

## SYSTEM eCall: A USEFUL TOOL FOR RESCUERS IN CASE OF ROAD ACCIDENTS

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### SYSTÉM eCall - AUTOMATICKÉ NÚDZOVÉ VOLANIE V PRÍPADE CESTNÝCH NEHÔD

#### Abstrakt

*Príspevok sa venuje problematike systému eCall, ktorý automaticky umožňuje na tiesňovú linku 112 nahlásiť cestnú dopravnú nehodu motorového vozidla. Podľa legislatívnych predpisov EÚ má byť systém povinne aplikovaný na všetkých nových osobných automobiloch a ľahkých úžitkových vozidlách vo všetkých štátoch EÚ od 1. októbra 2015.*

**KLúčové slová:** nehoda, motorové vozidlo

#### Abstract

*The article deals with the eCall system that automatically allows announcing a traffic accident of a road vehicle to an emergency call line 112. Pursuant to EU legal regulations, the eCall system shall be mandatorily applied in all new passenger cars category M1 and light trucks category N1.*

**Key words:** accident, motor vehicle

#### Introduction

Road safety is an issue of major concern across the entire European Union and for all of its inhabitants: 500 million citizens used more than 230 million vehicles on over 5 million km of roads in the 27 EU Member States in 2013. In average, there are more than 100 million road journeys every year across the various Member States and the number is still increasing due to broader free movement of goods, people and services.

The level of road traffic accidents is assessed according to number of fatalities in road traffic accidents. For example, totally 30 300 persons died (in the Slovak Republic 324 ones) and almost 1.5 millions people were injured in the European Union (hereinafter only „EU“) at approximately 1.1 million road traffic accidents in 2011. Since the 2001 year, a long-term decreasing is shown; number of traffic fatalities was decreased in 44 % compared with the 2001 year with 54 302 victims within the area of present EU member states (614 fatalities was recorded in the Slovak Republic in 2001) [1]. It means statistically that on average 112 persons per million inhabitants died in road accidents in 2001 while the fatality rate was down to 60 persons per million in 2011 [2].

With the aim to minimize consequences of serious traffic accidents within the whole EU countries area, the European Commission (hereinafter only “the Commission”) adopted regulation on the harmonised provision for an interoperable EU-wide eCall system [3] in April 2013 and two legislative proposals concerning deployment interoperable EU-wide eCall system [4] and type-approval requirements for the deployment of the eCall in-vehicle system [5] in June 2013. These proposals represent a final phase of the Commission legislative procedure focused on mandatory deployment of the eCall system within the whole EU territory. These regulations provide for that all new models of passenger vehicles and light trucks category N1 shall be equipped with eCall 112 system as well as establishing necessary infrastructure for receiving and processing eCall emergency calls in Public Service Answering Points (hereinafter only “PSAPs”) that will lead to compatibility, interoperability and continuity eCall service within the whole EU area.

#### 1 Functioning of the eCall system

Data contained from eCall devices allow emergency services to render relief to drivers and passengers immediately, even if the driver or passenger is unconscious or otherwise unable to call. It is estimated that eCall system can speed up the arrival of emergency teams by 40% in urban areas and 50% in rural areas and save up to 2,500 lives a year. Except benefits for road traffic safety, the eCall system can also have a significant impact on the reduction of the congestion caused by the traffic accidents and thus the overall congestion of the European roads as well as decreasing of secondary traffic accidents caused by unsecured accident sites. This system should bring benefits also for industry due to technologies, components and services applied in various eCall system elements including in-vehicle systems, wireless data transfer and systems for PSAPs. In-vehicle devices deployed within the e-Call system can be use also for services representing supplemental benefit (e.g. finding-out stolen vehicles).

The eCall system belongs among so-called intelligent transport systems in a road transport that consist of information and communication technology located in the transport infrastructure or inside a vehicle. This technology serves for road traffic optimization and management, increasing of road traffic safety and continuity, higher efficiency of road maintenance, higher quality of public transport and decreasing of the environmental burdening. The intelligent transport system ensures data transfer, information collecting, processing and exchange among transport service providers, transport information suppliers and transport information users. Issues concerning intelligent transport systems are solved also within the Slovak Republic legal system [6].

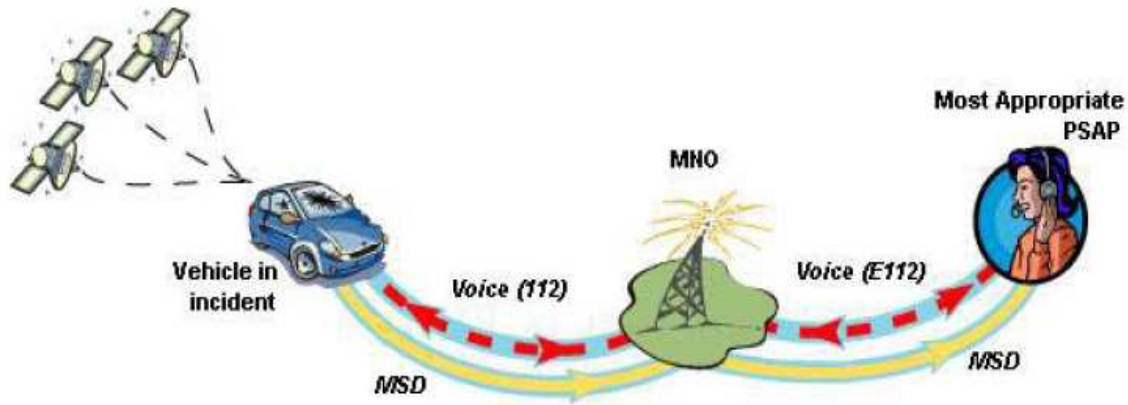
#### 2 Operational principles of the eCall system

When a serious traffic accident occurs, the eCall system automatically connects the Single European Emergency Call Number 112. It announces the accident site even in a case when a driver is unconscious or otherwise unable to call.

In case of serious accident, in-vehicle sensors will automatically trigger an eCall device. When activated, the in-vehicle system establishes a 112-voice connection and at the same time an emergency message, the minimum set of data (hereinafter only “MSD”) including key information about the accident, such as time, location, driving direction resulting from accurate satellite-based data and vehicle description is sent with the voice call.

The eCall can also be activated manually by pushing a proper push-button in the vehicle. A witness of the accident can do this action, for example.

The mobile network operator (hereinafter only “MNO”) identifies that the 112 call is an eCall from the ‘eCall flag’ inserted by the vehicle’s communication module. The MNO handles the eCall like any other 112 call and routes the call to the most appropriate emergency response centre — Public Safety Answering Point (PSAP). The PSAP operator will receive both the voice call and the MSD.



**Figure 1. eCall operational principles**

(Source: 52009DC0434. Communication from the Commission to the European Parliament the Council, the European Economic and Social Committee and the Committee of the Regions “eCall: Time for Deployment”. COM(2009) 434 final. Commission of the European Communities. Brussels, 21.8.2009.)

The information provided by the MSD will be decoded and displayed in the PSAP operator screen. The location and driving direction of the vehicle can be shown in a Geographic Information System. At the same time, the operator will be able to hear what is happening in the vehicle and talk with the occupants of the vehicle if possible. This will help the operator to ascertain which emergency services are needed at the accident scene (ambulance, fire service, and police) and to dispatch rapidly the alert and all relevant information to the right service.

Furthermore, the PSAP operator will be able to inform immediately the road/traffic management centres that an incident has occurred in a specific location, facilitating rapid information to other road users and thus preventing secondary accidents, helping to clear the carriageway and reducing traffic congestion.

### 3 The eCall system in the EU legislative documents in force

#### 3.1 Regulation 32013R0305 - the harmonised provision for an interoperable EU-wide eCall

The Regulation (EU) No 305/2013 (32013R0305) establishes specifications for the upgrading of the Public Safety Answering Point (PSAP) infrastructure required for the proper receipt and handling of eCalls, in order to ensure the compatibility, interoperability and continuity of the harmonised EU-wide eCall service. This regulation implements some new definitions, e.g.:

- ‘*emergency service*’ means a service, recognised as such by the Member State, that provides immediate and rapid assistance in situations where there is, in particular, a direct risk to life or limb, to individual or public health or safety, to private or public property, or to the environment, in accordance with national legislation;
- ‘*public safety answering point (PSAP)*’ means a physical location where emergency calls are first received under the responsibility of a public authority or a private organisation recognised by the Member State;
- ‘*most appropriate PSAP*’ means a PSAP defined beforehand by responsible authorities to cover emergency calls from a certain area or for emergency calls of a certain type;
- ‘*eCall PSAP*’ means a most appropriate PSAP defined beforehand by the authorities to first receive and handle the eCalls;
- ‘*eCall PSAP operator*’ means a person in the eCall PSAP receiving and/or handling the emergency calls
- ‘*eCall*’ means an in-vehicle emergency call to 112, made either automatically by means of the activation of in-vehicle sensors or manually, which carries a standardised minimum set of data and establishes an audio channel between the vehicle and the eCall PSAP via public mobile wireless communications networks;
- ‘*in-vehicle equipment*’ means equipment within the vehicle that provides or has access to the in-vehicle data required to perform the eCall transaction via a public mobile wireless communications network;

- *'minimum set of data (MSD)'* means the set of information defined by the standard EN 15722 "Road transport and traffic telematics — eSafety — eCall minimum set of data (MSD)" which is sent to the eCall PSAP;
- *'emergency control centre'* means a facility used by one or more emergency services to handle emergency calls;
- *'service partner'* means a public or private organisation recognised by national authorities, which has a role in the handling of incidents related to an eCall (e.g. road operator, assistance service); etc.

The Regulation lists requirements laid on eCall PSAP as regards handling eCall emergency calls and receiving the MSD originating from the in-vehicle equipment in accordance with relevant European standards as well as national procedures and legal acts concerning emergency call handling. Obligations for the EU Member States linked to the deployment of the eCall PSAPs infrastructure are listed too.

Taking into account, that a service partner included into the eCall infrastructure may be not only public services of the Integrated Rescue System but also private companies, it is necessary keep the European and national legal regulations on personal data protection during MSD data handling [7], especially of the EU directives 31995L0046 [8] and 2002L0058 [9], respectively. In the Slovak Republic, this means keeping also the Slovak generally binding regulations – the Act on Personal Data Protection [10] and the Act on Electronic Communications [11].

Pursuant to the Regulation, the EU Member States were obliged to submit to the Commission by 23 October 2013 the report of implementation of this Regulation. The report should include at least the list of competent authorities for assessing the conformity of the operations of the eCall PSAPs, the list and geographical coverage of the eCall PSAPs, a schedule of deployment during the ensuing two years, the description of the conformance tests and the description of the privacy and data protection protocols.

### 3.2 Proposal COM (2013) 0315 - on the deployment of the interoperable EU-wide eCall

The Proposal for a Decision of the European Parliament and of the Council on the deployment of the interoperable EU-wide eCall (COM (2013) 0315 – 52013PC0315) stipulates a duty for the EU Member States to deploy the necessary eCall PSAP infrastructure required for the proper receipt and handling of all eCalls within their territory no later than 1 October 2015. If necessary, this infrastructure shall be purged of non-emergency calls in order to ensure the compatibility, interoperability and continuity of the interoperable EU-wide eCall service. This is without prejudice to the right of each Member State to organise its emergency services in the way most cost effective and appropriate to its needs, including the possibility to filter calls that are not emergency calls and may not be handled by eCall PSAPs, in particular in the case of manually triggered eCalls.

The Proposal's Explanatory Memorandum deals also with operational costs for the eCall system deployment. The marginal costs of handling the 112 eCalls for each PSAP equipped to handle 112 calls enhanced with location capabilities cover the following:

- in-band modem server (cost of which depends on the number of eCalls);
- software to decode the MSD (minimum set of data) and integration with the PSAP software;
- operators training.

Where the eCalls will be received in a PSAP that also receives other emergency calls, the majority of these costs will be subsumed within the normal operational costs. Otherwise, they will depend on the number of operators needed to handle the estimated number of eCalls<sup>12</sup>.

The estimated costs of upgrading PSAPs average around EUR 1.1 million per Member State. This estimate derives from a cluster analysis based on the density of population of the country, accident typologies, road and emergency response infrastructures, and other general statistics. The cost in each country varies considerably depending on the number of PSAPs, but also on the technical solution chosen for upgrading the PSAPs.

### 3.3 Proposal COM (2013) 0316 - on the type-approval requirements for the deployment of the eCall in-vehicle system

The goal of the Proposal for a Regulation of the European Parliament and of the Council on the type-approval requirements for the deployment of the eCall in-vehicle system (COM (2013) 0316 - 52013PC0316) is to introduce into the EC motor vehicle type-approval system a requirement for fitting an eCall in-vehicle system for M1 category motor vehicles (motor vehicles with at least four wheels designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat) and for N1 category vehicles (motor vehicles with at least four wheels designed and constructed for the carriage of goods and having a maximum mass not exceeding 3,5 tonnes).

The proposal requires new types of passenger cars and light commercial vehicles to be designed and constructed as to ensure that in the event of a severe accident an emergency call (eCall) to the 112 is triggered automatically. It must also be possible to trigger manually emergency calls (eCalls) to the 112. Manufacturers shall demonstrate that all new types of vehicles in categories M1 and N1 are equipped with an eCall in-vehicle system, in accordance with this Regulation and the delegated acts adopted pursuant to this Regulation.

The Proposal also stipulates rules for privacy and data protection especially that vehicles equipped with eCall in-vehicle system should not be traceable and should not be subjected to any constant tracking in their normal operational status related to the eCall.

A new obligation is stipulated for the EU Member States: since 1 October 2015, national authorities shall only grant EC type-approval in respect of the eCall in-vehicle system to new types of vehicles, which comply with this Regulation, and the delegated acts adopted pursuant to this Regulation.

### 3.4 Decision No 32014D0585 – deployment of the interoperable EU-wide eCall service

Having passed the complete legislative process and accepting of opinions and remarks of relevant EU institutions, the Decision of the European Parliament and of the Council on deployment of the interoperable EU-wide eCall service was adopted on 15 May 2014 [12] that is addressed to the EU Member States.

The Decision stipulates an obligation of the Member States to deploy on their territory the eCall PSAP infrastructure required for the proper receipt and handling of all eCalls, if necessary purged of non-emergency calls, at least six months before the date of application of the Regulation of the European Parliament and of the Council concerning the type-approval requirements for the deployment of the eCall in-vehicle system (32013R0305), but in any case no later than 1 October 2017. The Member States shall also ensure that the handling of eCalls is provided free of charge to users of the EU-wide eCall service and ensure that eCalls can originate from anywhere in their territory, provided there is at least one public mobile wireless communications network available. The Decision laid a duty for member States to submit to the Commission the report on the state of implementation of this Decision by 24 December 2015. The report shall include at least the list of competent authorities entrusted with the assessment of the conformity of operations of the eCall PSAPs, the list and geographical coverage of the eCall PSAPs, the description of the conformance tests and the description of the privacy and data protection protocols

### 3.5 Consequences for the Slovak Republic

Based on files submitted on the negotiation of the Government of the Slovak Republic on 3 July 2013 [13], the Ministry of Interior of the Slovak Republic (MoI SR) and Ministry of Transport, Construction and Regional Development of the Slovak Republic (MTC&RD SR) are expert guarantors for application of the 32013R0305 Regulation into the legal system of the Slovak Republic and for taking other measures at the national level. It is necessary to pay close attention to the way and form of implementation of above-mentioned EU legal text also from the Fire and Rescue Corps standpoint because responses of the Fire and Rescue Corps members to traffic accidents represent a significant ratio of all firefighters' responses. Due this fact, implementation of the eCall system on the Slovak roads will lead to increased safety of responding firefighters.

### Conclusion

Benefits related to EU-wide eCall deployment include [4]:

- reduction in fatalities (with all vehicles eCall-equipped, between 1% and 10% depending on country population density and road and emergency response infrastructure);
- reduction in the seriousness of the injuries (between 2% and 15%);
- reduction in congestion costs caused by traffic accidents due to improved accident management, as the accident is immediately notified to the PSAPs and can therefore be transferred to the appropriate Traffic Management Control, which can immediately inform other road users, and help reduce secondary accidents;
- facilitation of rescue services and increased security of rescue team when extracting trapped occupants, as through the MSD they receive information on the fuel type;
- reduced SOS roadside infrastructure, as each road user would be able to trigger an emergency call from their vehicle.

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