

## **Executive Summary**

### **Introduction**

This document has been prepared by Helios Technology Limited ('Helios') on behalf of the Directorate-General Information Society, European Commission under contract reference 2001/48559. It presents proposals for "Recommendations towards a European policy and implementation plan for location enhanced 112" for discussion by CGALIES (Co-ordinating Group for Access to Location Information by Emergency Services).

The availability of caller location information could significantly enhance the provision of emergency services and deliver large benefits to society. Many operators and emergency authorities (EAs) throughout Europe have already deployed systems that enhance the call with location information (based upon for example, a known installation address).

Caller location systems in mobile communication networks are expected to become widespread in the coming years. The huge prospect for commercial services is expected to drive the location based services (LBS) market forward. It is expected that this market will develop rapidly due to favourable return on the related investment and competitive incentives. As location technology becomes widely available, the scope for further enhancement of emergency calls increases dramatically.

This issue is relevant to all of Europe and therefore a greater degree of cooperation and common development of solutions seems sensible. Effective introduction of a location enhanced emergency service requires co-ordination between stakeholders and users from different communities and cultures. Therefore, in May 2000, the Commission established CGALIES to actively involve the relevant players and to develop a consensus on relevant implementation issues.

### **Context of this study**

With the adoption of the new regulatory package, the Council and the European Parliament have made the forwarding of caller location by operators obligatory. Article 26 from the Directive on universal service and users' rights relating to electronic communications networks and services (2002/22/EC of 7 March 2002) states that:

"Member States shall ensure that undertakings which operate public telephone networks make caller location information available to authorities handling emergencies, to the extent technically feasible, for all calls to the single European emergency call number 112".

This provision establishes a legal requirement on operators, both fixed and mobile, for delivering location enhanced 112 (or 'E-112') to EAs across Europe and provides the context for this study. It will enter into force by 24 July 2003.

In close conjunction with this new provision is the need to protect users' privacy rights. This is dealt with in the new Directive concerning the processing of personal data and the protection of privacy in the electronic communications sector (at the time of writing, in second reading in the Council and the European Parliament). However, Article 10 from the Directive specifies that in the case of emergency calls, rights for life and for health protection take precedence over rights for privacy and therefore, data processing may be used in some cases without the user's consent. The exception for emergency authorities allows for the temporary denial or absence of consent of a subscriber or user for the processing of location data, on a per-line basis for organisations dealing with emergency calls and recognised as such by a Member

State. Any technical solutions for location enhancement must therefore meet the requirements for privacy protection.

To complement the new legislation, the Commission Services considered that it was important to outline a roadmap for implementation of E-112 services. Taking into account other work and discussions and further study by the contractor, this report makes proposals for recommendations for discussion by CGALIES.

### **Current status**

CGALIES issued a questionnaire to mobile operators regarding the plans and cost of deploying location technology in mobile cellular networks. The primary conclusion that may be drawn from the responses and further discussions with operators during the course of this study is that all operators have firm plans for the introduction of LBS. Some variance is likely in terms of services, timescales and technology. Basic levels of location service that are based on cell identity and signal strength will be ubiquitous by 2003 and higher performance location services (eg A-GPS, E-OTD) may be expected to penetrate the market by 2006.

Many Member States have already enhanced emergency call services by providing fixed caller location information to EAs based upon installation address. The availability of location information from cellular networks now makes feasible the provision of location information for all emergency calls. But EAs and other relevant public bodies must ensure that they do not fail to exploit the capabilities of this new technology for public benefit.

There is considerable variance between Member States in terms of structural arrangements and technical solutions surrounding the provision of emergency call services. There is therefore, in the context of E-112, an opportunity for increased cooperation in the pursuit of common solutions, where practical and feasible, whilst at the same time respecting matters of national policy interest and culture.

An uncoordinated approach by local or national authorities is likely to lead to increased costs and complexity for all stakeholders across Europe. The solutions currently being developed by the mobile industry through bodies such as Location Interoperability Forum (LIF) and proposed for standardisation to the third Generation Partnership Project (3GPP) may provide a potential basis for common solutions for E-112.

### **Benefits to society and emergency authorities**

The primary benefit to society is saving lives and an increased sense of security. This is delivered by improved call routing and obtaining faster (and improved) information for dispatching relevant resources. An increased sense of security is particularly relevant for European citizens travelling abroad who may not necessarily be familiar with the local language or local emergency service arrangements.

The primary benefit to the EA operations is to provide a timelier, and more effective response to the citizen who is in an emergency situation. It is expected that improved location information will also:

- Enable a more efficient use of valuable public resources;
- Help to deter the increasing number of spurious and malicious calls;
- Reduce stress amongst emergency personnel.

## Capability of location technologies

In order to deliver the planned benefits, a set of provisional user requirements has been developed through CGALIES, a summary of which can be found in this document.

With regard to fixed calls, the existing location solutions deployed by several Public Safety Answering Points (PSAPs) are broadly capable of meeting user expectations. The main issue is the inaccuracy of databases, partly caused by a failure to ensure timely updates. With respect to the location of mobile calls, no single location technology installed or currently under development is believed to meet all of the user requirements.

Currently available solutions based upon Cell ID (including Timing Advance (TA)) and Enhanced Cell Global Identity (E-CGI) can utilise legacy handsets and should satisfy many user requirements<sup>1</sup>. Technologies already available but not yet widely deployed (eg A-GPS and E-OTD) are expected to deliver more accurate location data and should satisfy a large proportion of the requirements. However, the commercial justification for the corresponding investment in infrastructure and handsets has yet to be demonstrated in an untested market.

Existing solutions based upon Cell ID and E-CGI can cater for legacy handsets and could therefore provide a baseline capability for full user roaming across Europe. Roaming at higher levels of service, for instance those based on technologies such as A-GPS and E-OTD, will rely upon the development of common handset solutions. Whilst this is unlikely to occur in the short term, it is likely that consolidation within the mobile industry will eventually lead to a limited number of interoperable handset solutions.

In summary, a determination of the location of 112 emergency calls is technically feasible now. However, the interface between the operators and the EAs/PSAPs will need to be specified as a matter of urgency. In addition, EAs/PSAPs will need to invest in upgrading their systems to be able to receive, process and use the location information that operators may provide. The newly adopted legislation that requires that "...caller location information is made available to authorities handling emergencies, to the extent technically feasible...", should therefore be interpreted accordingly.

## Establishing a European policy

It is considered that a coordinated implementation policy will help to accelerate the implementation and maximise the benefit of E-112 to EAs and society. Such a policy will need to define the approach to be adopted towards the implementation of E-112 and further enhancements as to the quality and the accuracy of location data.

The specific objectives of establishing a European implementation policy are to:

- a) Increase awareness of the potential benefits of E-112;
- b) Exploit currently available location information and emerging location technologies as soon as their performance is demonstrated and become available;
- c) Ensure that the potential benefits to society and EAs are realised to the fullest extent and at the earliest possible point in time;
- d) Reduce the overall cost of implementation to all parties where feasible, through increased cooperation and the development of common solutions.

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<sup>1</sup> See for instance CGALIES Working Package 1 report, Annex I to CGALIES report on implementation issues related to access to location information by emergency services (E-112) in the European Union

The implementation policy must effectively strike a balance between benefits, cost and acceptable return on investment. Furthermore, as the realisation of benefits relies upon the smooth convergence of implementation plans and timescales by fixed and mobile operators, PSAPs and EAs, all organisations along the chain will need to commit and invest towards realising E-112.

### **The available measures**

The types of measures that could form the basis of a European implementation policy are:

- a) Additional European regulation, for instance by specifying concrete performance parameters for E-112;
- b) Development of common technical solutions, such as a common interface between operators and PSAPs/EAs;
- c) Development of a common European implementation plan, guided by continued liaison and cooperation across Europe.

The primary purpose of implementing additional regulatory measures would be to accelerate the performance in terms of accuracy and service availability (eg in-door, urban, etc) of E-112 beyond that which could otherwise be justified on commercial grounds; taking into account what can be delivered today by cellular networks. This approach is analogous to the approach adopted in the US where the Federal Communications Commission (FCC) has mandated performance parameters<sup>2</sup> that requires operators to make significant additional infrastructure (and handset) investment.

It is the common belief of Europe's mobile operators that such regulation will not help to drive the current European market for mobile location based services (LBS). Some operators also believe that it may instead damage the wider commercial marketplace as a result of distracting attention and investment towards E-112.

There is an immediate opportunity to pursue the common development of data transfer interfaces between operators and PSAPs/EAs, and operational systems and applications deployed by EAs.

EAs and PSAPs must be prepared to make the necessary investments in operational systems and applications in order to receive and interpret location information in an automated way. With the increased cooperation between Member States and commonality regarding the issues encountered, the development of common ideas and solutions should help to mitigate the risk of technically divergent solutions and thereby reduce overall implementation costs. It will also contribute towards creating an increased awareness of location enhancement, particularly amongst PSAPs and EAs.

It is considered that some degree of continued cooperation and communication between stakeholders through bodies such as CGALIES would help to:

- Establish best practice and highlight common technical solutions;
- Establish a quicker and improved understanding of operational benefits and critical implementation issues/risks by stakeholders;
- Achieve a further reduction in costs and implementation effort.

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<sup>2</sup> see for instance Annex II of CGALIES report on implementation issues related to access to location information by emergency services (E-112) in the European Union

## The preferred option

Given the types of measures available with which to influence the implementation of E-112, it is considered that a European implementation policy may broadly follow one of three options. As the principle that location information must be passed on is now in European regulation, all three options are considered as 'Regulated' but with various degrees of involvement during implementation, namely:

- **Option A: 'Do Minimum'**

**Regulated/Uncoordinated** approach where national and regional organisations are left to prepare for implementation;

- **Option B: 'Best Effort'**

**Regulated/Coordinated** approach where operators pass the best location information available to them (including Cell ID and E-CGI) with further performance improvement depending on commercial development. PSAPs and EAs upgrade their information systems to be able to receive, process and use the location information provided;

- **Option C: 'Accelerated'**

**Regulated/Coordinated with an additional regulatory measure** to impose improved performance characteristics for E-112 on operators at an early date. PSAPs and EAs upgrade their information systems to be able to receive, process and use the location information provided.

It is considered that a 'Best Effort' approach (Option B) should form the basis of a European implementation policy towards the initial phase of implementation of E-112 ('E-112 Phase I'). This approach reduces the financial needs and risks when compared to the Accelerated approach. It will enable Europe to commence implementation of E-112 quickly and allow stakeholders to 'get a foot on the ladder' and reap the benefits of location information at an early stage.

Furthermore, when compared to the 'Do Minimum' approach, it will benefit Europe since:

- The development of common solutions and the increased cooperation across Europe will bring benefits to all stakeholders and reduce risks, in particular for PSAPs and EAs;
- It will help to synchronise the plans by operators and PSAPs and EAs.

As Europe's EAs gain experience with the use of location information provided to them, it is expected that their requirement will become more precise. At the same time, it is expected that the commercial Location Based Services (LBS) market will develop and new or upgraded location determination technologies will become more mature. Under such conditions, it is considered that a review should take place by Governments to review the Best Effort approach against expectations and determine whether a more accelerated approach via additional regulatory force is necessary. Of course, adopting this approach does not prevent any Member State from implementing its own additional measures.

Member States are advised that the ongoing provision of location information should, wherever possible, be provided free of charge by operators to PSAPs/EAs in order to encourage uptake of services. This does not include the initial cost of upgrading existing systems and applications in order to receive and interpret location information, which should be borne by each responsible organisation (including PSAPs and EAs). In addition, and in line with the provision that 112 must be provided free of charge to the user, it is important to specify that the cost of forwarding location information is not borne by the end user.

## The necessary actions

On the basis of the findings of this study, we recommend the following actions to be undertaken:

- Coordinated action to **increase awareness** amongst EAs and PSAPs of the benefits of location enhancement. This could include a mixture of media including on-line services, documentation, presentations and managed events;
- Coordinated action to ensure that the **necessary budget allocations** are made at national level to prepare for the necessary investment in systems and software upgrades for EAs and PSAPs;
- Continue coordination at European level and establish national liaison groups to establish common practices and benchmarks and **reduce the overall risks and costs**;
- Pursue the development of **common technical solutions** (eg data transfer interface), to facilitate implementation and reduce overall risks;
- Establish procedures governing the transfer of location information to EAs, including on the conditions for overriding the users' choice, in order to **create the best possible protection of the users' privacy**.

In support of this, it is recommended that the Commission undertakes the following specific actions:

- In the context of CGALIES, help **establish an awareness programme** to promote the potential benefits of E-112;
- In the context of CGALIES, help to develop (on an on-going basis) **generic E-112 implementation guidance** based on best practice and other relevant experiences;
- In the context of ETSI, investigate the possibility of **establishing a common interface standard** for the transfer of location data between operators and PSAPs/EAs; based (where possible) on commercial standards already under development. In view of the legal obligation to pass location information by July 2003, the common interface standard should be available by the beginning of 2003;
- In the context of ETSI and in order to assist a future review, establish **common measurement methods** and criteria for assessing the quality of the location information provided by operators to EAs;
- **Seek to continue CGALIES** to support the continued liaison and exchange of expertise and knowledge between stakeholders. It is recommended that a continuation of CGALIES would be highly beneficial to the E-112 implementation process. This should be under revised terms of reference focused upon the need of users including PSAPs and EAs and for liaison between Member States.

As a result of the newly adopted legislation concerning the provision of location information, it is recommended that operators should provide:

- **Fixed caller location** based upon most recently updated telephone installation address in the current database system of the fixed operator;
- **Mobile caller location** based upon the best location information available to the mobile operator.

Other actions recommended for operators and governments are:

- Continue and where necessary strengthen co-operation to ensuring a **seamless migration to higher levels of location performance** resulting from more accurate mobile location technologies whilst also helping to provide a full roaming functionality across network and country borders;
- **Reduce the overall cost** of implementation to all parties where feasible, through increased cooperation and the development of common solutions. These should be based, where possible, upon widely available commercial standards;
- Consider the need, and where necessary pursue, further measures that would **limit operators' liability** and protect them against damage claims resulting from poor performance or wrong location information. In the US, Congress passed law to this end that was felt a necessary pre-requisite for operators to pursue with the progression of location enhancement of emergency calls.

In support, it is recommended that the Commission undertakes the following specific actions:

- In conjunction with the Member States and in the context of CGALIES, **monitor the progress of E-112 implementation.**
- In conjunction with the Member States, after two years year of operation (i.e. by 2005), **assess the need for additional measures** including possible regulatory measures, aimed at raising the 'baseline' performance across Europe and speeding implementation. It is considered that by 2005, further information will be known regarding user requirements, the progress of E-112 implementation and mobile operators' plans for infrastructure roll-out;
- **Contract relevant studies** (as required) to support this review.

It is recommended that CGALIES gives careful consideration to these recommendations and, based on this, agrees on a common implementation path.