



# ECC Report **324**

Study of issues related to calls to emergency services from devices that are SIM-less or in Limited Service State (LSS) for another reason

approved 24 November 2021

## 0 EXECUTIVE SUMMARY

The ability to initiate an emergency communication to summon help when needed is recognised as a citizen's right in many countries around the world. As a result of this and as required by legislation, special arrangements are made on electronic communications networks to carry emergency calls. For example, emergency calls are made by dialling an easy-to-remember short code, the call might be carried on the network with a high priority and the call is free of charge to the caller. Mobile networks allow for a Limited Service State (LSS) to provide access to emergency services from devices that are SIM-less and from devices that do contain a valid SIM but which cannot fully register on the network for another reason. While the technology supports it, emergency calls from devices that are SIM-less are not supported in all European countries.

On 5 September 2019, the Court of Justice of the European Union (CJEU) ruled that calls to '112' from devices that are SIM-less should be located. This ruling has drawn attention to the issue of emergency calls from devices that are SIM-less and on the related issue of providing caller location information for such calls.

The purpose of this ECC Report is to examine the situation regarding calls to emergency services in Europe from devices that are SIM-less or from devices that are in LSS for another reason in order to fully understand:

- What is meant, in the context of this Report, by emergency calls from devices that are SIM-less and emergency calls from devices that are in LSS for another reason and to explain how such calls work;
- How to differentiate between calls from devices that are SIM-less and calls from devices that are in LSS for another reason;
- How caller location information for such calls can be provided to the Public Safety Answering Point (PSAP);
- To consider the technical and legal implications of the Court's ruling on the provision of caller location information for emergency calls made from devices that are SIM-less in Europe.

The analysis of the various issues raised in this report take account of a questionnaire on CEPT member countries' national situation regarding emergency calls from devices that are SIM-less which was carried out in 2019.

Following the analysis undertaken, the Report concludes that:

- The information presented in the COCOM report from 2013, as well as the responses to the ECC questionnaire in 2019, shows no change in the situation regarding calls to emergency services from devices that are SIM-less in the last 10 years. 21 CEPT countries allow calls from devices that are SIM-less and 8 CEPT countries prohibit it. There are also no known plans by the respondents to the ECC questionnaire to change their policies in the future;
- The CJEU court ruling clarifies that if calls to emergency services from devices that are SIM-less are supported in a Member State of the EU, then caller location information must also be provided to the emergency services with the call, subject that this is technically feasible;
- The EC opinion states that a Member State of the EU is, in principle, free to decide whether or not to permit calls to emergency services from devices that are SIM-less in national law;
- Network-based location information is available to the emergency services in those countries which permit calls to '112' from devices that are SIM-less;
- According to ETSI TS 103 625 [12], emergency calls from devices that are SIM-less or from devices in LSS for another reason, handset-provided location information cannot currently be sent to the emergency services by Short Message Service (SMS) (as an MSISDN is required) or by HTTPS (as a data connection is required). Consequently, this means that SMS to 112 services available in some European countries for persons with disabilities would also not be possible;
- Depending on the solution for PSAPs, receiving the International Mobile Equipment Identity (IMEI) and International Mobile Subscriber Identity (IMSI) may also be useful if one of these parameters can be used to access the operator databases containing location information;
- Currently available and potential future technical solutions for the provision of caller location information should be examined to determine if it would be feasible to improve the accuracy and reliability of caller location information for emergency calls from devices that are SIM-less and for emergency calls from devices in LSS for another reason.

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## LIST OF ABBREVIATIONS

<b>Abbreviation</b>	<b>Explanation</b>
<b>3GPP</b>	The 3rd Generation Partnership Project
<b>AML</b>	Advanced Mobile Location
<b>BEREC</b>	Body of European Regulators for Electronic Communications
<b>CEPT</b>	European Conference of Postal and Telecommunications Administrations
<b>CLI</b>	Calling Line Identity as described in ETSI EN TR 101 292 [17] or Calling Line Identification
<b>CJEU</b>	Court of Justice of the European Union
<b>ECC</b>	Electronic Communications Committee
<b>EECC</b>	European Electronic Communications Code
<b>ETSI</b>	European Telecommunications Standards Institute
<b>EU</b>	European Union
<b>GNSS</b>	Global Navigation Satellite System
<b>HLR</b>	Home Location Register
<b>HSS</b>	Home Subscriber Server
<b>HTTPS</b>	Hypertext Transfer Protocol Secure
<b>IMEI</b>	International Mobile Equipment Identity
<b>IMSI</b>	International Mobile Subscriber Identity
<b>LR</b>	Location Registration
<b>LSS</b>	Limited Service State
<b>MNO</b>	Mobile Network Operator
<b>MS</b>	Mobile Station
<b>MSISDN</b>	Mobile Subscriber ISDN Number
<b>MSC</b>	Mobile Switching Centre
<b>NAD</b>	Network Access Device
<b>PLMN</b>	Public Land Mobile Network
<b>PSAP</b>	Public Safety Answering Point
<b>SIM</b>	Subscriber Identity Module
<b>SMS</b>	Short Message Service
<b>TFEU</b>	Treaty on the Functioning of the European Union
<b>USD</b>	Universal Service Directive
<b>USIM</b>	Universal Subscriber Identity Module
<b>VLR</b>	Visitor Location Register
<b>Wi-Fi</b>	Wireless Fidelity

## 1 INTRODUCTION

The ability to initiate an emergency communication to summon help when needed is recognised as a citizen's right in many countries around the world. As a result of this and as required by legislation, special arrangements are made on electronic communications networks to carry emergency calls. For example, emergency calls are made by dialling an easy-to-remember short code, the call might be carried on the network with a high priority and the call is free of charge to the caller. Mobile networks allow for a "Limited Service State" (LSS) to provide access to emergency services from devices that are Subscriber Identity Module (SIM)-less and from devices that do contain a valid SIM but which cannot fully register on the network for another reason. While the technology supports it, emergency calls from devices that are SIM-less are not supported in all European countries.

On 5 September 2019, the Court of Justice of the European Union (CJEU) ruled that calls to '112' from devices that are SIM-less should be located. The Court's ruling holds that the Universal Service Directive (USD) requires EU Member States, subject to technical feasibility, to ensure that the undertakings concerned make caller location information available free of charge to the authority handling emergency calls to the pan-European emergency number '112' as soon as the call reaches that authority, including in cases where the call is made from a device that is SIM-less.

This ruling has drawn attention to the issue of emergency calls from devices that are SIM-less and on the related issue of providing caller location information for such calls.

The purpose of this ECC Report is to examine the situation regarding calls to emergency services in Europe from devices that are SIM-less or from devices that are in LSS for another reason in order to fully understand:

- What is meant, in the context of this Report, by emergency calls from devices that are SIM-less and emergency calls from devices that are in LSS for another reason and to explain how such calls work;
- How to differentiate between calls from devices that are SIM-less and calls from devices that are in LSS for another reason;
- How caller location information for such calls can be provided to the Public Safety Answering Point (PSAP);
- To consider the technical and legal implications of the Court's ruling on the provision of caller location information for emergency calls made from devices that are SIM-less in Europe.

The analysis of the various issues raised in this report take account of a questionnaire on CEPT member countries' national situation regarding calls from devices that are SIM-less which was carried out in 2019.

## **2 DEFINING EMERGENCY CALLS FROM DEVICES THAT ARE SIM-LESS OR FROM DEVICES IN 'LIMITED SERVICE STATE' FOR ANOTHER REASON**

A mobile device registers on a cell within its home network and can then make and receive calls. Since the earliest days of mobile telephony, provisions have been made in technical specifications for a device not fitted with a SIM to have the capability to make an emergency call. ETSI defines an emergency call from a device that is SIM-less as *"an emergency call that is originated from a mobile terminal which does not have a SIM or USIM"* [1].

Provisions have also been made for a device fitted with a valid SIM which cannot find a network cell to register on. In this case it is possible for the device to register on an available network for the sole purpose of facilitating an emergency call. When a device connects to a network in this way, either with or without a SIM, it is referred to as being in a "Limited Service State" (LSS).

The purpose of this chapter of the report is to clearly differentiate between an emergency call from a device that is SIM-less and an emergency call from a device in LSS for reasons other than not having a SIM fitted (see section 2.3 for further details). This is an important distinction to make as some European countries have implemented a policy of not permitting an emergency call from a device that is SIM-less while allowing an emergency call from a device fitted with a valid SIM but in LSS for another reason.

There are technical possibilities to make this distinction. In the UK for example, if there is no valid SIM fitted in the device, the mobile device can only send the IMEI in the emergency call setup. There is a parameter in the Mobile Switching Centre (MSC) which is set to "disallow" the emergency call for this call case. If the device is fitted with a valid SIM, the mobile network will receive the IMSI and the IMEI in the emergency call setup message. There is a parameter in the MSC which is set to "allow" the emergency call for this call case.

### **2.1 SITUATION REGARDING EMERGENCY CALLS FROM DEVICES THAT ARE SIM-LESS IN EUROPE**

In 2020, the European Commission's Communications Committee (COCOM), gathered information on this practice throughout Europe [3]. Countries were invited to indicate whether calls to '112' from devices that are SIM-less were allowed. Out of the 21 countries that provided this information, '112' calls from devices that are SIM-less were reported possible in 19 EU Member States, Austria, Cyprus, Czech Republic, Denmark, Estonia, Greece, Spain, Finland, Hungary, Ireland, Italy, Lithuania, Latvia, Malta, the Netherlands, Poland, Portugal, Sweden and Slovakia and Iceland. Some Member States do not allow calls from SIM-less phones in order to decrease the risk of false calls that may potentially burden the PSAP system. The countries that did not provide this facility are Bulgaria, Germany, Belgium, France, Romania, Slovenia, and the United Kingdom.

A questionnaire circulated in September 2019 by the ECC (see Chapter 5 of this Report for further details) confirmed that the situation has not changed in the intervening period for the 18 CEPT countries that responded to the ECC questionnaire.

### **2.2 REGISTRATION OF A MOBILE DEVICE ON A MOBILE NETWORK**

3GPP TS 23.122 [2] describes how a mobile device registers on a Public Land Mobile Network (PLMN). The mobile device (or mobile station (MS)) searches for a suitable cell on the PLMN and tunes to the control channel of the chosen cell in order to use the services available. This choosing is known as "camping on the cell" and this is performed in "idle" mode. The mobile device will then register its presence in the registration area of the chosen cell if necessary, by means of a Location Registration (LR).

If the mobile device loses coverage of a cell, or finds a more suitable cell, it reselects onto the most suitable cell of the selected PLMN and camps on that cell. If the new cell is in a different registration area, an LR request is performed.

If the mobile device loses coverage of a PLMN, either a new PLMN is selected automatically, or an indication of which PLMNs are available is given to the user, so that a manual selection can be made.

The purpose of camping on a cell in idle mode is fourfold:

- It enables the mobile device to receive system information from the PLMN;
- If the mobile device initiates a call, it can do this by initially accessing the network on the control channel of the cell on which it is camped;
- If the PLMN receives a call for the mobile device, it knows (in most cases) the registration area of the cell in which the mobile device is camped and can send a "paging" message for the mobile device on control channels of all the cells in the registration area. The mobile device will then receive the paging message because it is tuned to the control channel of a cell in that registration area, and the MS can respond on that control channel;
- It enables the MS to receive cell broadcast messages.

### 2.3 LIMITED SERVICE STATE

If the mobile device is unable to find a suitable cell to camp on, or the SIM is absent, not configured or malfunctioning, or if it receives certain responses to an LR request (e.g., "illegal MS"), it attempts to camp on a cell irrespective of the PLMN identity, and enters what is called a "Limited Service State" in which it can only attempt to make emergency calls. A device fitted with a valid SIM can enter LSS on an available network for other reasons including when:

- It is not possible to camp on to a cell on its home network because of limited or no coverage;
- In the case of international roaming, there is no roaming agreement between the home network and other available networks;
- The device is SIM-locked and, even if it is fitted with a valid SIM from another provider it cannot connect to any available network; or
- The device is fitted with a valid SIM, but it is not seated in the device correctly.

### 2.4 USE OF THE TERMS SIM-LOCK, SIM-LESS AND SIM-FREE

In this Report, we refer to calls to emergency services from devices that are 'SIM-less'. This means that the device is not fitted with a valid SIM but can make an emergency call if it is able to connect to an available network in LSS. It is important to clarify what is meant by the term 'SIM-less' as it may be used in other contexts within the industry and the wider user community.

For many years, Mobile Network Operators (MNOs) have locked devices, that they have supplied to their own customers under contract, to their own networks. This means that only SIMs with the profile of the original MNO can be used in the device. SIM locking is very common when the handset provided to the customer is subsidised by the MNO. By way of example, Ofcom UK have compiled information on their website regarding the SIM-locking policies in place by MNOs in the UK [4]. The information states that *"all of EE's and BT Mobile's, and most of Vodafone's handsets are sold locked to their networks. Tesco Mobile also locks most of its pay-as-you-go handsets and some of its pay monthly handsets. Sky's, Three's, Virgin Mobile's and O2's handsets are sold unlocked"*.

A device that is SIM-locked by MNO A which is fitted with a valid SIM with the profile of MNO B will not be able to register on MNO B's network and will camp on an available network in LSS mode.

Many mobile handset retailers use the term SIM-free when advertising a device that is not locked to any particular network and is being sold without a SIM. In the second-hand market for mobile handsets it is well-known that the functionality of the handset is tested by making an emergency call. This practice is discouraged by regulators and is one of the main reasons for some countries blocking access to emergency services from devices that are SIM-less.

The term SIM-free (which can be confused with SIM-less) is sometimes also used when referring to a device containing an embedded SIM (eSIM) which does not have a slot to fit a physical SIM card. The eSIM provides the capability of managing subscriptions remotely using over-the-air provisioning technology. The concept is described in ECC Report 274 [5].

Whether the device has a slot for a physical SIM card or the SIM is embedded within the device, the same rules apply regarding LSS.

## 2.5 ECALL

A specific type of emergency call is an eCall. This is an automatic call triggered when a car fitted with an eCall device (an In Vehicle System or IVS) crashes. It is also possible to make an eCall manually by pressing a button in the vehicle. When the eCall device in such a car is triggered, either automatically or manually, an emergency call is set up. The IVS is activated and it tries to register on an available network. As part of the network registration process, and before call set-up, the identity of the subscriber – International Mobile Subscriber Identity (IMSI) stored on the SIM - is sent to the subscriber's PLMN Home Location Register/Home Subscriber Server (HLR/HSS) for authentication. Should the IMSI authentication fail for any reason then, subject to network operator and national regulatory policies, it may not be possible to establish an eCall. In this event the IVS responsible for the eCall system shall continue to attempt to search and register on another network.

The network registration attempts shall continue until a number of retries or timeout events (specific values are specific to the in-vehicle equipment manufacturer) or available power is exhausted. If network registration fails but networks are present, it shall in any case attempt to make the eCall.

In some countries it is possible to make an emergency call without prior authentication. However, authentication where possible is preferred, to enable call-back.

During the network registration and authentication process the location of the IVS responsible for the eCall system Network Access Device (NAD) is determined from the identity of the cell on which the NAD is camped and this is stored as a location update in both the HLR/HSS and Visitor Location Register (VLR).

Because authentication is not performed during a LSS emergency call, the PSAP cannot in some circumstances receive a valid CLI. In this case, it will not be possible for the PSAP operator to call back the IVS responsible for initiating the eCall.



### 3 REGULATORY FRAMEWORK

In December 2018, Directive 2018/1972 [6] establishing the European Electronic Communications Code (EECC) entered into force. The Directive must be transposed by Member States by 21 December 2020. On 5 September 2019, the Court of Justice of the European Union (CJEU) ruled that SIM-less calls to '112' should be located. The Court's ruling was based on the prevailing legislation at the time.

Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002, still in force, concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications), otherwise known as the ePrivacy Directive, safeguards the confidentiality of electronic communications in the EU. The ePrivacy Directive is a key instrument to protect privacy and it includes specific rules on data protection in the area of telecommunication in public electronic networks.

For the purposes of this Report it is therefore important to provide context and describe the legislation applicable at the time of the Court's ruling as well as the legislation that will prevail on publication of this Report.

#### 3.1 EUROPEAN DIRECTIVES

The European legal framework for electronic communications services, including calls to emergency services, and caller location information availability obligations has changed a lot in the last two decades as technologies have developed and markets have evolved.

The European level legal provisions for emergency calls were incorporated in Article 26 of the Universal Service Directive [7] (hereinafter referred to as "the USD").

The original Article 26 of the USD from 2002 established the main provisions and obligations attached to '112' – the Single European emergency call number, including caller location information processing, that are highlighted as follows:

- *"Member States shall ensure that, in addition to any other national emergency call numbers specified by the national regulatory authorities all end-users of publicly available telephone services, including users of public pay telephones, are able to call the emergency services free of charge, by using the single European emergency call number '112'".*
- *"Member States shall ensure that calls to the single European emergency call number '112' are appropriately answered and handled in a manner best suited to the national organisation of emergency systems and within the technological possibilities of the networks".*
- *"Member States shall ensure that undertakings which operate public telephone networks make caller location information available to authorities handling emergencies, to the extent technically feasible, for all calls to the single European emergency call number '112'".*

The original provisions from 2002 concentrated on the call, as a main definition factor, all obligations, namely free of charge access, handling and answering, and caller location information transmission were attached to this definition. The amendment of the USD in 2009 maintained the main obligations of the provisions, but enhanced some aspects of the main elements:

- *"Member States shall ensure that all end-users of the service referred to in the next paragraph, including users of public pay telephones, are able to call the emergency services free of charge and without having to use any means of payment, by using the European emergency call number '112' and any national emergency call number specified by Member States".*
- *"Member States, in consultation with national regulatory authorities, emergency services and providers, shall ensure that undertakings providing end-users with an electronic communications service for originating national calls to a number or numbers in a national telephone numbering plan provide access to emergency services".*
- *"Member States shall ensure that calls to the European emergency call number '112' are appropriately answered and handled in the manner best suited to the national organisation of emergency systems. Such calls shall be answered and handled at least as expeditiously and effectively as calls to the national emergency number or numbers, where these continue to be in use".*

- *"Member States shall ensure that undertakings concerned make caller location information available free of charge to the authority handling emergency calls as soon as the call reaches that authority. This shall apply to all calls to '112'. Member States may extend this obligation to cover calls to national emergency numbers. Competent regulatory authorities shall lay down criteria for the accuracy and reliability of the caller location information provided".*

The definition factor for the three main obligations still depends on the calls, but the content of these obligations is specified.

In the case of the caller location information obligation, a new element was the definition and involvement of the service provider undertakings, who were obliged to provide access to emergency services and transmit caller location information to the PSAPs, free of charge and as soon as the actual call reached the PSAP. However, the USD gave freedom to Member States to lay down criteria for the accuracy and reliability of the caller location information provided.

Article 109 of the new European framework for electronic communications, the EEC, retains the main obligations of the earlier legislation, but broadens the scope in every way for emergency communications, with a new definition factor, using access to emergency services as a basis:

- *"(1) Member States shall ensure that all end-users of the services referred to in the next paragraph, including users of public pay telephones, are able to access the emergency services through emergency communications free of charge and without having to use any means of payment, by using the single European emergency number '112' and any national emergency number specified by Member States. Member States shall promote the access to emergency services through the single European emergency number '112' from electronic communications networks which are not publicly available but which enable calls to public networks, in particular when the undertaking responsible for that network does not provide an alternative and easy access to an emergency service".*
- *"(2) Member States shall, after consulting national authorities and emergency services and providers of electronic communications services, ensure that providers of publicly available number-based interpersonal communications services, where those services allow end-users to originate calls to a number in a national or international numbering plan, provide access to emergency services through emergency communications to the most appropriate PSAP".*
- *"(3) Member States shall ensure that all emergency communications to the single European emergency number '112' are appropriately answered and handled in the manner best suited to the national organisation of emergency systems. Such emergency communications shall be answered and handled at least as expeditiously and effectively as emergency communications to the national emergency number or numbers, where those continue to be in use".*
- *"(5) Member States shall ensure that caller location information is made available to the most appropriate PSAP without delay after the emergency communication is set up. This shall include network-based location information and, where available, handset-derived caller location information. Member States shall ensure that the establishment and the transmission of the caller location information are free of charge for the end-user and the PSAP with regard to all emergency communications to the single European emergency number '112'. Member States may extend that obligation to cover emergency communications to national emergency numbers. Competent regulatory authorities, if necessary after consulting BEREC, shall lay down criteria for the accuracy and reliability of the caller location information provided".*

The EEC uses the term "communication" as opposed to "call". This entails a notion of a more broader communication service scope, as also reflected in recital 285 where emergency communications is described as *"a means of communication that includes not only voice communications services, but also SMS, messaging, video or other types of communications, for example real time text, total conversation and relay services. However Member States are given a margin of appreciation as to which number-based interpersonal communications services are appropriate for their emergency services, including the possibility to limit those options to voice communications services and their equivalent for end-users with disabilities, or to add additional options".*

Guidance on the distinction between number-based and number-independent interpersonal communications services can be found in EEC recital 18:

*"Interpersonal communications services using numbers from national and international numbering plans connect with publicly assigned numbering resources. Those number-based interpersonal communications services comprise both services to which end-users numbers are assigned for the purpose of ensuring end-to-end connectivity and services enabling end-users to reach persons to whom such numbers have been assigned. The mere use of a number as an identifier should not be considered to be equivalent to the use of a number to connect with publicly assigned numbers and should therefore, in itself, not be considered to be sufficient to qualify a service as a number-based interpersonal communications service. Number-independent interpersonal communications services should be subject to obligations only where public interests require that specific regulatory obligations apply to all types of interpersonal communications services, regardless of whether they use numbers for the provision of their service. It is justified to treat number-based interpersonal communications services differently, as they participate in, and hence also benefit from, a publicly assured interoperable ecosystem."*

Caller location information provisions are exactly defined in Article 2(40) of the EEC, where caller location information means, *"in a public mobile network, the data processed, derived from network infrastructure or handsets, indicating the geographic position of an end-user's mobile terminal equipment, and, in a public fixed network, the data about the physical address of the network termination point"*.

It is however worth highlighting, that the EEC lays down the main provisions of emergency communications and caller location information, but according to these provisions, there are still remaining points, that have to be regulated on a Member State level, within the discretion of the Member States, taking into account the national circumstances.

With the new EEC legislation the reception and use of caller location information, including both network-based location information and where available, enhanced handset-based caller location information, improves the level of protection and the security of end-users and assists the emergency services in the discharge of their duties, provided that the transfer of the emergency communication and associated data to the emergency services concerned is guaranteed by the national system of PSAPs.

Undertakings that provide network-based location should make caller location information available to emergency services as soon as the call reaches that service, independently of the technology used. However, handset-based location technologies have proven to be significantly more accurate and cost effective due to the availability of data provided by satellite systems (GNSS) and Wi-Fi data.

Therefore, handset-derived caller location information should complement network-based location information even if the handset-derived location becomes available only after the emergency communication is set up.

Caller location information obligations and provisions are specified further by the EEC, and the legislation intends to reflect on the technology and technological improvements, and furthermore also tries to reflect on issues related to emergency calls.

It is important to refer, in this context, the article 10, point b) of the Directive 2002/58, that says:

*"Member States shall ensure that there are transparent procedures governing the way in which a provider of a public communications network and/or a publicly available electronic communications service may override:*

*(b) the elimination of the presentation of CLI and the temporary denial or absence of consent of a subscriber or user for the processing of location data, on a per-line basis for organisations dealing with emergency calls and recognised as such by a Member State, including law enforcement agencies, ambulance services and fire brigades, for the purpose of responding to such calls."*

This means that, only for the purpose of responding to a '112' call, it is permitted to limit the rights of European citizens regarding ePrivacy, by showing information that allows PSAP to get the location of the caller.

### 3.2 JUDGEMENT OF THE COURT OF JUSTICE OF THE EUROPEAN UNION IN CASE C-417/18

As highlighted in the introduction, the questions on the legislation and technical details around SIM-less calls were recently brought in front of the Court of Justice of the European Union in case C-417/18 [8].

This case was brought before the Court following an incident which took place in Lithuania in 2013. The victim, a young girl, called emergency services ten times after being abducted. The PSAP received the calls but the equipment in the PSAP did not show the number of the mobile telephone used, which prevented her from being located. It has not been possible to determine whether the mobile telephone used by the victim was fitted with a SIM card or why her number was not visible at the emergency call answering centre.

In support of their action during the national court case the plaintiff submitted that Lithuania has failed properly to ensure practical implementation of the USD, which provides that the Member States are to ensure that telecommunications undertakings make available, free of charge, to the authority handling emergency calls made to '112', caller location information as soon as the call reaches that authority. That rule applies to all calls made to the single European emergency call number '112'. That failure meant that it was impossible to pass on to operational police officers' information on the victim's location, which prevented the police from coming to her assistance.

The Regional Administrative Court, Vilnius, Lithuania asked the Court of Justice, whether the USD requires Member States to ensure that such location information is made available even where the call is made from a mobile telephone which is not fitted with a SIM card and whether the Member States have some discretion when laying down the criteria relating to the accuracy and reliability of the information on the location of the caller to '112' which enables them to limit that information to the identification of the base station which relayed the call.

The underlying Article 26(5) of the USD from 2009 states:

*"Member States shall ensure that undertakings concerned make caller location information available free of charge to the authority handling emergency calls as soon as the call reaches that authority. This shall apply to all calls to the single European emergency call number '112'. Member States may extend this obligation to cover calls to national emergency numbers. Competent regulatory authorities shall lay down criteria for the accuracy and reliability of the caller location information provided."*

The CJEU judgement stated that *"Article 26(5) of Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive), as amended by Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009, must be interpreted as requiring the Member States, subject to technical feasibility, to ensure that the undertakings concerned make caller location information available free of charge to the authority handling emergency calls to the single European emergency call number '112' as soon as the call reaches that authority, including in cases where the call is made from a mobile telephone which is not fitted with a SIM card."*

*Article 26(5) of Directive 2002/22, as amended by Directive 2009/136, must be interpreted as conferring on the Member States a measure of discretion when laying down the criteria relating to the accuracy and reliability of the information on the location of the caller to the single European emergency call number '112'; however, the criteria which they lay down must ensure, within the limits of technical feasibility, that the caller's position is located as reliably and accurately as is necessary to enable the emergency services usefully to come to the caller's assistance, this being a matter for the national court to assess."*

The CJEU in its judgment notes that it is apparent from the wording of the USD, that *"all calls to the single European emergency call number' are covered by the obligation to make caller location information available"*.

*Furthermore, the CJEU "has previously held that it followed from Article 26(3) of USD 2002/22, in its original version, which corresponds to Article 26(5) in the current version of that directive, that that provision imposes on the Member States, subject to technical feasibility, an obligation to achieve a result, which is not limited to putting in place an appropriate regulatory framework, but which requires that the information on the location of all callers to '112' be actually transmitted to the emergency services."*

"Therefore, it cannot be accepted that calls to '112' made from a mobile telephone not fitted with a SIM card are excluded from the scope of" the USD.

Consequently, the CJEU holds that the USD requires the Member States, "subject to technical feasibility, to ensure that the undertakings concerned make caller location information available free of charge to the authority handling emergency calls to '112' as soon as the call reaches that authority, including in cases where the call is made from a mobile telephone which is not fitted with a SIM card".

The CJEU also finds that although "the Member States enjoy some latitude when laying down the criteria relating to the accuracy and reliability of information on the location of the caller to '112'", those criteria "must, in any event, ensure, subject to technical feasibility, that the position of that caller is located as reliably and accurately as is necessary to enable the emergency services usefully to come to that caller's assistance. The discretion enjoyed by the Member States in laying down those criteria is therefore limited by the need to ensure the usefulness of the information transmitted in enabling the caller to be effectively located and, therefore, in enabling the emergency services to intervene". Since such an assessment is eminently technical and intimately linked to the specific characteristics of the national mobile telecommunications network, "it is for the national court to carry out that assessment".

### 3.3 EUROPEAN COMMISSION OPINION ON SIM-LESS CALLS TO EMERGENCY SERVICES [15]

According to the Treaty on European Union (TEU) and the Treaty on the Functioning of the European Union (TFEU) [9] the supreme authority to interpret EU law, and to review the compatibility of legislation with the treaties is vested in the CJEU. Based on Article 267, with the "preliminary ruling procedure" the CJEU in its Decision gives a legally binding interpretation of EU law confirming that a given Member State's laws, regulations or practices violate the rule of law.

The answer provided in the CJEU's ruling is not only binding on the individual national court which asked it, but as a precedent contains an authoritative interpretation of EU law, binding on all Member States and their authorities. During the previously referred CJEU court case, the European Commission (EC) submitted observations to the CJEU.

The Commission as guardian of the Treaties, intervenes as *amicus curiae* (friend of the court – similar to an expert witness giving a court the benefit of his advice) in preliminary ruling cases. The extract of the main points of the observations of the EC regarding SIM-less calls and the provisions of the USD could be highlighted as follow:

The EC understands that the national court's first question referred for preliminary ruling is aimed at clarifying whether there is an obligation to ensure that end-users of services using a telephone without a SIM card can call the single European emergency call number '112'.

The EC was of the opinion that Article 26 (1) and (2) of the USD provide the obligation to ensure that all end-users of services using "an *electronic communications service which makes national calls by dialling one or more numbers of the national telephone numbering plan*" may call the number '112', and also oblige undertakings providing such services to provide "access to emergency services".

Therefore, the EC considered that the obligation laid down in Article 26 (2) of the USD only covers cases in which the undertaking is already actively providing a given end-user with an electronic communications service for making national calls. In this respect the EC notes that an undertaking provides an electronic communications service enabling national calls to be made to an end-user only if the end-user uses a mobile device equipped with a SIM card and has a telephone number to call.

Therefore, the EC is of the opinion that the USD does not preclude a Member State from enshrining in its national law the obligation for undertakings to allow access to emergency services by dialling '112' from a mobile device without a SIM card. A Member State is therefore, in principle, free to decide whether or not such access should be provided for under national law.

In other words, according to the EC's opinion, Article 26(2), of the USD is to be interpreted as not imposing an obligation to provide access to emergency services by dialling '112' if the call is made from a mobile device

not fitted with a SIM card. However, that provision does not preclude Member States from establishing such a provision or obligation in their national law.

The EC also understands, that by its second question referred for a preliminary ruling, the national court asks whether Article 26(5) of the USD lays down an obligation to make caller location information available where national law provides for the possibility of calling the single European emergency call number '112' without a SIM card.

EC points out that, according to Article 26(5) of the USD, the concerned undertakings are required only when an emergency call is received via '112' to provide caller location information free of charge. It further states that this provision shall apply to *"all calls to the single European emergency call number '112'"*, without distinguishing between devices with and without a SIM card.

The EC underlines, that Article 26(5) of the USD is to be read and applied in conjunction with Article 26(3), of the Directive, according to which Members States must ensure that calls to the single European emergency call number '112' are *"appropriately answered and handled in the manner best suited to the national organisations of emergency systems"*.

According to the Commission, appropriate call handling means that the emergency services system is able to ensure that caller location information is transmitted and received in a timely manner, meaning, if a national law allows individuals to call '112' without a SIM card, the national emergency call centre system should have been equipped with the device enabling it to properly receive calls to '112' and to properly process caller location information.

In view of the foregoing, the EC considered, that where the national law provides for the possibility to call the European emergency number '112' in the absence of a SIM card, Article 26(5) of the USD is to be read as the information relating to the caller location must be made available to the authority handling the emergency calls, and Article 26(3) of the USD meaning that this authority must react effectively and respond to the calls to the European emergency call number '112' to provide the assistance necessary.

## 4 TECHNICAL COMPLIANCE WITH THE LEGAL OBLIGATIONS IN CASE OF EMERGENCY CALLS FROM DEVICES THAT ARE SIM-LESS FROM DEVICES IN LSS FOR ANOTHER REASON

ECC Report 225 [10] provides a comprehensive overview of the various methods to obtain emergency caller location information and provide that information to the PSAP. Following consideration of the CJEU ruling and the EC opinion, this section considers the technical feasibility and options for obtaining and providing caller location information from devices that are SIM-less or in LSS for another reason.

### 4.1 NETWORK-BASED LOCATION INFORMATION (CELL-ID)

The most universally available location information for any emergency call originating on a mobile device is Cell-ID. With Cell-ID, the position of a mobile terminal is estimated with the knowledge of the geographic position of its serving radio equipment (e.g. cell tower). Many location-based services applications establish the location of the user by simply identifying which base station the user is connected to when making the emergency call. This basic form of location information is independent of the mobile terminal and, therefore, can be provided for emergency calls originating from SIM-less devices or devices in LSS for another reason.

One of the main disadvantages of Cell-ID is that in large cell areas (e.g. with a radius of up to 35km) the location information may not be very helpful in pinpointing the caller.

Enhanced versions of Cell-ID offering greater precision in large cell areas are available. These include Cell-ID with Timing Advance (2G), Cell-ID with Round Trip Time (3G), Cell-ID with Path loss and Related Measurements, Cell-ID with Angle of Arrival and Radio Frequency (RF) Pattern Matching. These methods are all described in Chapter 7 of ECC Report 225. If a mobile network supports an enhanced version of Cell-ID then it may be technically possible to provide enhanced location information for emergency calls from SIM-less devices or devices in LSS for other reasons. In Lithuania for example, more enhanced location information is made available for such calls. This provides a more precise breakdown of the location of the device with the whole cell area as illustrated in Figure 1 below:

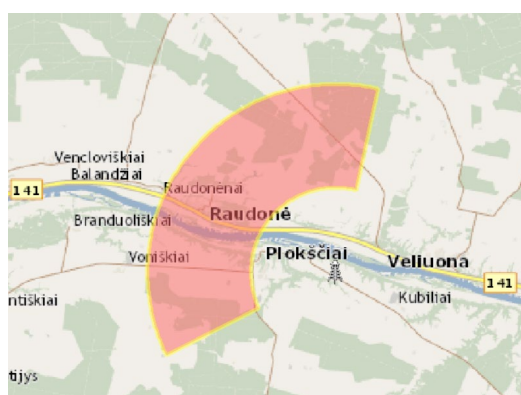


Figure 1: More precise location using enhanced Cell-ID techniques (Source: LT 112)

### 4.2 HANDSET-BASED LOCATION INFORMATION (ADVANCED MOBILE LOCATION)

Modern mobile devices with Global Navigation Satellite System (GNSS) capabilities can calculate a very accurate location. In Europe, a technology called Advanced Mobile Location (AML) has been widely deployed. In the event of an emergency call, an AML-enabled device (all Android and iOS devices worldwide support AML) will automatically calculate its position and send this location information to the emergency services. The device also has the capability to augment GNSS location information with Cell-ID and location information obtained from nearby Wi-Fi devices to further verify the accuracy and reliability of the location information received. It should be noted that even though almost all smartphones in the world support AML, the infrastructure for supporting it may not yet be available in all countries. AML is currently deployed in 23 CEPT countries (Austria, Belgium, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Malta [16], Moldova, The Netherlands, Norway, Romania, Slovenia, Sweden, United Kingdom) as well as in New Zealand, United Arab Emirates and the US [11].

The transport mechanism used to send the location information of the caller to the PSAP is either by SMS or HTTPS. ETSI has produced a technical specification describing the transport mechanism for AML. It states that *"in case the citizen initiates an emergency call but the handset has no coverage from the home MNO, the call is handled by another mobile network operator with signal coverage in that area. In this limited service state it is currently not possible to send an SMS, as the technical standards only allow emergency voice calls (normally without it being possible to supply an MSISDN), nor would transport using HTTPS always be possible (which requires a data subscription to be verified on home network or a Wi-Fi connection)"* [12].

Mobile handsets in LSS would thus not be able to transport AML location information from the handset to the PSAP. Consequently, this means that SMS to 112 services available in some European countries for persons with disabilities would also not be possible.

### 4.3 CALLER LOCATION THROUGH IMEI

CLI is a very important parameter for the emergency services. Firstly, with a valid and diallable CLI, a call-back can be initiated by the PSAP and, secondly, the PSAP call taker may be able to determine or assume from the CLI if the call originates from a fixed, mobile or nomadic service. The CLI also provides a unique reference for subsequent call queries including recordings.

Calls from devices that are SIM-less or from devices in LSS for another reason will not provide a CLI to the PSAP. Therefore, a call-back will not be possible.

Under normal circumstances, a valid CLI does make it easier to identify the subscription associated with the device and in many cases the subscriber will also be the caller.

In some CEPT countries (e.g. The Netherlands, Norway and Romania), databases exist and are available to the PSAPs which allow them access to information related to a subscription which could include an address associated with the number presented as CLI. This could be useful in helping to complement caller location information received automatically from the network or from the handset. These databases will not be effective for emergency calls from devices that are SIM-less or for calls from devices which may be in LSS for another reason.

In such cases where the CLI cannot be determined and transmitted to the PSAP by the originating network, the originating network should provide alternative information to the PSAP [13]. In this situation, an identifier of the device (i.e. IMEI) or the SIM in the case of a device with a valid SIM in LSS for another reason (i.e. IMSI), may be transmitted by the originating network. When only the IMEI is received, the PSAP call taker can deduce that the call is from a device in LSS and possibly does not have a valid SIM. Some examples follow:

In October 2020, Finland decided to implement an Alternative Identity (A-id) for an emergency call from a SIM-less device using the following notation based on the originating network:

**Table 1: Finland’s implementation of an Alternative Identity (A-id) for an emergency call from a SIM-less**

Originating MNO	A-id for a SIM-less emergency call
MNO 1	+358 112 <IMEI7>
MNO 2	+358 113 <IMEI7>
MNO 3	+358 114 <IMEI7>
MNO 4	+358 115 <IMEI7>
Notes: +358 11X is defined as emergency "A-id-range" in the national numbering plan IMEI7 is the last seven (7) digits of the device's IMEI-code	



Based on the range +358 11X, the PSAPs in Finland are immediately able to identify incoming emergency calls from SIM-less devices. They are also immediately able to identify the originating operator and to immediately conclude that the A-id presented is not a diallable number.

With the IMSI, the PSAP operator can deduce that the call is from a device with a valid SIM but in LSS for another reason. In the UK, the IMEI and IMSI are used together to differentiate between calls from SIM-less devices which are prohibited on the network and calls from devices fitted with a valid SIM but in LSS for another reason which are allowed. The IMEI/IMSI can be used by the PSAP to link the voice call and the location information received.

Depending on the solution implemented by PSAPs ("push" or "pull" method), the IMEI and IMSI may also be useful to interrogate databases containing location information.

#### 4.4 PRIORITISATION ON TELECOM NETWORKS

According to ETSI TR/102180 V1.5.1 [18] it should be possible to give priority to emergency calls over all other calls. This priority should be maintained across public communications networks but does not imply a privilege of pre-emption. In case of mobile networks priority should be given by the MSC to calls towards the PSAP.

Calls to '112' from devices that are SIM-less or in LSS for another reason have the same prioritisation on networks as other calls to '112'. This is because the priority is given on the type of call placed (i.e. '112' or a national short code). The emergency calls to '112' from devices that are SIM-less or in LSS for another reason are handled in the same way in the network as normal emergency calls.

No common approach exists for prioritising SMS messages sent to emergency services.

#### 4.5 TECHNICAL FEASIBILITY

The USD, in its original version, imposes on the Member States, subject to technical feasibility [14], an obligation to achieve a result, which is not limited to putting in place an appropriate regulatory framework, but which requires that the information on the caller location for all calls to '112' be actually transmitted to the emergency services. Therefore, calls to '112' made from a mobile telephone not fitted with a SIM cannot be excluded from the scope of the USD.

*According to the recital 284 from EEC, "Providers of number-based interpersonal communications services have an obligation to provide access to emergency services through emergency communications. In exceptional circumstances, namely due to a lack of technical feasibility, they might not be able to provide access to emergency services or caller location, or to both. In such cases, they should inform their customers adequately in the contract. Such providers should provide their customers with clear and transparent information in the initial contract and update it in the event of any change in the provision of access to emergency services, for example in invoices. That information should include any limitations on territorial coverage, on the basis of the planned technical operating parameters of the communications service and the available infrastructure. Where the service is not provided over a connection which is managed to give a specified quality of service, the information should also include the level of reliability of the access and of caller location information compared to a service that is provided over such a connection, taking into account current technology and quality standards, as well as any quality of service parameters specified under this Directive."*

The criteria relating to the accuracy and reliability of information on caller location must, in any event, ensure, subject to technical feasibility, that the position of that caller is located as reliably and as accurately as is necessary to enable the emergency services usefully to come to that caller's assistance. Therefore, it cannot be accepted that calls to '112' made from a mobile telephone not fitted with a SIM are excluded from the scope of that provision, as is stated in the CJEU court ruling in case C-417/18.

## 5 SITUATION IN CEPT COUNTRIES

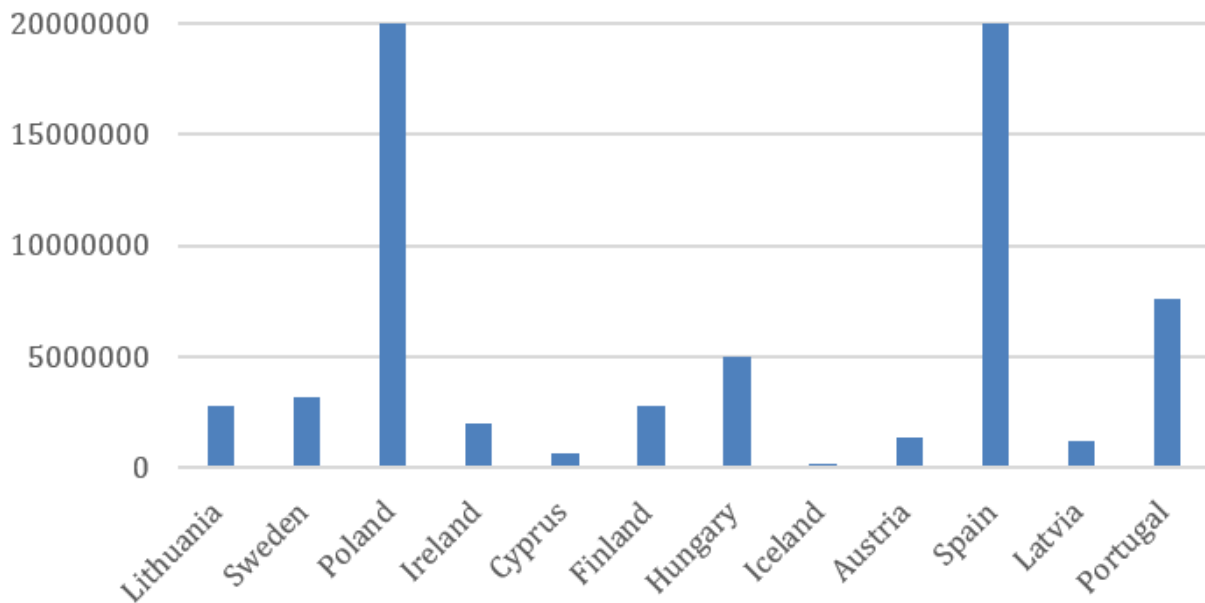
This section of the report provides a summary of the responses received to a questionnaire on calls to emergency services from devices that are SIM-less. The questionnaire was circulated in September 2019 and 23 responses were received from 18 CEPT countries.

### 5.1 COUNTRIES THAT PERMIT EMERGENCY CALLS FROM DEVICES THAT ARE SIM-LESS

From the submissions received, it appears that Austria, Cyprus, Finland, Hungary, Iceland, Ireland, Latvia, Lithuania, Poland, Portugal, Russian Federation, Spain and Sweden all permit calls to emergency services from devices that are SIM-less while Bulgaria, France, Germany, Romania and Switzerland do not.

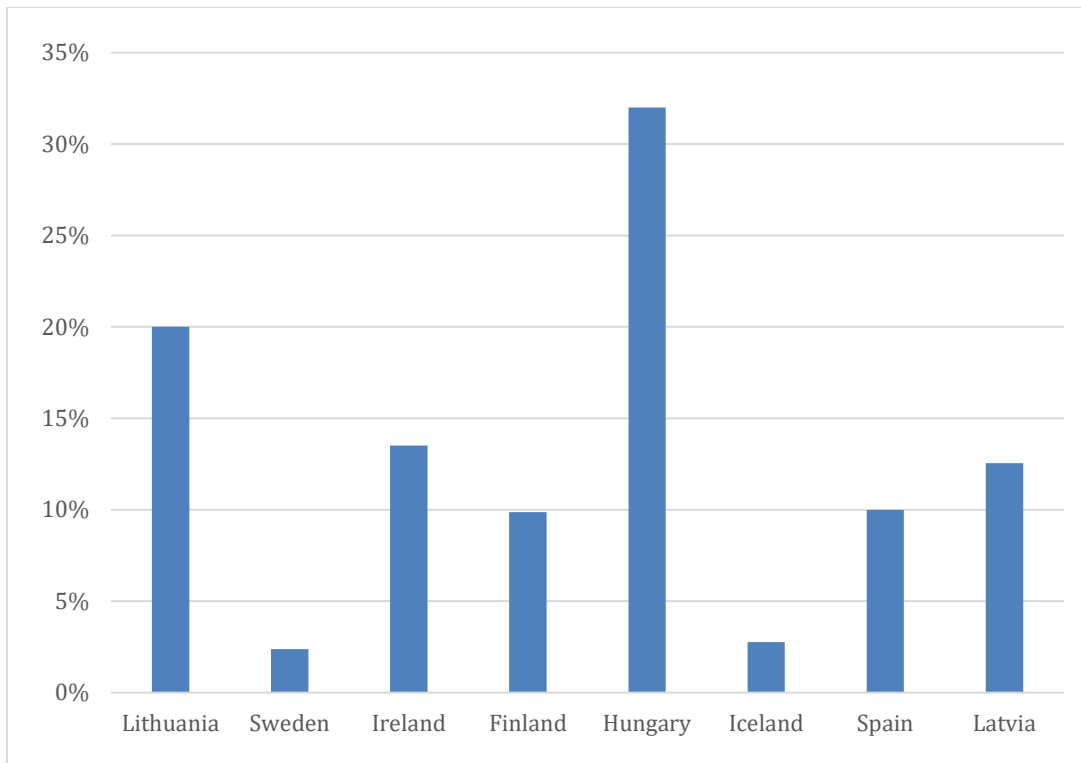
### 5.2 NUMBER OF EMERGENCY CALLS RECEIVED

Not every respondent provided information on the total number of emergency calls received. The table below provides an overview of the information received from some respondents. The number of calls ranges from 200896 in Iceland to 2000000 in Spain (The Spanish figure of 20000000 is for emergency calls originating on mobile devices only).



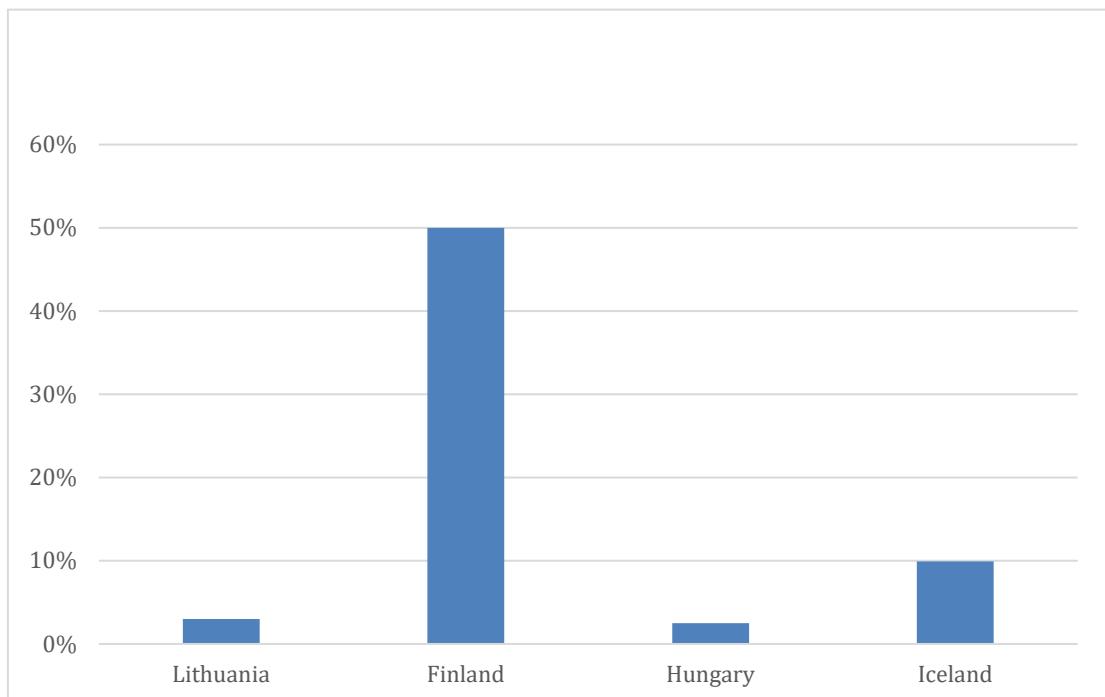
**Figure 2: Estimated no. of emergency calls per country (2018)**

Of those countries that support emergency calls from devices that are SIM-less to '112', some respondents were able to provide an estimate on the number of calls they received from SIM-less devices. The number of SIM-less calls ranges from 5550 in Iceland to less than 10% of the total number of emergency calls received in Spain (i.e. less than 2000000). It should be noted that Poland, Ireland and Spain qualified the figures provided by stating that they could not differentiate between calls from devices that are SIM-less and calls from devices in LSS for another reason.



**Figure 3: Estimated % of total emergency calls that originate from devices that are SIM-less per country (2018)**

Some respondents were also able to provide an estimate as to how many emergency calls from SIM-less devices received were legitimate emergency calls. The number of legitimate SIM-less calls ranges from 551 in Iceland to an estimated 135000 in Finland.



**Figure 4: Estimated % of total emergency calls from devices that are SIM-less which are considered legitimate emergency calls per country (2018)**

## **6 PROVISION OF CALLER LOCATION INFORMATION FOR EMERGENCY CALLS FROM DEVICES THAT ARE SIM-LESS**

All CEPT countries that allow SIM-less calls to emergency services responded that caller location information for such calls was provided (Cyprus, Finland, Hungary, Iceland, Ireland, Latvia, Lithuania, Poland, Portugal, Spain, Sweden and Russian Federation). Cell-ID (or GNSS coordinates for the cell) is automatically provided in almost all cases. In Austria, the automatic pull system solution based on CLI has been implemented for caller location. This solution needs the CLI of the caller for retrieval and delivery of caller location data to the PSAPs. Therefore, it is at present not possible to automatically provide the caller location information for SIM-less calls. As part of the implementation of the EECC in Austria it is planned to establish an explicit obligation to provide caller location for SIM-less calls.

Some respondents mentioned that caller location information is requested from the caller but this is not relevant for the purposes of this Report or the relevant obligations contained in European Legislation regarding the provision of caller location information. Some respondents also stated that they receive the IMEI number for SIM-less calls which can be useful for follow up.

### **6.1 PRIORITY ON NETWORKS FOR EMERGENCY CALLS FROM DEVICES THAT ARE SIM-LESS AND AVAILABILITY OF CALL-BACK**

All respondents in countries where SIM-less calls to emergency services are permitted confirmed that such calls receive the same priority as other emergency calls on mobile networks and that call-back would not be possible as no CLI would be available.

### **6.2 CHANGES IN POLICY REGARDING SIM-LESS CALLS - PAST AND FUTURE**

Several respondents stated that permitting SIM-less calls to emergency services has always been policy. On the other hand, Switzerland, France, Bulgaria and Germany introduced a policy to prohibit such calls due to a high number of false calls or hoax calls. Also calls to emergency services from SIM-less devices to test the functionality of devices when stolen or purchased second-hand was cited as a reason for prohibition.

Finally, of the countries that responded that they do not currently permit SIM-less calls to emergency services, none of them have plans to change that policy.

## 7 CONCLUSIONS

- The information presented in the COCOM report from 2013, as well as the responses to the ECC questionnaire in 2019, shows no change in the situation regarding calls to emergency services from devices that are SIM-less in the last 10 years. 21 CEPT countries allow calls from devices that are SIM-less and 8 CEPT countries prohibit it. There are also no known plans by the respondents to the ECC questionnaire to change their policies in the future;
- The EC opinion states that a Member State of the EU is, in principle, free to decide whether or not to permit calls to emergency services from devices that are SIM-less in national law;
- The CJEU court ruling<sup>1</sup> clarifies that if calls to emergency services from devices that are SIM-less are supported in a Member State of the EU, then caller location information must also be provided to the emergency services with the call, subject that this is technically feasible<sup>2</sup>;
- Based on the findings of the ECC questionnaire, network-based location information is made available to the emergency services in those countries which permit calls to '112' from devices that are SIM-less;
- According to ETSI TS 103 625 [12], emergency calls from devices that are SIM-less or from devices in LSS for another reason, handset-provided location information cannot currently be sent to the emergency services by SMS (as an MSISDN is required) or by HTTPS (as a data connection is required). Consequently, this means that SMS to 112 services available in some European countries for persons with disabilities would also not be possible;
- Depending on the solution for PSAPs, receiving the IMEI and IMSI may also be useful if one of these parameters can be used to access the operator databases containing location information;
- Currently available and potential future technical solutions for the provision of caller location information should be examined to determine if it would be feasible to improve the accuracy and reliability of caller location information for emergency calls from devices that are SIM-less and for emergency calls from devices in LSS for another reason.

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<sup>1</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:62018CJ0417&from=en>

<sup>2</sup> EECC Article 109 (6) does not contain the limitation of technical feasibility "Member States shall ensure that caller location information is made available to the most appropriate PSAP without delay after the emergency communication is set up. This shall include network-based location information and, where available, handset-derived caller location information. Member States shall ensure that the establishment and the transmission of the caller location information are free of charge for the end-user and the PSAP with regard to all emergency communications to the single European emergency number '112'. Member States may extend that obligation to cover emergency communications to national emergency numbers. Competent regulatory authorities, if necessary after consulting BEREC, shall lay down criteria for the accuracy and reliability of the caller location information provided."

**ANNEX 1: LIST OF REFERENCES**

- [1] ETSI TS 123 271 V7.10.0: “Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Functional stage 2 description of Location Services (LCS) (3GPP TS 23.271 version 7.10.0 Release 7)”, January 2010
- [2] Non-Access-Stratum functions related to Mobile Station (MS) in idle mode (3GPP TS 23.122)
- [3] COM(2020) 808 final - REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL on the effectiveness of the implementation of the single European emergency number '112, December 2020
- [4] <https://www.ofcom.org.uk/about-ofcom/latest/features-and-news/mobile-firms-banned-from-selling-locked-handsets>
- [5] [ECC Report 274](#): “Regulatory Analysis of Over-The-Air Provisioning of SIM profiles including its impact on Number Portability”, approved December 2018
- [6] Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (Recast)
- [7] Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users’ rights relating to electronic communications networks and services (Universal Service Directive) (OJ 2002 L 108, p. 51), as amended by Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 (OJ 2009 L 337, p. 11) (‘Directive 2002/22’)
- [8] Case No. C-417/18 - Judgment of the Court (Fourth Chamber) of 5 September 2019 (request for a preliminary ruling from the Vilniaus apygardos administracinis teismas — Lithuania) — AW, BV, CU, DT v Lietuvos valstybė, represented by the Lietuvos Respublikos ryšių reguliavimo tarnyba, the Bendrasis pagalbos centras and the Lietuvos Respublikos vidaus reikalų ministerija
- [9] Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union - Consolidated version of the Treaty on European Union - Protocols - Declarations annexed to the Final Act of the Intergovernmental Conference which adopted the Treaty of Lisbon, signed on 13 December 2007 - Tables of equivalences
- [10] [ECC Report 225](#): “Establishing Criteria for the Accuracy and Reliability of the Caller Location Information in support of Emergency Services”, approved October 2014
- [11] European Emergency Number Association: “AML Report Card”, November 2020
- [12] ETSI TS103 625 V1.1.1: “Emergency Communications (EMTEL); Transporting Handset Location to PSAPs for Emergency Calls - Advanced Mobile Location” December 2019
- [13] ETSI TR 102 180 V1.1.1: “Basis of requirements for communication of individuals with authorities/organizations in case of distress (Emergency call handling)”, February 2007
- [14] Court of Justice of the European Union: PRESS RELEASE No 105/19 - Judgment in Case C-417/18 - Luxembourg, 5 September 2019
- [15] sj.a (2018) 5879014 - Written observations filed, in accordance with Article 23, second paragraph, of the Statute of the Court of Justice of the European Union, by the European Commission October 2018
- [16] Malta Communications Authority - News Article: “The 112 Emergency Service – More Accurate Location Tracking”, March 2018
- [17] ETSI TR 101 292: “Public Switched Telephone Network (PSTN); Protocol over the local loop for display and related services; Proposed enhancements and maintenance of existing standards”, September 1999
- [18] ETSI TR 102 180 V1.5.1: “Emergency Communications (EMTEL); Basis of requirements for communication of individuals with authorities/organizations in case of distress (Emergency call handling)”, July 2015