eCall.

How this this requirement will be fulfilled in Lithuania is still under discussion due to the term "competent" used in the article mentioned above. There's no such an institution that is competent to test eCall EN 16454 conformance of the ERC by its current mandate. The owner of the ERC's information system is Fire and Rescue Department at the ministry of the interior and the ERC is the authorised user of this system. Following common sense and in order to avoid potential conflict of interest, those two institutions cannot be authorised to test conformance of the system that they own/use. This means that there shall be another independent institution selected, appointed and authorised to perform the eCall assessment.

3.8 Potential eCall Handling Procedures

ERC hasn't defined its eCall handling procedures yet, but it's important to address different scenarios that might occur and to ensure their relevant handling. An extensive list of potential eCall scenarios was identified in EENA Operations Document "eCall"² under section 8.4 "PSAP procedures". Therefore, some thoughts on potential eCall handling procedures are based on this list and presented in this document:

- **Silent calls when MSD is available (procedures could be different if it is a manual or an automatic call)**
Automatic silent calls with MSD should have higher priority of response over manual silent calls with MSD. Automatic silent call with MSD would firstly mean that the eCall has been activated by car collision and no one in the vehicle is able to talk. It should be assumed that such situation may bear higher danger to life and health. In such case police, ambulance and fire units should be dispatched to the scene instantly while in case of manually activated silent call with MSD only the closest available police patrol or another unit should be dispatched for the initial check-up.
- **Silent calls when MSD is not available (procedures could be different if it is a manual or an automatic call)**
Handling of such scenario might be similar to the one commented above, just in addition call back might be needed to request MSD from the vehicle. In case call back doesn't return MSD for an automatic silent call without MSD police, ambulance and fire units should be dispatched to the scene instantly relying mostly on network location data and/or information from another call. In case of manually activated silent call without MSD only closest available police patrol or another unit should be dispatched for the initial check-up.
- **Call back**
Having assumed that in case call back is unsuccessful, there might be at least 3 call back attempts required to be made by a call taker as it this is a routine procedure in case of interrupted regular 112 voice call.
- **Multiple generation of manual or automatic eCalls: prioritisation of automatic eCall**
There might be multiple eCalls received from one vehicle as well as from the same location from multiple vehicles. In the first situation, the first eCall will probably trigger the emergency response. Repetitive

² http://www.eena.org/uploads/gallery/files/operations_documents/2014_10_24_3_1_5_eCall_Update_v2.0_FINAL.pdf





eCalls coming from the same vehicle will be evaluated for additional information. In the second situation, the ERC's information system will warn the call taker about multiple eCalls coming from the same location. In both situations, automatic eCalls will have higher priority over manual ones.

- **Request a new MSD**

Request for a new MSD will require pushing an appropriate button in the ERC's CAD system, therefore such a scenario should not bear specific risks.

- **VIN decoding**

VIN decoded information is additional information to the one sent in the MSD, therefore a scenario when VIN decoding is unavailable should not bear specific risks.

- **Management of the "No confidence in position" flag**

Incident position is critical to know to a call taker. "No confidence in position" message would warn the call taker to perform additional comparison of the location with the location information provided by a mobile network, consult digital maps or vehicle occupants themselves.

- **eCall routed to the wrong PSAP**

Wrongly routed eCall shall not cause mishandling/delays and both ERC 112 PSAPs will be capable to equally respond to all eCalls independently from which part of Lithuania they are received.

- **Forwarding the call to another PSAP**

Such functionality is implemented in both ERC PSAPs, but it will be not necessary to use it if the previous case "Call routed to the wrong PSAP".

- **Multilingualism**

Both ERC PSAPs can handle calls in Lithuanian, English, Polish and Russian languages. For other languages, response based on decoded MSD might be triggered.

4 eCall Flag. Pilot Tests and the Roadmap to Full Introduction

On the 30th of June 2015, the ERC, all three Lithuanian mobile operators (Omnitel, Bitė Lietuva and Tele2), the National Communications Regulator (RRT), the Fire and Rescue Department, the Ministry of the Interior and the Ministry of Transport and Communications signed the National Memorandum on eCall functionality implementation in the mobile networks. The National eCall Memorandum was aimed at reaching a common agreement on implementation of the eCall Flag (discriminator) within Lithuanian mobile networks. This feature plays a significant role in the eCall chain as it ensures proper routing of in-vehicle eCalls.

It is important to explain, that eCalls need to be recognised and treated in the mobile network differently as regular 112 voice call made from a handset. This means that mobile network shall understand that the eCall is being made by a car and route it to different destination in the ERC's 112 PBX, i.e. to the eCall MSD decoder. Without such distinction, all 112 calls (both eCalls and regular 112 calls) would need to transit/checked via eCall MSD decoder. This means regular 112 calls would be delayed in the eCall MSD decoder for 3-10 seconds and would expose caller to fax-machine-like sound which in turn would likely cause caller's discontentment.

In order to make sure that Lithuanian mobile networks are ready for eCall technology from April 2018, the National Memorandum defined phases:

- 1) demonstrational implementation of eCall Flag (Discriminator) and its full chain testing;
- 2) final implementation of eCall Flag (Discriminator) and its full roll-out.

Demonstrational implementation of eCall Flag (Discriminator) was carried out between mid-2015 and mid-2016. All three Lithuanian mobile operators added standardised eCall functionality to their core network equipment and special eCall numbers of eCall modem has been assigned for each network in each of the two eCall compatible ERC 112 PSAPs. Test calls were made using an in-vehicle eCall device prototype which was able to produce both automatic and manual 112 eCall without need of real car crash and to generate and to send eCall MSD to the appropriate ERC 112 PSAP's eCall MSD Decoder. According to agreed testing scenario, 4 eCall test calls were made from each mobile network – 2 calls from the area, served by ERC 112 PSAP in





Vilnius and another 2 from the area, served by ERC 112 PSAP in Klaipėda. All test calls proved to be successful – all of them reached correct MSD eCall Decoder in the correct ERC 112 PSAP.

For the final implementation of eCall Flag (Discriminator) and its full roll-out, the National Communications Regulator (RRT), issued an order with the obligation to mobile network operators to make their networks eCall ready before October the 1st 2017.

5 Relationship with In-Vehicle Emergency Call Third Party Services Providers

5.1 Background

Since 2013 the ERC received 3 requests for cooperation from private companies providing private commercial in-vehicle emergency call and telematics services to car owners. The nature of those requests was similar – to share long format 112 PSAP numbers that would be called by private call centers in case their customers (car owners) were involved in car collisions. In such cases, the TPSP call centre would first receive an emergency call from a collided vehicle, and then would call corresponding 112 PSAP that in turn would dispatch emergency services to the collision site. All companies intended to convey accident coordinates and other relevant information verbally via regular voice call to the PSAPs long format number. Up to date ERC has signed the agreement with one TPSP services provider.

5.2 ERC's attitude towards TPSP providers

It is worth noting that the ERC as an organisation is not obliged or mandated to respond to private car emergency calls and to share long format numbers. On the other hand ERC is legally allowed to cooperate with public and private organisations under agreements. Immediate response to automatic car collision alarms are among other services of TPSP providers, so their access to 112 PSAPs across EU and other relevant countries is absolute prerequisite. When the matter comes to saving lives, 112 PSAPs should demonstrate positive attitude towards cooperation with TPSP providers. Such cooperation however shall not affect/change PSAP operations and procedures, as much as they cannot put any legal, financial or another burden onto PSAP management. On the contrary, TPSP providers shall adapt their procedures and IT systems to 112 PSAP requirements.

5.3 ERC's requirements for long format number access

It was already mentioned in this document, that the ERC has currently one agreement with a commercial TPSP provider. Agreement was negotiated for several months. The main requirements from the ERC's side are listed and commented below:

- ♦ **Language.** All voice communications shall be carried out solely in Lithuanian language. On daily basis ERC's 112 PSAPs communicate in Lithuanian language. In a shift, there are always call-takers able to speak Russian, Polish or English, but not all call-takers are English speakers. Commercial TPSP providers initially wanted to communicate in English, but the ERC considered it inappropriate. The main reason for that, is that the ERC cannot guarantee that all calls coming from the TPSP provider's are routed to an English speaker, therefore it has been agreed to use the Lithuanian language.
- ♦ **Permanent** long format caller ID phone number of TPSP provider's call centre that would be used to contact the ERC. The TPSP number is added to the ERC's information system database. This way, any call coming from the TPSP provider's call centre is identified as such. In case of changing this number, the TPSP provider shall inform ERC about the change in advance.
- ♦ **Permanent** long format call back number of TPSP provider's call centre which will be active for a callback from the ERC, if necessary. In case of changing this number, the TPSP provider shall inform ERC about the change in advance.





- ◆ **Uniform Coordinate Format** to pinpoint emergency location. Location will be given by providing latitude/longitude in WGS 84 DMS (degrees, minutes, seconds) coordinates, plus naming province, settlement, seniunija, place, street/junction and heading, if available. Other relevant visible location cues may also be provided.
- ◆ **Automatic data transmission interface.** This requirement isn't yet applied to TPSP providers that intend to get access to long format numbers of ERC. Such interface would ensure faster and more accurate transfer of incident information from TPSP provider's call centre to the ERC. There is a special standard that defines requirements specifically for interfaces with EN 16102 (Intelligent transport systems - eCall - operating requirements for third party support). On the other hand, making data interfaces with multiples TPSPs across the EU would put huge burden on the ERC's human, financial and ICT resources, therefore development of such interface isn't planned in the near future. Development of such interface(s) shall be funded and maintained solely by TPSP providers.

5.4 Thoughts from the ERC about the co-existence of 112 based eCall and TPSP services

Currently, the existing access to long ERC's 112 PSAPs numbers and specifically verbal provision of car incident information opens up room for information loss or/and misinterpretation. This in turn may cause slower or/and inaccurate response and dispatch of the field units.

The implementation of the above mentioned automatic data transmission interface between ERC's 112 PSAPs would require significant investments. Therefore, the ERC is thinking about alternatives for the co-existence of 112-based eCall and TPS eCall. Two potential models are provided below:

Alternative (A)

1. The in-vehicle eCall device, in case of crash, by default, always calls 112 and transmits the eCall MSD to a 112 PSAP. The 112 PSAP uses the open voice session as long as necessary for the proper response. After the voice session with 112 PSAP is closed, then;
2. In-vehicle TPS device calls private TPS PSAP for whatever else is needed from TPS.

Benefits:

- a) quicker response due to no mediator;
- b) no need for both PSAP and TPS eCall providers to create and maintain multiple interfaces between multiple TPS eCall providers and multiple 112 PSAPs across Europe.

Alternative (B)

If the in-vehicle eCall device is set by default to be used with TPS eCall provider in case of crash, then:

1. The TPS eCall connection is made to private eCall TPSP call-centre;
2. The TPSP receives the voice call and vehicle data, then;
3. The TPSP encodes information, received from a vehicle, to a standardised eCall MSD;
4. And routes the call to the appropriate long number of the PSAPs eCall;
5. It should provide the number of the SIM card of the vehicle, instead of number of the TPS PSAP, so that the 112 PSAP can make a call back to the vehicle.

Benefits:

- a) regular eCall received from the perspective of eCall, therefore no need to invest into additional interfaces;
- b) no need for both PSAP and TPS eCall providers to create and maintain multiple interfaces between multiple TPS eCall providers and multiple 112 PSAPs across Europe.

Deficiency

- a) longer response time;



6 Conclusions

- The whole eCall chain has been successfully tested in Lithuania. The final eCall flag implementation and the ERC's eCall conformance assessment are to be completed by the 1st of September 2017;
- Appropriated eCall handling procedures are to be defined and adopted before the full roll-out of 112 based eCall; ERC's and emergency services' staff shall be trained appropriately;
- A more efficient and simplified mechanism for cooperation between 112 PSAPs and TPSPs is needed.



ANNEX. List of data responses to the requests to KETRIS and EUCARIS

Data Category	KETRIS data name	EUCARIS data name
VIN	vin_code	VehIdentificationNumber
Licence Plate	plate_no	VehRegistrationNumber
Make	brand_name	VehMake
Model Name	model_name	VehCommercialName
Registration Country	reg_basis_country_name	-
Owner status	rights_type	-
First registration date	first_reg_date	VehFirstRegistrationDate World
Vehicle Category	tm_type_id	VehEuropeanCategoryCode
Number of Seats	sitting_places	VehNumberOfSeats
Number of standing places	standing_places	VehNumberOfStandingPlaces
Maximum weight	maxweight	VehMaxMassPermittedWhole
Vehicle Weight	ownweight	-
Engine Capacity	engine_capacity	VehCapacity
Engine power	engine_power	EngineMaxPower
Fuel Type	fuel_type	EngineFuel
Color	color	VehColour
Year of production	year_produced	VehSignalStartDate