**ECC Report** 225 - Annex 5

Accuracy & Reliability of Caller Location Information for Emergency Services Calls

 – Summary of Responses to Questionnaire

Questionnaire prepared by ECC/WG NaN/
Project Team Emergency Services (PT ES)

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**LIST OF ABBREVIATIONS**

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|  |  |
| --- | --- |
| **Abbreviation** | **Explanation** |
| **CEPT** | European Conference of Postal and Telecommunications Administrations |
| **ECC** | Electronic Communications Committee |
| **PT ES** | Project Team Emergency Services |
| **PSAP** | Public Safety Answering Point |
| **ERO** | Emergency Response Organisation  |
| **ECAS** | Emergency Call Answering Service |
| **PPDR** | Public Protection and Disaster Relief |

# Introduction

On 10 October 2013, the ECC/WG NaN’s Project Team on Emergency Services (PT ES) issued a questionnaire entitled “Accuracy & Reliability of Caller Location Information for Emergency Services Calls”.

The purpose of the questionnaire was to gain feedback and insights from key stakeholders to assist PT ES to develop an ECC Report the purpose of which is to provide guidance to CEPT member countries to implement EU legislative requirements set out in Article 26(5) of the Universal Service Directive (2002/22/EC).

The closing date for responses was 15 November 2013 which was then extended to 6 December 2013.

Questions 1-17 were addressed to emergency organisations/PSAP operators while questions 18 - 27 were addressed to electronic communications network operators with questions 24-27 specifically addressed to mobile network operators.

This document analyses and summarises the responses received to the questionnaire.

# Breakdown of responses

The following table provides a breakdown of responses received from organisations representing
26 countries:

| **Country** | **Responding Organisation** | **Category of Respondent** |
| --- | --- | --- |
| Austria | Federal Ministry for Transport, Innovation and Technology (BMVIT) | Ministry |
| Bosnia & Herzegovina | Communications Regulatory Agency BH | National Regulatory Authority |
| Croatia | Croatian Post and Electronic Communications Agency (HAKOM) | National Regulatory Authority |
| Cyprus | Office of the Commissioner of Electronic Communications and Postal Regulation (OCECPR) | National Regulatory Authority |
| Cyprus Police | Police  |
| Denmark | Danish National Police  | Police/ Public Safety Answering Pont (PSAP) |
| Copenhagen Fire Brigade | Fire  |
| TDC | Fixed and Mobile Operator |
| Telia | Fixed and Mobile Operator |
| Telenor | Fixed and Mobile Operator |
| Hi3G (Three) | Mobile Operator |
| Estonia | Emergency Response Centre | PSAP  |
| Technical Surveillance Authority | National Regulatory Authority |
| Finland | TeliaSonera | Fixed and Mobile Operator |
| Mobile Positioning/DNA | Fixed and Mobile Operator |
| Emergency Response Centre Administration (ERCA) | PSAP |
| Elisa Oyj | Fixed and Mobile Operator |
| Germany | Deutsche Telekom | Fixed and Mobile Operator |
| Bundesnetagentur on behalf of “Expertengruppe Notruf(EGN)” | PSAP |
| E-Plus Mobilfunk GmbH & Co. KG | Mobile Operator |
| Vodafone | Fixed and Mobile Operator |
| Greece | Ministry of Infrastructure Transports & Networks (MITN) | Ministry |
| Hungary | Hungarian National Police | Police |
| Ireland | Emergency Call Answering Service (ECAS) | PSAP |
| Irish Fire Services | Fire |
| Health Service Executive | Ambulance |
| Meteor | Mobile Operator |
| H3GI / Three | Mobile Operator |
| Italy | Telecom Italia | Fixed and Mobile Operator |
| Latvia | State Fire and Rescue Service | Fire |
| Latvijas Mobilais Telefons | Mobile Operator |
| Telekom Baltija | Fixed Operator |
| Bite | Fixed and Mobile Operator |
| Lithuania | Ministry of Transport and Communications | Ministry |
| The Communications Regulatory Authority of the Republic of Lithuania (RRT) - Co-ordinated response representing the following stakeholders: |  |
| Omnitel | Mobile Operator |
| Bite Lietuva | Mobile Operator |
| Tele2, UAB | Fixed and Mobile Operator |
| TEO LT, AB | Fixe Operator |
| Emergency Response Centre (ERC) | PSAP |

|  |  |  |
| --- | --- | --- |
| Luxembourg | Luxembourg Regulatory Institute (ILR) | National Regulatory Authority |
| Mauritius | Vijay Boojhawon  | Independent Consumer Electronics Professional |
| Montenegro | Agency for Electronic Communications and Postal Services (EKIP) | National Regulatory Authority |
| Norway | Norwegian Post and Telecommunications Authority (NPT) | National Regulatory Authority |
| Poland | Ministry of Administration and Digitisation | Ministry |
| Portugal | Portugal Telecom | Fixed Operator |
| Vodafone | Fixed and Mobile Operator |
| Cabavisao Television | Fixed and Mobile Operator |
| Romania | National Authority for Management and Regulation in Communications (ANCOM) ) - Co-ordinated response representing the following stakeholders: | National Regulatory Authority |
| 112 PSAP operator | PSAP |
| Romanian National Police | Police |
| Romanian National Fire Brigade | Fire |
| Romanian National Ambulance Service | Ambulance |
| Serviciul Mobil de Urgenţǎ, Reanimare şi Descarcerare (SMURD) | Emergency Rescue Service |
| Vodafone Romania | Mobile Operator |
| Orange Romania | Mobile Operator |
| Cosmote Romania | Mobile Operator |
| RCS&RDS | Mobile Operator |
| Romtelecom | Fixed Operator |
| GTS Romania | Fixed Operator |
| NetConnect Internet | Fixed Operator |
| UPC Romania | Fixed Operator |
| Slovak Republic | Ministry of the Interior of the Slovak Republic | Ministry / PSAP |
| Orange Slovensko | Fixed and Mobile Operator |
| Slovak Telekom | Fixed and Mobile Operator |
| Telefónica Slovakia | Mobile Operator |
| UPC Broadband Slovakia | Fixed Operator |
| GTS Slovakia | Fixed Operator |
| Slovenia | Amis | Fixed and Mobile Operator |
| Debitel Telekomunikacije | Fixed and Mobile Operator |
| Detel Global | Fixed Operator |
| Mega-M | Fixed Operator |
| Novatel | Fixed / VoIP operator |
| SI.mobil | Mobile Operator |
| Softnet | Fixed / VoIP operator |
| T-2 | Fixed / VoIP operator |
| Teleing | Fixed and Mobile Operator |
| Telekom Slovenije | Fixed and Mobile Operator |
| Tusmobil - Mobile | Mobile Operator |
| Tusmobil - Fixed | Fixed Operator |
|  |

| **Country** | **Responding Organisation** | **Category of Respondent** |
| --- | --- | --- |

|  |  |  |
| --- | --- | --- |
| Spain | 112 Canarias - Dirección General de Seguridad y Emergencias (Canaries) | PSAP |
| CAT112 (Cataluña) | PSAP |
| Axencia Galega de Emerxencias (Galicia) | PSAP |
| Euskaltel S. A. | Fixed and Mobile Operator |
| 112 Castilla y León (JCyL) | PSAP |
| 112 Castilla-La Mancha (JCLM) | PSAP |
| 112 Murcia (Murcia) | PSAP |
| France Telecom España (Orange) | Fixed and Mobile Operator |
| Vodafone Spain | Fixed and Mobile Operator |
| Telecable de Asturias S.A. | Fixed and Mobile Operator |
| Yoigo | Mobile Operator |
| Sweden | SOS Alarm Sverige AB | PSAP |
| Switzerland | Orange Switzerland | Mobile Operator |
| Backbone Solution AG | Fixed / VoIP operator |
| Sunrise Communications AG | Fixed and Mobile Operator |
| Swisscom | Fixed /Mobile / VoIP Operator |
| United Kingdom | Ofcom | National Regulatory Authority |

97 responses from 27 CEPT countries representing ministries, NRAs, PSAPs, fixed, mobile and VoIP operators and 1 response from an independent consultant based in Mauritius.

# Responses to Questions

## Question 1

PT ES has made a preliminary determination that there are three stages within the service chain where caller location information is needed. They are:

1. To establish the correct PSAP? – Using available caller location information the call is routed from the electronic communications network to the corresponding PSAP (i.e. the PSAP responsible for the area in which the incident occurred);
2. To assign the correct dispatch station/emergency team? – based on the responsibility area of each dispatch station/emergency team per discipline (e.g. police, fire brigade, ambulance) the call is further routed from the PSAP to the correct dispatch station/emergency team (usually the closest available to the incident’s area);
3. To determine the location of the incident and consequently the best route to reach the emergency incident? – based on more accurate caller location information and information obtained directly from the caller (interview) the best incident location is calculated resulting also in the best route being used to reach the emergency.

Respondents were asked if they agreed with the above stages and to provide an explanation if they had a different view.

## Summary of Responses to Question 1

The vast majority of respondents agreed with the 3 stages set out in Question 1. There were some who answered no and provided further information explaining why.

**Denmark** (**Danish National Police)** agreed with stages 1 and 2 noting that the PSAP provides the responding emergency service with the incident’s area. The responding emergency service then determines the best route to the incident.

**Denmark (Copenhagen Fire Brigade)** agreed but noted that stage 2 will also normally be based on further information from the caller in addition to location since in many cases they also perform the actual dispatch.

**Germany (EGN)** answered yes but noted that in Germany assigning the correct dispatch station / emergency team (stage 2) is a matter for the PSAP taking the call (Stage 1) and managing the emergency service actions. The call is typically not further routed to a dispatch station / emergency team. Stage 3 is covered by the PSAP as well.

**Greece (MITN)** also agreed but stressed that there is only one PSAP operating for 112 calls. It is located in Athens. The other 4 national emergency numbers for police, fire brigade, emergency medical service and coast guard are using their own regional PSAPs.

**Ireland (ECAS)** disagreed as the National PSAP and Emergency Response Organisation (ERO) model in Ireland is slightly different. For the purposes of responding to this questionnaire ECAS has attempted to reference the model used where possible. The PSAP in Ireland is an independent stage 1 filtering PSAP and individual EROs do not entirely fit with stage 2 as defined in Question 1. In the Irish model there is a single independent stage 1 PSAP which utilises caller location information to identify the correct Emergency Service and indeed division within the individual services is identified based on operational areas of responsibility. Any available caller location information associated with an emergency call is passed directly to the responsible ERO.

**Lithuania** answered “No” for stages 1 and 2 and “Yes” for stage 3. The reason for this is that in Lithuania, emergency call routing is a different mechanism defined by competent authorities (such as Ministry of the Interior and Ministry of Health) and submitted to public network operators so that they know the PSAPs and the areas they serve and route emergency calls accordingly. We believe that in the scope of Universal Service Directive location data is supplementary to a voice call and the main purpose of it is to locate an incident rather than to find an appropriate PSAP.

**Montenegro** agreed noting that within the Operational Communication Centre’s (OKC 112) systems there is a possibility to integrate with a centralised system for managing traffic signals. However as there is no such centralised system in Montenegro it is not possible for OKC 112, in the case of an accident, to define the nearest route to the scene of an accident.

**Poland** agreed and elaborated by stating that the PSAP is responsible for answering emergency calls and then passing the information, including caller location information, on incidents to a correct dispatch station. The PSAP is not responsible for dispatching and is not involved in determining the best route to reach the emergency location. Currently, the call is answered by the PSAP responsible for the area in which the incident occurred or one substitute PSAP. In the future (2014), in order to reduce the time needed for answering, the calls will be answered by any of 17 PSAPs in Poland who will have the ability to establish caller location and assign to the correct dispatch station.

**Romania** disagreed with the sequencing of the stages. The answers it received from the 4 emergency organisations and the national PSAP operator determines that the correct chain of events in Romania is not 1,2,3 but actually 1, 3, 2 (i.e. determine the PSAP, determine the location of the incident and then dispatch the emergency team). See further details in the answer to Question 2.

**Spain (Galica)** agreed but clarified certain issues regarding each of the stages based on its own experiences:

1. Regarding stage 1, a small percentage of calls (1%) that are made from territories bordering Galicia (Portugal, Castilla y León and Asturias) that are routed to our 112 PSAP in Galicia, should be routed to their respective 112 emergency centers.
2. Regarding stage 2, currently it does not integrate all the 112 services (fire brigade, ambulances, police, etc.), and most of the time it has to carry out additional steps with the emergency call, in order to transfer data to the resources mobilised for the emergency.
3. Regarding stage 3, in some cases the location area from which the emergency call is provided by the mobile operators, covers an extensive area, especially with calls originating in rural areas. In this case, the information it can offer in order to locate the emergency is limited.

**Spain (Vodafone)** noted that every emergency number (short code) that requires location information has a translation to a longer number (normally a geographic number of the national numbering plan). The translation tables from the short code to the long numbers determine another variable, the location. Using specific rules dependent on the type of service (fixed, mobile or nomadic) the location information and based on this, the translation is made from short code to long number and the call is then routed. Vodafone has detected an increasingly complex system to deliver a call to an emergency centre. 112 in Spain is the competence of each Autonomous Community and sometimes there is more than one number to deliver the call to the emergency centre. Considering all the emergency services and all the circumstances there is a really complex system where there are 364 different end-points to deliver calls to depending on the location of the user. This leads to ambiguous situations, for instance, when the service has different numbers for different areas that can be covered by the same cell.

**Sweden (SOS Alarm)** agreed with stages 2 and 3. For stage 1 it currently only uses “municipality ID” to guide the call to the correct PSAP. However, it intends to review using caller location here as well.

## Question 2

This question requested the views of respondents on whether or not they saw any additional uses of caller location information other than those mentioned in Question 1. (e.g. other critical stages where location information is needed, other relevant details related with these stages, from a location information perspective). Respondents were asked to provide as much information as possible.

## Summary of Responses to Question 2

14 respondents answered “No” to this question with **Ireland (Fire Service)** stating that the list was comprehensive and **Poland** noting that the 3 stages outlined in the questionnaire provided a sufficient mechanism to assign the correct emergency team.

14 respondents answered “Yes” and 13 of those provided additional information.

**Austria** considers that additional uses could include identifying nearby parallel incidents, identifying multiple messages on the same incident and identifying similar/other incidents at that location that occurred in the past.

**Croatia**, **Montenegro**, **Slovak Republic** and **Spain (JCLM)** consider that the information could be used effectively to identify fake, hoax or false calls to the emergency services by comparing the content of the call with the caller location.

**Denmark (Danish National Police)** noted that in Denmark the fire service can define special objects at a particular location (e.g. stores of ADR[[1]](#footnote-1) goods). Thus the emergency service can take precautions in an early stage of the incident.

**Denmark (Copenhagen Fire Brigade)** stated that major incidents often produce multiple calls. If caller location is of a reasonable quality (GPS level accuracy) it can also be used to determine the order in which to answer calls. Calls originating in the close vicinity of an already-reported incident are more likely to be an additional call about the already-known incident, so it makes more sense to answer other calls first.

**Finland (ERCA)** considers that caller location information could be used to locate persons that are lost or in distress and **Norway** has a similar view stating that whenever the caller is unable to, or due to the nature of the specific situation does not want to, explain where he/she is.

**Hungary (Hungarian National Police)** considers that caller location information can sometimes be very useful for the public emergency warning systems for example in the case of nuclear power plant accident or a mass collision on the highway. By analysing caller location information from multiple calls, the PPDR organisations are able to evaluate the geographic scope of situation.

**Ireland** (**ECAS)** considers that it would be useful in some cases to be able to report current or recent track (actual course over ground as distinct from heading) for the caller if available to the EROs. This would be of great benefit, for example with incidents such as accidents on motorways, by allowing the EROs to identify the correct carriageway and save valuable time in reaching people. This is incorporated in the eCall standards but would also be of use for conventional calls from mobile phones. Caller Location may also be of use at some time in the future to identify clusters of incidents or emergencies and also allow emergency services to quickly determine if additional calls received are in relation to incidents they may already be responding to (e.g. multi-vehicle accidents, or incidents observed by multiple passers-by). Highly accurate (<5m) caller location information could also be of use to the emergency services to direct the actions of callers in need of assistance if used with accurate mapping and GIS information.

**Switzerland (Swisscom)** considers that caller location information could be used in the process of legal interception where, for example, a child has been kidnapped.

**Sweden (SOS Alarm)** always needs to get a position where the caller is located (if he is at the site of the event). It provides an opportunity for fast and efficient handling of the case by being able to send alerts resources to the right place. Other uses include informing the caller about where the nearest defibrillator (AED) is available. This is used today in the Stockholm area and will be extended over additional areas in Sweden. One should not forget the inverse relationship to caller location, i.e. be able to position the mobile phones that are within a certain geographical area in order to warn them if some accident/emergency events occurs, such as gas emissions. Here is a precise positioning as possible important. In Sweden is such a model under development. The technology is in place, but it requires a change in the law in order to get a generally position within a geographical area in these specific cases. Desirable is a unified (European) vision and standard for this.

**Romania** did not answer “yes” or “no” but provided the following information relating to the steps it follows in handling an emergency call:

1. Call is routed to the right 112 PSAP based on A-number geographic prefix (also for mobile);
2. Cell id/sector id information is passed to the 112 PASP together with the call, in the SS7/ISUP/IAM;
3. The 112 PSAP establish the cell coverage based on a database of cell features sent/updated offline by the mobile operator;
4. The 112 PSAP call taker answers the call (interview begins) – T0 moment; questions related to location and type of emergency are being asked (procedure) – assess location and agencies involved; interview has a max target time of 40 seconds (T0 + 40);
5. Upon assessment, call is passed to relevant agencies’ PSAPs (police, fire brigade…), at county level, including location on GIS maps – call conference;
6. Each agency conducts its specialised interview, if needed, to establish the type and level of intervention needed; also further questions regarding location, if needed, may be asked – total max target time 2 minutes (T0 + 120);
7. The agencies’ intervention teams are being dispatched; depending on the type of intervention and location of the incident the max target times are between 8 and 20 minutes for cars or 1 hour of flight for helicopters; location info is passed via specific resources available (usually TETRA terminals); limited availability of GIS map representation of the incident location; intervention teams are dispatched even if there is no accurate incident location info available;

**Questions 3 to 7**  aim to gather different views regarding important aspects of the accuracy and reliability features of the 112 caller location information which will help shape the definition of the terms “accuracy” and “reliability” of caller location information to be used in the ECC Report.

## Question 3

In Question 3, emergency organisations/PSAP operators were asked if they define any requirements or criteria regarding the "accuracy" of the 112 caller location information. If yes, more information on those definitions was requested.

## Summary of Responses to Question 3

26 respondents answered “No”. Of those some additional remarks were included.

**Croatia** stated that it would be helpful for PSAPs, emergency services and safety of citizens (interest of states) to have any acceptably accurate positioning system.

**Finland (ERCA)** made a remark that accuracy is equal to meters from real location.

**Hungary (National Police)** commented that it used to have a regulatory backbone solution but it currently does not have this.

**Ireland (ECAS)** stated that it requests caller location information but it does not define the required accuracy. This is not currently within the remit of ECAS as the Stage 1 PSAP for Ireland. Fixed line and mobile operators are directed to provide the “best available information” in line with current EU Directives however no other criteria have been defined. The individual agreements that ECAS has in place with the various mobile and fixed line operators cover the requirement to provide caller location information but do not define the required accuracy or reliability.

<http://www.btirelandwholesale.com/pdf/-RIOLIROMainBodyExecutionVersionGenericV3_2.pdf>

**Lithuania** stated that according to a national legislation, the ERC shall propose location information accuracy and reliability criteria to the National Communication Regulator which in turn shall define these criteria.

**Norway** stated that its national requirements are outlined in the Norwegian Electronic Communications Act and the Norwegian Regulations on Electronic Communications Networks and Services (Ecom Regulations). NPT provides the requirements based on the regulations. The emergency organisations/PSAPs give inputs to NPT regarding "accuracy" and other aspects with regard to emergency communications.

**Poland** stated that there is only a general regulation based on article 78.3 of 'The act of 16 July 2004 Telecommunications Law” indicating that ˜information on the location of a network termination point shall mean: 1) for a public fixed telecommunications network “detailed address of a network termination point installation; 2) for a public mobile telecommunications network “geographic location of publicly available telecommunications services user terminal”.

**Romania** stated that no special requirements are currently used. The mandatory requirements apply (cell id/sector id for mobile service, postal address for fixed service, and declared address with special flag in address database for nomadic service).

**Sweden (SOS Alarm)** does not define additional requirements, but on the other hand, its customers require a precise alert address/location and they do not care how they get it.

5 respondents answered “Yes” and provided the following information.

**Ireland (Fire Service)** answered “Yes” and supposed that pinpointing the caller’s actual location, and if possible predicting motion, would be advantageous.

**Montenegro** provided the following details: Due to Article 12. Regulation of the quality of service parameters, limits and methods of measurement parameters for the use of the single European number 112 for emergency calls (Sl.CG, no. 64/2009 of 22.9.2009.):

1. All data provided about location must be accompanied by the identification of the network from which the call begins;
2. Fixed public telephone network operators are obliged to make available the installation address lines from which 112 calls were made, with the requirement that the location area of the caller from a landline does not exceed 100 m2;
3. Public mobile operators are obliged to provide the information about the caller's location, according to the requirement that the area of a circle that determines the caller's location, to be within the circle of radius 100m in 67% of calls or within a circle of radius 300m with 95% of calls across the network based technology;
4. Operators process location data on a non-discriminatory manner. It is specifically prohibited to discriminate between the quality of data about its subscribers and other users of public telephone networks;
5. Software applications that are used to process information about location on the operator side, must support the technology for the processing of caller location, based on calculations time difference dispatch receiving signals from base stations, which allows obtaining information about the location with the required degree of accuracy specified in paragraph 3 of this Article;
6. Operators are required to contact the ministry in charge of electronic communications, for approval - a positive opinion on the equipment, software and hardware that processes information about the caller's location, in order to provide the criteria and parameters to be single platform.

In the **Slovak Republic**, according to the Decree of Ministry of Interior of the Slovak Republic no. 91/2013, providers of fixed telephone networks must provide the address of where the end user terminal is installed. Providers of mobile communications networks must provide sector ID.

In **Spain (Galicia)** the current caller location system for mobile terminals (75% of total calls) could be improved if instead of working with a probability area, it could deal with a GPS position from where the call is made.

**Switzerland (Swisscom)** specified the following criteria:

1. Criterion for “fixed” or “mobile”: Method of location estimation - Criterion “size”: Diameter of the circle, which has an area which is the same as the sum of all location areas delivered for one call (we have in Switzerland per call 1..10 ellipsis);
2. Criterion “hit rate”: percentage how many from 100 calls are in reality inside the location area. This criterion is at least as important as the size. A small size with a bad hit rate is very different in comparison to a small size with a very high hit rate.
3. Criterion “average size city/rural/mountain”: Average size (see definition above) of calls in city/rural/mountain. IMPORTANT: Don’t make a statistic of all cells in the respective areas, as one cell can cover a much larger area, than many small cells somewhere well hidden in a city. We therefore define the average size depending on a test track with a car in the respective area, where we make all 20 seconds a call. The cells hit by these calls are used to calculate the average size of the cell. This reflects better the real world situation, where emergency calls can start anywhere.

While not answering “Yes” or “No”, **Denmark (Copenhagen Fire Brigade)** stated that the requirements depend on the stages outlined in Question 1:

Stage 1: To establish the correct PSAP – Base station coverage area (“Cell ID”) will suffice (but will also generate errors)

Stage 1a: Selection of call answering order - Position within 100 meters. Must be accompanied with quality data e.g. with 90% probability within a reported radius. The more accurate the better until a radius of 5 meters after which further accuracy does not matter greatly.

Stage 2: To assign the correct dispatch station/emergency team - In addition to position within 100 meters with quality data, further incident information (subtype of incident) is needed for dispatch. The more accurate the better until a radius of 5 meters after which further accuracy does not matter greatly.

Stage 3: To determine the location of the incident and consequently the best route to reach the emergency incident - Position with 50 meters (the more accurate the better). Must be accompanied with quality data e.g. with 90% probability within a reported radius. The more accurate the better until a radius of 5 meters after which further accuracy does not matter greatly.

**Ireland (HSE Ambulance)**, while also not answering ”Yes” or “No”, stated that if X and Y coordinates are available this also assists with location identity.

**Greece**, while not answering “Yes” or “No” listed the current requirements in force regarding the accuracy of the “112” caller location information. They are:

1. for fixed telephone connection: the physical address of the fixed telephone connection,
2. for mobile telephone numbers: the best possible accuracy that can be achieved through existing technological capabilities.

There is also a legal obligation for mobile network operators that have location based systems in their networks that allow for better accuracy than the coordinates of the Base Station to provide this type of information.

## Question 4

In Question 4, emergency organisations/PSAPs were asked if they saw the requirements for “accuracy” linked to:

1. information transmitted by the electronic communications network?
2. information transmitted by the end-user terminal equipment?
3. information provided directly by the caller, during the emergency call?
4. other type of information (please specify)?
5. Or, do you believe that there should be differences in requirements between different types of voice services (fixed, mobile, nomadic)? Please elaborate on this.

## Summary of Responses to Question 4

The following table summarises the responses received including additional comments:

| **Country** | **Organisation** | **a** | **b** | **c** | **d** | **e** | **Remarks** |
| --- | --- | --- | --- | --- | --- | --- | --- |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Austria | BMVIT | Y | Y | Y | Y | Y | Accuracy needs to be the best possible for each individual case |
| Croatia | HAKOM | Y | Y | Y |  |  |  |
| Cyprus | All | Y | Y | Y |  |  |  |
| Denmark | Police | Y | Y |  |  |  | Especially with mobile and nomadic service which is often used |
| CPH Fire Brigade | Y | Y |  |  |  | * **For Fixed:** Reliable directory service with official address verification (“geocodable”)
* **For Mobile:** a + b (eCall like behavior)
* **For Nomadic:** a + b (for mobile nomadic an eCall like behavior, for fixed nomadic a real A-number, not just the A-number of the entry point into the fixed network)
 |
| Estonia | All | Y | Y | Y |  |  |  |
| Finland | ERCA | Y | Y |  |  |  |  |
| Greece |  | Y | ? | Y |  |  | The information concerning the name of the caller, may be very helpful as the Emergency Services can take any possible information about the exact location of the caller (being on a mountain, or in a boat on the sea), contacting to his/her home family.In relation to point e) we believe that there’s a greater need for setting accuracy requirements in mobile telecommunications and nomadic voice services, as this would facilitate the process of locating the caller. |
| Hungary | Police | Y | Y |  |  |  | In these cases the harmonised legislation seems to be relatively simple |
| Ireland | ECAS |  |  |  |  | Y | The PSAP Operator and Emergency Service Call Taker should be provided with the best possible information in terms of reliability and accuracy however it should be noted that at various stages of the call and call handling process, the available information can change or be updated e.g. a mobile call may be initially presented with cell mast location only, a few seconds later this could potentially be updated with a caller provided location or indeed a user terminal supplied location (e.g. apps or eCall) or indeed a mobile network derived location via MLS query. The Call handling process should utilise the most up to date and accurate information however this currency, accuracy, and reliability of the different sources or feeds of caller location will need to inform and direct the call handling process and be clearly displayed to the PSAP and ES operators.Requirements and Criteria for the accuracy of Caller Location information should apply to any and all information which can be provided in advance of the call (e.g. database submissions for fixed line installation and Cellular network Cell ID information) and also to any information provided or derived at the time of or during the call including Information provided by the Cellular network (e.g. Cell ID presented with the call and also network derived or handset supplied location to be made available in real-time during the call via mechanisms such as MLP – mobile location protocol or other methods)Differences in requirements and criteria for the provision of caller location information between different types of Voice services are and will continue to be necessary arising from the fact that the type and use of the service as well as the potentially available information will always differ. E.g. for a Traditional home or small business POTS (or derivative) installation, 100% accuracy and reliability in terms of the Installation address should be expected however in the fixed line case of Corporate installations with centralised telephony systems caller location will not always be at the line installation location. This fact however (i.e. that this installation may serve multiple callers not located at the installation address) should be clearly presented to and understood by both the PSAP operator and The Emergency Service call taker by the Telecoms installation provider so that is can be appropriately used in the call handling and assistance processes.As the type and source of Caller location varies depending on the type of the call and also potentially varies during the course of the emergency call it is expected that the accuracy and reliability criteria will also need to reflect this and a model may need to be developed that incorporates the various types of information as well as the use of any subsequently provided or updated information. |
| Fire Service | Y |  |  |  |  |  |
| HSE (Ambulance) | Y | Y | Y |  |  |  |
| Latvia | All | Y |  |  |  |  |  |
| Lithuania | All | Y |  |  |  | Y | There are different ways of a transmission of location data from fixed line and mobile data, so are different accuracy criteria for both. |
| Luxembourg | ILR | Y | Y |  |  |  |  |
| Mauritius | Vijay Boojhawon | Y |  |  |  |  |  |
| Montenegro | EKIP |  |  |  |  |  | There should be no difference between these voice services. The current state should be identical to all three services. With the existence of address model, digital maps with address, location of the caller from a landline is directly related to that address, and it can’t be more accurate. For mobile services everything is defined in the response for previous question, and it depends of that does the informations go through electronic communications network or via the end-user terminal equipment. |
| Norway | NPT | Y | Y |  | Y | Y | Information is collected from "The National Reference Database" (NRDB). All available caller information is accessed via the NRDB. PSAPs only deal with the interface to the NRDB. |
| Poland | Ministry of Administration and Digitisation |  |  |  |  |  | The general criteria listed in the article 78.3 of ˜The act of 16 July 2004 Telecommunications Law” are currently sufficient for the PSAP to establish caller location and assign the correct emergency team to the emergency incident. |
| Romania | All |  |  | Y |  | Y | Interview and interviewing techniques are also very important and cannot be substituted by automated location; location questions during interview are compulsory in order to locate the incident (not necessarily the same thing with the location of the caller), to detail the location via e.g. points of interest in the area, to confirm the correctness of the position obtained |
| Slovak Republic | PSAP | Y |  | Y |  |  | Also see answer to question 3 |
| Spain | Canaries |  | Y | Y |  |  |  |
| Cataluña |  |  |  |  |  | For a PSAP, ideally the level of accuracy should be independent of the technology. In fact, it can be considered a margin of error "reasonable" to give mobile calls. |
| Galicia |  |  |  |  | Y | Requirements should by different depending on the type of voice calls (fixed, mobile or nomadic). If we work on a fixed voice call, the precision is good because we are working with a GPS point, but with a mobile phone call the accuracy in finding the location is very important because it depends if the call comes from an urban or a rural area. |
| JCLM | Y | Y |  | Y | Y | D: CMT databaseE: Yes, we believe that different types of voice services require different criteria (for example: size of the probability area in mobile calls, or the age of the information in fixed phones) |
| JCyL |  |  | Y |  |  | We see the accuracy of the 112 caller location information definition linked to the information provided by the caller, during the emergency call. To check and to confirm any other information related to location data and generated by the networks, by asking directly the caller during the interview, constitutes a basic operative procedure for us. |
| Murcia | Y | Y | Y |  |  |  |
| Sweden | SOS Alarm | Y | Y | Y |  | Y | Yes. Basically, we wish an accuracy of 2 meters. However, we recognise the difficulties for telecom operators to always be able to deliver such accuracy. If we know that we always get an accurate end-user position, we can initially be satisfied with an approximate net position from the network referred to in paragraph (a) and (b) below.* A: Direct in the conversation an approximate position is delivered with an accuracy of about 1000 m, which gives us a municipality.
* B: Within 30 seconds end-user terminal delivers a GPS position with accuracy of 2 meters.
* C: We cannot make any claims on the caller
* D:-
* E: We want to have the same kind of requirements on all types of communication. Our ambition is to build a more precise position over time, i.e. an approximate position from the beginning and as soon as possible a more precise position. Even nomadic IP must be able to be positioned.
 |
| Switzerland | Swisscom |  |  |  |  |  | There should be different requirements for devices which are used on a fixed address and such for devices moving in different access networks. In the second case the requirements should be linked to all technical elements in the call chain, which can influence the accuracy: - a) information transmitted by the end-user terminal equipment: transport without errors, deliver the source of the information too - b) information transmitted by the end-user terminal equipment: Accept them as additional info for PSAP, but if they do, to follow a set of recommendations, where all PSAP have to agree on. Recommendations can be for example to deliver at least beside the localisation the age of information. Problem here: No possibility to enforce any requirements - d) requirements for all access network providers in a country, see the upcoming standards for VoIP calls in the group m493 at ETSI (Swisscom does participate there too). Requirements should be the method used for localisation, and for each method additional technical minimum requirements on the quality of the implementation, as there are many ways to implement them. We have seen many very bad implementations, with a lot of errors. If access networks are not challenged with real-world tests, these errors are never corrected. - Requirements for the VPN case as defined from a contribution of Swisscom in m493 at ETSI |

## Question 5

In Question 5, emergency organisations / PSAPs were asked if they define any requirements regarding the “reliability” of 112 caller location information and to provide that information is relevant.

## Summary of Responses to Question 5

24 respondents answered “No” that they did not define any requirements for “reliability” of caller location information.

Of these, **Croatia (HAKOM)** added that the PSAP is the end-user of caller location information provided by electronic communications operators but that it had no impact on strategic decisions and policies in relation to this matter. Nevertheless, it considers that there should be criteria set regarding “reliability”

Similarly, the **Hungary (National Police)** stated that the emergency organisations do not have competence to regulate the parameters of reliability but they do have needs. Usually these requirements are fitted with the capability of the network providers’ infrastructure.

In **Ireland** the **ECAS** stated “No” under current legislation and agreements whereas the **Fire Service** stated “No” based on proven technologies.

**Lithuania** also stated “No” but according to national legislation ERC shall propose location information accuracy and reliability criteria to the National Communication Regulator which in turn shall define these criteria.

**Norway** stated “No” and referred to its remarks on Question 3 which state that its national requirements are outlined in the Norwegian Electronic Communications Act and the Norwegian Regulations on Electronic Communications Networks and Services (Ecom Regulations). NPT provides the requirements based on the regulations. The emergency organisations/PSAPs give inputs to NPT regarding “accuracy” and other aspects with regard to emergency communications.

In **Poland** the answer is also “No” but like Lithuania provisions exist in legislation. According article 78.6a of ˜The act of 16 July 2004 Telecommunications Law” the President of the Office of Electronic Communications may specify, by means of a decision for a particular operator, detailed requirements concerning the accuracy and reliability of a network termination point location for public mobile telecommunications networks, taking account of technical capabilities and prospects for network development of a particular operator as well as the need to precisely locate the network termination point in order to provide effective help by statutory emergency services. The decision shall also specify the schedule to adapt the network to the requirements specified in the decision with respect to accuracy and reliability of the network termination point location.

7 respondents answered “Yes” with the following additional information provided.

The **Czech Republic’s** requirement is that the caller must be within the provided area in at least 70% of cases.

**Denmark (National Police)** stated that if the location information is not reliable (based on some definition) you must be able to take other considerations into account.

**Finland (ERCA)** stated “Yes” and considers that reliability = real-time. If the information is older than 5 days it will not be used.

**Montenegro** stated “Yes” and cited Article 12. – Regulation of the quality of service parameters, limits and methods of measurement parameters for the use of the single European number 112 for emergency calls.

The **Slovak Republic** stated “Yes” and cited the Decree of the Ministry of the Interior of the Slovak Republic no. 91/2013, which states that providers must provide identification or callers location within 15 seconds in at least 99,5% of cases.

**Switzerland (Swisscom)** also answered “Yes” stating a requirement for a 95% hit rate with an availability requirement of 99.7%.

**Denmark (Copenhagen Fire Brigade)** did not answer “Yes” or “No” but referred to its answer to Question 3 i.e. position should be accompanied with quality data e.g. with 90% probability within a reported radius

**Ireland (HSE Ambulance)** also did not answer “Yes” or “No” but stated that X & Y coordinates, however if the person is making the call for someone else, (patient) then their location details necessary also.

## Question 6

In Question 6 respondents were asked if they saw such requirements/criteria for “reliability” linked to the following 5 options (and if option e was selected to elaborate with more information):

1. the degree of trust of the source generating the location information (e.g. a location information generated by the end-user terminal equipment might be less reliable than an information generated by an electronic communications network)
2. the means (technologies and/or transmission lines) used to generate and transmit the location information from the electronic communications network side to the PSAP/emergency side (e.g. using network components with high reliability or redundancy)
3. issues related to the interpretation of the information received (e.g. use of different geo-referencing systems on the transmitting side and on the receiving side might cause different information being generated)?
4. existence of means to verify, in a timely manner, that the location information received is compliant with the applicable rules (e.g. the information provided which should meet an accuracy level of x does actually meet this requirement)?
5. other issues (please specify)?

## Summary of Responses to Question 6

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Country** | **Organisation** | **a** | **b** | **c** | **d** | **e** | **Remarks** |
| Austria | BMVIT | Y |  |  | Y |  |  |
| Croatia | HAKOM | Y |  | Y |  |  | The harmonised solution across Europe should ensure criteria in all EU states. |
| Cyprus | Police | Y | Y | Y |  |  |  |
| OCECPR | Y | Y | Y |  |  |  |
| Czech Republic | CTO |  | Y |  | Y |  |  |
| Denmark | Danish National Police |  |  |  |  |  | Yes |
| CPH Fire Brigade | Y | Y |  |  |  |  |
| Estonia | All | Y | Y | Y |  |  |  |
| Finland | ERCA | Y | Y |  | Y |  |  |
| Greece |  | n/a | Y | n/a | Y |  | In relation to point e) other issues the information concerning the name of the caller, may be very helpful as the Emergency Services can obtain helpful information about the exact location of the caller (being on a mountain, or in a boat on the sea), contacting to his/her home family, which can be verified with the electronic communication network information. |
| Hungary | National Police | Y | Y | Y |  |  |  |
| Ireland | ECAS | Y | Y | Y | Y | Y | Remark on a): The source of caller location information should be considered in terms of the reliability of that information to be used in Call handling and Emergency Caller location. This is particularly relevant to user supplied information e.g. the Handset supplied information or indeed subscriber provided address details used for VoIP Service accounts which are typically not verified by the provider. Higher reliability requirements should be expected and associated with Service provider supplied information.Remark on b): It should be clarified however that the protocols and standards for the transmission of location information (once determined) should control or eliminate the possibility for transmission error i.e. if a location is to be transmitted it should be verifiable at the receiving side as being 100% correct or it should simply be ignored if it cannot be verified as being transmitted correctly. The reliability of the transmission of caller location (i.e. once the information is received can it be considered accurate and reliable) is considered to be a different question to availability as a function of the ability to send or receive the information dependent on reliable transmission and redundancy.Remark on c): Again however it should be clarified that the protocols, standards and mechanisms for the transfer of caller locations information should eliminate the potential for this type of interpretation error. Standard coordinate reference systems are widely used and it is expected that agreement on the CRS to be used in specific cases would eliminate these errors.Remark on d): The definition of a Timely manner however is expected to involve some discussion. If this is taken to mean validation and verification of information available at the time of the call then the expectation is that this could only be achieved through the comparison of multiple sources of information (e.g. Cell Location and Handset supplied GPS co-ordinates). If multiple sources of caller location information are available then it may be reasonable to expect that the decisions and location components of the PSAPs systems would indicate reliability based on a relative comparison of multiple sources of information. In practice however this could be quite difficult to achieve and report on requiring significant changes to the existing systems.After the fact reporting (either automated or manual) or indeed data sampling (through drive testing or other means) can also provide some indication that the data provided is compliant with the relevant criteria however these methods will also add to the cost of PSAP operations. Remark one): Any agreed or mandated criteria for reliability should clearly define “reliability” and should specifically incorporate and reference “availability” of information as a component of reliability as covered above. |
| HSE |  |  |  |  |  | CLI and location information should be transmitted by the communication device in every instance and verbal and other communication methods should complement this. |
| Latvia | All | Y | Y |  |  |  |  |
| Lithuania | All | Y | Y | Y | Y |  |  |
| Luxembourg | ILR | Y | Y | Y |  |  |  |
| Mauritius | Vijay Boojhawon | Y |  |  |  |  |  |
| Montenegro | EKIP | Y | Y | Y | Y |  |  |
| Norway | NPT | Y | Y | Y | Y |  |  |
| Poland | Ministry of Administration and Digitisation |  |  |  |  |  | The regulations of ˜The act of 16 July 2004 Telecommunications Law” are currently sufficient for the PSAP to establish caller location and assign the correct emergency team to the emergency incident. If necessary, according the article 78.6a of ˜The act of 16 July 2004 Telecommunications Law”, the President of the Office of Electronic Communications may specify, by means of a decision for a particular operator, detailed requirements concerning the accuracy and reliability of a network termination point location for public mobile telecommunications networks. |
| Romania | All |  | Y | Y | Y | Y | The reliability issue, as a general concept, should be kept in mind and dealt with during the design of the specific technical implementing solution phase (i.e. the solution for passing the location information from telecom side to emergency side and inside emergency). |
| Spain | Canaries | Y |  |  |  |  |  |
| Cataluña |  |  |  |  |  | No |
| Galicia | Y | Y |  | Y |  |  |
| JcyL |  |  |  |  |  | We see the reliability of the 112 caller location information definition linked to the information provided by the caller, during the emergency call. To check and to confirm any other information related to location data and generated by the networks, by asking directly the caller during the interview, constitutes a basic operative procedure for us. |
| JCLM |  |  | Y |  |  |  |
| Murcia | Y | Y | Y | Y |  |  |
| Sweden | SOS Alarm | Y | Y | Y | ? | ? | It would be very interesting, if we can get an indication of the reliability together with the incoming emergency call, for example, information on the technology that generated the position, if it is the same geodatasystem as the PSAP uses, when the position was last updated etc. |
| Switzerland | Swisscom |  |  |  |  |  | It is very important that a minimum hit rate is defined, required and tested in a regular way by independent companies. Based on experience in Switzerland a minimum hit rate of 95% should be defined and tested. Any hit rates below this criterion create unnecessary insecurity on level PSAP. |

## Question 7

In Question 7, respondents were asked if they believed that there should be differences in the definitions between different types of voice services (e.g. fixed, mobile, nomadic) and to elaborate on their response.

## Summary of Responses to Question 7

16 respondents answered “Yes”.

**Croatia (HAKOM), Germany (EGN) and the Hungary (National Police)** added that different technologies with different capabilities and using different methods for positioning require different definitions.

**Ireland (ECAS)** agreed noting that different means of determining caller location already dictate to a great extent the differences in definitions for accuracy and reliability between different types of voice services. For Fixed line services it should be considered that there is a relatively slow installation/deployment/change rate and that in general fixed line by definition identifies a place where that installation is located. It is therefore not unreasonable to expect 100% availability and reliability, as well as accuracy of <10m of provided location for fixed line installations. For Mobile Services this again is highly dependent on the technologies both on the handset and within the network itself and the criteria for availability, accuracy and reliability are likely to be complex. For Nomadic services such as VoIP this is a much bigger consideration e.g. it could be expected that there should be 100% reliability in stating that the line in question is in fact a potentially Nomadic service but beyond that further criteria are required in terms of accuracy and reliability.

**Ireland (Fire Service)** considers that Nomadic is the issue nowadays.

**Finland (ERCA)** stated that in fixed lines the installation address should be provided whereas in mobile a measured point should be provided.

**Norway** stated that there should be 3 levels of requirements based on the nature of the types of voice service: 1. Fixed, 2. Nomadic and 3. Mobile.

The requirements are already set out in legislation in **Poland**. It stated that in the range of accuracy the differences are already indicated in the article 78.3 of “The act of 16 July 2004 Telecommunications Law“ different definition of “information on the location of a network termination point” for a public fixed telecommunications network and for a public mobile telecommunications network. Also if necessary, according the article 78.6a of ˜The act of 16 July 2004 Telecommunications Law”, the President of the Office of Electronic Communications may specify, by means of a decision for a particular operator, detailed requirements concerning the accuracy and reliability of a network termination point location for public mobile telecommunications networks.

**Romania** also has established requirements. Current status for automated location:

1. Mobile calls: cell id/sector id information sent with the call to 112 PSAP where a database with cell/sector technical characteristics is maintained, helping draw an estimate of the cell/sector service area;
2. Fixed calls: the A number identity received at 112 PSAP is matched with the subscriber database maintained from operators’ reporting, resulting in an administrative address;
3. Nomadic calls: similar situation as for fixed calls; operators are also obliged to inform (flag) 112 PSAP when updating the subscriber database about the nomadic use of specific identification entries;

There are (quite) significant differences in requirements between agencies. For some agencies, the current degree of accuracy of the location of the incident poses fewer problems than for other agencies.

**Denmark (CPH Fire Brigade)** considers that 1) Fixed - should have a geocodable directory address, 2) Mobile - should include quality data and 3) mobile nomadic - should include quality data. Fixed nomadic – a real A-number should have a geocodable directory address. Spain (Canaries)

The **Slovak Republic (PSAP)** considers that:

1. For the fixed network, the address where end user terminal is installed is usually sufficient.
2. For the mobile networks, the desired accuracy of caller location should be within 50 meters. This is however not achievable with sector ID location method used in Slovakia.
3. Nomadic calls to European emergency number 112 are not possible in Slovakia.

**Spain (Canaries)** considers that the need for different requirements is motivated by the need for greater precision in the case of mobile services due to their nature, where there is a frequent change of location data.

**Spain (Galicia)** stated that the location on mobile and nomadic voice services should include a system in order to report information about the cause associated with failure in receiving this information on the location as this happens in approximately 15% of mobile calls.

**Czech Republic (CTO)** considers that an exact address is required for fixed calls while

**Spain (JCLM)** considers that different types of voice services require different criteria (for example: size of the probability area in mobile calls, or the age of the information in fixed phones)

**Switzerland (Swisscom)** stated that the accuracy of a device used only at a fixed address and a nomadic device cannot be the same. In the first case the situation is easy. It can be required to get the address. In the second case the accuracy is highly dependent on the location determination method. VoIP services can use different networks for the transport and so different location determination methods can be involved. However, Swisscom highly recommend defining one reliability requirement for ALL kind of services and for all kind of methods of location determination! For example a hit rate of 95%. All methods can increase the size of the location determination, until the hit rate is 95%. This way the localisation areas can also be better compared, as it is always a play between the hit rate and the size of the localisation area.

13 respondents answered “No”.

**Denmark (Danish National Police)** believes however that it is a more relevant issue in mobile and nomadic services while **Latvia, Montenegro** and **Ireland (HSE Ambulance)** believe that there should be no differences as accurate location information is required for each incident. This should be recognised on a global basis.

**Spain (Cataluña)** stated that, as a PSAP, we need the maximum possible accuracy and reliability in all types of voice services. In mobile communications, Cataluña can consider less precision.

**Sweden (SOS Alarm)** see the same need for accuracy and reliability regardless the type of voice service.

**Greece** answered “No” however, sometimes in rural areas, the cell coverage maybe too large, which affects the time we need to find the exact point of the caller.

**Questions 8 to 13 address accuracy and reliability related problems encountered and solutions implemented to cope with them, per type of service and geotype. These questions aim to gather any relevant experience of emergency organisations receiving 112 caller location information with insufficient accuracy and/or an insufficient degree of reliability.**

## Question 8

In Question 8, respondents were asked if they have encountered any problems regarding the “accuracy” of the 112 caller location information received from electronic communications networks and, if yes, to describe them.

## Summary of Responses to Question 8

7 respondents answered “No”. 2 respondents added additional comments.

**Hungary (National Police)** noted that they had very little information about this topic so it is possible that there may have been problems but available information suggests that this data collection has not happened in Hungary at PPDR organisations yet.

**Poland** stated that no such problems were reported to them.

21 respondents answered “Yes” and the following additional comments were provided.

**Croatia (HAKOM)** stated that the Cell ID positioning considers the location of the base station to be the location of the caller and communicates the sector information. The network cannot guarantee that the serving cell, which is used to estimate the handset location, is the closest to the caller. The accuracy of this method depends of the size of the cell. This method can be used regardless of the type of phone but the provided accuracy and reliability are not according to emergency services’ needs.

**Lithuania** had similar concerns stating that the main problem is inaccuracy of location data received from mobile networks. To date there is a requirement for mobile network operators to provide location information with Cell-ID accuracy which is basically based on a coverage of each base transceiver station. The error radius ranges from 50 meters to 20 and more kilometers. Longer error radius causes longer time for localisation of the caller therefore response time becomes longer as well. This in turn may put life and health of those calling for help at risk.

**Latvia** and **Luxembourg** commented that only CELL ID information is available.

**Montenegro** stated that mobile operators are able to provide the location of the caller based on the base station (cell, sector) whose accuracy is measured in km2. But by the Regulation of the quality of service parameters, limits and methods of measurement parameters for the use of the single European number 112 for emergency calls, they have to change that.

**Norway** also referred to the higher requirements in European legislation and the new Electronic Communications Act and stated that the accuracy for mobile (and nomadic VoIP) is not good enough today.

**Romania** made a number of points:

1. The coverage of a responsibility zone for an intervention team varies taken into account the specific purpose of the respective agency and the geotype (e.g. smaller for ambulance, larger for fire brigade);
2. Sometimes a cell/sector coverage area intersects several responsibility zones from one agency;
3. Sometimes isolated problems with updating the technical information database;
4. Insufficient accuracy of the location information.

**Denmark (DANISH National Police)** stated that with nomadic service the PSAP often gets misleading information. In mobile services the accuracy with Cell ID varies from 1000 to 4000 meters

**Denmark (CPH Fire Brigade)** pointed out that Cell ID borders do not follow PSAP borders which may cause calls to be transferred to the wrong PSAP.

**Estonia** mentioned experiences where occasional inaccuracy of location data in terms of distances is sent and that the accuracy varies depending on the technological capacity of the network operators.

**Finland (ERCA)** also noted that the accuracy of location information varies widely and it can lead to a situation where the dispatcher does not trust the accuracy of the location information in general and he will rather use false address information than more accurate location information.

**Germany (EGN)** noted the experience of receiving calls from mobile phones where the caller is unaware of his/her location or unable to provide the information verbally.

The **Slovak Republic** considers that in the case of mobile networks, sector ID criteria used in Slovakia are sufficient for the need of basic verification of information provided by the caller, but unless more details are provided by the caller the exact location of incident could not be determined.

**Spain**’s 6 112 PSAPS all answered yes and made the following points:

1. The level of accuracy of location information sent by the Mobile Operators in areas with low levels of density base stations (EEBB) **(Canaries)**.
2. For calls from mobile, the location that receives the PSAP is the POSIC (cell / sector, location). This area is too large to accurately locate the caller **(Cataluña)**.
3. In **Galicia**, they have detected some cases in which the information for the location from a call made from a mobile terminal doesn´t correspond with the location of the caller. In some cases, where the call is made from rural areas, the location area is so large that the information provided on location is very short and limited. The lack of accuracy on this type of information is under the responsibility of the telecommunication operators or phone companies that offer the services.
4. **JCLM** has observed that the information provided by the CMT isn’t accurate.
5. In **Murcia** they found that the 112 caller location information in rural zone is less accuracy than in urban zone.

**Sweden (SOS Alarm)** constantly encounter problems regardless of type of electronic communication. The worst calls are via VoIP where it currently is required to distinguish the calls which do not have a geographic location attached and label them as IP calls. Therefore the SOS Alarm call taker will be extra careful in the interview. The number of such calls is constantly increasing. We don’t have any statistics on the success rate over mobile positioning, but there are many cases where, for example, mobile operators moved base station towers to another geographical area and forgott to reprogram them which has given a total of faulty mobile positioning. We feel that the prospect of a 112 caller location constant becomes worse and worse.

**Switzerland (Swisscom)** noted many problems.

* The PSAPs get different localisations from different sources, where some are reliable and some not. They cannot distinguish from which source they got the information and so they have lost confidence in the sources which were very reliable!
* PSAP in cities would like to see from mobile networks a street name and a house number. When they get areas, which cover several streets and house numbers they are frustrated and do not use any of this information anymore.
* Swisscom has learned the hard way that location areas can be interpreted in many different ways. If for example an ellipse is delivered, it can be interpreted as the most probable point is in the center, or that the most probable point is equally spread over the whole area of the ellipse. It is necessary to provide training for those who use this information, and to teach them also different strategies using this information in a good way. The problem with this is that there are always many different people on the phone receiving emergency calls, and so not all receive the same training, if there is a training at all.
* PSAPs in cities work with maps on street level. When the localisation is covering areas with several streets they see on their screen just all in red, which frustrates them. Therefore they have lost confidence in this kind of information and do not use this information any more, even when it can be very valuable in special situations.

## Question 9

In Question 9 respondents were asked if they identified any possible solutions to the problems identified in response to Question 8.

## Summary of Responses to Question 9

14 respondents answered “No” with the following additional information provided.

**Montenegro** referred to regulations mentioned already which obliges operators to give precise locations. Although this regulation was adopted in year 2009, the operators still do not fulfill their obligations.

**Poland** referred to its answer to Question 8 where it stated that the Ministry had not received reports of such problems and **Spain (Galicia)** considers that the solution to these problems depend on the telecommunications operators or phone companies.

**Sweden (SOS Alarm)** believes that the only solution is regulatory requirements.

16 Respondents answered “Yes” providing the following additional information.

**Croatia** stated that today the PSAP in Croatia has no way to force or persuade mobile network operators to increase the accuracy of positioning using more accurate method (e.g. E-CITA)

The **Czech Republic** stated that secondary location information could be obtained by pull method from the operators.

**Finland (ERCA)** considers that more information about location information accuracy and reliability could be delivered to the dispatcher when he locates the caller while **Romania** stated that these things are usually sorted out during the interview between the dispatcher and the caller.

**Germany (EGN)** considers that smartphone Apps utilising GPS could provide more accurate and reliable information.

**Ireland (ECAS)** regularly notifies fixed line operators of individual issues with installation records and are currently working to improve the overall quality of the fixed line address information. A more long term and consistent solution to the accuracy and indeed reliability of provided fixed line information will only be possible by the fixed line operators undertaking a complete review and enhancement of the information that they hold and make that information available to the PSAP. This is likely to require agreed standards and criteria to be enforced.

**Ireland (HSE Ambulance)** stated that systems should be made 99.999% reliable.

**Lithuania** called for better accuracy within mobile networks with an acceptable error radius of 100 meters.

The **Slovak Republic** stated that in the case mobile services the use of GNSS location data provided by the end user terminal and improvement of location information provided by electronic communication networks would be beneficial. It adheres to the findings identified in the EENA operations document – “Caller Location in Support of Emergency Services“(<http://www.eena.org/ressource/static/files/2011_05_27_2.2.2.cl_v1.3.pdf>)

**Spain (Canaries)** stated that the use and standardisation of smart phone APP´s able to send accurate location information obtained from GPS module of these devices (in GPS coverage area) to the Emergency Centers should be encouraged. 1-1-2 CANARIAS has implemented an international APP called FRESS 1-1-2 that provides not only accurate location, but also the possibility of sending pictures and text chat.

**Spain (Cataluña)** stated that, currently, operators can provide caller position with greater accuracy by using triangulation positioning, and other technologies.

**Spain (JCLM)** stated that it is necessary to establish standards in the information related to the user personal files, provided by communications networks.

**Switzerland (Swisscom)** considers that there is a need to define a minimum reliability for all localisations, i.e. a hit rate of 95%. For every localisation method a short documentation describing how it does work and how the results should be interpreted. Training needs to be provided so that PSAP operators know the strategy on how to handle and interpret the localisation information with all other information received from the caller. There is also a need to define how the center of the ellipse has to be interpreted – i.e. most probable point or nothing special, the most probable point can be anywhere inside. The method used to create the localisation also needs to be marked so that it is known which operator/method created it.

## Question 10

In Question 10 respondents were asked to group the solutions provided in Question 9 into the following categories:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type of service** | **Geotype (only for****mobile)** | **Positioning****method\*** | **Description of the****problem** | **How it affects the****accuracy** | **(Possible) Solution** | **Comments** |
|  |  |  |  |  |  |  |

\*e.g. cell/sector location, TA (Timing Advance), RTT (Round Trip Time), UTDOA (Uplink Time Difference of Arrival), EOTDA (Enhanced Observed Time Difference of Arrival), GNSS (Global Navigation Satellite System), AGNSS (Assisted GNSS), or combinations of the above.

## Summary of Responses to Question 10

The responses are best illustrated in table format:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Respondent** | **Type of service** | **Geo-type (mobile only)** | **Positioning****method\*** | **Description of the****problem** | **How it affects the****accuracy** | **(Possible) Solution** | **Comments** |
| **Czech Republic**  | mobile | any | Operator defined area | Location area too big | Not accurate enough | Using ANY possible method | Need to be required by law |
| **Denmark** | Mobile | all | Cell ID | Cell ID borders does not follow PSAP borders which may cause call to be transferred to the wrong PSAP |  | promote mandatory eCall like behavior for all mobile devices calling 112 |  |
| **Finland****(ERCA)** | mobile  | all  | Depends of mobile operator cell/sector location, TA (Timing Advance), RTT (Round Trip Time), UTDOA (Uplink Time Difference of Arrival), EOTDA (Enhanced Observed Time Difference of Arrival),  |  |  |  |  |
| **Germany** EGN | mobile | dense urban, urban and rural | GPS |  | Increases accuracy significantly compared to Cell ID | Smartphone App |  |
| **Greece** | mobile | rural | Cell location | Large cell coverage | delay in time for the exact location estimation | Other type of positioning method is necessary | Based on operator’s technological solutions  |
| **Ireland** ECAS | Fixed |  | Installation address and optionally co-ordinates supplied in advance | Incorrect Address provided (rare occurrence but has happened) | Not accurate. | Identify CLI in question and flag it with relevant operator | This is an after-the-fact solution to a problem which could be avoided with better quality information.  |
| Fixed |  | Installation address and optionally co-ordinates supplied in advance | Unusable address provided |  |  |  |
| Fixed |  | Installation address and optionally co-ordinates supplied in advance | No Installation details | STD Code matching/lookup will be used to determine caller location for automatic call routing purposes. Will be confirmed by ECAS operator. | Identify CLI in question and flag it with relevant operator | This is an after-the-fact solution to a problem which could be avoided with better quality information.  |
| Mobile | Urban, Rural | Cell/Sector ID | Large Cell Sizes. Cell/Sector ID cannot be considered an accurate method of determining caller location although generally sufficient for the identification of the correct Operational Area. | Definition of a caller location as possibly being within a large cell is not accurate for caller location. |  | Use Cell/Sector ID for initial call routing decision only. Caller location should be determined using network based and/or handset based techniques. |
| **Lithuania** | There exist methods/technologies that can be used to increase caller localisation accuracy. As the emergency response organisation we aren’t competent to tell which of technologies is the best to be used. We say – acceptable error radius – 100 meters. |
| **Luxembourg** | Mobile  | All  | Cell ID  | Accuracy to low  | Not enough precision  | To get coverage maps from all the cells of all mobile operators Introduction of location based services (triangulation) by mobile operators  |  |
| **Norway** | Fixed  |  | Based on the callers registered address  | The registrations may not be accurate, or there may be some missing information  | It may take longer time to determine where the caller is. Depending on the caller’s ability to explain.  | Better system for checking the correctness of all registered addresses.  |  |
| Nomadic  |  | As for fixed, but the call Is flagged to tell the PSAP operator that the caller may be somewhere else, and one will have to ask whether the given address is correct or not.  | There is no good solution if a nomadic VoIP user is located elsewhere than the registered address  | The registered addresses may differ from the actual location of the caller.  | Implement a solution based on ETSI M493 project or IETFs ECRIT project.  |  |
| Mobile  |  | Today: Only cell ID. In one year: Cell ID, Sector, TA (timing advance) and base/cell station coverage estimation  | The address of the owner of the subscription is also visible, like it is for fixed.  | Cell ID alone may give a 360 degree circle with radius up to 32 kilometres. Not very accurate.  | New regulation to force implementation of sector and TA view, together with base/cell station coverage estimation.  |  |
| **Romania** | Things are usually sorted out during the interview. |
| **Slovak Republic (PSAP)** | See answer No 9. |
| **Spain (Canaries)** | Mobile | Dense Urban | GNSS  | accuracy | Improves accuracy if GNSS coverage | APP Fress | Complements 112 call location sent from the Provider |
| Mobile | Urban | GNSS | accuracy | Same improvement | APP Fress | Complements 112 call location sent from the Provider |
| Mobile  | Rural | GNSS | accuracy | Same improvement | APP Fress | Complements 112 call location sent from the provider that usually has low reliability due to the low density of EEBB. |
| **Spain (Cataluña)** | Mobile | All | POSIC (cell/sector location) | Area where the mobile could be, is too large | Low Precision | Alternative technologies (triangulation) |  |
| **Spain (JCLM)** | Fixed |  | CMT Database | No standards | DDBB don’t match | to establish standards |  |
| **Spain (JCyL)** | Mobile | Rural | POSIC | Probable Location zone is too big |  |  |  |
| **Spain (Murcia)** | Mobile | Dense urban | Cell/sector location | None |  |  |  |
| Mobile | Urban | Cell/sector location | None |  |  |  |
| Mobile | Rural | Cell/sector location | Geolocation include an area of 2km square |  |  | To improve geolocation protocols of network operators. |
| Fixed |  | Matching with database of networks operators | None |  |  |  |
| **Switzerland (Swisscom)** | Any  | Any  | Any  | Different reliabilities from different sources  | One bad accuracy from one operator can destroy the confidence in good accuracy from other operators  | National authority creates a requirement for a minimum reliability  |  |
|  |  | Any  | Any  | When receiving bad accuracy: Being able to detect the source  | One bad accuracy from one operator can destroy the confidence in good accuracy from other operators  | Mark the source of localisation in all protocols  |  |
|  | Any  | Any  | Any  | Ambiguity of location information  | Wrong interpretation of the data  | Define in standards how to interpret the center of circles and ellipsis. Training on level PSAP  |  |

## Question 11

In Question 11 respondents were asked if they had encountered any problems regarding the “reliability” of the 112 caller location information received from electronic communications networks and if so to describe them.

## Summary of Responses to Question 11

13 respondents answered “No” and provided the following additional information.

In **Germany** **(EGN),** utilisation of caller location information is only starting so there is no experience of any problems yet.

In **Hungary (National Police)**, there is very little available information on this topic but the Police are sure that there could be but as far as they know data collection has not happened in Hungary at PPDR organisations yet.

**Montenegro** stated that it does not have the possibility to get location of caller, because mobile and fixed-line operators don’t pass that information.

**Sweden (SOS Alarm)** stated that the service works stable but with poor accuracy

16 respondents answered “Yes” and provided the following information.

The **Czech Republic** stated one problem was that the caller was too far from the presented location area.

**Spain (Cataluña)** presented the same problem where sometimes the location is incorrect and they receive the location from a BTS that is not coursing the call.

**Denmark (CPH Fire Brigade)** stated poor quality data from mobile operators due to lack of maintenance of cell id coverage.

**Estonia** stated that potential inaccuracies may cause perceived unreliability.

**Finland (ERCA)** stated that location information received has been too old or out of date.

**Ireland (ECAS)** noted that reliability of caller location information is less visible to a stage-1 filtering PSAP service as operated by ECAS. Caller location is always (currently) verbally confirmed by the ECAS operator prior to handover where possible. It should also be noted that for mobile calls (as it only receives Cell ID) the reliability of this is difficult, if not impossible, to measure. Consistent availability of caller location is a big consideration however and we regularly have situations where we have no caller location information for a fixed line or mobile call.

**Latvia** has encountered the problem of an end-user location where the user device is in a VoIP network.

**Lithuania** noted the problem of a 2 months’ time gap between updates of databases of fixed line operator customers.

In **Norway**, the reliability is pretty good, but there are occasions when the call is routed to the wrong PSAP. The caller may be located in the region of PSAP 1 while the base station to which he/she is connected is located in the region of PSAP 2. In such cases the call will be transferred to the right PSAP.

**Romania** stated that the reliability issue, as a general concept, should be kept in mind and dealt with during the design of the specific technical implementing solution phase (i.e. the solution for passing the location information from telecom side to emergency side and inside emergency).

**Slovak Republic** stated that very rarely, caller location could not be determined by the electronic communication network (but it is well within 0, 5% limit), or the caller is located outside the sector provided by the network.

**Spain (Canaries)** experienced cases where no data is received because of technical location failure from the Provider or by failure to transport the location information to the PSAP from the Telecommunications Provider. See the operational data to analyse more cases that have occurred, but there is no statistical evidence. **Spain (Galicia)** reported similar problems where around 15% of the calls made from mobile terminals have no associated information on the location. The source of the problem is related to the communication operator that receives the call.

**Switzerland (Swisscom)** provided details of two problems:

1. Fraud: Seldom, and when it happens, it is always the same source, where it can be tracked down who it is.
2. Technical problems: Delays, data errors, errors in the protocols, different interpretation of protocols, number of digits used of the coordinates

**Ireland (HSE – Ambulance)** did not answer “Yes” or “No” but stated that it is difficult to determine, from Ambulance Control perspective, control cannot question or interrogate electronically transmitted information.

## Question 12

In Question 12 respondents were asked if they identified any solutions to the problems raised in response to Question 11.

## Summary of Responses to Question 12

15 respondents answered “No”.

**Montenegro** added that Mobile operators have to fulfill their obligations by Article 12. Regulation of the quality of service parameters, limits and methods of measurement parameters for the use of the single European number 112 for emergency calls.

The question was not applicable to 4 respondents. **Ireland (ECAS)** added that for availability concerns they are continuing to work with the fixed line and mobile operators to improve the availability of the information provided in advance of the call.

5 respondents answered “Yes”. Lithuania added that updates should be done more often or automatic data provision solutions should be implemented.

## Question 13

In Question 13 respondents were asked to describe the solutions identified in response to Question 12 and to group those in accordance with the following table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type of service** | **Geotype (only for****mobile)** | **Positioning****method\*** | **Description of the****problem** | **How it affects the****reliability** | **(Possible) Solution** | **Comments** |
|  |  |  |  |  |  |  |

\*e.g. cell/sector location, TA (Timing Advance), RTT (Round Trip Time), UTDOA (Uplink Time Difference of Arrival), EOTDA (Enhanced Observed Time Difference of Arrival), GNSS (Global Navigation Satellite System), AGNSS (Assisted GNSS), or combinations of the above.

## Summary of Responses to Question 13

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Respondent** | **Type of service** | **Geotype (only for****mobile)** | **Positioning****method\*** | **Description of the problem** | **How it affects the reliability** | **(Possible) Solution** | **Comments** |
| **Czech Republic** | mobile | any | cell/sector | GSM can serve up to 35 km |  | Using ANY possible method |  |
| **Denmark** | Mobile | all | Cell ID | poor data quality from mobile operators due to lack of maintenance of cell id coverage | Erroneous or missing position | Fix current systems and underlying data |  |
| **Finland (ERCA)** | Mobile  | all  |  | If the location information is not real-time it could be false.  | False information causes false location.  | More information about how old the location information is |  |
| **Germany EGN** | N.A. |  |  |  |  |  |  |
| **Ireland ECAS** | Fixed |  | Installation address and optionally co-ordinates supplied in advance | No Installation details | Fixed line Caller information is not reliably available. (falls Backbone Solution to STD code matching) | Identify CLI in question and flag it with relevant operator | This is an after-the-fact solution to a problem which could be avoided with better quality information.  |
| Mobile | Urban/rural. | Cell/Sector Location | Cell/Sector information not available | Automated Call routing cannot be performed and manual search with Caller provided location required | Flag Cell/Sector to relevant mobile operator to resolve. | We have worked extensively with mobile operators and have recently reduced the number of “misses” for this type of lookup. |
| **Lithuania** | There exist methods/technologies that can be used to increase caller localisation reliability. As the emergency response organisation we aren’t competent to tell which of technologies is the best to be used. |
| **Spain (Cataluña)** | Mobile | All | Cell/sector location | Incorrect location | Incorrect location | Configuring mobile operators in their Backbone Solution bone |  |
|  | Fixed |  | Pull | The data provided are incorrect | Incorrect location | Updated data from operators |  |
| **Spain (JCyL)** | Fixed |  |  | Sometimes Errors in data and no data |  |  |  |
|  | Mobile | All | POSIC | Sometimes Errors in data and no data |  |  |  |
|  | VoIP |  |  | No location |  |  |  |
| **Spain (Murcia)** | Mobile | Dense urban | Cell/ sector location | None |  |  |  |
|  | Mobile | Urban | Cell/ sector location | None |  |  |  |
|  | Mobile | Rural | Cell/ sector location | None |  |  |  |
|  | Fixed |  | Matching with database of networks operators | - Database of network operators has errors in location data- No all networks operators are all include in CMT |  | * To improve location data in CMT’s BBDD.
* To include local networks operators in CMT’s BBDD.
 |  |
| **Switzerland (Swisscom)** | Any  | Any  | Any  | - Fraud: Seldom, and when it happens, it is always the same source, where it can be tracked down who it is.  | -  | - Track down fraud cases  |  |
|  | Any  | Any  | Any  | - Technical problems: Delays, data errors, errors in the protocols, different interpretation of protocols, number of digits used of the coordinates  | -  | - Better testing - Fixing errors  |  |
|  | Any  | Any  | Any  |  |  | - Track down fraud cases  |  |

**Question 14 addresses accuracy and reliability functional requirements needed, per type of service and geotype. As direct “beneficiaries” of 112 caller location information it is necessary to gather emergency organisations’ views on the functional requirements for accuracy and reliability of caller location information.**

## Question 14

In Question 14 respondents were asked, after taking account of the need for optimal functioning of the emergency system and the most efficient way to implement any new measures, for their opinions regarding the requirements needed by the emergency services regarding the accuracy and reliability of 112 caller location information at each main stage of the service chain as described in Question 1. Respondents were asked to frame their answers using the following model:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type of service** | **Geotype (only for****mobile)** | **Main Stage** | **Accuracy Requirement** | **Reliability Requirement** | **(Possible) Positioning Method\*** | **Comments** |
|  |  |  |  |  |  |  |

\*e.g. cell/sector location, TA (Timing Advance), RTT (Round Trip Time), UTDOA (Uplink Time Difference of Arrival), EOTDA (Enhanced Observed Time Difference of Arrival), GNSS (Global Navigation Satellite System), AGNSS (Assisted GNSS), or combinations of the above.

## Summary of Responses to Question 14

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Respondent** | **Type of service** | **Geotype (only for****mobile)** | **Main Stage** | **Accuracy Requirement** | **Reliability Requirement** | **(Possible) Positioning Method\*** | **Comments** |
| **Austria** | All Services |  |  | As good as possible, definitively way below 100 meter | As good as possible | The best possible and available solution |  |
| **Czech Republic** | all | All | PSAP | region | 100% | any |  |
| all | All | emergency team | city district | 100% | any |  |
| all | All | navigation | coordinates | 100% | any |  |
| **Denmark****(Fire brigade)** | See answer to question 3 |
| **Finland (ERCA)** | All  | all  | 1  | cell location  | real-time  |  |  |
| All  | all  | 2  | best possible  | real-time  |  |  |
| All  | all  | 3  | best possible  | real-time  |  |  |
| **Germany (EGN)** | Fixed |  | 1 | Civic address | 99% |  |  |
| Fixed |  | 2 and 3 | Civic address | 99% |  |  |
| mobile | dense urban | 1 | 1000 m | 67% |  | 3000 m in 90% of cases |
| mobile | Urban | 1 | 1000 m | 67% |  | 3000 m in 90% of cases |
| mobile | Rural | 1 | 1000 m | 67% |  | 3000 m in 90% of cases |
| mobile | dense urban | 2 and 3 | 25 m | 67% |  | 100 m in 90% of cases |
| mobile | Urban | 2 and 3 | 35 m | 67% |  | 150 m in 90% of cases |
| mobile | Rural | 2 and 3 | 50 m | 67% |  | 200 m in 90% of cases |
| Additional comment: Regarding the accuracy and reliability requirements the outcome of the final report from CEGALIES should be considered as well. *Coordination Group on Access to Location Information by Emergency Services (CEGALIES):* *“Report on implementation issues related to access to location information by emergency services (E112) in the European Union”, Jan. 28th, 2002* |
| **Ireland ECAS** | Fixed |  | Identify correct ERO and operational area | Identify coordinates and address of the property where the fixed line call originated. +/-10m for coordinates. | Information should be available for >99% of calls and expected reliability of the information should be close to 100% | Pre-populated database or real-time external lookup of fixed line installation details keyed on Originating CLI. | For fixed line installations, the address data is often provided in advance for all installations. It is not unreasonable to expect a high level of accuracy and reliability for this information derived and provided by the Telecoms operator based on actual, desktop, or automated GIS survey and property information.  |
| Fixed |  | Determine the Exact Location of the Incident | Identify coordinates and address of the property where the fixed line call originated. +/-5m for coordinates. (5m requirement based on densely populated urban areas) | Information should be available for >99% of calls and expected reliability of the information should be close to 100% | Pre-populated database or real-time external lookup of fixed line installation details keyed on Originating CLI. |  |
| Mobile | All | Identify correct ERO and operational area | +/- 500m is desirable but not possible with cell/sector ID based approaches.For cell/sector ID information to be used only to identify the correct ERO +/- 3km would be desirable. | Stated accuracy achieved in > 95% of calls. This allows some margin for error due to mobile network topology etc. but should be consistently high (and available) in urban areas. | Cell/Sector ID,Network based methods,Handset based methods or hybrids. | Caller location for identification of the correct ERO should be available immediately. Network based and Device based positioning methods may introduce a delay in determining position and consequently initial call routing decisions will need to be based on cell/sector ID. This decision can be updated in-call when more accurate information may be supplied from network based or device based methods. |
| Mobile | All | Determine the Exact Location of the Incident | +/- 10m desirable to assist in locating person in need of assistance. | Enhanced level of accuracy should be available for >70% of calls and if available the reliability of this information should be >95% | (A)GNSS | See note below! |
| Note: While (A)GNSS is likely to be the only reliable means of attaining the level of accuracy that the emergency services may require to locate people in all cases, there are a variety of technical and integration challenges associated with the use of device supplied (A)GNSS information including such factors as indoor coverage, device support, device reliability (e.g. user-preferences) etc. To address these challenges and provide a more universal caller location solution for mobile caller, network based technologies should also be utilised (in parallel) as and where supported by the underlying mobile networks. This is likely to result in a blended approach to Caller location based on the concept of immediate supply of Cell/Sector ID for call routing purposes and subsequently refined and updated in call with network based caller location and then (A)GNSS based device supplied information. The source of the information and in particular the relevant expected levels of accuracy and reliability should be clearly defined for and indicated to the PSAPs and ERO as the users of this information. |
| **Latvia** | Fixed | - | All stages |  |  | Telecommunication operator data base |  |
| Mobile | Rural | 1. stage |  |  | Cell/sector location |  |
| Mobile | Rural | 2. stage  |  |  | Cell/sector location |  |
| Mobile | Rural | 3. stage |  |  | Cell/sector location + GNSS |  |
| mobile | Urban | 1. stage |  |  | Cell/sector location  |  |
| mobile | Urban | 2. stage  |  |  | Cell/sector location + GNSS |  |
| mobile | Urban | 3. stage |  |  | Cell/sector location + GNSS |  |
| **Lithuania** | There exist methods/technologies that can be used to increase caller localisation accuracy and reliability. As the emergency response organisation we aren’t competent to tell which of technologies is the best to be used. Our wish – precise address with every 112 call from fixed line networks and 100 meters errors radius accuracy with every 112 call from mobile networks. |
| **Luxembourg** | All  | All  | 1,2,3  | No requirements  | No requirements  | Cell/sector location  | For fixed service: detailed address of caller  |
| **Montenegro** |  |  |  | Yes | Yes | This depends from technical capabilities of mobile phones operators | They have to meet the expectation from Regulation, and it’s their decision which type of service satisfies required precision |
| **Norway** | Mobile  |  |  |  | Very good  | Cell ID, Sector view, Timing Advance and cell coverage measures/estimates. + GPS positioning provided by the handset.  |  |
| Fixed  |  |  | Correct registered address.  | 100%  |  |  |
| Nomadic  |  | «Flag» indicating that the device may be located elsewhere than the given registered address(es).  | Correct registered address, and at least one alternative address.  |  | The use of location servers.  |  |
| **Poland** | fixed and mobile  | as listed in in the article 78.3 of  ‘The act of 16 July 2004 Telecommunications Law’ (for a public mobile telecommunications network – geographic location of publicly Available telecommunications services user’s terminal). | at all stages(as described in Question 1) | no additional requirements; but if necessary, the President of the Office of Electronic Communications may specify, by means of a decision for a particular operator, detailed requirements concerning the accuracy and reliability of a network termination point location for public mobile telecommunications networks | no additional requirements; but if necessary, the President of the Office of Electronic Communications may specify, by means of a decision for a particular operator, detailed requirements concerning the accuracy and reliability of a network termination point location for public mobile telecommunications networks | no additional data | no additional comment |
| **Romania** | For fixed service the current solution works right, particular problems are mainly related to location inside large private networks. The nomadic service does not currently pose a lot of problems due to the limited no. of such calls to 112.Regarding the mobile service an upgrade of the current solution or other solutions resulting in a “designated area” might not help improve significantly the results; the accuracy seen as a significant improvement relates generally with the possibility to send a response team (i.e. to allow dispatching a team to an assigned location).From an operational perspective some ideas which might help better identify the problems encountered by the emergency organisations are presented below: - False/hoax calls pose sometimes significantly more problems in terms of costs of dispatching intervention teams than those caused by inaccurate location information – estimation, no data available. They happen mostly in urban areas rather than in rural ones, usually from mobile pre-paid subscriptions – estimation;- (Possible) Worst case scenario from positioning perspective: person unable to provide any info regarding the incident site, rural area with low to zero population density, large location area (cell, currently) intersecting several different responsibility zones;- A very important role also plays the level of detail of the GIS map available for emergency services, all the way to the intervention team, and the number of additional details regarding the points of interest shown on the map (useful during interview to “understand” the exact location of the incident). Ideally, all parties involved (112 PSAP, agency PSAP, intervention team) should access/share the same location data; access to online street-view cameras would also be useful;- The call-back possibility can be used, sometimes, to update de location, directly (new positioning request in the telecom network or new call) and via interview (asking for more details). |
| **Slovak Republic (PSAP)** | We adhere to the requirements identified in the EENA operations document „Caller Location in Support of Emergency Services“ (http://www.eena.org/ressource/static/files/2011\_05\_27\_2.2.2.cl\_v1.3.pdf) |
| **Spain (Canaries)** | Currently there is no periodic statistic about call location. |  |  |  |  |  |  |
| **Spain (Cataluña)** | Fixed |  | establish the correct PSAP | 1 km. | 98 % |  |  |
|  | Mobile | All | establish the correct PSAP | 1 km. | 98 % |  |  |
|  | Fixed |  | assign the correct dispatch | 50 m. | 98 % |  |  |
|  | Mobile | All | assign the correct dispatch | 50 m. | 98 % |  |  |
|  | Fixed |  | determine the location of the incident | 50 m. | 99 % |  |  |
|  | Mobile | All | determine the location of the incident | 50 m. | 99 % |  |  |
|  | Fixed |  | establish the correct PSAP | 1 km. | 98 % |  |  |
| **Spain (JCLM)** | Fixed |  | Determine the location of the incident | Establish standards in the information related to the user personal files, provided by communications networks. |  | CMT Database |  |
|  | mobile |  | Establish the correct PSAP | Reduce the number of calls received on each other PSAP region from bordering areas |  | cell/sector location |  |
| **Spain (JCyL)** | Fixed |  | All | Actualised Data | Actualised Data |  |  |
|  | Mobile | All | All | The best according the available technologies of telecommunication operator | The best according the available technologies of telecommunication operator |  |  |
|  | VoIP |  | All | The best according the available technologies of telecommunication operator | The best according the available technologies of telecommunication operator |  |  |
| **Spain (Murcia)** | Mobile | All of them | 1 y 2 |  |  | Cell/Sector ID |  |
|  | Mobile | All of them | 3 |  |  | GNSS |  |
|  | Fixed | - | 1, 2 y 3 |  |  | Matching with database of networks operators |  |
| **Switzerland (Swisscom)** | Any  | dense urban, urban, rural  | 1  | municipality  | 99,7%  | Any suitable  |  |
|  | Any  | dense urban, urban, rural  | 2  | 1 km  | 99,7%  | Any suitable  |  |
|  | Any  | dense urban, urban, rural  | 3  | 100 Meter  | 95%  | Any suitable  |  |

**Questions 15 to 17 relate to statistics of 112 calls with accuracy & reliability problems and measurement methods, per type of service and geotype. This inquiry aims to gather relevant opinions based on existing call statistics or future projections regarding inaccurate information or where reliability may be questionable. The purpose of this is to quantify the impact of accuracy and reliability requirements on the performance of the emergency services particularly where any modifications have been made and how those modifications helped to improve the performance of emergency responders.**

## Question 15

In Question 15 respondents were asked if they measure in any way the impact of accuracy and/or reliability of the 112 caller location information related problems or quantify the impact they have on the performance of emergency service responders.

## Summary of Responses to Question 15

25 respondents answered “No”.

**Ireland (ECAS**) stated that as a stage-1 filtering PSAP ECAS does not have visibility of the full impact of caller location information on performance of the Emergency Services in responding to persons in need of assistance at this time.

**Romania** stated that no statistics exist for measuring the adequacy of the current accuracy of the caller location coming from the telecom side. The general expert opinion signals no issues with the location sent via fixed service. Nomadic service is not currently seen as an issue also. Current statistics available refer to number of different types of calls, response times and QoS factors mentioned in COCOM questionnaire.

**Spain (Galicia)** added that they don´t have tools in order to measure the performance of the system.

Only **Ireland (HSE Ambulance)** answered “Yes”.

## Question 16

In Question 16 those respondents that answered “Yes” to the previous Question 15 were asked to describe their measurement and quantification processes and methods and also including the type of service and geotype (for mobile) it applies to.

## Summary of Responses to Question 16

**Ireland (HSE Ambulance)** stated that they measure timings within the anatomy of a call. All timings are examined to ascertain if a more effective way of providing patient care can be devised.

## Question 17

In Question 17 those respondents that answered “No” to Question 15 were asked if they thought it would be useful to have a process in order to track the impact, in time, of (insufficient) accuracy and reliability of the 112 caller location information?

## Summary of Responses to Question 17

20 respondents answered “Yes” that it would be useful to have tools to track and record this information.

**Denmark (CPH Fire Brigade)** stated that it is a chicken vs. egg situation. Unless position quality is improved IT does not make sense to monitor the impact.

**Ireland (ECAS)** and **Montenegro** considers that this would be a useful metric to discuss and improve the overall services offered.

**Germany (EGN**) answered “Yes” provided that the information could be collected automatically.

**Romania** stated that Implementation of statistics is important in order to monitor the specific cases where location fails or more accuracy is needed. This might affect the current flow of actions, requirements of emergency teams to complete some more data is necessary. A periodic exercise is favoured over a permanent one.

The **Slovak Republic** thinks it would be useful in order to justify expenditures on implementation of progressive technologies to enhance accuracy and reliability of caller location.

**Switzerland (Swisscom)** would be especially interested for the cases where it had a huge impact, so they could perhaps optimise their location estimation. Like Slovakia, Swisscom also considers that it would make it easier to justify investments.

**Spain (Canaries)** believes that it would allow to have a target to measure the number of calls positioned, their degree of reliability and have a comparison between incidents of the same type managed with or without call location,

**Spain (Galicia)** considers that it would be useful to have some kind of mechanism for being able to measure the impact, the accuracy and the reliability of the information on the location from the call made to our 112 PSAP.

**Sweden (SOS Alarm)** stated that it would be very useful to be able to measure, but it needs to collect data from the entire chain, ie from the first approximate position until the helpful resource is in place on the actual position (which requires that the resource actually reports when he arrives on location and not before).

## Question 17a

A sub-question of Question 17 asked if it would be difficult to implement such a mechanism to track the impact, in time, of (insufficient) accuracy and reliability of the 112 caller location information.

## Summary of Responses to Question 17a

11 respondents answered “Yes” it would be difficult.

**Hungary (National Police)** stated that it would not be easy. The mechanism can be based on the existing mission control/management systems. The quantification process can rely on the evaluation of information stored in it. Otherwise the mission control/management systems have different architecture, databases, data format etc. Due to these facts the implementation would be a challenge.

**Norway** stated that it would be difficult and maybe the focus should be on improving the actual accuracy performance.

**Spain (JCLM)** stated that its technology platform currently does not allow it.

5 respondents answered “No” that it would not be difficult to implement such a mechanism.

**Finland (ERCA)** stated that a comparison of utilised information data and emergency response delays would be easy and **Ireland (HSE – Ambulance)** stated that parameters could be set on a measuring tool.

8 respondents did not answer “Yes” or “No” but provided the following information.

**Germany (EGN)** stated that the possibility had not been evaluated yet and **Ireland (ECAS)** stated that it was unknown but that some of the Emergency services in Ireland may be able to develop such metrics. For Example the Ambulance Service will have data on the time taken to dispatch assistance on a call by call basis however this data would need to be analysed in the context

**Greece** answered that it is “Not necessary”.

**Montenegro** stated that it could confirm the information about location received from its operational units and that it could confirm if the informations received is true or not.

**Poland** stated that the Ministry of Administration and Digitisation is responsible for the general modernisation of the emergency call system in Poland. This includes changes of law regulations (project of the new act on emergency call system, accepted by the Council of Ministers, accepted by the Parliament, not yet signed by the President of the Republic of Poland) as well as the infrastructure (new ˜public safety answering points” with a dedicated telecommunication network). According to the project, new PSAP will be able inter alia to gather data and statistics about handling emergency calls. Ministry of Administration and Digitisation currently does not have sufficient information about the impact of accuracy or reliability of the 112 caller location information on the performance of emergency service responders. According the project of the act on emergency call system, new PSAP will provide necessary information and statistics that would allow such analysis. According to the project of the act on emergency call system, new PSAP will gather information and statistics that would provide such a mechanism.

**Romania** stated that implementation of statistics is important in order to monitor the specific cases where location fails or more accuracy is needed. This might affect the current flow of actions, requirements of emergency teams to complete some more data is necessary. A periodic exercise is favoured over a permanent one.

The **Slovak Republic** stated that the implementation might be complicated unless a single European method is developed. Different services use different technologies and have different information sharing policies as well as operating procedures. If possible, tracking the accuracy and reliability of callers shouldn´t burden PSAP operators or first responders with new tasks.

**Spain (Canaries)** considers that, technically, statistics could be implemented on the number of calls that should position themselves and has not been received from the operator, or GPS data in the case of IP services. Economic investment is required to develop specific modules to obtain automated information.

**Spain (Galicia)** considers that it might be difficult to have this type of mechanism because the communication operator would have to give additional information on how they deal with this information of the location of the call made to the 112 PSAP. We don´t think they will be in favour of these types of actions.

**Sweden (SOS Alarm)** stated that the data needed are probably there already, but it can be costly to adjust the technical preconditions for compiling data and to ensure that the final position (when the unit arrives) is correctly reported.

## Question 17b

Another sub-question of Question 17 asked respondents their views on what would be the most important information to gather regularly and to elaborate on that if possible.

## Summary of Responses to Question 17b

**Austria** stated that accuracy and the quality of accuracy would be the most important info. Ideally the transmission of the accuracy of a caller’s location should automatically be combined with an accompanied info about the quality of the accuracy data (e.g. visual with a traffic light system green-yellow-red)

**Croatia** stated that the most important problem encountered is the time needed to provide the location. Emergency situations require an immediate response. Delays to obtain the location data are unacceptable. The location data shall be available as soon as the call reaches the authority handling emergency calls. The data on the deviation of received and precise location. The time needed to identify precise location in the case of receiving incorrect location.

**Cyprus (Police and OCECPR)** stated that “accurate position of the CLI was important.

**Denmark (Police)** stated that service time at the PSAP and no. of incidents with errors in location provided to the responding services was important.

**Denmark (CPH Fire Brigade)** stated that reported position (including quality) linked with actual position of incident was important.

**Estonia** considers that the most important information is the time spent on ascertaining the exact location of the caller, on issuing the dispatch order and on actual arrival of the operational resources on the site.

**Finland (ERCA)** listed 3 important elements:

1. The location data that ERC-data system has used when alarming units.
2. Other location information available to dispatcher during the call e.g. cell location
3. Location information from the units at the scene.

**Germany (EGN)** stated that location information provided vs. actual location of the emergency incidence was important.

**Greece** stated the needed time for the exact location estimation at all cases.

**Hungary** stated that it would be very useful to have some kind of mechanism, because it can help the efficiency improvement of emergency situation handling. In its opinion it is very important to gather regularly all of the data connected with the time frame out of emergency situation handling, which comes from the inaccuracies. But it is almost sure the most important information is the loss of time.

**Ireland (Fire Service)** considers that GPS co-ordinates are the solution but there are lots of delays in receiving these.

**Ireland (HSE Ambulance)** stated thatCLI and location information are vitally important to responding Emergency Services. The accuracy of this information should be regularly benchmarked to ensure it is of the highest quality.

**Latvia** stated that caller location measurement accuracy and time needed to receive accurate location of caller was important.

**Luxembourg** considers that accurate position of caller location in reference to the cell ID location is important.

**Norway** stated that statistics on the accuracy/validity of all registered addresses was important.

**Romania** stated that implementing such statistics is a cross-agency task, involving modifications in the electronic system and at intervention procedure level (system will need to monitor some other parameters and intervention teams will be asked to complete some data in the case file after the closing of the case).

Possible examples of relevant information for accuracy & reliability issues:

1. The average coverage of a responsibility zone for an intervention team, per geotype, with (yearly) repartition of no. of calls.
2. The average cell coverage area for 2G/3G/4G national mobile networks, per geotype, with (yearly) repartition of no. of cells and calls.

The **Slovak Republic** considers that the accuracy of callers location (size of the area in m2), verification whether caller was indeed located inside the area identified and time needed to achieve incident location by the first responders. Verification should be automated as much as possible.

**Spain (Canaries)** listed 3 groups of important information:

1. Located call percentage
2. Comparison of time resolution between incidents correctly located or not
3. Number of failures in position and origin (source of information, transportation information or receiving information)

**Spain (Cataluña)** stated that

1. When there hasn't been location information.
2. When the information received is incorrect.
3. Time spent by the operator in locating the emergency when it isn't available by automatic means or when is wrong.

**Spain (Galicia)** considers that the most important information would be to have identified all the reasons of why this kind of information from mobile phones isn´t available in those calls that offer no location details. This happens in approximately 15% of mobile calls.

**Spain (JCLM)** stated that the following information is important:

1. Percentage of calls with automatic location information
2. Percentage of calls with accurate location information.

**Sweden (SOS Alarm)** stated that the most important thing is to regulate the telecom operators' obligations and to ensure that the positioning is handled assimilated regardless the way of electronic communication. Additionally it is important to pursue, primarily a world standard, and secondly a European standard if the former is impossible. The methodology should be a rough position at an early stage so exactly and reliably as possible and then a precise point as soon as possible.

**Switzerland (Swisscom)** stated that information, especially in typical cases where the localisations are not correct and all cases where wrong localisation had a huge impact. Important: Provide each case with date/time and MSISDN.

**Questions 18 to 27 are addressed to electronic communications network operators. These questions aim to gather data from relevant operators for each type of service (fixed, mobile, nomadic) and geotype for mobile (dense urban, urban, rural) in order to have an overview of positioning methods used and reliability related features implemented throughout Europe and, if possible, to learn from national experiences.**

## Question 18

Respondents were asked to provide information regarding the 112 caller location information which is sent from their respective networks to the emergency organisations and to frame their answers using the table below:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Type of service** | **Geotype (only for mobile)** | **Positioning method \*** | **Accuracy of location information** | **Map or data/index \*\*** | **Means of transmission \*\*\*** | **Technology/****protocol** | **Comments** |
|  |  |  |  |  |  |  |  |

\* e.g. cell/sector location, TA (Timing Advance), RTT (Round Trip Time), UTDOA (Uplink Time Difference of Arrival), EOTDA (Enhanced Observed Time Difference of Arrival), GNSS (Global Navigation Satellite System), AGNSS (Assisted GNSS), or combinations of the above.

\*\*whether the information passed is the location map or the data/index needed to compute the map

\*\*\*e.g. radio, copper links, optic fibre

## Summary of Responses to Question 18

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Respondent** | **Type of service** | **Geotype (only for mobile)** | **Positioning method \*** | **Accuracy of location information** | **Map or data/index \*\*** | **Means of transmission \*\*\*** | **Technology/****protocol** | **Comments** |
| **Austria** | A) Fixed Line | n.a. | Customer database;Network-Termination-Point | Street/ street number/ postal code | Data/index; Postal address | Fax/Telephone | Fax/Telephone | No location information available in case of private networks.SOAP/https in discussion/preparation |
| B) Nomadic services | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | No location information available in case of nomadic use. |
| C) mobile | dense urban, urban, rural | Network-Cell-Area | Depends on cell-area width (>700m) | Index: Antenna-Position in WGS84 (decimal) | Internet (optional: Telephone) | SOAP/https (optional: Fax) | SOAP/https only with few PSAP in use |
| **Croatia**  | mobile  | Urban Rural  | Cell ID Cell ID  | 300m 1000-5000 m  | Data Data  | Eth/fiber Eth/fiber  | MLP 3.2.0 MLP 3.2.0  |  |
| fixed  | Urban Rural  |  | Urban: for 90% locations is under 100 m, for 10 % locations is under 500 m Rural: for 90% locations is under 500 m, for 10 % locations is under 5000 m  | map geo-coordinates and street address  | n/a  | Web Service /SOAP  | Service is ready from operator’s side but it is currently not active because of limitations on PSAP. Besides the described solution, there is another possibility for delivering of caller location information for which we are waiting the changes of regulations, in accordance with the opinion of the Personal Data Protection Agency from July 13, 2010 (Class: 004-02/10-01/105)  |
| **Cyprus****(CYTA & MTN)** | Mobile telephonyMNO 1  |  | Cell location | * Installation address of the base station
* Cell ID
* Latitude & Longitude of the Base Station
* Name of the subscriber if it is registered to our database
 | Overlay on Google maps | Radio  | 2G, 3G |  |
| Mobile Telephony MNO 2 | Dense urban, urban, rural | Cell and sector location | Cell and sector location provided have an accuracy of 100% | Information provided:a) site coordinatesb) site addressc) sector orientation/azimuthd) technology (2G/3G) | Depends on the PSAP connectivity to internet. Usually DSL/Copper link. | Web Interface | Average time for providing the data is 45sec and maximum time is 90sec. Both from the time the call to 112 has been initiated. |
| VoIP Telephony(nomadic) |  | Location information refers to the registered subscriber address |  |  | copper link |  |  |
|  Fixed Telephony |  | subscriber address |  |  | copper link |  |  |
| **CYPRUS (OCECPR)** | Mobile telephony MNO 1  |  | Cell location  | Installation address of the base station Cell ID Latitude & Longitude of the Base Station Name of the subscriber if it is registered to our database  | Overlay on Google maps  | Radio  | 2G, 3G  |  |
| Mobile Telephony MNO 2  | Dense urban, urban, rural  | Cell and sector location  | Cell and sector location provided have an accuracy of 100%  | Cell and sector location provided have an accuracy of 100%  | Cell and sector location provided have an accuracy of 100%  | Web Interface  | Average time for providing the data is 45sec and maximum time is 90sec. Both from the time the call to 112 has been initiated.  |
| **Czech Rep. (Telefonica)** | Fix |  | Address of the network termination point | Very good |  | Radio, copper links, optic fiber |  |  |
| Mobile | All | Cell/sector location | Good |  | Radio | GERAN, UTRAN |  |
| **Czech Rep. (Vodafone)** | Emergency call, location number specification (coordinates of BTS, azimuth, signal ratio, type of cell Indoor, outdoor, femto…) | Whole network: Location is presented -Triangle, circle, coordinates of point (indoor cell) | Cell ID, where call is originated, information is part of telephony setup (User to user signalling) | Cell covered area | Yes, coverage map sources are provided to emergency center database | Telephony signalling | ISUP – location number, translated to ISDN DSS1 User to user signaling for delivery to emergency center |  |
| **(Czech Rep.)****T-Mobile** | Mobile | ?? | Location of the “best server” of the cell where the caller is located is transmitted. | Depends on the cell size. | n/a – the location is transmitted. | All. | At the end the call is handed over to PSAP in ISUP | The solution works in this way:* Caller initiates call to the 112.
* In the SUP:IAM:CalledNumberParameter we transmit <routing code which points to the nearest emergency center><112><GPS location of the best server of the cell where the caller is located encoded to 8 digits>
 |
| Fixed | n/a | n/a | n/a | n/a | File exchange |  | For fixed lines the operator handovers periodically the address (street, building, city etc.) of each fixed line in special file called “info35” to the PSAP. |
| **Denmark (TDC)** | GSM |  | TA |  | UTM | Radio |  |  |
| UMTS |  | RTT |  | UTM | Radio |  |  |
| **Denmark (Telia)** | Mobile | All | Cell ID  | Depends on cell size. Please also see answer to Q24 on 112 app (GPS). | Data/index | Radio | LIF’s Mobile Location Protocol (MLP) | N/A |
| Fixed |  | USD Directory subscriber information | 100% | N/A | Fixed technology | N/A | N/A |
| **Denmark (Telenor)** | Fixed |  | Public address book of phone number | House/ apartment/ office address | index | n/a | n/a | Address of calling party looked up at emergency centre |
| Mobile | Dense urban | Cell/sector | 200-500 m | map | Copper links | XML data | Common solution between DK operators developed. Coordinates with approximate location transferred in XML format using MPLS network. Coordinates of the cell are pre-computed representing the center of the cell.Data is sent in parallel with the call instantly and does not affect the call setup.The position given will be the same for all calls originating from that cell – and as such does not give a precise position of the calling party – only approximate – however enough for the police to avoid misunderstandings regarding alike place-names  |
| Mobile | Urban | Cell/sector | 1km-5km | map | Copper links | XML data | As above |
| Mobile | rural | Cell/sector | 10 km | map | Copper links | XML data | As above |
| **Denmark (Hi3G)** | Mobile | DU/U/R | RTT | RTT 80-5000m | Data/index | radio | MLP | Accuracy depending on Sector size |
| Mobile | DU/U/R | GPS | 25-50 | Data/index | radio | MLP | Danish Emergency authorities have chosen not to use this positioning method as it takes to long time (GPS fix) |
| **Estonia** | Mobile |  | Various technologies:CGI, CGI-TA, E-CGI, sector+distance | Dense urban up to 200m Urban – up to 500m, Rural – up to few kms | WGS84 coordinates and probability area | IP connection  | HTTP/POST XML |  |
| Fixed |  | Customer address database | Postal address | Can be translated to coordinates | IP | HTTP/POST XML |  |
| **Finland (TeliaSonera)** | Mobile  | All  | CELL ID, TA+RTT  |  |  |  |  |  |
| **Finland (Mobile Positioning/DNA)** | Mobile 2G  |  | CGI/TA  |  |  |  |  |  |
| Mobile 3G  |  | RTT  |  |  |  |  |  |
| **Finland (Elisa)** | Mobile  | All  | 2G: CI+TA+Rx and combinations, CI as the base method 3G: CI  | Generally around 0 - 300 meters in dense urban, 0 - 2000 meters in urban and 0 - 6000 meters in rural. However, it's not possible to state maximum inaccuracy due to multiple sources of inaccuracy ranging from errors in radio network data to air interface unpredictability.  | Data/index (WGS84 coordinates of the subscriber).  | Copper  | MLP 1.0 with some modifications.  | The positioning platform is highly available.  |
| **Germany (Deutsche Telekom)** |  |  |  |  |  |  |  | Cell based localisation: According to German regulation (Section 7 paragraph 7 sentence 3 NotrufV + paragraph N3-A.6.1.4 TR Notruf) |
| **Germany (EPlus)** | GSM/UMTS Voice | no Differentiation | Cell (Center of Gravity) | depending on Cell Size | Coordinates of the Centre of Gravity of the Cell | Radio | U2U Signaling | Transmission of the Coordinates together with the Voice Call |
| **Germany (Vodafone)** | Fixed NetworkMobile Network | All | Address dataCell data | ExactCell size | DataData | Fixed networkRadio Network | TDM / ISUPTDM / ISUP |  |
| **Greece** | fixed |  | Physical Address of telephone line connection | Exact position  |  | Copper links |  |  |
| mobile |  | Cell Area, Cell Set, Cell ID, Base station Address, Azimuth, and maximum coverage distance | Cell coverage |  |  |  |  |
| Nomadic |  | Register subscriber’s address |  |  |  |  |  |
| **Ireland (Meteor)** | Fixed | N/A | Installation address | Subject to accurate address entry & precision of address (absent post codes) | N/A | Multiple Interconnect routes for resilience.Address details for fixed installations provided by FTP.Address lookup is based on CLI of incoming call. | See: <http://www.btwholesale.ie/whole_ecas.shtml> |  |
| Mobile | All | Cell ID | Approximation within the radius of the cell site and varies with cell size | Latitude & Longitude of cell site. | Multiple Interconnect routes for resilience.Cell site details provided by FTP. Address lookup is based on Global Cell Identity provided in call signaling. | See: <http://www.btwholesale.ie/whole_ecas.shtml> |  |
| Nomadic | N/A | Installation Address | Subject to Accurate Address entry & precision of address (absent post codes) |  | Multiple Interconnect routes for resilience. Address details for fixed installations provided by FTP.Address lookup is based on CLI of incoming call. | See: <http://www.btwholesale.ie/whole_ecas.shtml> |  |
| **Three** | Mobile | Static mapping of Cell ID to address | Static mapping | The location provided gives an area equal to the coverage foot print of the cell. | Cell ID value is passed only. | In band on the same links that carry the customer’s voice call via E1 copper. | The caller ID presented to the 112 operator has additional digits appended to include the Cell ID of the serving cell at time of call connect. |  |
| **Italy** **(Telecom Italia)** | Fixed telephony | N.A: | Subscriber fixed line physical access location (i.e. subscriber name and subscriber site street address). | The provided subscriber fixed line street address is the subscriber site address where the public network termination point was installed, as declared in the contract with operator for publicly available telephony provision. | N.A. | Fixed caller location is retrieved directly by the PSAP querying the operator location platform with the subscriber Calling Line Identity (i.e. E.164 number) of the established emergency service call. In fact operators and PSAPs are interconnected through asecure IP-based national centralised VPN that is operated by the Administration (so called CED Interforze operated by the Ministry of the Interior Affair). | Secure (IPsec) IP VPN for connectivity and MLP protocol for location messages exchange. | Network provided caller location information and its accuracy has been defined by the competent Administration via a government decree in 2008 and 2009. **Common fixed and mobile telephony remarks:**Location information in not used or necessary for call routing purposes, since each PSAP territorial serving area is defined in advance with the Administration basing on the set of telephone districts which a specific Operative Centre is in charge of for emergency provision. When the emergency call is established with the pertinent PSAP, the PSAP itself, on the basis of the information included in call signalling, activates a query to operators’ database platform to derive location information; such a~~s~~ query is delivered to operators’ system using a national centralised system, which is operated by the responsible Administration (so called CED Interforze belonging to the Ministry of the Internal Affair) and it is directly interconnected with all the operator location platforms.Regarding latency for location provision the Administration fixed an initial average indicative value of about 4s and also the international sufficient latency limit of 15 s. |
| Mobile telephony  | dense urban, urban, rural. | Radio coverage cell to which is attached/registered the calling end user mobile terminal equipment. | Network provided Cell ID (more specifically. CellID+TA for GSM, CellID+RTT for UMTS and CellID for LTE) of the radio coverage cell in which end user terminal is attached/registered. | Geographic coordinates adhere to the OMAP LIF TS 101 V 3.0.0. Appendix C: Geographic Information. | PSAPs and operators are interconnected with a dedicate IP-based VPN and the location retrieval is operated by a national centralized system, that is directly operated by Administration (so called CED Interforze / Ministery of the Interior Affair).  |  IPsec VPN connectivity and OMA LIF Mobile Location Protocol (Emergency LocationImmediate service) standard. | Caller location information and its accuracy has been defined by the competent Administration via a government decrees in 2008 and 2009.In addition the previous indicated remarks also apply. |
| **Latvia** | Mobile | All listed | Cell ID | Estimated cell size | Cell center coordinates and estimated cell circle radius | Dedicated copper links | HTTPS/OMA MLP protocol | *Mobile operator Latvijas Mobilais Telefons* |
| Mobile | data | Cell location |  Up to 40km | Index | radio | CDMA 2000-1x | *Mobile operator Triatel* |
| Mobile | Dense urban | Cell/Sector | 200-2500m | Data | Radio | HTTPS | *Mobile operator Bite* Time – 10s;Dis: accuracy |
| Mobile | Urban | Cell/Sector | 1000-5000m | Data | Radio | HTTPS | *Mobile operator Bite* Time – 10s;Dis: accuracy |
| Mobile | Rural | Cell/Sector | 5000-10000m | Data | Radio | HTTPS | *Mobile operator Bite*Time – 10s;Dis: accuracy |
| **Lithuania (Omnitel)** | Mobile | Dense urban, urban, rural | Cell ID/sector location | On the level of Cell ID and sector | Data (x, y coordinates; radius and azimuth) | Copper fixed line (redundant solution) | XML over HTTP | Compliant to PSAP requirements |
| **Lithuania (Bite Lietuva)** | Mobile | Dense urban | Cell/Sector | 200-2500m | Data | Radio | Https | No comments |
| Mobile | Urban | Cell/Sector | 1000-5000m | Data | Radio | Https | No comments |
| Mobile | Rural | Cell/Sector | 5000-10000m | Data | Radio | Https | No comments |
| **Lithuania (Tele2)** | Mobile | Dense urban | Cell/sector location | Till 500 m | Data/index | Copper links & optic fiber | MLP through secure IP/VPN channel |  |
| Mobile | Urban | Cell/sector location | 500 m – 1 km | Data/index | Copper links & optic fiber | MLP through secure IP/VPN channel |  |
| Mobile | Rural | Cell/sector location | Till 15 km | Data/index | Copper links & optic fiber | MLP through secure IP/VPN channel |  |
| **Lithuania (TEO LT; AB)** | Fixed | - | User installation address | - | - | - | - | CD is regularly provided with user address DB bind to telephone number |
| **Luxembourg** | Mobile Voice and SMA |  | Technology (2G/3G)/Cell/sector | Reliable | To our knowledge, map is not computed at 112 services | Mobile Voice and SMS | Cobber links | ISUP |
| Fixed | N/A  | N/A  | N/A  | N/A  | Fixed  | Copper / optical fiber  | TDM / VOIP  |
| **Montenegro** |  |  |  |  |  |  |  | Operators do not provide information about 112 caller location due to technical reasons. Currently, there is no communication between operators and 112 Center, but its implementation is expected in near future. |
| **Norway**  | Mobile  |  | Cell ID (one out of three mobile network operators also offer sector and TA)  | Moderate  | Data/index  | Copper links and fiber  |  |  |
| Fixed  |  | Registered addresses  | Good  | Data/index  | Copper links and fiber  |  |  |
| **Poland** | fixed (PSTN/ISDN access, IP PABX service)  |  | Postal address declared at the moment of signing the agreement for telephony service (service address location/ network termination point address). Information sent to the Location and Information Platform with a Centralised Data Base (PLI CBD) prior to emergency call (at the moment of creation new client) contains: subscribe name, postal code, city/town, street name, building number  |  |  |  |  |  |
| **Portugal (Portugal****Telecom)** | Fixed  |  | Location address  | Address + ZIP Code  | data/index  | Optical fiber, copper  | Proprietary  | The information is stored in an external database. The address is obtained from the A-number using a specific application.  |
| Mobile  | all  | Cl based  | 100 m - greater than 20 Km  | data  | Mainly optical fiber  | Proprietary  | Positioning is provided in the call setup redirecting number. Low accuracy due to the positioning method.  |
| **Portugal (Vodafone)** |  |  |  |  |  |  |  | Based on the site location number where the call is setup, information regarding latitude/longitude and an estimated ratio of the location where the calling party is potentially located is sent with the call to 112 centre. This information is passed in ISUP IAM message to PSTN that delivers it to PSAP. This is procedure for all 2G/3G/4G mobile calls with and without SIM/USIM cards in UE and is also valid for customers which are not subscribers of our network (such as roamers In and other PLMN subscribers). For fixed access, the location information is based on the post code and address of the calling party’s number |
| **Portugal (Cabavisao Television)** | Fixed  |  | Customer Address sent offline every Monday  | The information is validated by customer and from the Service providers during the service installation and maintenance operations  | Not Applicable  | Not applicable  | FTP  |  |
| **Romania** | The answers given below to questions 18 to 27 cover the responses received from all 4 mobile operators and 4 fixed operators.a. Mobile calls: cell id/sector id information sent with the call to 112 PSAP where a database with cell/sector technical characteristics is maintained, helping draw an estimate of the cell/sector service area;b. Fixed calls: the A number identity received at 112 PSAP is matched with the subscriber database maintained from operators’ reporting, resulting in an administrative address;c. Nomadic calls: similar situation as for fixed calls; operators are also obliged to inform (flag) 112 PSAP when updating the subscriber database about the nomadic use of specific identification entries. |
| **Slovak Republic (Orange)** | Mobile telephony service | All | cell/sector location | cell coverage | Data – x,y, angle, radius | IP interconnection | MLP (XML over HTTP) |  |
| Mobile telephony |  | Location number in SS7 format | Cell location/ address | WGS position of BTS | Signaling link | SS7 |  |
| Landline telephony |  | Installation address | Postal address | data | Offline batch  | - | Switch to online exchange is planned (currently stopped) |
| Mobile telephony service | All | cell/sector location | cell coverage | Data – x,y, angle, radius | IP interconnection | MLP (XML over HTTP) |  |
| **Slovak Republic (Slovak Telekom)** | MOBILE |  | CELL-ID | 300m-25km | DATA | RADIO | MLP 3.0 | Time:1s-15s |
| FIXED |  |  |  | DATA |  | SOAP/WSDL | Information on where the service is to be provided (network termination point placement) as specified in subscriber contract. |
| **Slovak Republic (Telefonica)** | 112 | all | sector location | size of sector computed based on cell power  | location map vectors | radio | LBS/MLP | time for location depends on paging time |
| **Slovak Republic (GTA Slovakia)** | fixed  |  | place of installation defined in contract  | street / house no  |  |  |  |  |
| **Slovenia (Amis)** | fixed |  | Pull | 100% | Data (address of caller) |  |  | Communication between emergency organisation and provider (us) is established via phone call. |
| **Slovenia (Debitel)** | mobile | all | Cell | 90% | map, vector diagram | internet/VPN | webservices | real-time |
| **Slovenia (Detel)** | FixedNomadic |  |  |  | data |  |  |  |
| **Slovenia** **(Mega M)** | Fixed |  | N/A | N/A | N/A | N/A | N/A | Call is only routed to correct regional center according to postcode of subscriber. No location data sent. |
| **Slovenia (Novatel)** | Fixed |  | Address of users | 100% | no |  | Pull data protocol | We send caller location on emergency organisation request |
| Nomad |  | Address of users |  | no |  | Pull data protocol | We send caller location on emergency organisation request |
| **Slovenia (Si.Mobil)** | VoIP |  |  |  | Address of subscriber line | Copper, fiber | SIP, h.248 | Location is fixed and send upfront to 112 centers |
| Mobile | Cell ID | Cell/sector location | Cell Coverage | - MSISDN-Cid-cell coverage-time stamp | radio | AIFIuCSISUP | Push method |
| **Slovenia (Softnet)** | VOIP | / | Fixed location | 100% | / | Copper / Optic fibre | Fixed VOIP technology | / |
| **Slovenia (T-2)** | Fix | / | / | +/- 10m | Data + index | Fibre optic | TCP/IP xML |  |
| Mobile | / | Cell/ sector location | / | Map | Fibre optic | TCP/IP xML |  |
| **Slovenia (Teleing)** | Fix | / | / | +/- 10m | Data + index | Fibre optic | TCP/IP xML |  |
| Mobile | / | Cell/ sector location | / | Map | Fibre optic | TCP/IP xML |  |
| **Slovenia (Telekom)** | mobile | all | cell | 90% | map, vector diagram | internet/VPN | webservices | real-time |
| fixed |  | coordinates | 100 m² | data | VPN | web service | real-time |
| **Slovenia (Tusmobil)** | Emergency service | / | User provided address | 99% | / | Copper / optic | Fixed land line PSTN,ISDN / VoIP |  |
| Emergency service | Shape files | Shape files WGS84 | 99% | Map | Radio | GSM/UMTS |  |
| **Spain** **(112****Euskaltel)** | Fixed |  | CLI |  |  |  |  | We provide CLI. External DB with CLI-Location info available. |
| Mobile |  |  |  |  |  |  | As MVNO, this service is provided by MNO |
| **Spain (Orange)** | 112 | Longitude/Latitude | Cell/sector location |  | data |  | http/ipSEC |  |
| 062 | Longitude/Latitude | Cell/sector location |  | data |  | http/ipSEC |  |
| 091 | Longitude/Latitude | Cell/sector location |  | data |  | http/ipSEC |  |
| **Spain (Vodafone)** | Fix Telephony | any | Subscriber’s address | Very high |  |  |  | (1) |
| MobileTelephony | any | User Cell ID | high |  |  |  | (2) |
| Nomadic services | any | Subscriber’s contract address | Dependent on user circumstances |  |  |  | (3) |
| 1. Subscriber’s address is obtained through the phone number identified in the call. Operating companies are obliged to send CMT[[2]](#footnote-2) the subscriber’s address corresponding the telephone number which corresponds with the Network Terminating Point.
2. Using protocol POSIC112 v2 VODAFONE gives to the emergency centres the following parameters or values in each of the calls originated in its mobile network to locate the user (following are shown examples of each values):
	1. Calling number: 34426124222
	2. Emergency number: 112
	3. Service: E112
	4. Timestamp: 20130206115321
	5. Zone or cell where the user is located, it can be a sector or circle depending on the Cell Global Identity (CGI),in UTM coordinates:

 Zona1:--> NumZona:31; LetraZona:T; (x:-2122578944,y:1167476480); RadioInterior:0; RadioIncertidumbre:201; AngIni:0; AngFin:360; Probabilidad:100.Additionally, to some emergency centres VODAFONE gives the following values: * + Autonomous community: 2 (Andalucía)
	+ Province: 22 (Huelva)
	+ Town (postal code of the cell): 22482
	+ Second incertitude zone, so:
		1. If zone 1 is an arc, zone 2 must be a circle.
		2. If zone 1 is a circle, zone 2 must be another circle with a 25% greater radius.

Subscriber’s contract address is obtained through the phone number identified in the call. Operating companies provide the data. |
| **Spain (Telecable )** | From our fixed lines, we have two different scenarios in calls to 112 services:- From our cable customers, based on the location of the customer, we call to the specific 112 emergency site. The location information in the provisioning process, based on where the line is installed.- From our SIP customers, since we don´t know the location of the customer, we have to use a code related to the postal code indicating the 112 emergency site we have to call to.In both cases, from our switches we call the 112 emergency sites through ISUP trunks. In those calls we sent the following information: originating number, date and time. Besides, we're full MVNO, so we don´t have our own radio network, we use the radio network ofour host operator. So, in calls to emergency organisations, they sent us the calls indicating the shortemergency code and the translated geographic number. They set that information based on the location of the mobile line, but we don´t know where it exactly is.After receiving the call from our host operator, we sent it to the emergency organisations through ISUP trunks too, with the same information as in fixed lines case. |
| **Spain (Yoigo)** | mobile  | all geotypes  | cell id/Local Area Code  |  | Date needed to compute the map  | Radio |  |  |
| **Switzerland (Backbone Solution)**  | nomadic  |  | client profile address information  | dependant on clients profile actuality  | zip-code and city name  |  |  | location is depending on the clients efforts to keep his profile and location of his VoIP device actual. The client gets informed about this when his registering for our VoIP service |
| **Switzerland (Sunrise Communications)** | Mobile 2G  | dense urban, urban, rural  | TA (Timing Advance)  |  | data/index  |  |  | only two rows, not able to add row and input for 4G  |
| Mobile 3G \*\*\*\* Mobile 4G  | dense urban, urban, rural \*\*\*\*\* dense urban, urban, rural  | cell/sector location \*\*\*\*  |  | data/index  |  |  | \*\*\*\* only two rows, not able to add row and input for 4G \*\*\*\* No call feature on 4G => fallback to 2G or 3G  |
| **Switzerland (Orange)** | As MVNO of Orange, we refer to Orange’s answer to that question |
| **Switzerland (Swisscom)** | Mobile  | Dense, urban, rural, mountains  | Prob3D+ (Probability calculation, propagation of antennas in 3D, calibrated TA and RTT, History)  | Depending on GSM and UMTS, Topology, distributions of Antennas  | 1..10 ellipsis  | Mixed  | MLP over IP  |  |
| Fixed and VoIP  | Dense, urban, rural, mountains  | Address of fixnet or access  | Building  | Address data  | Mixed  | MLP over IP  |  |

**Questions 19 and 20 are intended to gather any relevant experience from electronic communications network operators regarding the sending of 112 caller location information to the emergency organisations and any issue regarding the accuracy or the reliability of the information that might have been experienced.**

## Question 19

Respondents were asked if, during liaisons with emergency organisations, they noticed themselves or the emergency services signalled to them any problem related to the "accuracy" of the 112 caller location information sent and if so, to describe them.

## Summary of Responses to Question 19

41 Respondents answered “No” and provided the following additional information.

**Denmark (Telenor)** stated that during implementation of current system (2005) the requirements were to establish a good enough location to avoid confusion when emergency personnel were interviewing the calling party regarding whereabouts. It was agreed that an electronically given position should – if possible - be supplemented with interview of the caller. This to avoid limitations from stand-alone electronic location information if the caller is a person just passing by (location less relevant), going opposite direction on highway, calling on behalf of someone else etc.

**Lithuania (Tele2)** stated that there were some technical issues regarding reliability, but accuracy wasn’t affected if subscriber location report was sent and received.

**Spain (Vodafone)** stated that in the Public Consultation made by SETSI, it was said that emergency centres have detected that 10.28% of calls coming from fix networks hadn’t location information. The origin of this inaccuracy should be investigation though VODAFONE can’t bring additional information since we don’t have detected this type of problems in the calls coming from our fix network. Vodafone don’t have incidences in the incidences managing system that is centralised and managed by CMT.

**Spain (Yoigo)** stated that only issues were referred to non-updated info, but corrections were applied immediately.

17 Respondents answered “Yes” and provided the following additional information.

**Croatia** stated that in mobile networks more accurate positioning method would be preferred.

**Czech Republic (Vodafone)** stated that accuracy is dependent on area covered by cell, proper system provisioning and map sharing, during cutovers to new technology or network reconfiguration. Benefit – cell accuracy is delivered inside of telephony signaling – location number, no additional channel to EMC.

**Finland (Mobile Positioning DNA)** stated that of course they would like to have better accuracy. Finland is quite big country but only 5.3 million people. Outside of our capital city there are very wide places which are covered with large mobile cells. That does our positioning quite inaccurate.

**Finland (ELISA)** stated that in couple of cases over the past 10 years the location estimate returned has been incorrect due to synchronisation issues in radio network (RNW) data. The RNW data is imported daily to the positioning platform and used as basis for calculating the location estimate with the data got from the target UE (i.e. CI or possibly other additional information).

**Ireland (Three)** stated that at times the database provided to ECAS did not include a number of temporary sites which were installed for several special events, this has since been addressed.

**Norway** stated that for fixed, the emergency organisations have signalled that the reliability/quality of registered addresses must be better. For nomadic, there should be some possibilities for locating when the unit is not on its registered address. For mobile, there are requests for sector view, TA and estimated/measured cell coverage. For mobile there should also be a GPS solution as add-on to the information gathered by the networks themselves.

**Portugal (Vodafone)** stated that it has received some questions regarding how it could improve accuracy on the information provided for mobile access, namely the possibility of using solutions based on the use of GPS (which is directly related to the type on handset used by the customer) and the possibility to indicate in which direction is the calling party heading to while in mobility.

**Romania** referred to some isolated problems:

1. Isolated problems with updating the technical information database; and
2. Given the specificity of electromagnetic wave propagation and the fact that can’t define the range of the cell according to counties’ borders, neighbouring rural areas can cause problems on the accuracy of location information, which is manifested by routing the call to the PSAP in neighbouring county.

**Slovak Republic (Slovak Telecom)** stated that some cell radius parameters are too big for efficient localisations.

**Slovenia (Slovenia Telekom, Debitel and Novatel)** referred to the problem of how to locate callers using nomadic services.

**Spain (Orange)** stated that sometimes due to errors loading the location data of the cells in the platform

**Switzerland (Sunrise Communications)** stated that for mobile, the emergency organisations are not satisfied with the accuracy of the location information as they compare the results with what they see in TV series. We too had problems with the routing to the regional centers of the emergency organisations because of errors during network migration/upgrade activities.

**Switzerland (Swisscom)** referred to the problem of certain areas being far too large where several ellipses are difficult to handle. Also missing data.

2 respondents did not answer “Yes” or “No” but provided the following information.

**Italy (Telecom Italia)** stated that first of all the location procedure and its accuracy were defined in advance by the responsible Administration, choosing the network provided solution for its availability and reliability. So no specific issue about accuracy emerged, since each involved actor knew the chosen and expected accuracy level.

For fixed telephony the subscriber site street address is the only reliable possibility, considering that the operator only knows the public network access to which the end user is attached; no issue emerged for accuracy of the fixed subscribers location.

Also for mobile telephony the location information reliability is the main point, so a network provided location information provision was selected by the responsible Administration; the Cell ID is the reliable location information that each mobile operator can assure in any national area. Of course when the radio coverage cell is larger, the location information is less precise. No specific accuracy issue emerged till now..

**Spain (Telecable)** stated that in fixed lines, as soon as it is advised any change on translated numbers, it updates them in its switches in order to route them correctly. In mobile lines, regularly it checked calls to emergency services in order to validate the information received from its host operator.

## Question 20

In Question 20, respondents were asked if they found any possible solutions to coping with the problems identified in their responses to Question 19 and if yes, to describe them by framing their answers using the following table.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type of service** | **Geotype (only for****mobile)** | **Positioning method\*** | **Description of the problem** | **How it affects the accuracy** | **(Possible) Solution** | **Comments** |
|  |  |  |  |  |  |  |

\* e.g. cell/sector location, TA (Timing Advance), RTT (Round Trip Time), UTDOA (Uplink Time Difference of Arrival), EOTDA (Enhanced Observed Time Difference of Arrival), GNSS (Global Navigation Satellite System), AGNSS (Assisted GNSS), or combinations of the above.

## Summary of Responses to Question 20

13 respondents answered “No” or “Not Applicable” to this question. Additional information from those respondents who answered “Yes” is contained in the table below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Respondent** | **Type of service** | **Geotype (only for****mobile)** | **Positioning method\*** | **Description of the problem** | **How it affects the accuracy** | **(Possible) Solution** | **Comments** |
| **Czech Republic (Vodafone)** | Mobile | Location number | cell/sector location | Signal is received sometimes too far from BTS (mountains) |  |  |  |
| Fixed | Address of end point | coordinates, address | Provide correct address of caller due to different billing address, address of POI connection, customer own distributed network, easy remote VoIP technology access to customer located PBX,Improve customer onboarding process |  |  |  |
| **Denmark (Hi3G)** | Mobile | Dense urban/urban/rural | RTT | Cell db on location server is updated 1-2 a week. If call is made just after a new site has been set up or moved it could result in missing location | No location | More frequent updates | Prediction calculation has taken many hours before. With smarter calculations the calculation now is much quicker and by that it is possible to update cell db more often |
| Mobile | Dense urban/urban/rural | GPS | Long time to fix position | Operator do not get position until 20-25 sec after call is made | Removal of GPS positioning. Operator make a second positioning after have retrieved RTT |  |
| **Finland (Mobile Positioning/DNA)** | mobile 2G  | rural  | CGI/TA  | very large cells  |  | Some GPS based system  |  |
| mobile 3G  | rural  | RTT  | very large cells  |  | Some GPS based system  |  |
| **Finland (Elisa)** | Mobile  |  | All  |  |  | Improving the RNW data quality by importing it from multiple sources.  | Positioning relies very heavily on the reliability of the RNW data. The RNW data sources are not originally intended to be used for this purpose.  |
| **Greece** | Mobile | rural | Cell id | Large coverage | Difficult to find the exact location | Other type of positioning method is necessary |  |
|  | Fixed | It is stated that it is not always possible to give the exact location in the following cases: Home zone type (telephone connection that looks like mobile but is fixed), For VoIP calls there is a notification/flag for the user in case it is nomadic, the telephone connection is in operation less than 1 day, DDI connections |
| **Ireland (Meteor)** | Fixed | N/A | Registered postal address. | Rural addresses in particular can be reliant on local knowledge (e.g. Family Name, Townland, and County). Also Subject to human error in data entry.  | Emergency services may not have sufficiently granular local knowledge. Depending on address entry, the address provided may be of little or no use. | New precision post code system set to be implemented in Ireland by 2015 is expected to significantly improve accuracy. |  |
| Mobile | All | Cell ID | Not precise and varies by cell site. | Used currently limited to matching call origin appropriate regional emergency service but rural sites can overlap two or more regional emergency service areas. | Ultimate solution will flow from the wider debate in which device and network solutions are being considered. Also a need for emergency services to be able to handle more precise location information. |  |
| Lithuania (TEO LT, AB) | Fixed | - | User installation address | Some addresses could be incorrectly assigned, or user made changes to installation, moved VoIP phone to other location. | This will allow to identify accuracy inconsistencies  | Provide several address: Billing, installation, coordinates of operators user distribution box (last in chain before user installation), location of IP Address installation if calling using VoIP |  |
| **Norway** | Mobile  |  | Cell ID (one out of three mobile network operators also offer sector and TA)  | Cell ID with possible coverage radius of 32 km is not very accurate  | In rural areas the accuracy is very poor. Better in urban areas where the cell coverage radius is much smaller.  |  |  |
| Fixed  |  | Registered addresses  | The addresses may be of poor quality, wrong or not present at all.  |  | Better cross-check of all registered addresses.  |  |
| Nomadic  |  | Registered addresses and «flag» indicating possible nomadic use.  | The addresses may be of poor quality, wrong or not present at all.  |  | Better cross-check of all registered addresses. + Some solution for acquiring correct location when unit is not located on registered address.  |  |
| **Portugal (Vodafone)** | Taking into account the requirements demanded regarding the information sent to PSAP (reliability of the location of the calling party, same information regardless of the handset of the calling party, capability of allowing access to callers from other networks and callers without SIM cards and based on push solutions), none of the solutions address are capable to deliver a more accurate information. Potential solutions to the issues referred above are highly dependent on the calling party’s handset, functionalities and capabilities of the device (namely on what regards GPS solutions) and personal configurations set by the user. Also, the implementation of tools to cope with the issues referred above are not only dependent on developments from the operators side; PSAP capabilities need to be able to support them, which requires further developments from the PSAP side are needed. Finally and taking into account that access should be assured to any calling party (even calls made without SIM cards), it won’t be possible to send an Any\_time\_interrogation / Provide\_Subcriber\_Info MAP operation to reconfirm location. GPS solution depends on mobiles capabilities |
| **Romania** | 1. Increase the frequency of updating the database (for 1st issue).2. For this problem a solution has not been identified so far (for the 2nd issue). |
| **Slovak Rep. )Slovak Telecom)** | MOBILE | RURAL | CELL-ID | Big areas | VERY | Use better localisation methods |  |
| MOBILE | DENSE | TA, ECGI | TA accuracy is worse than CELL-ID. TA step is 550m | HIGH | Use other localisation methods in URBAN area | Because of signal reflection caused by buildings and because of TA step definition, which is 550m |
| MOBILE | EVERYWHERE | AGNSS | Problem with mobile phone capability to use this localisation method by default | HIGH | Mobile phone manufactures needs to provide A-GPS over control plane capabilities by default into all mobile phones |  |
| **Slovenia (Debitel)** | mobile | Nomadic |  | how to find the location of terminal |  |  |  |
| **Slovenia (Novatel)** | Nomadic |  | Address of users | The Nomadic users on VoIP. We cannot provide there location | fully | Emergency organisation have one reserved 112 number for nomadic users |  |
| **Spain (Orange)** | All | All | Cell / Sector Location | Incorrect data  | Bad location of the call | Periodic Audit of the data |  |
| **Spain (Vodafone)** | VODAFONE thinks that the existing systems are accurate from the perspective of what the network can deliver. Trying to incorporate new functionality lying on the operator side may not be rational or proportionate. |
| **Spain (Telecable )** | Based on our solutions, we have to focus on provisioning correctly our fixed lines (where we specify the location) and hacked regularly the information sent from our host operator, in our mobile lines. |
| **Spain (Yoigo)** | mobile  | all geotypes  | cell id/Local Area Code  | cells not updated  | Position provided was not correct  | Info of the cell updated |  |
| **Switzerland (Swisscom**) | Mobile  | Urban, rural  | All location calculation methods from network vendors  | Bad concepts and very bad quality of localisation from worldwide acting network vendors. No flexibility from network vendors to eliminate the errors and to optimise all  | Unusable location estimation  | Using from network vendors only the original values for cell ID, TA, RTT and implementing a different location calculation with Prob3D+  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | Cell location  | More than one antennas per cell ID  | Wrong localisation  | Redesign architecture for multiple antennas per cell ID  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | Cell location  | Unrealistic antenna model  | Wrong localisation  | Using type of antenna and for each type a 360 degree beam map  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | Cell location  | Ignoring cell selection process handset/network  | Too large areas  | Modeling cell selection process handset/network GSM/UMTS, using for GSM a penalty of -10 on the field strength measurement in comparison to UMTS  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | all  | Conceptual mixing real field strength and predicted field strengths  | Huge wrong areas when assuming the phone picks the strongest antenna  | Using normal distributions for real field strengths, with the predicted field strength in the center and estimating the standard deviation from real world samples.  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | Cell location  | Flatland calculations in areas with hills and mountains  | Localisation in wrong valleys, far too large areas  | Using 3D propagation model of radio beams  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | Cell location  | Too large cells  | Localisation in all distances from an antenna  | Using TA and RTT  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | Cell location + TA/RTT  | Many reflections in cities  | Caller far closer to antenna than calculated from TA or RTT  | Estimating distance distribution for each TA with 100, 000 test calls in cities. Estimate distributions for RTT in a similar way with many sample calls UMTS.  | Solved in Prob3D+  |
| Mobile  | Rural, mountains  | Prob3D+  | Reduce factor of reflections in rural and mountain areas  | Too large location areas  | Using different distance distributions for city/urban/mountains areas  | We are in discussion to implant this soon.  |
| Mobile  | Urban, rural  | all  | Wrong localisation in tunnel and in-house  | Bad localisation in-house and tunnel  | Using maps for all tunnel and in-house  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | Anything with TA or RTT and repeater in tunnel  | Repeater in tunnel  | Bad localisation in-house and tunnel  | Calculate propagation using nearest repeater in tunnel  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | Anything method based on TA or RTT and repeater in tunnel  | Delays in cable  | Wrong shift of position in tunnel and airports  | Estimating propagation delays for all repeaters based on type of connection (cable, fiber or air) and the length of the cable  | Solved in Prob3D+  |
| Mobile  | Urban, rural  | all  | Often a caller does call multiple times. Not using all data available.  | Too large areas  | Using all data from the last 15 min and combine it  | Solved in Prob3D+  |

## Question 21

In Question 21, Respondents were asked if they had encountered any problems regarding the "reliability" of the 112 caller location information sent and, if yes, to describe those problems.

## Summary of Responses to Question 21

48 Respondents answered “No” and provided the following additional information:

**Denmark (Telenor)** stated that Cell-ID is always available and can be used for immediate approximate positioning.

**Spain (Orange)** stated that it uses the IPSec protocol with 112 Centers.

12 Respondents answered “Yes” and provided the following additional information:

**Czech Republic (Vodafone)** referred to its response to Question 23.

**Ireland (Three)** stated that the information sent historically was out of sync with the network at times due to the pace of change. This has since been addressed.

**Lithuania (Omnitel)** stated that so far it” providing location data automatically only with CLI to central PSAP call center from Vilnius area. For other calls manual procedure for obtaining location information is available. Automated location data provision for all calls is due by the end of 2013.

**Lithuania (Tele2**) stated that there were some technical issues regarding reliability, when subscriber location report was wrongly sent/not sent from mobile operator side or wrongly interpreted/was not taken from PSAP side.

**Luxembourg** provided details of an incident in March 2013. “XXXX has been notified by Administration des Services de Secours that a substantial amount of calls originated from XXXX network to 112 were not related with emergency calls. Furthermore, these calls were all presenting CLI 352091000022 and not Customer CLI. Explanation: The CLI 352091000022 is assigned by default to all emergency calls to 112 from mobile devices with no SIM card. It is obvious that with such a configuration, XXXX has no possibility to sort out the real emergency character of the calls to 112. There is actually no means of filtering such calls. Furthermore, the Administration des Services de Secours has evaluated that 10% of such calls are indeed falling into Emergency characters which require 112 assistance.

**Montenegro (Telenor)** stated that reliability (accuracy) in GSM-based locating depends on the density and layout of base stations, density of call structure and terrain.

**Montenegro (MTel)** stated that a problem may arise if a cell covers a border area between two towns. There is no such problem in the fixed telephony unless the user indicates the wrong town in his/her address.

**Norway** stated that problems can occur due to missing or wrong, or low quality of, registered addresses. For mobile the reliability is pretty good, but the accuracy varies a lot.

**Slovenia (Slovenia Telekom and Debitel)** stated that there were problems with failure of equipment.

**Switzerland (Swisscom)** stated that there was a problem with very bad quality LBS systems from network vendors and very low motivation from network vendors to improve their LBS solutions. LBS is now usually integrated in network equipment, which is paid in a block. This way network vendors have low interest to improving and optimising their systems, as they get the cash almost independent from any quality requirements. We had no quality checks on data problems with failure of equipment.

2 respondents did not answer “Yes” or “No” but provided the following information.

**Spain (Vodafone)** stated that from its perspective the same considerations done in accuracy are predicable for the reliability of the location information provided. It thinks that there is path for improvement in the system and an important part of the work is in the emergency centres side. As mentioned above, Vodafone has detected an increasing complex system to deliver a call to an emergency centre. 112 in Spain is competence of each Autonomous Community sometimes there is more than one number to deliver the call to the emergency centre. Considering all the emergency services and all the circumstances there is a really complex system where there are 364 different ending points to deliver a call depending on the location of the user. This will lead to ambiguous situations, for instance, when the service has different numbers for different areas that can be covered by the same cell.

In Vodafone’s opinion, public administrations should make the effort to keep the balance between efficiency and complexity. It is also important, in its opinion, to keep a reference database public and accessible for those who need access to that information, at least for operators in order to have a reference for auditing purposes.

No system is 100% reliable so, when, for instance when the cell ID is not present there is a real problem for the operator to deliver the call, especially taking into account the additional regulation in Spain to deliver the location information. There always should be an overflow called number to ensure that an emergency call is delivered to an ending point even if some information is missing.

Above all of these considerations there is also place to make slight improvements in existing systems that are reality specific to each implementation, for instance Vodafone already make suggestions to CMT to improve the existing system to provide subscribers’ addresses.

**Spain (Telecable)** stated that where SIP lines are used it is quite difficult to be sure where the line is, due to the technology implementation.

## Question 22

In Question 22, Respondents were asked if they found any possible solutions to coping with these problems identified in response to Question 21.

## Summary of Responses to Question 22

28 respondents answered “No” or “Not applicable”. Of those that answered “No” the following additional information was provided.

**Montenegro** stated that solutions to the problems identified in response to Question 22 were technologically infeasible.

**Slovak Republic (UPC)** stated that customers are obligated to use the Voice service only on dedicated geographical address according to the general terms and conditions (GTC), but we are not able to guarantee that customer will comply with the GTC.

8 Respondents answered “Yes” but only two provided further details of those solutions identified.

**Denmark (Hi3G)** referred to its answers to Question 20 which were – solution for fixed: more frequent database updates – solution for mobile: Removal of GPS positioning and operators to make a second positioning after having retrieved Round Time Trip (RTT).

**Ireland (Three)** stated, in reference to the problem it identified in response to Question 21, that a new more robust automated process is now used for the sharing of this information with ECAS. As the solution is a procedural fix rather than a technical one the answers to 23 are not applicable.

##  Question 23

In Question 23 respondents who answered “Yes2 to Question 22 were asked to describe the solutions also specifying the type of service (fixed, mobile, nomadic) and – in case of mobile service – per geotype (dense urban, urban, rural), using this table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Type of service** | **Geotype (only for mobile)** | **Positioning method \*** | **Description of the problem** | **How it affects the reliability** | **(Possible) Solution** | **Comments** |
|  |  |  |  |  |  |  |

\* e.g. cell/sector location, TA (Timing Advance), RTT (Round Trip Time), UTDOA (Uplink Time Difference of Arrival), EOTDA (Enhanced Observed Time Difference of Arrival), GNSS (Global Navigation Satellite System), AGNSS (Assisted GNSS), or combinations of the above.

## Summary of Responses to Question 23

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Respondent** | **Type of service** | **Geotype (only for mobile)** | **Positioning method \*** | **Description of the problem** | **How it affects the reliability** | **(Possible) Solution** | **Comments** |
| **Czech Republic (Vodafone)** | fixed, mobile, nomadic | Address, coordinatesCell/SectorAddress provided by subscriber |  | Management of subscriber database,Different billing address than calling, hidden private WAN networksWorst location in areas with small density of cells, e.g. MountainsSame principles like for fixed,Subscriber database with address, no nomadic localisation functionality |  |  |  |
| **Denmark (Hi3G)** | Mobile | Dense urban/urban/rural | RTT | Cell db on location server is updated 1-2 a week. If call is made just after a new site has been set up or moved it could result in missing location | No location | More frequent updates | Prediction calculation has taken many hours before. With smarter calculations the calculation now is much quicker and by that it is possible to update cell db more often |
| Mobile | Dense urban/urban/rural | GPS | Long time to fix position | Operator do not get position until 20-25 sec after call is made | Removal of GPS positioning. Operator make a second positioning after have retrieved RTT |  |
| **Ireland (Meteor)** | Mobile | All | Cell ID | Minor administrative issues affecting updates to the list of cell IDs. | Potential for a slight increase in latency in providing location information for new sites. FallBackbone Solution to LAC remained for more general regional location information. | Solution in place through a revision to the process for providing these updates. | Past issue which has been resolved. |
| **Italy (Telecom Italia)** | Fixed telephony | N.A: | Subscriber fixed line physical access location (i.e. subscriber name and subscriber site street address). | The provided subscriber fixed line street address is the subscriber site address where the public network termination point was installed, as declared in the contract with operator for publicly available telephony provision. | Fixed caller location is retrieved directly by the PSAP querying the operator location platform with the subscriber Calling Line Identity (i.e. E.164 number) of the established emergency service call. In fact operators and PSAPs are interconnected through asecure IP-based national centralised VPN that is operated by the Administration (so called CED Interforze operated by the Ministry of the Interior Affair). | Secure (IPsec) IP VPN for connectivity and MLP protocol for location messages exchange. | Network provided caller location information and its accuracy has been defined by the competent Administration via a government decree in 2008 and 2009. **Common fixed and mobile telephony remarks:**Location information in not used or necessary for call routing purposes, since each PSAP territorial serving area is defined in advance with the Administration basing on the set of telephone districts which a specific Operative Centre is in charge of for emergency provision. When the emergency call is established with the pertinent PSAP, the PSAP itself, on the basis of the information included in call signalling, activates a query to operators’ database platform to derive location information; such a~~s~~ query is delivered to operators’ system using a national centralised system, which is operated by the responsible Administration (so called CED Interforze belonging to the Ministry of the Internal Affair) and it is directly interconnected with all the operator location platforms.Regarding latency for location provision the Administration fixed an initial average indicative value of about 4s and also the international sufficient latency limit of 15 s. |
| **Lithuania (OMNITEL)** | Mobile | Dense urban, urban, rural | Cell/sector location | Mapping of call and location data sent over separate channels | If unique identifier is missing for a transaction, mapping is not possible | In case of no CLI IMEI will be provided in the A number field for both call and location data transaction. Yet, IMEI is not the best unique subscriber identifier (as it is not truly unique in the network). |  |
| **Lithuania (TELE2)** | Mobile | All types | Cell/sector location | Cell/sector coordinates were wrongly interpreted | Wrong caller location was set | System configuration changes on PSAP side. |  |
| Mobile | All types | Cell/sector location | Wrong A number was sent | PSAP couldn’t identify caller location | Software changes on mobile operator side |  |
| Mobile | All types | Cell/sector location | Cell/sector coordinates were wrongly interpreted | Wrong caller location was set | System configuration changes on PSAP side. |  |
| **Norway** | For the registered addresses issue, the Norwegian regulator performs random checking of the mobile service providers. The regulator also gets statistics from the NRDB (mentioned above). In addition the regulator has a web based solution for registering incidents with regard to wrong routing and other issues concerning emergency calls. |
| Portugal (Vodafone) | Taking into account the requirements demanded regarding the information sent to PSAP (reliability of the location of the calling party, same information regardless of the handset of the calling party, capability of allowing access to callers from other networks and callers without SIM cards and based on push solutions), none of the solutions address are capable to deliver a more accurate information. Potential solutions to the issues referred above are highly dependent on the calling party’s handset, functionalities and capabilities of the device (namely on what regards GPS solutions) and personal configurations set by the user. Also, the implementation of tools to cope with the issues referred above are not only dependent on developments from the operators side; PSAP capabilities need to be able to support them, which requires further developments from the PSAP side are needed. Finally and taking into account that access should be assured to any calling party (even calls made without SIM cards), it won’t be possible to send an Any\_time\_interrogation / Provide\_Subcriber\_Info MAP operation to reconfirm location. GPS solution depends on mobiles capabilities |
| **Slovenia (Debitel)** | all | all |  |  |  | Redundancy of the equipment implemented, organised vendor's support. |  |
| **Slovenia (Slovenia Telekom)** | all | all |  |  |  | Redundancy of the equipment implemented, organised vendor's support. |  |
| **Spain (Telecable )** | With SIP customers, we found the solution of using a code related to the postal code to cope with that problem |
| **Switzerland (Swisscom)** | Mobile  | all  | all  | Network vendors not being able to correctly implement location calculations and being inflexible to correct errors or improve calculations.  | Unusable results, extreme quality variations  | Reducing role of network vendors to deliver only the basic data: time stamp, cell ID, TA and RTT and implement a far better location calculation based on this basic input data and other data (for example 3D models) and complete independent of them. This way being able to react fast, optimise all what is necessary and not having to discuss every single detail of the implementation with all the many people worldwide involved in big network vendors  |  |
| Mobile  | all  | all  | no location for PSAP  | long phases with no data  | Auto check and alarm on warning and errors in log files  |  |
|  |  |  | different interpretation of data  | misinterpretation  | Briefing PSAP of possible uncertainties and how to cope with the caller  |  |

##  Question 24

Question 24 is aimed at retrieving information from respondents on any plans they might have for future commercial implementation of more accurate mobile positioning methods, per geotype. The inquiry intends to give an overview of the actions that might be already scheduled by some mobile operators, on a voluntary basis, in the following 3 years, which will also improve the accuracy and the reliability of the 112 caller location information. Respondents who answered “Yes” were asked to describe these measures and how they affect the accuracy and/or the reliability of the information sent to emergency organisations. Also specifying the geotype (dense urban, urban, rural).

## Summary of Responses to Question 24

39 Respondents answered “No”. Of those, the following additional information was provided.

**Denmark (Telia)** stated that positioning is based upon agreement with the authorities. No work in this area is foreseen. Authorities have launched a 112-app that initiates a 112-call to the emergency services and transfers positioning data based on GPS.

**Denmark (Telenor)** stated that no launches of any commercial services are planned. However “legal intercept”, legal tracing on 2G/3G has been implemented – where positioning is initiated from the core towards the radio network. The radio network (in build SMLC) responds with estimated location (calculated from Cell ID, TA/RTT, site coordinates, mast height, antenna direction, neighbor information or retrieving GPS position from terminal etc.) Same method can be implemented for emergency calls – thus providing a more accurate position – but not substituting the need for interviewing the calling party.

**Germany (Deutsche Telecom)** stated that it does not intend to provide commercial services with additional accurate mobile positioning methods. There is no demand in the market for new solutions, in the past few years there was only low demand for location based services. Furthermore improved accurate positioning methods for providing commercial services would cause severe privacy issues.

**Germany (Vodafone)** stated that due to the development and increasing penetration of handset based location technologies using GNSS derived location information any implementation of network based location technology would not be commercially sustainable.

**Italy (Telecom Italia)** stated that no commercial plan exists to improve location accuracy, also taking into account that the direct use of 112 emergency service location is not possible basing on the existing EU regulation.

**Lithuania (Omnitel)** stated that its business product roadmap does not contain any requirements related to more accurate positioning services.

**Lithuania (Tele2)** stated that, at the moment, there is no plan to use commercial services. However operator and emergency center are working on improving reliability of connectivity as parallel location report sending to multiple locations.

**Luxembourg** stated that from its point of view, the 112 caller location information is well optimised and, thus, does not require significant improvement regarding accuracy and/or reliability. There is no plan to launch commercial services actually using LBS due to the small size of the country.

**Portugal (Vodafone)** stated that it is not planning any implementation of other positioning system beyond the ones already implemented supported on TA and RTT. This is supported by the principal of universal access (i.e., allowing any caller to access the emergency services). More accurate systems require specific devices and equipment and, therefore won’t be available and supported to all calling parties.

**Romania** stated that taking into account the investments for the network development and coverage extension, including LTE, for the next three years no upgrade in the field of mobile positioning is stipulated in the mobile operators’ investment plans.

**Slovenia (T-2 and Teleing)** stated that the accuracy they have is based at the level of calls. In the future, they do not plan to use the GPS or other methods.

**Spain (Vodafone)** stated that it already delivers accurate and reliable information for locating the user calling to emergency centre. Vodafone is not considering new changes on its system, if new changes era imposed by new dispositions, Vodafone will develop the changes which should be proportionate, rational and implemented at a European level.

**Spain (Yogi)** stated that it is improving the information update process to improve the accuracy of the information provided.

**Switzerland (Swisscom)** stated that all new devices have their own location calculation based on AGPS, WLAN etc. which can be used for commercial Apps. Today 1/3 of all apps are location based. They do not need location calculation from networks.

7 respondents answered “Yes” and the following additional information was provided:

**Czech Republic (Vodafone)** stated that E-call functionality will be activated, dependent on government legislation, option: LTE network, VoLTE deployment requirements.

**Czech Republic (T-Mobile)** stated that, If agreed with PSAP, they would like to change the current method in mobile networks from the solution described in the answer to Question 18 to a new method where T-Mobile would handover the cell id where the caller is located in the ISUP in respective field and abandon the encoding of location information to the called number. This would significantly simplify the solution both on the side of T-Mobile CZ and PSAP.

**Norway** stated that new regulations are already in effect. The accuracy shall be equivalent to, or better than, what one can obtain from Cell ID + Sector view + TA. It is also strongly recommended that the network operators offer information on actual cell coverage.

**Portugal (Portugal Telecom)** is analysing ways to improve the cell ID database regarding cell radius values.

**Slovenia (Debitel and Telekom Slovenia)** stated two upcoming improvements - a) GPS data sent from application on android/iOS. b) eCall

3 Respondents did not answer “Yes” or “No” but provided the following information:

**Estonia** stated that commercial services are available and they provide reasonable accuracy for most commercial applications. Currently there is remarkable network equipment generation upgrade (LTE 4G) in process which may provide better accuracy.

**Denmark (Hi3G)** stated that it already has the possibility to deliver last known position by cell/sector. That is not used by 112 at the moment.

**Spain (Vodafone)** stated that, as already indicated it already delivers accurate and reliable information for locating the user calling to emergency centre. Vodafone is not considering new changes on its system, if new changes are imposed by new dispositions, Vodafone will develop the changes which should be proportionate, rational and implemented at a European level.

##  Question 25

Question 25 attempts to evaluate the accuracy of different possible mobile positioning methods, per geotype. Respondents are asked to provide this information in order to have industry’s opinion on the accuracy of different mobile positioning methods. Respondents were asked to frame their answers based on the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Geotype** | **Positioning method\*** | **Accuracy of location information** | **Comments** |
|  |  |  |  |

\* e.g. cell/sector location, TA (Timing Advance), RTT (Round Trip Time), UTDOA (Uplink Time Difference of Arrival), EOTDA (Enhanced Observed Time Difference of Arrival), GNSS (Global Navigation Satellite System), AGNSS (Assisted GNSS), or combinations of the above.

## Summary of Responses to Question 25

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Respondent** | **Geotype** | **Positioning method\*** | **Accuracy of location information** | **Comments**  |
| **Austria** | n.a. | n.a. | n.a. | n.a. |
| **Croatia** | Urban  | E-CITA  | 140m  | On 67% of request  |
|  | Rural  | E-CITA  | 550m  | On 67% of request  |
| **Cyprus (CYTA & MTN) MNO1** |  | Cell location | Refer to Answer 18 |  |
|  **Cyprus (CYTA & MTN) MNO2** | All | A-GPS LBS (Location Based Server) | Approx. 1m |  |
|  **Cyprus (OCECPR)**  |  | Cell location (MNO 1)  | Refer to Answer 18 (MNO 1)  |  |
|  | All (MNO 2)  | A-GPS LBS (Location Based Server) (MNO 2)  | Approx. 1m  | All (MNO 2)  |
|  |  |  |  |  |
| **Czech Republic (Telefonica)** |  |  |  | N.A |
| **Czech Republic****(T-Mobile)** |  |  |  | N.A |
| **Czech Republic (Vodafone)** | dense urban, urban, rural | cell/sector location | GoodGoodNot accurate | Available for all subscribers |
| dense urban, urban, rural | GPS | Available only in outdoor, best accuracy | Only for smart phonesDelay in GPS collection data, GPRS subscription |
| **Denmark (Telenor)** | Dense urban | Cell/TA/RTT/(A)GPS | Varying  | GPS signals are weak in dense urban so cell id with TA/RTT can provide a more reliable location – though less accuracy.Large amount of customer base still have no phone with GPS |
| Urban | GPS/AGPS/Cell+TA/RTT |  | As above but better GPS signal.Large amount of customer base still has no phone with GPS |
| Rural | GPS/AGPS/cell+TA/RTT |  | Not much experience with this – however GPS signals are more easily retrieved in rural areas.Depends on available GPS in phone |
| **Denmark (Hi3G** | Dense Urban | RTT | Very good |  |
| Urban | RTT | Good |  |
| Rural | RTT | Fair to good | Dependent on how far MS is from base station |
| Dense Urban/Urban/rural | GPS | Very good | If user is outdoor |
| **Estonia** |  | • CGI, CGI-TA, E-CGI – urban 300-500m rural up to few km.• A-GPS – outside buildings ca 10 m RTT – up to 200 m |  |  |
| **Finland (TeliaSonera)** | All  | A-GPS  | Refer network vendors  |  |
| **Finland (Elisa)** | dense urban  | Enhanced Cell ID methods, OTDOA and (A-) GNSS.  | OTDOA and (A-)GNSS: 0 - 100 meters ECID: 0 - 300 meters (maximum inaccuracy cannot be stated)  | In dense urban where the cell density is high it's probable that ECID, OTDOA and (A.)GNSS methods are nearly on a same level regarding accuracy. Of course, plain GNSS is not probably available indoors and availability near tall buildings, at least here in Finland and with GPS, can be poor.  |
| urban  | ECID, OTDOA and (A-)GNSS  | ECID: 0 - 2000 meters OTDOA: 0 - 200 meters (A-)GNSS: 0 - 70 meters (maximum inaccuracy cannot be stated)  | ECID and OTDOA accuracies depend in addition to the geotype also on the cell density which is, of course, related to frequency used as well.  |
| rural  | ECID, (OTDOA) and (A-)GNSS  | ECID: 0 - 6000 meters (OTDOA: 0 - 2000 meters) (A-)GNSS: 0 - 50 meters (maximum inaccuracy cannot be stated)  | ECID and OTDOA accuracies depend in addition to the geotype also on the cell density which is, of course, related to frequency used as well. OTDOA might not be applicable, depending on the frequency used, because UE needs to measure at least 2 neighbouring eNBs.  |
| **Finland (Mobile Positioning/DNA)** | mobile 2G/3G  | CGI/TA / RTT  |  | Better accuracy = more money. Technically it is possible to get better accuracy but it costs lot of money and there is no income from this side.  |
| **Germany (Deutsche Telekom)** | We couldn’t gain any experience of mobile positioning methods besides cell based localisation. |
| **Germany (EPlus)** | We do not intend to implement any service to improve the accuracy of location information |
| **Germany (Vodafone)** | Due to the market development into the direction of handset based location technologies using GNSS derived location information Vodafone has not further analyzed network based location technologies. We, therefore, do not have any experience with these technologies. |
| **Ireland (Meteor)** | N/A | N/A | N/A | N/A |
| **Ireland (Three)** | We have no experience with the other suggested methods. |
| **Italy (Telecom Italia)** | See answer to question 27 |
| **Latvia (Triatel)** |  | GPS (GNSS) | 5-10 m |  |
| **Lithuania (Omnitel)** | Dense urban | TA, RTT, triangulation by signal strength of neighbor cells | ~100-300 m |  |
| Urban | TA, RTT, triangulation by signal strength of neighbor cells | ~200-500 m |  |
| Rural | TA, RTT, triangulation by signal strength of neighbor cells | ~500-3000 m |  |
| **Lithuania (Bite Lietuva)** | N.A. |
| **Lithuania (Tele2)** | All types | Cell/sector location | The more base stations operator has, the more accurate location can be set.  |  |
| **Montenegro** | GSM-based technology enables only relatively good accuracy (from several hundred meters up to several kilometers). When assessing the quality of GSM-based positioning, it should take account of the fact that the range of a base station is normally 35km, and the extended range is 120km. For a high accuracy (of one meter), GPS technology is necessary. It requires the use of user devices with GSM functions (hw + sw), and GPS satellite network. A mobile operator can only indirectly affect the type of user devices in the market through its supply. |
| **Portugal** **(Portugal Telecom)** | Dense urban, urban  | Cl+TA  | Better accuracy in dense urban areas than rural areas.  | Cheapest solution and quickest in locating the UE. A disadvantage is the very low accuracy (depending on cell size). We have never tested this type of solutions, so our answer is based in theoretical information and some information collected from suppliers.  |
| Dense urban, urban, rural  | U-TDOA  | Good accuracy in most areas.  | An advantage is that it works on any UE. A disadvantage is the cost of implementation. Requires LMUs. We have never tested this type of solutions, so our answer is based in theoretical information and some information collected from suppliers.  |
| Rural  | AoA  | Better accuracy in rural areas than in urban areas due to better results with line of sight.  | An advantage is that it works on any UE. Cheap solution and quick in locating the UE. A disadvantage is the very low accuracy. Special antennas are needed. We have never tested this type of solutions, so our answer is based in theoretical information and some information collected from suppliers.  |
| Urban, rural  | A-GPS  | Good accuracy in open areas like rural and some urban areas.  | An advantage is the high accuracy in open areas. SUPL implementation of A-GPS is a more cost effective solution. A disadvantage is the support of the feature in the UE (UE complexity). Another disadvantage is that it does not work in indoor locations. A third disadvantage is that the GPS receiver drains the UE battery power. We have never tested this type of solutions, so our answer is based in theoretical information and some information collected from suppliers.  |
| Urban, rural  | E-OTDA  | Good accuracy in most areas.  | A disadvantage is the support of the feature in the UE. Another disadvantage is the cost of implementation. GSM method of location. Requires LMUs (OTDOA in UMTS and LTE). We have never tested this type of solutions, so our answer is based in theoretical information and some information collected from suppliers.  |
| **Portugal (Vodafone)** | Please see answer to question 24 |
| **Romania** | Answer from Orange Romania:Dense urban A-GNSS 5m Dedicated applicationUrban A-GNSS 5m Dedicated applicationRural A-GNSS 5m Dedicated applicationThe current method offers the best accuracy from a cost-benefit point of view.A-GNSS could represent a further development taking advantage of the above mentioned accuracy of location information. The disadvantage is the fact that the caller to benefit from this method of location should initiate the call on a smartphone terminal equipped with GPS cell. This aspect may be neglected, taking into consideration the evolution of the mobile handset market.In our view the other mentioned technologies would require major unreasonable investment, with no real and tangible benefits for the operator. |
| **Slovak Republic (Orange)** | All | Cell/sector location | Cell |  |
| **Slovak Republic (Slovak Telekom)** | DENSE URBAN | CELL | 100m – 500m | DENSE URBAN |
| DENSE URBAN | TA | 550m – 1,1km | DENSE URBAN |
| DENSE URBAN | ECGI | 250m – 600m | DENSE URBAN |
| DENSE URBAN | RTT | 150m – 300m | DENSE URBAN |
| URBAN | CELL | 300m – 1km | URBAN |
| URBAN | TA | 550m – 1,1km | URBAN |
| URBAN | ECGI | 250m – 1km | URBAN |
| URBAN | RTT | 250m – 500m | URBAN |
| RURAL | CELL | 1km – 25km | RURAL |
| RURAL | TA | 550m – 5km | RURAL |
| RURAL | ECGI | 1km – 5 km | RURAL |
| RURAL | RTT | 500m – 3 km | RURAL |
| EVERYWHERE | AGNSS | 5m – 30m | EVERYWHERE |
| **Slovak Republic (Telefonica)** | dense urban | sector location | may be sufficient (indoor cell) | depends on particular case  |
| rural, urban | sector location | mostly not sufficient | depends on particular case |
| - | others |  | we have no experience with other positioning methods |
| **Slovenia (Debitel)** |  | GPS | GPS |  |
| **Slovenia (Mega M)** | N/A | N/A | N/A | N/A |
| **Slovenia (Novatel)** | We do not provide mobile network |  |  |  |
| **Slovenia (Softnet)** |  |  |  | VoIP on fixed location |
| **Slovenia (Slovenia Telekom)** |  | GPS | GPS |  |
| **Vodafone** | VODAFONE considers that the existing location information is accurate and reliable. It is used not only in the 112 emergency service but in different emergency services. Different positioning methods that will increase the costs of location information might not be neither proportionate nor rational, since they will affect more than one service increasing costs for all the calls to the emergency systems to get a slight benefit in some of them. |
| **Yoigo** | Dense Urban  | Cell id/Location Area Code  | quite precise  | info provided is good and enough for the purposes of the PSAP agency  |
| Urban  | Cell id/Location Area Code  | quite precise  | info provided is good and enough for the purposes of the PSAP agency  |
| Rural  | Cell id/Location Area Code  | not very precise  | in some cases info provided is enough, but in others the info is too wide  |
| **Swisscom** | Dense  | Prob3D+ GSM  | 50 (in-house) 500 Meter  | -  |
| Dense  | Prob3D+ UMTS  | 50 (in-house) 300 Meter  | -  |
| Urban  | Prob3D+ GSM  | Usually 1..5 ellipsis 500 3000 Meter  | Variations depending on topology and density of antennas  |
| Urban  | Prob3D+ UMTS  | Usually 1..5 ellipsis 100 800 Meter  | Variations depending on topology and density of antennas  |
| Rural/mountains  | Prob3D+ GSM  | Usually 1..5 ellipsis 500 1500 Meter  | Variations depending on topology and density of antennas  |
| Rural/mountains  | Prob3D+ UMTS  | Usually 1..5 ellipsis 100 800 Meter  | Variations depending on topology and density of antennas  |
| **Orange** | Refer to Orange reply |  |  |  |

##  Question 26

Question 26 asks respondents, based on the current status of their respective networks to provide any evaluation of time and costs of implementing more accurate positioning methods, for each geotype (dense urban, urban, and rural), using the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Geotype** | **Positioning method \*** | **Time needed** | **Costs involved** | **Comments** |
|  |  |  |  |  |

\* e.g. cell/sector location, TA (Timing Advance), RTT (Round Trip Time), UTDOA (Uplink Time Difference of Arrival), EOTDA (Enhanced Observed Time Difference of Arrival), GNSS (Global Navigation Satellite System), AGNSS (Assisted GNSS), or combinations of the above.

## Summary of Responses to Question 26

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Respondent** | **Geotype** | **Positioning method \*** | **Time needed** | **Costs involved** | **Comments**  |
| **Austria** | n.a. |
| **Croatia**  | ALL (one network based GMLC/SMLC (Gateway Mobile Location Centre / Serving Mobile Location Center)  | E-CITA  | 6 months  | around 1 mil â‚¬  |  |
| **Cyprus (CYTA & MTN) MNO1** | Refer to answer in 24 |  |  |  |  |
| **Cyprus (CYTA & MTN) MNO2** | All | A-GPS LBS (Location Based Server) | 6 months | €500,000 |  |
| **Cyprus (OCECPR)** | Refer to question 24 (MNO 1)  |  |  |  |  |
| All (MNO 2)  | A-GPS LBS (Location Based Server) (MNO 2)  | 6 months (MNO 2)  | â‚¬500,000 (MNO 2)  |  |
| **Czech Republic (Telefonica)** | n.a. |
| **Czech Republic (Vodafone)** | All network | GPS smartphones | 6 month | Dependent on type of solution | New interface towards EMC |
| **Czech Republic (T-Mobile)** | Due to old infrastructure on the side of emergency centers all plans to increase the accuracy were so far abandoned. |  |  |  |  |
| **Denmark** |  |  |  |  |  |
| **Denmark (Telenor)** | Dense urban/urban/rural | Combination of cell+TA/RTT and (A)GPS | 1 year | 750.000 to 1.500.000 Euro | As not all mobiles have GPS and GPS signal is not reliable in indoor environment – fall Backbone Solution methods are needed.Positioning in-call of UEs using SMLC functionality (from more accurate GPS over calculated position (cell, TA/RTT, direction, neighbour cell to only cell id) |
| **Denmark (Hi3G)** | We already deliver up to AGNSS which is the most accurate positioning method at the moment |
| **Estonia** | No such analysis available |
| Finland (TeliaSonera) | All  | Positioning of simless handsets  | +1 year  |  |  |
| Finland (Elisa) | All  | CI+RTT  | 6 - 12 months  | 500000 eur and upwards capex and x eur opex  | It's impossible to estimate costs and time precisely due to many reasons, e.g. end of life for certain network elements, customisation work needed from network vendor etc.  |
| All  | A-GNSS  | 12 months - 18 months  | 800000 - 1300000 eur capex and 200000 eur per year opex  | It's impossible to estimate costs and time precisely due to many reasons, e.g. end of life for certain network elements, customisation work needed from network vendor, required capacity etc.  |
| All  | LTE CID  | 12 months - 18 months  | 800000 - 1300000 eur and x eur opex  | It's impossible to estimate costs and time precisely due to many reasons, e.g. end of life for certain network elements, customisation work needed from network vendor, required capacity etc.  |
| All  | LTE ECID  | 12 months - 18 months  | 900000 - 1400000 eur and x eur opex  | It's impossible to estimate costs and time precisely due to many reasons, e.g. end of life for certain network elements, customisation work needed from network vendor, required capacity etc.  |
| All  | LTE OTDOA  | 12 months - 18 months  | 1000000 - 1500000 eur and x eur opex  | It's impossible to estimate costs and time precisely due to many reasons, e.g. end of life for certain network elements, customisation work needed from network vendor, required capacity etc.  |
| **Germany (Deutsche Telekom)** | As yet has not been considered |
| **Germany (EPlus)** | Not relevant |
| **Germany (Vodafone)** | As we do not have any experience with network based location technologies we are not able to make any comments on timescales and costs of these technologies. |
| **Ireland (Meteor)** | Any | Any | 2 years+ | Several Million Euro | Meteor would have to invest some time and resource to generate an informed estimate of the scope of work involved and the associated cost. No such work has been undertaken to date. There is limited internal knowledge to build from as Meteor does not currently offer any commercial location based services.   |
| **Ireland (Three)** | We would need to undertake a detailed study to answer this question which would take longer than the time provided to respond to this questionnaire. |
| **Italy (Telecom Italia)** | See answer to question 27 |
| **Latvia** |  | UTDOA/EOTDA | 3Y | Up to 3 000 000 EUR | Mobile operator Triatel  |
| All type | TA or Enhanced Cell ID | 1 year | 700 000 EUR | Mobile operator Bite |
| **Lithuania** |  |  |  |  |  |
| **Lithuania (Omnitel)** | Dense urbanUrbanRural | TA, RTT, triangulation by signal strength of neighbor cells | ~12 months of implementation work | ~3M - 10M LTL CAPEX | This is based on a rough estimate of previous proposals. Such implementation was never thoroughly evaluated. |
| **Lithuania (Bite Lietuva)** | All type | TA or Enhanced Cell ID | 1 year | 700 KEUR |  |
| **Lithuania (Tele2)** |  | 2G/CI-TA-Rx, 3G/CI-RTT  |  | Approx. 3.2 million LTL |  |
| **Montenegro (Telenor)** | For time and costs estimation, RFI process is necessary. Currently, there is no sufficient data for valid estimation. The information about accurate location depends on the capabilities of mobile telephones. |
| **Montenegro (Mtel)** | As we had no intention to implement the services for caller location, we have no precise data available.According to previous proposals of solutions presented to us, the price of hardware and software for MPS with implementation services amounted to about €500,000. We are not able to provide more precise information./Mtel/ |
| **Norway** | Implementation of sector view and TA for the two remaining mobile network operators are estimated to no more than NOK 10 million per network. The possible implementation of measured/estimated cell coverage presentation/view has no cost estimates yet. On the PSAPs side, some systems must be updated and extended. No cost estimates yet made. For the possible use of handsets GPS location information, no cost estimates are present. For the position of nomadic users, no cost estimates are present. |
| **Portugal (Portugal Telecom)** | Dense urban  | U-TDOA, A-GPS  | â‰¥ 6 months  | N.A.  | Considering UE impact of supporting A-GPS UE we need an alternative location method. Cost of radio features depend of positioning method and needs to be supported by radio vendors.  |
| Urban  | U-TDOA, A-GPS  | â‰¥ 6 months  | N.A.  | Considering UE impact of supporting A-GPS UE we need an alternative location method. Cost of radio features depend of positioning method and needs to be supported by radio vendors.  |
| Rural  | Cl+TA, AoA, A-GPS  | â‰¥ 6 months  | N.A.  | Considering the cost of the radio component, U-TDOA will not be implemented initially. Cost of radio features depend of positioning method and needs to be supported by radio vendors.  |
| **Romania** | No costs evaluation.Orange Romania: For A-GNSS method, a preliminary feasibility study is needed. After completing the analysis and the preparation of the business plan, an implementation period of approx. 10 months could be envisaged. |
| **Slovak Republic (Orange)** | All | TA | 1 year | 500 000 € | SMPC |
| **Slovak Republic (Slovak Telecom)** | ALL | AGNSS, RTT,ECGI | 6 months | Unknown approx. 200k € |  |
| **Telefonica** | -  | more accurate than sector location |  | high |  |
| **Slovenia (Mega M)** | N/A | N/A | N/A | N/A | N/A |
| **Slovenia (Novatel)** | We do not provide mobile network |
| **Slovenia (Softnet)** | VoIP on fixed location |
| **Spain (Vodafone)** | Implementing new positioning systems will mean additional costs. It’s difficult to know the amount of them not knowing the kind of technical adaptations required and same is predicable for time. Since VODAFONE thinks the existing system is right to deliver accurate and reliable information and isn’t proposing a new one, it is harder to have an idea of the cost of a different system. Anyway, since the location information in Spain is delivered to more than one emergency service, to make a cost/benefit analysis, it is necessary to have this in mind for our country. |
| **Spain (Yoigo)** | Urban Dense  | Cell id/Location Area Code  |  |  | no need to improve or the cost require will not compensate the investment  |
| Urban  | Cell id/Location Area Code  |  |  | no need to improve or the cost require will not compensate the investment  |
| Rural  | Cell id/Location Area Code  |  |  | cost to improve the accuracy is difficult to estimate but anycase it will be huge and difficult to manage for a single operator, especially if it´s a small/medium one  |
| **Switzerland (Orange)** | Refer to Orange MVNO |
| **Switzerland (Swisscom)** | dense urban, urban, rural  | Application on device using AGPS, WLAN etc.  | 2 - 3 Years  | 3 - 4 Million CHF  | -  |
| dense urban, urban, rural  | Optimise ProbCalc3D+ with network based forced short handovers, wherever multiple antennas (on different places) are available, to get other TA/RTT  | 2 - 3 Years  | approx. 20 Million Euro  | We have seen that RTT has a very stable distance accuracy of +- 70 Meter. This allows very accurate triangulation, if antennas are switched during an emergency call. This can be developed together with network vendors.  |

##  Question 27

The 27th and final Question gave Respondent’s an opportunity to provide additional information (e.g. considerations on the estimates made for time and costs). Not covered in previous questions.

## Summary of Responses to Question 27

**Croatia** considers that it would make sense that one positioning (network based; e.g. E-CITA method) platform could serve on the most economical way all end users (e.g. police, 112,) and this should be centralised under one of the Government agencies used for all emergency services. Operators are willing to work on positioning enablers (features and interfaces in the network), but there should be consensus on national/EU level on positioning methods and overall technical solution that should be implemented.

**Cyprus (CYTA, MTN and OCECPR**) sees no clear commercial business case for such an investment.

**Czech Republic (Vodafone)** mentioned Integration of LBS system, which will collect GPS coordinates from callers ~ 0,5 – 1M Euro, new interface to EMCN/A (T-Mobile)

**Denmark (Telenor)** stated that its radio network is not capable of triangulating mobiles and the cost of implementing this equipment would be in the order of 7-10mill Eur. SMLC solution with position retrieved from GPS capable mobiles (in GPS coverage), alternatively calculated from all known information about current cell, TA/RTT, neighboring cells etc. Adaptations needed to forward positioning information in already implemented data-network.

**Denmark (Hi3G)** stated that it already delivers up to AGNSS which is the most accurate positioning method at the moment.

**Finland (Teliasonera)** stated that it has an action plan for features of positioning for roaming customers and simless handsets.

**Finland (Elisa)** stated that all cost and time estimates are non-binding. Plain GNSS is most probably not feasible solution due to limited availability (not available e.g. indoors), possibly long TTFF etc.

**Germany (Deutsche Telekom)** suggests to discuss the alternative approach that to improve the accuracy of the localisation data of emergency calls in addition to the network based localisation information (in this case radio cells), additional device based localisation information (in this case GNSS/GPS) should be used. Subsequently, in the standards regarding ‘emergency call’ the transmission of additional device based localisation information should be included. Whether the approach using E-Calls (the transmission of additional information through voice channel) or alternative approaches are expedient, would have to be examined. This solution would be limited solely to emergency calls, and therefore fundamentally unproblematic with regard to data privacy

**Germany (Vodafone)** stated that any regulatory measure on emergency call localisation should consider the developments with commercial location based services. These now almost exclusively use GNSS derived location information from the handset. Even governmental emergency related initiatives as e-call rely on these technologies due to their superior accuracy. Hence, future provision of location data with emergency calls should as well predominantly rely on handset based technologies. Network based information could be suitable to complement the handset derived information.

**Ireland (Meteor)** would be concerned that any network based solutions could become redundant by the time they could be delivered as handsets with Geo Positioning capabilities become ever more pervasive.

Italy (Telecom Italia) stated that it is not possible to estimate the cost of so general alternatives, since the impact is usually very high on the mobile networks for time and cost. So in general more precise location solutions through BTS radio channel measures are to be considered very expensive and in principle not economically sustainable for operators. Instead “best effort” solutions based on the autonomous GPS inside the mobile terminal equipment or on the more reliable “Assisted GPS” solution could be the most appropriate choice to deepen. So in the medium-long term the improving of mobile location accuracy should not be based on UTDOA (Uplink Time Difference of Arrival) or EOTDA (Enhanced Observed Time Difference of Arrival) methods, since they are not a definitive solution for improving accuracy and they have a very high cost for operators. More viable direction for analysis by CEPT/ECC, in our view, are GNSS (Global Navigation Satellite System) based solutions. It is has also to be considered that, if future evolution for improving location accuracy will be based on internal GNSS/GPS of the mobile terminal equipment (i.e. the location software GNSS/GPS application for smartphone), the location data is likely to be “best effort” (no reliability). Probably the so called “Assisted GNSS” (AGNSS) with an appropriate standard for mobile terminal equipment could be a more viable and balanced solution, in fact GNSS/GPS data can be integrated with the telephone network in order to provide potentially more precise and also reliable location information. This is an issue for the future.

**Latvia (Triatel)** stated Installation and implementation additional cells (sites), CORE Hardware and Software

**Lithuania (Tele2)** qualified that the price stated in response to Question 26 is only for indication purposes as we haven't started any official request for bill of quantity.

**Portugal (Portugal Telecom)** stated that usually there is no position technology applicable in every situation and area. Some positioning methods do not work indoors or have problems in urban areas while others work well in urban areas but have poor results in rural areas. It is also expected that the next generation of mobile will not only support GPS but also Galileo to achieve better accuracy and availability.

**Slovak Republic (Orange)** suggested that EC makes efforts to push the terminal vendors willing to sell terminals in EU countries to fully support 3GPP and OMA standards to support enhanced network initiated positioning methods, e.g. A-GPS (SUPL or Control Plane), OTDOA and other positioning methods as it is the case in North America region.

**Slovak Republic (Slovak Telecom)** stated that licensing rules of buying positioning methods and positioning performance capacity should be different according to vendors of location based services.

**Slovak Republic (Telefonica)** added that all costs related to emergency services in Slovakia are borne by operators. Therefore, there are no incentives for operators to invest in more accurate localisation methods, particularly if commercialisation potential is low.

**Spain (Telecable)** stated that since it is a full MVNO these questions apply to its host operator and it is not aware of any plans to implement more accurate mobile positioning methods.

**Switzerland (Swisscom)** stated that unfortunately, there are not many vendors in the market and since the topics are mainly driven by the needs of operators and not of PSAP, there was never a big clean up based on end-to-end tests and quality optimisations. The vendors do also not work together and share knowledge, they keep all closed. So it is not only a question of costs but also a question about how all the processes are handled in the future.

# Summary of General Responses received

Several stakeholders submitted general observations and comments rather than a question-by-question response to the questionnaire. This section summarises those responses.

## Bosnia and Herzegovina:

Dear Colleague,

In accordance with: Calls to Emergency Services: Accuracy & Reliability of Caller Location Information, we inform you the following:

In Bosnia and Herzegovina call centers 112 for emergency services have not been implemented. All emergency calls are directed directly from caller to separate emergency services (122-police, 123-firebrigade and 124-health) without any data about locations of the caller. Emergency services 122, 123 and 124 have not been implemented as central emergency centres and generally it is implemented in a way that we have distributed emergency centres per municipalities. Routing in mobile networks is done based on the cellular location (base stations).

Caller location information are obtained directly from the caller (interview).

The implementation of call centers 112 for emergency services is the responsibility of the Government of Bosnia and Herzegovina (Civil Protection Sector).

Electronic communications network operators are able to comply with the time schedule and to upgrade their systems in accordance with technical requirements of the Government of Bosnia and Herzegovina, in the implementation of the call centers112 for emergency services.

Best regards

Rešid Šeremet,

Chief of Numbers Licensing Department

Communications Regulatory Agency B&H

## United Kingdom

Dear Mr Dragomir,

**RE: ECC Questionnaire: Calls to Emergency Services: Accuracy & Reliability of Caller Location Information**

Thank you for your request for information regarding the accuracy and reliability for caller location information for emergency calls in the UK. Having read through your questionnaire, I’m afraid that at this time it would not be possible to provide answers to all of the questions raised. This is because Ofcom is currently in the process of a public consultation into this issue[[3]](#footnote-3), in which we are seeking responses to similar questions, and therefore providing answers to some questions could pre-empt consultation responses.

Our Consultation will continue until 23rd December. We will review the responses received in the New Year and consequently be in a position to address some of the forward-looking aspects of your questionnaire thereafter. As discussed on the phone, I intend to attend the next meeting of this working group in February 2014.

At this time we are able to provide answers to those questions that pertain to the current regulatory framework and emergency call handling practices. I must point that those answers provided are made on behalf of Ofcom and do not necessarily represent the views of, for example, the Emergency Authorities, PSAP operators or Communications Providers.

Yours sincerely

Tim Gilfedder

cc. Huw Saunders, Director, Network infrastructure, Ofcom

**UK Emergency Call Architecture (questionnaire Q1):**

The UK emergency call architecture consists of a single Stage 1 PSAP (consisting of a number of operator centres), which identify the correct Emergency Authority (EA) to whom to forward the call.



Source: BT, <http://www.niccstandards.org.uk/meetings/2012johnmedland.pdf?type=pdf>

Ofcom’s Statement of Policy regarding the performance of Stage 1 PSAPs (Call Handling Agents (CHAs)) can be found here:

<http://stakeholders.ofcom.org.uk/binaries/consultations/emergency-call-handling/statement/statement.pdf>

**Current regulatory policy (questionnaire Q3 & Q7):**

Ofcom’s General Conditions of Entitlement apply in this regard. In particular General Condition 4 states:

“*4.1 The Communications Provider shall ensure that any End-User can access Emergency Organisations by using the emergency call numbers “112” and “999” at no charge and, in the case of a Pay Telephone, without having to use coins or cards.*

*4.2 The Communications Provider shall, to the extent technically feasible, make accurate and reliable Caller Location Information available for all calls to the emergency call numbers “112” and “999”, at no charge to the Emergency Organisations handling those calls, at the time the call is answered by those organisations.*

*4.3 Where a Communications Provider provides an Electronic Communications Service:*

*(a) at a fixed location, the Caller Location Information must, at least, accurately reflect the fixed location of the End-User’s terminal equipment including the full postal address; and*

*(b) using a Mobile Network, the Caller Location Information must include, at least, the Cell Identification of the cell from which the call is being made, or in exceptional circumstances the Zone Code.*

*4.4 For the purposes of this Condition,*

*(a) “Caller Location Information” means any data or information processed in an Electronic Communications Network indicating the geographic position of the terminal equipment of a person initiating a call;*

*(b) “Cell Identification” means the geographic coordinates of the cell which is hosting the call, and where available, an indication of the radius of coverage of the cell;*

*(c) “Click to Call Service” means a service which may be selected on a web-site or other application by an End-User and which connects the End-User only to a number or a limited set of numbers pre-selected by the Communications Provider or an End-User;*

*(d) “Communications Provider” means a person who provides End-Users with an Electronic Communications Service, or provides access to such a service by means of a Pay Telephone, for originating calls to a number or numbers in the National Telephone Numbering Plan but shall exclude any Click to Call Service;*

*(e) “Mobile Network” means either the GSM (Global System for Mobile communications as defined by the European Telecommunications Standards Institute) or UMTS (Universal Mobile Telecommunications System as defined by the European Telecommunications Standards Institute) networks or any other standard for mobile communications that is, or may be, adopted in the UK;*

*(f) “Pay Telephone” means a telephone for the use of which the means of payment may include coins and/or credit/debit cards and/or pre-payment cards, including cards for use with dialling codes. For the avoidance of any doubt, references to a Pay Telephone include references to a Public Pay Telephone10;*

*(g) “Zone Code” means a code which identifies the geographic region in which the call was originated.*”

With regards to Voice over IP (VoIP) calls, our Statement in 2008 (<http://stakeholders.ofcom.org.uk/binaries/consultations/voip/statement/voipstatement.pdf>):

States:

“*…for mostly fixed services we would expect a registered address and VoIP flag on the emergency call handling database. For mostly nomadic or mobile services we would expect a VoIP flag only*”.

**Measurement of location information accuracy (questionnaire Q15)**

Ofcom has an ‘own-initiative’ programme examining compliance with GC4. The scope of this activity is generally considered every 6 months, and includes both fixed and mobile Communications Providers.

<http://stakeholders.ofcom.org.uk/enforcement/competition-bulletins/open-cases/all-open-cases/cw_996/>

## Vodafone Spain

VODAFONE SPAIN RESPONSE TO SETSI INVITATION TO PARTICITE IN THE CEPT COLLECTION OF DATA TO MAKE A REPORT ON ACCURACY AND RELIABILITY OF 112 LOCATION INFORMATION.

On 7th August 2013, State Secretary for Telecommunications and Information Society (Secretaría de Estado de Telecomunicaciones y para la Sociedad de la Información- SETSI) has contacted VODAFONE ESPAÑA, S.A.U. (VODAFONE) informing that European Conference of Postal and Telecommunications Administrations (CEPT) inside Network and Numbering working group (NaN) decided last April creating a working sub-group to study emergency services: PT ES (Project Team Emergency Services).

SETSI informed that main objective of the PT ES group is preparing a report with recommendations about accuracy and reliability of emergency calls location in different networks and telephony services (mobile, nomadic, VoIP). The report will be of technical nature and will have the objective of exploring different options from the technical point of view and cost/benefit analysis, including the point of view of all agents implied in this type of services either from the offer or the demand side: Operating companies, manufactures and emergency centres. SETSI also invited VODAFONE to participate responding to the proposed questions contained in this document. VODAFONE sent its response on 12 September 2013, aligned with the response to the public consultation made by SETSI at the beginning of 2013, accommodating the format of the content to the CEPT consultation and being specific.

On 15 October 2013, SETSI contacted VODAFONE again with an updated questionnaire coming from PT ES.

VODAFONE welcomes the opportunity for answering the new approach of questions and will do it in the same terms done in the previous document sent in September.

**PREVIOUS CONSIDERATIONS**

Location services for emergency calls in VODAFONE networks (fix and mobile) are based on accuracy and reliability criteria and are free of charge following the in force dispositions. Any improvement of the existing processes must be proportional and rational.

Given that the scope of this collection of data is to prepare a report of technical nature, VODAFONE considers that the mention to Next Generation Networks (NGN) is a “must”, specially taking into account that the VoIP technology is contained in the information sent by SETSI. Taking into account that services should be technology neutral, VoIP can sustain either telephony or nomadic services and in NGN networks, telephony services will be sustained over VoIP either on fix or mobile networks (VoLTE). This technical change, in VODAFONE opinion, doesn’t mean the necessity of changes in the nature of the information sent by the location service for emergency calls.

An additional issue to consider at this stage is the location information to be delivered by no telephony VoIP calls (nomadic services). This type of information to be sent and whether the caller has or hasn’t a CLI. In Spain, the National Numbering Plan has a specific attribution of a range for nomadic services. The disposition is the following:

*RESOLUCIÓN de 30 de junio de 2005, de la Secretaría de Estado de Telecomunicaciones y para la Sociedad de la Información por la que se atribuyen recursos públicos de numeración al servicio telefónico fijo disponible al público y a los servicios vocales nómadas, y se adjudican determinados indicativos provinciales.*

It stipulates that the operator using this numbers to provide the service should send the contract address as location information.

Another scenario appears when the VoIP call is made without a CLI, normally the service providers are OTTs like Skype, Line, etc. In this case different questions come on board: who is responsible to send location information? Which type of information can be delivered? Or how the sender should interface with PSAPs?

In VODAFONE’s opinion, the general framework puts the obligation of delivering location information on the service provider, not in the network operator. The above mentioned Resolution on nomadic calls is a good example since the operator who provides the services is responsible for delivering the location information regardless the network operator used for the connection.

The obligation to provide location services for emergency calls at the European level is restricted to 112 calls. Nevertheless, Spanish regulation is much more extensive and includes the same obligation for 7 additional numbers, regulating the kind of information and the service implied in following dispositions.

*“RESOLUCIÓN de 21 de noviembre de 2008, de la Secretaría de Estado de Telecomunicaciones y para la Sociedad de la Información, por la que se identifican los servicios de atención de llamadas de emergencia a efectos de la obtención de los datos de los abonados al servicio telefónico disponible al público”* which establishes the obligation for operating companies to send to emergency services entities (including 061, 062, 082, 085, 088, 091, 1006 and any service attending situations of the same nature) the same information provides to 112; y

“Orden ITC/750/2010, de 17 de marzo, por la que se establecen las condiciones para la puesta a disposición de los datos de localización del usuario llamante del servicio telefónico móvil a los servicios de atención de llamadas de emergencia prestados a través de los números 062 y 091” which establishes the obligation for Operating Mobile Companies to provide for 062 and 091 location information using the technical solution implemented for 112 as reference.

The existence of these regulations allows envisaging that the type of information and the procedures are accurate and reliable so is used beyond the strict European dispositions.

At the same time, their existence should be taken into account when analysing technical changes which might impose disproportionate burdens for the Operating Companies if the technical changes aren’t encompassed with the necessary remedies of normative and/or economic nature.

Being the information accurate and reliable, the technological change in the telephony due to the implantation of NGNs where voice will be transmitted using packets instead of circuit switching technologies, doesn’t need to involve new information to be delivered. Nevertheless, it might mean some technical changes in the networks to ensure that emergency services can get the same information regardless the users are NGN or Circuit Switching.

As VODAFONE mention in its response to the SETSI public consultation on the same matter, any change in the provision of the location services should be considered under the following circumstances: i) the change must be done by all the countries in the European Union zone and ii) operating companies will have public financing to make the changes. The second circumstance is out of scope for the present collection of data which, at list from the technical point of view, is taking into account the first one.

1. ADR (formally, the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)) is a 1957 United Nations treaty that governs transnational transport of hazardous materials. "ADR" is derived from the French name for the treaty: **A**ccord européen relatif au transport international des marchandises **D**angereuses par **R**oute). [↑](#footnote-ref-1)
2. Comisión del Mercado de las Telecoimunicaciones [↑](#footnote-ref-2)
3. Consultation and responses (when published) can be found here: <http://stakeholders.ofcom.org.uk/consultations/emergency-mobiles-cfi/> [↑](#footnote-ref-3)