



# **Pilot project on the design, implementation and execution of the transfer of GNSS data during an E112 call to the PSAP**

Contract No 440/PP/GRO/PPA/15/8308

Deliverable D3.3 - Recommendation for the pilot



Loïc Bellon  
*July - 2017*

## Contract No 440/PP/GRO/PPA/15/8308

### Deliverable D3.3

Pilot project on the design, implementation and execution of the transfer of GNSS data during an E112 call to the PSAP

	<b>Responsibility-Office-Company</b>	<b>Date</b>	<b>Signature</b>
<b>Prepared by</b>	Loïc Bellon	16 Jun 2016	
<b>Verified by</b>	Matthieu Forte	16 Jun 2016	
<b>Approved by</b>	Matthieu Forte	16 Jun 2016	

#### LEGAL NOTICE

This document has been prepared for the European Commission however it reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

**ENREGISTREMENT DES EVOLUTIONS / CHANGE RECORDS**

ISSUE	DATE	§ : DESCRIPTION DES EVOLUTIONS § : CHANGE RECORD	REDACTEUR AUTHOR
1.0	03/02/2016	Deliverable outline	L. Bellon
1.1	30/05/2016	First draft – Sections 1, 2, and 3	L. Bellon
1.2	13/06/2016	Adding of sections 4, 5, and 6	L. Bellon
1.3	14/06/2016	Modifications based on Consortium members review	L. Bellon I. Embaby
1.4	16/06/2016	Modification of Table 2 "Cost/Benefits analysis NPV per scenario (€ billion, 2015-2030)" following the updated of deliverable D2.1/D2.2	L. Bellon

## TABLE OF CONTENTS

<b>1. INTRODUCTION .....</b>	<b>8</b>
1.1 PLACE OF THIS DOCUMENT AND OBJECTIVES.....	8
1.2 FOREWORD .....	9
1.3 APPLICABLE DOCUMENTS.....	10
1.4 REFERENCE DOCUMENTS .....	10
<b>2. RECOMMENDATION FOR THE PILOT METHODOLOGY .....</b>	<b>11</b>
<b>3. COMPLIANCE OF HELP112 ARCHITECTURES WITH USER REQUIREMENTS .....</b>	<b>12</b>
<b>4. COSTS/BENEFITS ANALYSIS RESULTS .....</b>	<b>19</b>
<b>5. IMPLEMENTATION ROADMAP IN PILOT SITES .....</b>	<b>21</b>
<b>6. CONCLUSION.....</b>	<b>23</b>

---

## LIST OF TABLES

Table 1 – Applicable documents.....	10
Table 2 – Reference documents.....	10

## LIST OF ILLUSTRATION TABLES

Table 1 - HELP112 flow chart .....	8
Table 2 - Cost/Benefits analysis NPV per scenario (€ billion, 2015-2030) .....	19

## LIST OF ANNEXES

Annex 1 - Compliance of HELP112 architectures with Accuracy/Precision requirements .....	26
Annex 2 - Compliance of HELP112 architectures with Response Time requirements .....	27
Annex 3 - Compliance of HELP112 architectures with Presentation of the caller's location in the PSAP requirements .....	28
Annex 4 - Compliance of HELP112 architectures with Privacy requirements .....	29
Annex 5 - Compliance of HELP112 architectures with Acceptance of the solution requirements....	30
Annex 6 - Compliance of HELP112 architectures with Security requirements.....	31
Annex 7 - Compliance of HELP112 architectures with Method of estimating the location information requirements.....	32
Annex 8 - Compliance of HELP112 architectures with Battery life requirements.....	33
Annex 9 - Compliance of HELP112 architectures with Incurring charges requirements.....	34
Annex 10 - Compliance of HELP112 architectures with Data transmission requirements .....	35
Annex 11 - Compliance of HELP112 architectures with Roaming requirements.....	36
Annex 12 - Compliance of HELP112 architectures with Improvement of AML specific requirements .....	37
Annex 13 - Architectures implementation roadmap in pilot sites.....	39

---

## LIST OF ABBREVIATIONS

**3GPP** - 3rd Generation Partnership Project

**A-GNSS** - Assisted Global Navigation Satellite System

**A2C** - Authorities to Citizens communication

**ACE** - Accredited Center of Excellence

**AML** - Advanced Mobile Location

**API** - Application Program Interface

**BSC** - Base Station Controller (2G)

**BSSAP-LE** - LCS Extension for Lb, Lp and Ls interfaces

**BSSMAP-LE** - BSSMAP LCS Extension

**BSSLAP** - BSS LCS Assistance Protocol

**C&C** - Command & Control

**C2A** - Citizens to Authorities communication

**CAD** - Computer-aided dispatch

**CAPEX** - Capital expenditures

**CEN** - European Committee for Standardisation

**CERN** - European Organisation for Nuclear Research

**CNES** - French Space Agency

**EC** - European Commission

**E-CID** – Enhanced Cell ID

**ECAS** - Emergency Call Answering Service

**ECC** - Electronic Communications Committee

**EE** - British mobile phone operator, formerly Everything Everywhere

**EGNOS** - European Geostationary Navigation Overlay Service

**E-GNSS** – European Global Navigation System

**EISEC** - Enhanced Information System for Emergency Calls

**ESA** - European Space Agency

**ESSN** - Emergency Services Staff Network

**ETC** - Electronic Toll Collection

**ETSI** - European Telecommunications Standards Institute

**EU** - European Union

**FP7** - Framework Programme 7

**GIS** - Geographical Information System

**GMLC** - Gateway Mobile Location Center

**GNSS** - Global Navigation Satellite System

**GPS** - Global Positioning System

**GSM** - Global System for Mobile Communications

**HSS** - Home Subscriber Server

**ICE** - In Case of Emergency

**IETF** - Internet Engineering Task Force

**IP** - Internet Protocol

**IPR** - Intellectual Property Right

**IRSN** - French Nuclear Safety Institute

**Iupc** - Interface between RNC and SAS (RNC interface)

**IVE** - in-vehicle equipment

**IVS** - in-vehicle systems

**KPI** - Key Performance Indicator

**LAC** - Location Area Code

**LBS** - Location based Services

**LCS** - LoCation Services

**LCS-AP** - LCS Application Protocol

**LPP** - LTE Positioning Protocol

**LTE** - Long-Term Evolution

**LPP** - LTE Positioning Protocol

**MAC** - Media Access Control

**MEP** - Member of the European Parliament

**MLC** - Mobile Location Centre

**MME** - Mobility Management Entity (4G)

**MNO** - Mobile Network Operator

**MSD** - Minimum Set of Data

**MSG** - Mobile Standard Group

**MT-LR** - Mobile Terminating Location Request

**NG** - Next Generation

**NG112** - Next Generation 112

**OPEX** - Operating Expenditures

**OS** – Operating System

---

**OTDOA** - Observed Time Difference Of Arrival

**PCAP** - Positioning Calculation Application Part

**PCO** - Project Control Office

**PEMEA** - Pan-European Mobile Emergency Application

**PSAP** - Public Service Answering Point

**R&D** - Research & Development

**RNC** - Radio Network Controller (3G)

**Rx** - Received Signal level

**RRLP** - Radio Resource Location services Protocol

**RTT** – Round Trip Time

**SAS** - Standalone SMLC

**SET** - SUPL enabled terminal

**SIM** - Subscriber Identity Module

**SIP** - Session Initiation Protocol

**SL** - SUPL Location

**SLA** - Service Level Agreement

**SLC** - SUPL Location Center

**SLP** - SUPL location platform

**SMLC** - Serving Mobile Location Center

**SMS** - Short Message Service

**SSID** - Service Set Identifier

**SUPL** - Secure User Plane

**TDOA** - Time Difference of Arrival

**TA** - Timing Advance (between an MS and its serving BTS)

**TL** - Task Leaders

**TLRR** - Trigger Location Reporting Request

**TM** - Technical Manager

**TOA** - Time of Arrival

**TTFT** - Time To First Fix

**WP** - Work Package

**WPL** - Work Package Leader

**UE** - User Equipment (mobile)

**UMTS** - Universal Mobile Telecommunication System

**URI** - Uniform Resource Identifier

**URN** – Uniform Resource Name

**WGS84** - World Geodetic System Datum 84

**VoLTE** - Voice over LTE

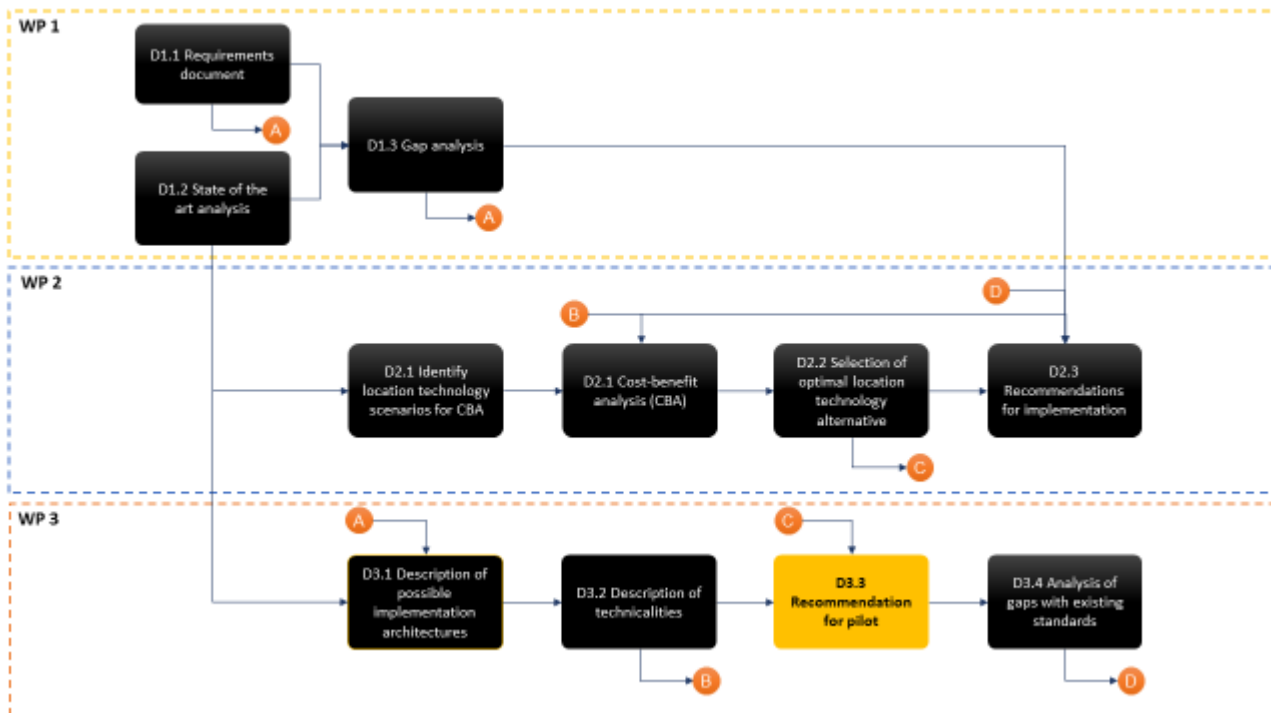
# 1. INTRODUCTION

## 1.1 PLACE OF THIS DOCUMENT AND OBJECTIVES

This document is the “Recommendation for the pilot”, identified as D3.3 in the list of project deliverables.

It is generated as part of the contract 440/PP/GRO/PPA/15/8308.

The objectives of this document are to determine the architecture(s) (among those described in D3.2) that will be implemented in the pilots based on a pre-defined compliance matrix and criteria that will be used to rank the solution. The compliance matrix will be based on the user requirements defined in D1.3 and D3.1. To choose the best architecture(s), criteria will also be based on the WP2 Costs/Benefits analysis and on the implementation roadmap in each pilot. The chart below defines the place of this document and its interaction with other work packages deliverables:



**Table 1 - HELP112 flow chart**

As a reminder, here are the goals of each work package’s deliverable:

- WP1:
  - D1.1: Defines the **user requirements and formulates a set of user scenarios** that will lead the implementation and evaluation of the architecture.
  - D1.2: Analyses and compares the **existing solutions and the underlying technologies** for the provision of caller location.



- D1.3: Analyses how **existing solutions satisfy the requirements**, reports the **barriers for deployment** and provides **recommendations for the implementation**.
- WP2:
  - D2.1: Defines the **key location and transmission technology scenarios** and assess the **costs and benefits of each scenario**.
  - D2.2: Recommends **the optimal scenario(s) for the help112 caller location** based on the results of the cost-benefit analysis.
  - D2.3: Provides **a more detailed assessment of the costs linked to implementation of the selected technology scenario(s)** as well as **key operational and financial recommendations**.
- WP3:
  - D3.1: **Defines possible implementation architectures for the pilot sites**, covering location/transmission tech. alternatives of WP1.
  - D3.2: Describes **technicalities of these architectures** and recommendations for their implementation.
  - D3.3: **Selects the architecture to be deployed** for the pilots based on outputs of WP2.
  - D3.4: **Analyses the gaps between the selected architecture and the existing standards** (eCall, 3GPP, ECC-REP-225).

## 1.2 FOREWORD

Emergency caller location is the most important piece of information for both PSAPs and first responders. Ensuring it is accurate, reliable and timely will save lives and significant emergency services resources. Not having it will mean negative outcomes for our citizens.

In the absence of a detailed and prescriptive regulatory framework, emergency mobile caller location information in Europe has typically relied on Cell-ID. Often, Cell-ID is inadequate because the cell radius is too large, notably in rural areas, and sometimes the serving cell might not be the closest one to the handset.

Developments in location technologies and the proliferation of GNSS enabled smartphones are leading to improved location information being available in the handset. Making such handset derived positioning information available to PSAPs during emergency communications in a secure and reliable manner is highly desirable.

This consortium, known as the HELP112 consortium, aims demonstrate that accurate and reliable caller location information is highly effective and is also highly efficient. It also studies possible deployment strategies across Europe in a cost effective manner, securing better outcomes for our citizens and simultaneously not placing any additional burden on the emergency services, mobile network providers or public authorities.

### 1.3 APPLICABLE DOCUMENTS

AD	Title of the document & reference
<b>AD 1</b>	Contract 440/PP/GRO/PPA/15/8308
<b>AD 2</b>	Help112 Consortium Agreement

**Table 1 – Applicable documents**

### 1.4 REFERENCE DOCUMENTS

RD	Title of the document & reference
<b>RD 1</b>	Help112 Technical, Management & Financial Proposal TPZF/SSA-T2015-PP-0451 is1.0 31/07/2015
<b>RD 2</b>	Help112 Requirements Document D1.1
<b>RD 3</b>	Help112 Requirements Document D1.3
<b>RD 4</b>	Help112 Cost-Benefit analysis D2.1
<b>RD 5</b>	Help112 Technical description D3.2

**Table 2 – Reference documents**

---

## 2. RECOMMENDATION FOR THE PILOT METHODOLOGY

---

The selection of the HELP112 architecture for the pilots followed the method below to define the most appropriate architecture(s) to be implemented during the pilot phase of HELP112 project.

As a reminder, here is the list of the six architectures foreseen for the pilot phase of HELP112 and described in HELP112 deliverable D3.2:

- **Architecture 1:** Handset hybrid positioning method + E-GNSS SUPL server and client + SMS transmission.
- **Architecture 2:** Handset hybrid positioning method + SMS transmission international roaming enabled.
- **Architecture 3:** Handset hybrid location method + SMS transmission method + NBL Location Calculator based on Radio measurement Report (RMR).
- **Architecture 4:** Handset hybrid location method + Data channel transmission method.
- **Architecture 5:** Handset hybrid location method + IMS SIP transmission method.
- **Architecture 6:** Handset hybrid location method + In-band modem transmission method (Personal eCall).

The first criteria that will be taken into account in the choice of the architecture for the pilots is the compliance with user requirements (Requirements that apply to all HELP112 stakeholders: Caller, MNOs, PSAP, OS provider, Handset manufacturers ...) defined in HELP112 deliverables D1.1 and D3.1. For each type of requirement, a matrix of compliance of each architecture foreseen for the pilots against each requirement will be define. Based on this matrix, selected requirements will be extracted and used to make the first rankings of the solutions.

The second criteria will be based on the outputs of the costs benefits analysis of Work Package 2 and will aim at defining the most effective architecture to be deployed in the pilots in the short term with regards to the associated implementation and maintenance cost for each stakeholder (MNOs, PSAP, Public Authority, OS provider, Handset manufacturers, ...), and to the benefits in terms of human lives saved brought by each architecture.

The third and final criteria is the capacity of each pilot to implement the necessary infrastructure for each foreseen architecture in the timeframe of HELP112 project. Based on the feedbacks of each pilot reported in HELP112 deliverable D3.2, each architecture will be ranked depending on its implementation roadmap in the pilot sites.

Finally, the results of all above criteria will be combined to firstly eliminate the architectures that either are not compliant with relevant requirements, or would be less effective in terms of cost and benefits, or could not be implemented in the pilot sites during the timeframe of HELP112, and secondly select the best architecture(s) to be implemented in each pilot site.

---

### 3. COMPLIANCE OF HELP112 ARCHITECTURES WITH USER REQUIREMENTS

---

For each class of user requirements defined in D1.3 and D3.1, the compliance of each architecture foreseen for the pilots (D3.2) with each requirement is depicted in Annexes 1 to 12 of this document.

As a reminder, here is the defined user requirements classification. For further details, please refer to D1.3 or D3.1.

The requirement ids are in the form:

Requirement id: XXXX\_NNN

where

XXXX is a four character abbreviation identifying the requirement category and

NNN is a three digit number identifying the requirements in each category

The category's four character abbreviations are:

**ACCU** for accuracy and reliability requirements (*Annex 1*)

**RESP** for response time requirements (*Annex 2*)

**PRES** for presentation of the caller location in the PSAP (*Annex 3*)

**PRIV** for privacy requirements (*Annex 4*)

**ACCE** for requirements regarding the acceptance of the solution (*Annex 5*)

**SECU** for security requirements (*Annex 6*)

**LOCA** for requirements regarding the use of different positioning methods (*Annex 7*)

**BATT** for requirements regarding the battery life of the handset (*Annex 8*)

**CHAR** for requirements regarding the charges that a caller may occur (*Annex 9*)

**TRAN** for data transmission requirements (*Annex 10*)

**ROAM** for roaming callers requirements (*Annex 11*)

**AML** for AML specific requirements (*Annex 12*)

And here are the HELP112 user requirements by class of requirements:

**ACCU:**

- ACCU\_001: Confidence radius in meters.
- ACCU\_002: Precision in urban area at 30m 67% of the time.
- ACCU\_003: Precision in urban area at 100m 95% of the time.
- ACCU\_004: Precision in rural area at 30m 67% of the time.

- ACCU\_005: Precision in rural area at 100m 95% of the time.
- ACCU\_006: Accuracy less than precision.

**RESP:**

- RESP\_001: Less than 5 seconds for Cell-Id.
- RESP\_002: Less than 30 seconds for other methods.

**PRES:**

- PRES\_001: Reception on PSAP call taker available GIS.
- PRES\_002: No additional task for call taker.
- PRES\_003: Caller location either push or pull.
- PRES\_004: Caller location displayed in WGS84 coordinates system.

**PRIV:**

- PRIV\_001: Caller location only available for emergency call.
- PRIV\_002: Location storage policy.
- PRIV\_003: Location access at PSAP level.
- PRIV\_004: Location not stored on the handset.
- PRIV\_005: Location availability.

**ACCE:**

- ACCE\_001: HELP112 solution available for the widest range of handsets.
- ACCE\_002: No caller intervention needed.
- ACCE\_003: Location information not visible or accessible to the caller.
- ACCE\_004: No interference of location and transmission process with voice call.

**SECU:**

- SECU\_001: Continuous availability of HELP112 solution to authorized entity.
- SECU\_002: Ensure protection of HELP112 solution against attacks

**LOCA:**

- LOCA\_001: Use of handset GNSS capabilities.
- LOCA\_002: Make use, trial and demonstrate the advantages of E-GNSS to compute caller's location.
- LOCA\_003: Use of multiple positioning methods.

- LOCA\_004: Fall-back location solution.

**BATT:**

- BATT\_001: Priority given to voice call.
- BATT\_002: Location methods used rely on battery capacity.

**CHAR:**

- CHAR\_001: Data channel used if already activated.
- CHAR\_002: Location SMS free of charge for the caller.

**TRAN:**

- TRAN\_001: Study the possibility to use the IP channel to transmit the location information.
- TRAN\_002: Fall-back transmission solution if the data channel is unavailable.

**ROAM:**

- ROAM\_001: International roaming.

**AML:**

- AML\_001: Transmit extra data.
- AML\_002: Handset's HELP112 software triggered by emergency SMS.

According to the compliance matrix (HELP112 architectures/User requirements) defined in *Annexes 1 to 12*, the compliance of each architecture against the requirements in the list hereafter is not relevant. Indeed, no architecture among the 6 foreseen for the pilots is better covering these requirements than another. These requirements will therefore not be used to rank the HELP112 architectures:

- ACCU\_001: Confidence radius in meters.
- ACCU\_002: Precision in urban area at 30m 67% of the time.
- ACCU\_004: Precision in rural area at 30m 67% of the time.
- ACCU\_006: Accuracy less than precision.
- RESP\_001: Less than 5 seconds for Cell-Id.
- PRES\_001: Reception on PSAP call taker available GIS.
- PRES\_002: No additional task for call taker.
- PRES\_003: Caller location either push or pull.
- PRES\_004: Caller location displayed in WGS84 coordinates system.

- 
- PRIV\_001: Caller location only available for emergency call.
  - PRIV\_002: Location storage policy.
  - PRIV\_003: Location access at PSAP level.
  - PRIV\_004: Location not stored on the handset.
  - PRIV\_005: Location availability.
  - ACCE\_002: No caller intervention needed.
  - ACCE\_003: Location information not visible or accessible to the caller.
  - SECU\_001: Continuous availability of HELP112 solution to authorized entity.
  - SECU\_002: Ensure protection of HELP112 solution against attacks.
  - LOCA\_001: Use of handset GNSS capabilities.
  - LOCA\_003: Use of multiple positioning methods.
  - BATT\_001: Priority given to voice call.
  - BATT\_002: Location methods used rely on battery capacity.
  - CHAR\_002: Location SMS free of charge for the caller.
  - AML\_002: Handset's HELP112 software triggered by emergency SMS.

The rest of the user requirements are the following:

**ACCU\_003:** Precision in urban area at 100m 95% of the time.

Should GNSS signals be available, all the architecture are compliant with this requirement. Otherwise, only **Architecture 3** will cover this requirement by using network based O-TDOA location method when a 3G or 4G network is used by the caller.

**ACCU\_005:** Precision in rural area at 50m 95% of the time.

Should GNSS signals be available, all the architecture are compliant with this requirement. Otherwise, only **Architecture 3** will cover this requirement by using network based O-TDOA location method when a 3G or 4G network is used by the caller.

**RESP\_002:** Response time less than 30sec for location methods different from Cell-Id.

Should GNSS signals and GNSS assistance data be available at the time of the location estimate, all the architecture are compliant with this requirement. However, only **Architecture 3** will cover this requirement in any case since even if GNSS signals or assistance data are unavailable, the Location Calculator will be able to compute a location estimate better than Cell-Id by using the Radio Measurement Report (RMR) transmitted by the handset (Need to be confirmed by trial).

**ACCE\_001:** HELP112 solution available for the widest range of handsets.

Since the Radio Measurement Report is available for all mobile phone irrespectively of their WiFi or GNSS capabilities, **Architecture 3** is the best candidate to cover this requirement, since even for mobile phones without WiFi or GNSS capabilities, the Location Calculator should be able to compute a location estimate better than Cell-Id using the RMR transmitted by the handset. Concerning the transmission method, **Architecture 5 and 6** are far behind since they respectively use an IMS network (will not be deployed everywhere in Europe in the coming years) and an in-band modem into the handset (need to be implemented by each handset manufacturer) to transmit the location data.

**ACCE\_004:** No interference of location and transmission process with voice call.

**Architecture 6** (Personal eCall) is the only architecture that is **not compliant** with this requirement. Indeed, the voice call will be muted during the whole transmission of the location information. This loss of communication between the caller in distress and the emergency services call taker is a major issue of this architecture for the acceptance by PSAPs and has been several time escalated since the beginning of HELP112 project.

**LOCA\_002:** Make use, trial and demonstrate the advantages of E-GNSS to compute caller's location.

Smartphones that embed Galileo-ready chipset are not foreseen to be available before the end of this year (2016) and even if this type of smartphone should be available before the beginning of HELP112 trial phase, assistance data for Galileo would remain unavailable. For these reasons, the only architecture that allows to test E-GNSS advantages during the time frame of HELP112 is **Architecture 1**.

**LOCA\_004:** Fall-back location solution better than Cell-Id.

For each architecture, the handset sends its location after a configured timeout. If after this timeout, the mobile phone did not manage to compute any location, it sends a "no location" message. In that case, **Architecture 3** is the only one that will be able to provide a location estimate better than Cell-Id since the Location Calculator will be able to compute a location based on the Radio Measurement Report sent by the mobile phone.

**CHAR\_001:** Data channel used if already activated.

Architecture 1 and 4 are using the data channel. Architecture 1 for the location estimate, and Architecture 4 for the transmission of location information. So for these two architectures, if the data channel is not activated, either it will not be possible to estimate any location, or the location data will not be transmitted to the PSAP.

In Architecture 5, we made the assumption that all communications (voice included) are using the data channel. This assumption will be verified when LTE networks are implemented everywhere and 2G and 3G networks are not used anymore.

**Architecture 2, 3, 6** do not use the data channel and are therefore fully compliant with this requirement.



**TRAN\_001:** Study the possibility to use the IP channel to transmit the location information.

**Architecture 4 and 5** are compliant with this requirement. Others architectures do not use the data channel to transmit the location information and are therefore not compliant with this requirement.

**TRAN\_002:** Fall-back transmission solution if the data channel is unavailable.

No architecture, among the ones foreseen for the pilots, has a fall-back transmission solution. Nevertheless, **Architecture 4** could be modified in order to use a transmission method using SMS when the data channel is unavailable.

**ROAM\_001:** International roaming.

In Architectures 1, 2, 3, the HELP112 location data are transmitted by SMS to a location server. Among them, **Architecture 2** is a specific architecture that handles international roaming. Architectures 1 and 3 do not. However, it would be possible to consider architectures derived from Architectures 1 or 3, using the SMS transmission defined in Architecture 2. Architectures 4, 5, and 6 that respectively use the data channel, a SIP message over IMS network, and the voice channel to transmit the location data to the PSAP, all handle roaming without any need for modification.

**AML\_001:** Transmit extra data.<sup>1</sup>

In Architectures 1 and 2, no additional data is transmitted by comparison with the current version of AML. In **Architecture 3**, in addition to the data currently sent by AML, the Radio Measurement Report is sent to the location server in order to be used by the Location Calculator to compute a location using a Network Based Location method. There is no additional data transmitted in the solution proposed in **Architecture 4**, but it remains possible since this is the data channel that is used to transmit the location information.

Considering the relevant requirements extracted from the compliance matrix and the work done in previous HELP112 deliverable, the intermediate conclusions of this section are the following:

- **Architecture 3** is the one that best cover the requirements, particularly for accuracy and response time requirements when no GNSS signals are available or when the GNSS location estimate takes too long to be computed, and for acceptance requirements since this solution should provide a location estimate better than Cell-Id whatever the

<sup>1</sup> AML\_001 requirement only apply to Architectures 1, 2, 3, and 4 and will not be considered in the final choice of the architecture to be implemented in the pilots.

type of handset be (GNSS/WiFi enabled or not). Besides it provides a fall-back location solution better than Cell-Id in case of no location is returned by the handset. Should a pilot site start from an AML implementation, this architecture also improve the current AML solution by transmitting additional data (i.e. Radio Measurement Report).

- **Architecture 1** is the only one that could provide results on E-GNSS added value during the timeframe of HELP112. And even when Galileo ready chipset are available for smartphones and Galileo assistance data are provided by OS providers, it is the only architecture that would be in position to **provide a location estimate while being independent from OS providers**.
- **Architecture 2** is the only one that handles international roaming when we consider an SMS transmission.
- **Architecture 4** is an architecture that could be used in the short term to test the transmission of location data on the data channel.
- **Architecture 5** is not compliant with a major requirement, which is requirement ACCE\_001 since IMS networks are currently not widely deployed.
- **Architecture 6** is not compliant with two major requirements concerning the acceptance by either emergency caller or call taker. Indeed, each handset manufacturer would have to develop an in-band modem in their handset, which could take several years to reach all users in Europe since it would not be possible to upgrade existing mobile phone. Besides, in this architecture, the transmission of location information significantly interferes with the voice call since it is completely muted during the whole transfer of the location information (from 4 to 20 seconds). This issue is considered as a major one by PSAP (HELP112 D1.1 and D1.3).

## 4. COSTS/BENEFITS ANALYSIS RESULTS

The table below presents the Net Present Value (€ billion) for the next 15 years for all the 22 scenarios (Location methods/Transmission method) taken into consideration in the Costs/Benefits analysis done within Work Package 2. The Net Present Value represents the difference between the value saved by implementing a solution and the cost of implementation/operation of this solution. The scenarios highlighted in green correspond to the 6 Architectures foreseen for the pilots in Work Package 3.

Location methods	Transmission methods				
	Network transmission	SMS	Data channel (HTTPS)	IMS/SIP	Voice channel (in-band modem)
Enhanced Network Based Location – Control Plane	€ 223				
Cell-Id A-GPS		€ 211	€ 183	€ 147	€ 118
Cell-Id A-GNSS (without Galileo) WiFi		€ 280 Architecture 2	€ 242 Architecture 4	€ 195 Architecture 5	€ 179 Architecture 6
Cell-Id A-GNSS WiFi Enhanced NBL User Plane		€ 297 Architecture 3 (Transmission architecture 2)	€ 257	€ 207	€ 194
Cell-Id E-GNSS (included Galileo) WiFi		€ 284 Architecture 1 (Transmission architecture 2)	€ 246	€ 198	€ 183
Cell-Id E-GNSS (included Galileo) WiFi Enhanced NBL User Plane		€ 298	€ 258	€ 208	€ 195
Enhanced NBL Control Plane A-GNSS	€ 272				

**Table 2 - Cost/Benefits analysis NPV per scenario (€ billion, 2015-2030)**

The 6 foreseen architectures cover all the transmission methods except Network transmission that is used exclusively for control plane network based location methods. The control plane network based location methods rely entirely on a considerable investment in infrastructure for each MNO, which is currently not foreseen to be implemented and cannot be tested during the pilots.

The 6 architectures defined in Work Package 3 cover all the transmission methods and positioning methods used among the other 20 scenarios studied in the Costs/Benefits analysis (if we consider

---

that the "Cell-Id + A-GPS" location method is a limited case of the "Cell-Id + A-GNSS + WiFi" location method).

All scenarios presented in the Costs/Benefits analysis use transmission methods that can handle international roaming. However, in the architectures foreseen for the pilots (HELP112 deliverable D3.1 and D3.2), Architecture 1 and 3 use a SMS transmission method that cannot handle roaming. It goes without saying that roaming issue is an important matter and Architecture 1 and 3 could be easily combined with the SMS transmission method presented in Architecture 2 so that they could handle international roaming. Nevertheless, in the foreseen architectures for the pilots, Architecture 2 is a specific one that will allow to test the technical feasibility of the roaming enabled SMS transmission method without caring about the location method used.

The Costs/Benefits analysis highlights the fact that the SMS transmission methods is the one that brings the most benefits in the short term. Indeed, this transmission method is available on every type of network, and without the need for the caller to have an active data connectivity.

The Costs/Benefits analysis shows that even if the IMS/SIP transmission method is certainly the future transmission method that will be used, it will take many years before this type of network is widely implemented in Europe, and for the PSAPs to be IMS/SIP ready. Besides, a new format of HELP112 location data should be defined in order to send it into the SIP message, and PSAPs that are IMS/SIP ready should recognize and process these HELP112 location data in the SIP message. So if we consider a fast and wide implementation of the HELP112 solution in the coming years, this is not the architecture we are looking at.

According to the Costs/Benefits analysis, the best architecture that could be implemented in the near future in terms of Benefits vs Costs includes a "Cell-Id E-GNSS (included Galileo) WiFi Enhanced NBL User Plane" positioning method and a SMS transmission method that handles international roaming. This architecture is the combination of architectures 1, 2, and 3 defined in Work Package 3. In the future, Architecture 1, 2, and 3 could easily be combined. However, for the pilot phase of HELP112 project, each of these three architectures allows to test a specific location or transmission method independently:

- Architecture 1: E-GNSS location method.
- Architecture 2: International roaming enabled SMS transmission method.
- Architecture 3: User Plane Network Based Location method (Safety Net).

---

## 5. IMPLEMENTATION ROADMAP IN PILOT SITES

---

According to the feedbacks received from pilot sites and reported in HELP112 deliverable D3.2 for each architecture (defined in Work Package 3), the implementation roadmap of each foreseen architecture in each pilot site is depicted in *Annex 13*.

What can be extracted from the results in *Annex 13* is that it will not be possible for any pilot site to implement **Architecture 5** in the timeframe of HELP112 project, since it will take time before IMS network are widely deployed, and since pilot sites are not IMS/SIP ready and are not expected to be in the timeframe of HELP112 project.

Another important information is that although two pilot sites (Lithuania and Italy) have eCall ready PSAP and could test a new eCall flag for HELP112 location data, the definition of this new eCall flag and its implementation by MNOs could take time. Besides, handset manufacturers are not expected to implement the necessary in-band modem at the mobile phone level in the timeframe of HELP112 project. As a consequence, it will probably not be possible to implement **Architecture 6** in the timeframe of HELP112 project.

All pilot sites will be able to test the transmission method used in **Architecture 1** during the pilot phase of the project, either by using AML (UK, Lithuania, and Austria), or by modifying an existing location server to receive the HELP112 location SMS (Italy). Concerning the location part, it relies on OS providers/Handset manufacturers that will have to use the E-GNSS SUPL server to get assistance data for Galileo instead of their own location capabilities. Should this not be possible, E-GNSS tests using the E-GNSS SUPL server could still be conducted offline.

**Architecture 2** (solution 2-A; see D3.2) could be tested in the UK pilot, in the Lithuanian pilot (TBC), and in the Italian pilot. It mainly relies on OS providers/Handset manufacturers that should implement into the handset a HELP112 software that translates 112 emergency number in the long number of the visited country location server (based on MNC/MCC) if needed (Foreign caller in a visited country).

It will not be possible to implement an end-to-end version of Architecture 3 during the pilot phase of HELP112 project, since no OS provider or handset manufacturer shows any interest in implementing such functionality (sending of the Radio Measurement Report to the HELP112 location server in addition to HELP112 location data), at least for this year. Nevertheless, offline test of **Architecture 3** Location Calculator could still be conducted in UK and Lithuania (TBC) during the pilot phase of the project, since some of the MNOs in these two countries are ready to provide the Cell tower database requested for the location methods based on the Radio Measurement Report.



**Reference:** HELP112-D3.3-TPZ

**Date:** 16/06/2016

**Version:** 1.4

---

Should either an OS provider or a Handset manufacturer implements a HELP112 software that translates the 112 emergency number in the URL of the Location server (based on MNC/MCC), **Architecture 4** (National approach; see D3.2) could be tested in the UK pilot and in the Italian pilot.

---

## 6. CONCLUSION

---

Regarding the results presented in the previous sections, two architectures are far behind the others in terms of interest to be tested during the pilot phase of HELP112 project:

- **Architecture 5** (Handset hybrid location method + IMS SIP transmission method) since a wide European deployment of IMS network will take years, a new format (Uniform Resource Identifier) for HELP112 has to be defined, and PSAPs will not be IMS/SIP ready in the coming years. All of this makes this architecture not compliant with major acceptance requirements, and less interesting than other architectures in terms of Costs vs Benefits in the short term. Moreover, no pilot will be in position to test such an architecture during the timeframe of HELP112 project.
- **Architecture 6** (Handset hybrid location method + In-band modem transmission method (Personal eCall)). Although PSAPs will have to be eCall ready by the end of year 2017, they show no interest in expanding this solution to emergency call using mobile phones. Indeed, this solution would interfere too much with the voice call (4 to 20 seconds of silent call during the sending of location data) and could slow down the deployment of emergency services, which is in contradiction with the need for having an accurate and fast caller's location estimate. Furthermore, considering HELP112 timeframe, it would take too much time to define and implement a new eCall flag for emergency call initiated from mobile phones.

On the contrary, the four other architectures are complementary. They could be easily combined to cover as much as possible the user requirements, and to bring the best added value in the short term in terms of benefits vs costs.

The compliance with user requirements and the Costs/Benefits analysis show that the best architecture to be implemented in the near future is a combination of architecture 1, 2, and 3, that is to say a "Cell-Id E-GNSS (included Galileo) WiFi Enhanced NBL User Plane" positioning method and a SMS transmission method that handles international roaming. During the pilot phase of HELP112 project, each functionality of this "ideal" architecture could be tested by implementing:

- **Architecture 1** to test the added value brought by the use of E-GNSS in the location estimate process. This architecture could be tested in any pilot sites if the requested HELP112 software is provided by OS providers/Handset manufacturers. Otherwise, tests could still be conduct offline to show the added value of E-GNSS.
- **Architecture 2** to test an implementation of the SMS transmission method that handles international roaming. This architecture could be tested in the UK pilot. The possibility to test it in the Lithuanian pilot is not confirmed yet.
- **Architecture 3** to test the added value brought by the use of a Network Based Location method managed at the PSAP level (a Location Calculator connected to the HELP112 Location server), and based on the Radio Measurement Report sent by the mobile phone (User Plane) along with the location data provided by the handset's location capabilities. Offline tests of the User Plane Network Based Location methods could be conducted in the UK pilot, and probably in the Lithuanian pilot.

Since European PSAPs are moving toward IP transmission, it could be interested to also test **Architecture 4** that uses the data channel to transmit the location information. Besides, when the data connectivity is available to transmit the location information, the data channel is a more reliable way than SMS to convey location data to emergency services. This architecture could be tested in the UK pilot and in the Italian pilot.

To take advantages of the data channel transmission and overcome the lack of data connectivity that could happen in many situations (lack of network coverage, roaming...), an architecture that use the data channel as the main transmission method, and a SMS as a fall-back transmission solution could be considered in the future.



## Annex 1 - Compliance with Accuracy/Precision and Reliability requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NBL Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
<b>ACCU_001</b>  Confidence radius in meters.	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
<b>ACCU_002</b>  Precision urban 30m 67%.	Compliant if GNSS signals are available. In this case the data channel is also required in order to use the E-GNSS ready SUPL server.  Reliability measurement can only be confirmed by trial	Compliant if GNSS signals are available.  Reliability measurement can only be confirmed by trial	NBL (Safety Net): <b>Not compliant with precision requirement.</b>  HBL: Compliant if GNSS signals are available.  Reliability measurement can only be confirmed by trial	Compliant if GNSS signals are available.  Reliability measurement can only be confirmed by trial	Compliant if GNSS signals are available.  Reliability measurement can only be confirmed by trial	Compliant if GNSS signals are available.  Reliability measurement can only be confirmed by trial
<b>ACCU_003</b>  Precision urban 100m 95%.	Compliant if GNSS signals are available. In this case the data channel is also required in order to use the E-GNSS ready SUPL server.  Reliability measurement can only be confirmed by trial	Compliant if GNSS signals are available.  Reliability measurement can only be confirmed by trial	NBL (Safety Net): <ul style="list-style-type: none"> <li>O-TDOA is compliant with precision requirement (3G/4G).</li> <li>Other NBL methods are not compliant with precision requirement.</li> </ul> HBL: Compliant if GNSS signals are available.  Reliability measurement can	Compliant if GNSS signals are available.  Reliability measurement can only be confirmed by trial	Compliant if GNSS signals are available.  Reliability measurement can only be confirmed by trial	Compliant if GNSS signals are available.  Reliability measurement can only be confirmed by trial

			only be confirmed by trial			
<b>ACCU_004</b>  <b>Precision rural 30m 67%.</b>	<p>Compliant if GNSS signals are available. In this case the data channel is also required in order to use the E-GNSS ready SUPL server.</p> <p>Reliability measurement can only be confirmed by trial</p>	<p>Compliant if GNSS signals are available.</p> <p>Reliability measurement can only be confirmed by trial</p>	<p>NBL (Safety Net): <b>Not compliant with precision requirement.</b></p> <p>HBL: <b>Compliant if GNSS signals are available.</b></p> <p>Reliability measurement can only be confirmed by trial</p>	<p>Compliant if GNSS signals are available.</p> <p>Reliability measurement can only be confirmed by trial</p>	<p>Compliant if GNSS signals are available.</p> <p>Reliability measurement can only be confirmed by trial</p>	<p>Compliant if GNSS signals are available.</p> <p>Reliability measurement can only be confirmed by trial</p>
<b>ACCU_005</b>  <b>Precision rural 50m 95%.</b>	<p>Compliant if GNSS signals are available. In this case the data channel is also required in order to use the E-GNSS ready SUPL server.</p> <p>Reliability measurement can only be confirmed by trial</p>	<p>Compliant if GNSS signals are available.</p> <p>Reliability measurement can only be confirmed by trial</p>	<p>NBL (Safety Net):</p> <ul style="list-style-type: none"> <li>O-TDOA is compliant with precision requirement (3G/4G).</li> <li>Other NBL methods are not compliant with precision requirement.</li> </ul> <p>HBL: <b>Compliant if GNSS signals are available.</b></p> <p>Reliability measurement can only be confirmed by trial</p>	<p>Compliant if GNSS signals are available.</p> <p>Reliability measurement can only be confirmed by trial</p>	<p>Compliant if GNSS signals are available.</p> <p>Reliability measurement can only be confirmed by trial</p>	<p>Compliant if GNSS signals are available.</p> <p>Reliability measurement can only be confirmed by trial</p>
<b>ACCU_006</b>  <b>Accuracy less than precision.</b>	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant

**Annex 1 - Compliance of HELP112 architectures with Accuracy/Precision requirements**

## Annex 2 - Compliance with Response time requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NBL Location Calculator	4. Handset hybrid/ data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
RESP_001  Less than 5 sec for Cell-Id.	n/a	n/a	n/a	n/a	n/a	n/a
RESP_002  Less than 30 sec for other methods.	Compliant if GNSS signals are available and assistance data are available to improve the TTFF.	Compliant if GNSS signals are available and assistance data are available to improve the TTFF.	Compliant. A location estimate that is better than Cell-Id will always be available at least as an output of the Location Calculator (NBL). Need to be confirmed by trial.	Compliant if GNSS signals are available and assistance data are available to improve the TTFF.	Compliant if GNSS signals are available and assistance data are available to improve the TTFF.	Compliant if GNSS signals are available and assistance data are available to improve the TTFF.

Annex 2 - Compliance of HELP112 architectures with Response Time requirements

### Annex 3 - Compliance with Presentation of the caller location in the PSAP requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NBL Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
<b>PRES_001</b> Reception on available GIS.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.
<b>PRES_002</b> No additional task for call-taker.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.
<b>PRES_003</b> Caller location either push or pull.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.	Compliant, depends mostly on CAD implementation.
<b>PRES_004</b> WGS84 coordinates system.	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant

Annex 3 - Compliance of HELP112 architectures with Presentation of the caller's location in the PSAP requirements

## Annex 4 - Compliance with Privacy requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NB L Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
PRIV_001 Caller location only available for emergency call.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.
PRIV_002 Location storage policy.	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
PRIV_003 Location access at PSAP level.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.
PRIV_004 Location not stored on the handset.	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
PRIV_005 Location availability.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.

Annex 4 - Compliance of HELP112 architectures with Privacy requirements

## Annex 5 - Compliance with Acceptance of the solution requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NBL Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
<b>ACCE_001</b>  HELP112 solution available for the widest range of handset types.	<ul style="list-style-type: none"> <li>Only supports devices implementing E-GNSS SUPL server and client.</li> <li>Only supports devices with GNSS or WiFi capability.</li> <li>Only supports devices with data connectivity.</li> </ul>	<ul style="list-style-type: none"> <li>Only supports devices with GNSS or WiFi capability.</li> </ul>	Compliant	<ul style="list-style-type: none"> <li>Only supports devices with GNSS or WiFi capability.</li> <li>Only supports devices with data connectivity.</li> </ul>	Not compliant.	Not compliant.
<b>ACCE_002</b>  No caller intervention needed.	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
<b>ACCE_003</b>  Location information not visible or accessible to the caller.	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
<b>ACCE_004</b>  No interference of location and transmission process with voice call.	Compliant	Compliant	Compliant	Compliant	Compliant	Not compliant.

Annex 5 - Compliance of HELP112 architectures with Acceptance of the solution requirements

## Annex 6 - Compliance with Security requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NB L Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
<b>SECU_001</b>  Continuous availability of HELP112 solution to authorized entity.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.
<b>SECU_002</b>  Ensure protection of HELP112 solution against attacks.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.	Need to be guaranteed by each stakeholder.

**Annex 6 - Compliance of HELP112 architectures with Security requirements**

## Annex 7 - Compliance with Method of estimating the location information requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NBL Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
<b>LOCA_001</b>  Use of handset GNSS capabilities.	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
<b>LOCA_002</b>  Make use, trial and demonstrate the advantages of E-GNSS to compute caller's location.	Compliant	Not compliant until smartphones with E-GNSS chipset are available.	Not compliant until smartphones with E-GNSS chipset are available.	Not compliant until smartphones with E-GNSS chipset are available.	Not compliant until smartphones with E-GNSS chipset are available.	Not compliant until smartphones with E-GNSS chipset are available.
<b>LOCA_003</b>  Use of multiple positioning methods.	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
<b>LOCA_004</b>  Fall-back location solution.	Not compliant	Not compliant	Compliant	Not compliant	Not compliant	Not compliant

Annex 7 - Compliance of HELP112 architectures with Method of estimating the location information requirements



## Annex 8 - Compliance with Battery life requirements

	ARCHITECTURES					
REQUIREMENTS	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NB L Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
<b>BATT_001</b>	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
<b>Priority given to voice call.</b>						
<b>BATT_002</b>	Handset manufacturers shall define a power level threshold for each location method. Handset HELP112 software (OS provider or Handset manufacturers) shall make use of the defined thresholds.	Handset manufacturers shall define a power level threshold for each location method. Handset HELP112 software (OS provider or Handset manufacturers) shall make use of the defined thresholds.	Handset manufacturers shall define a power level threshold for each location method. Handset HELP112 software (OS provider or Handset manufacturers) shall make use of the defined thresholds.	Handset manufacturers shall define a power level threshold for each location method. Handset HELP112 software (OS provider or Handset manufacturers) shall make use of the defined thresholds.	Handset manufacturers shall define a power level threshold for each location method. Handset HELP112 software (OS provider or Handset manufacturers) shall make use of the defined thresholds.	Handset manufacturers shall define a power level threshold for each location method. Handset HELP112 software (OS provider or Handset manufacturers) shall make use of the defined thresholds.
<b>Location methods used rely on the battery capacity.</b>						

**Annex 8 - Compliance of HELP112 architectures with Battery life requirements**

## Annex 9 - Compliance with Incurring charges requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NB L Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
<b>CHAR_001</b>  Data channel used if already activated.	Compliant  If the data connectivity is unavailable, then no location is computed since the data connectivity is required to access the E-GNSS SUPL sever.	Compliant	Compliant	Compliant  If the data connectivity is unavailable, then the location information is not transmitted to the PSAP.	n/a	Compliant
<b>CHAR_002</b>  Location SMS free of charge for the caller.	Mainly depends on MNOs.	Mainly depends on MNOs.	Mainly depends on MNOs.	n/a	n/a	n/a

Annex 9 - Compliance of HELP112 architectures with Incurring charges requirements

## Annex 10 - Compliance with Data transmission requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NB L Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
<b>TRAN_001</b>  Study the possibility to use the IP channel to transmit the location information.	Not compliant	Not compliant	Not compliant	Compliant	Compliant	Not compliant
<b>TRAN_002</b>  Fall-back transmission solution if the data channel is unavailable.	n/a	n/a	n/a	Not compliant with regards to the definition of this architecture, but a fall-back solution using SMS transmission is possible.	n/a	n/a

Annex 10 - Compliance of HELP112 architectures with Data transmission requirements

## Annex 11 - Compliance with Roaming requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NB L Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
<b>ROAM_001</b>  <b>International roaming.</b>	Not compliant, but could be by using the SMS transmission implementation defined in architecture 2.	Compliant	Not compliant, but could be by using the SMS transmission implementation defined in architecture 2.	Compliant, but the data connectivity is often switched OFF by a caller that is not in his home country.	Compliant	Compliant

Annex 11 - Compliance of HELP112 architectures with Roaming requirements



## Annex 12 - Compliance with Improvement of AML specific requirements

REQUIREMENTS	ARCHITECTURES					
	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NB L Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
AML_001  Transmit extra data.	Not compliant	Not compliant	Compliant	Possible	n/a	n/a
AML_002  Handset's HELP112 software triggered by emergency SMS.	Compliant	Compliant	Compliant	Compliant	n/a	n/a

Annex 12 - Compliance of HELP112 architectures with Improvement of AML specific requirements

## Annex 13 – Implementation roadmap in pilot sites

ARCHITECTURES						
PILOT SITE	1. Handset hybrid/E-GNSS SUPL/SMS	2. Handset hybrid/SMS international roaming	3. Handset hybrid/SMS/NBL Location Calculator	4. Handset hybrid/data channel	5. Handset hybrid/IMS SIP	6. Handset hybrid/Personal eCall
UK pilot (BT)	Rely on OS provider or handset manufacturer for the E-GNSS part. For the transmission part, use of AML (SMS).	Handset part relies on OS provider/Handset manufacturers. Will be ready to test SMS transmission that handles roaming (Architecture 2-A).	Offline tests of the Location Calculator possible.	Handset part relies on OS provider/Handset manufacturers. Should be able to test the transmission method (National approach).	Not possible in the timeframe of HELP112 project.	Not possible in the timeframe of HELP112 project.
Lithuania pilot (112 ERC)	Rely on OS provider or handset manufacturer for the E-GNSS part. For the transmission part, use of AML (SMS).	Handset part relies on OS provider/Handset manufacturers. Studies the possibility to reserve a long number for their location server.	Offline tests of the Location Calculator possible.	Not possible in the timeframe of HELP112 project.	Not possible in the timeframe of HELP112 project.	A new eCall flag has to be defined for Personal eCall. PSAP ready to test a new eCall flag if exists. Rely on OS provider or handset manufacturer for the handset's in-band modem. MNOs would have to implement this new eCall flag.
Italy pilot (AREU)	Will modify AREU location server to receive HELP112 location data. Handset software configured to use the full length MSISDN of the AREU server instead of 112.	Will modify AREU location server to receive HELP112 location data. Handset software configured to use the full length MSISDN of the AREU server instead of 112.	Not possible in the timeframe of HELP112 project.	Will modify AREU location server to receive HELP112 location data (National approach). Handset part relies on OS provider/Handset manufacturers.	Not possible in the timeframe of HELP112 project.	A new eCall flag has to be defined for Personal eCall. PSAP ready to test a new eCall flag if exists. Rely on OS provider or handset manufacturer for the handset's in-



Reference: HELP112-D3.3-TPZ

Date: 16/06/2016

Version: 1.4

	Rely on OS provider or handset manufacturer for the E-GNSS part.	Rely on OS provider or handset manufacturer for the E-GNSS part.				band modem. MNOs would have to implement this new eCall flag.
<b>Austria pilot (NNO)</b>	Rely on OS provider or handset manufacturer for the E-GNSS part. For the transmission part, use of AML (SMS). National emergency numbers shall trigger handset's HELP112 software.	Not possible in the timeframe of HELP112 project.	Not possible in the timeframe of HELP112 project.	Not sure that it could be possible in the timeframe of the project.	Not possible in the timeframe of HELP112 project.	Not possible in the timeframe of HELP112 project.

**Annex 13 - Architectures implementation roadmap in pilot sites**



**Reference:** HELP112-D3.3-TPZ

**Date:** 16/06/2016

**Version:** 1.4

---

**END OF DOCUMENT**