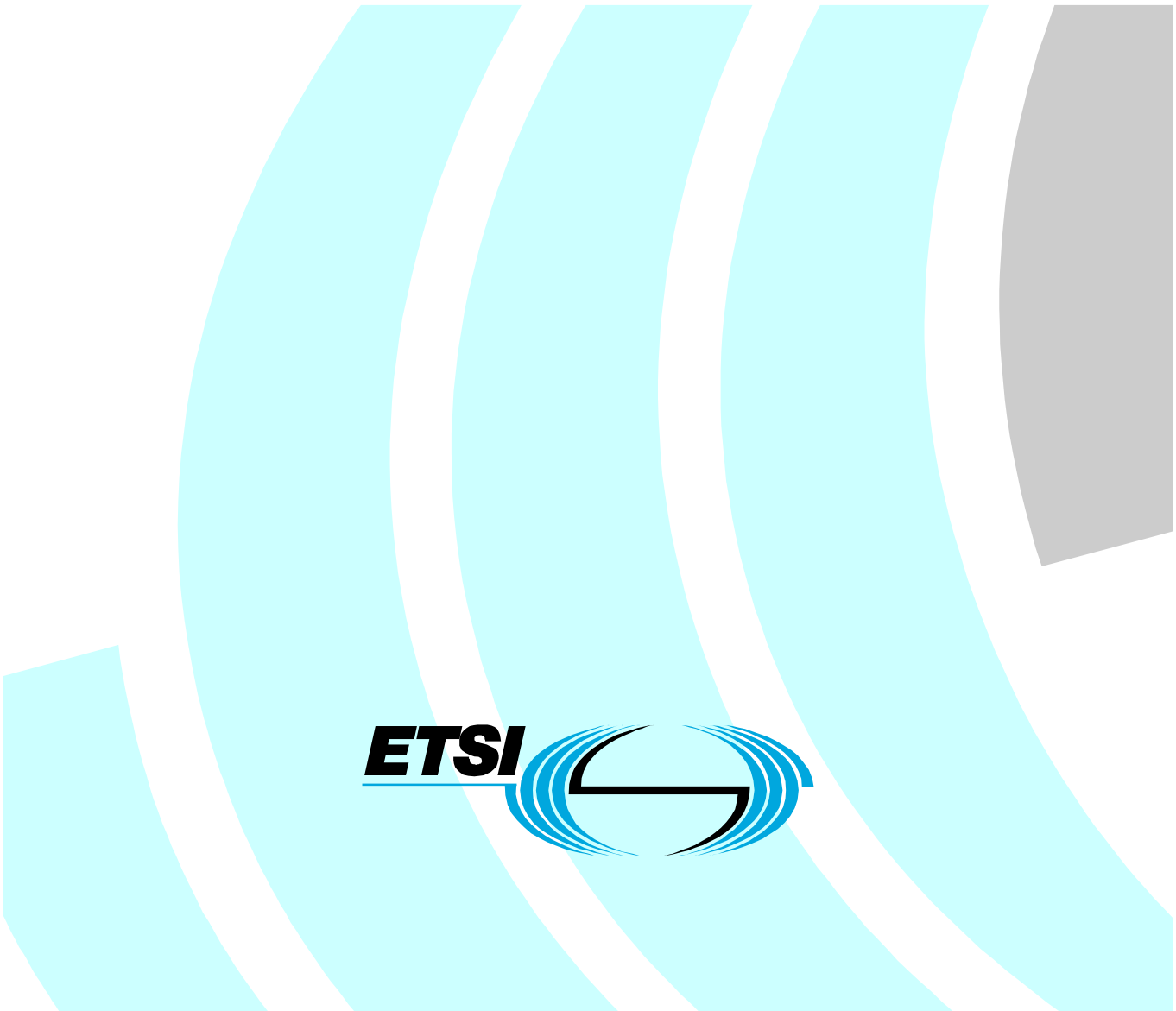
ETSI TS 102 164 V1.1.1 (2003-04)

Technical Specification

Service and Protocols for Advanced Networks (SPAN); Emergency Location Protocols



Reference
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Keywords
location, mobile, protocol

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

1 Scope

The present document specifies the protocol that is used by the Local Emergency Operator to obtain the location information that is registered on the Mobile Operator Location Server.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

[1] EPSG geodesy parameters Version 6.3, February 2002.

NOTE: http://www.epsg.org/.

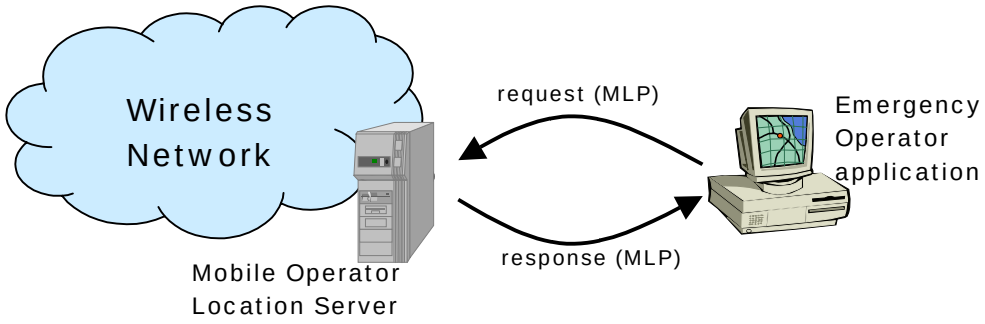
3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

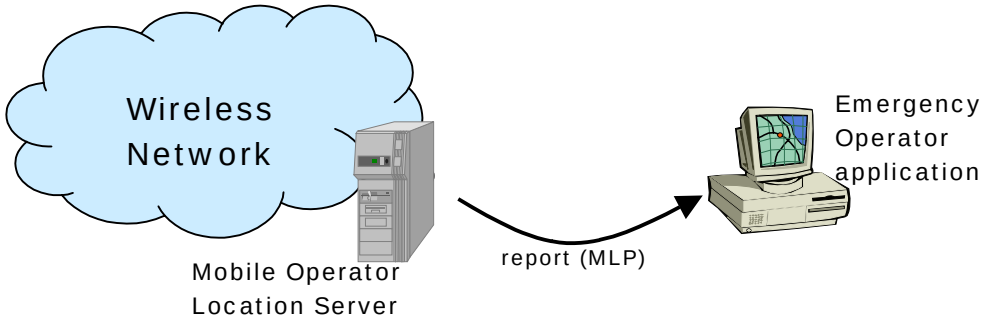
APSG	Americas Petroleum Survey Group
EMTEL	EMergency TELecommunication services
EPSG	European Petroleum Survey Group
ISO	International Standards Organization
LCS	Local Contact Service
LIF	Location Interoperability Forum
MLP	Mobile Location Protocol
POSC	Petrotechnical Open Software Corporation
QOP	Quality Of Position

4 MLP Lite 112

A subset of the Location Interoperability Forum (LIF) Mobile Location Protocol (MLP) Version 3.0.0 (6 June 2002) sufficient for mobile operators and emergency number service operators to implement an initial service where the emergency number operator can request the location of a phone from the mobile operator and receive either a valid response or an error response in reply.



It is anticipated that after initial implementation, some Mobile Operators will implement the functionality to initiate a position fix on the origination of a call to 112 by the user and push the resulting location information to the Emergency Operator



Please see full LIF specification at http://www.openmobilealliance.org/tech/lif for further details and information.

Note that in this implementation of the LIF MLP protocol:

- ALL compulsory LIF elements are compulsory.
- Some optional LIF elements are compulsory.

5 Name and address data

The LIF MLP standard does not include Name and Address type fields but does include an extension mechanism to allow additional elements to be added.

A Name and Address extension is included in this specification to enable fixed line operators to adopt the same protocol as mobile operators to provide location information to emergency services:

- Potential data sources to populate these fields include:
  - installation address for fixed lines phones;
  - addresses "reverse geocoded" from latitude, longitude position of mobile handset;
  - location of pico cells within buildings.

Note that the referenced extension (and therefore the structure and elements within this extension) could be different for different countries, different operators and different emergency services.

I.e. if required the name and address fields and field formats could be defined differently to suit different countries, different operators or different emergency services.

6 Emergency Location Immediate service (LIF defined service)

The emergency location immediate service is used by the Emergency Operator to retrieve the position of a mobile subscriber that has initiated an emergency call from the Mobile Operator.

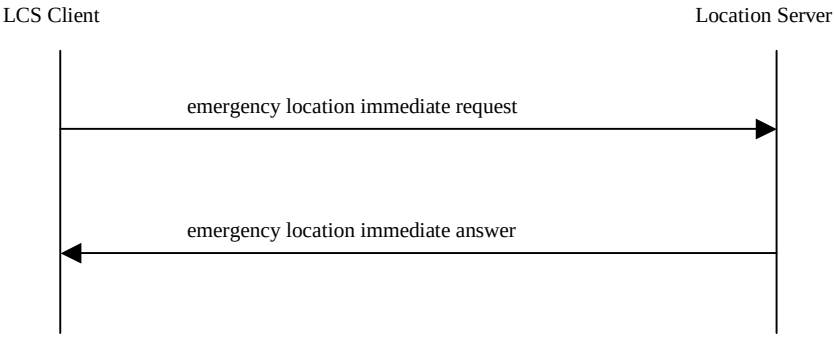
The response to the service is required immediately.

The service consists of the following messages:

- Emergency Location Immediate Request.
- Emergency Location Immediate Answer.

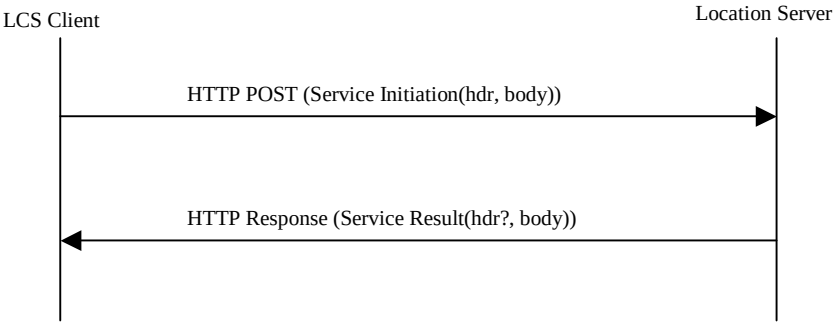
The following message flow encapsulates this service:

Emergency Operator | Mobile Operator



Request and Answer implemented as:

Emergency Operator | Mobile Operator

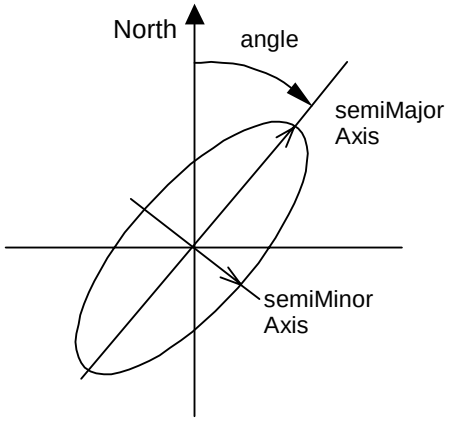


6.1 Emergency Location Immediate request (subset of LIF defined request)

XML Code	Notes
<?xml version="1.0" ?>	
<!DOCTYPE svc_init SYSTEM "MLP_SVC_INIT_300.DTD">	
<svc_init ver="3.0.0">	Service initiation for MLP Version 3.0.0
<hdr ver="3.0.0">	Header for MLP Version 3.0.0
<client>	Who is requesting this location fix
<id>*aaaa….a*</id>	Emergency operator registered user name for login
<pwd>*aaaa…a*</pwd>>	Emergency operator password for login
</client>	
</hdr>	
<eme_lir ver="3.0.0">>	Emergency Location Immediate Request for MLP Version 3.0.0
<msids>	Identifier of device to be located
<msid type="MSISDN">*ccppppppppppp*</msid>	Identifier is a MSISDN formatted as Country Code + Phone Number (GSM/3GPP should conform to TS 123 003)
</msids>	
</eme_lir	
</svc_init>	

6.2 Emergency Location Immediate answer - Valid response (subset of LIF defined response)

XML Code	Notes
<?xml version="1.0" ?>	
<!DOCTYPE svc_init SYSTEM "MLP_SVC_RESULT_300.DTD" [	
<!ENTITY % extension SYSTEM	Utilize the LIF extension mechanism to point to the DTD defining the National Regulatory Organization
'http://www.oftel.gov.uk/UK999_MLP_address_extension.dtd'> (note this is an example of a dtd)	Name and Address extension
%extension;	
]>	
<svc_result ver="3.0.0">	Service result for MLP Version 3.0.0
<eme_lia ver="3.0.0">	Emergency Location Immediate Answer for MLP Version 3.0.0
<Caller_Location>	Name and address data elements as defined by the referenced DTD above
<CustomerName>*aaaaa…a*</CustomerName>	Registered Customer Name
<Line1>*aaaaa.a*</Line_1>	Address of current location
<Line2>*aaaaa.a*</Line_2>	Notes -
<Line3>*aaaaa.a*</Line_3>	All elements could be defined as optional
etc	Elements could be defined differently
etc>	This is only an example of how to include additional fields
<Line6>*aaaaa.a*</Line_n>	
<PostCode>*aaaaa…..a*</PostCode>	Post Code
</Caller_Location>	
<eme_pos>	Position answer
<msid type="MSISDN">*cccpppppppppp*</msid>	Position is for this MSISDN (formatted as Country Code + Phone Number) (GSM/3GPP should conform to TS 123 003)
<pd>	Position description
<time utc_off="±*hhmm*">*yyyymmddhhmmss*</time>	Local Date and Time of phone when position was measured.

XML Code	Notes
<shape>	Shape of uncertainty area
<EllipticalArea>	It is an ellipse!  Note that circle can be described by making semiMajor axis = semiMinor axis Default WGS84 Coordinate Reference System is defined by LIF to be 4326 by the EPSG authority. (see clause 12)
<coord>	Coordinate of the centre of the ellipse
<X>*addd.ddd*</X>	Latitude in decimal degrees prefixed with N or S
<Y>*addd.ddd*</Y>	Longitude in decimal degrees prefixed with E or W
</coord>	
<angle>*nnn.nn*</angle>	Angle in degrees of rotation of the ellipse measured clockwise from north
<semiMajor>*nnnnn*</semiMajor>	Length of semiMajor axis in metres
<semiMinor>*nnnnn*</semiMinor>	Length of semiMinor axis in metres
<angularUnit>aaaaaa</angularUnit>	Unit for <angle> (Required LIF parameter but default unit is degrees!)
<distanceUnit>*nnnnn*</distanceUnit>	Optional - default unit is meter
</ EllipticalArea >	
</shape>	
<alt>*±nnn*</alt>	Optional - Altitude of phone if available (in respect to coordinate ellipsoid NOT actual height)
<speed>*nnnn*</speed>	Optional - speed in meters/sec if available
<direction>*nnnn*</direction>	Optional - Direction phone is moving if available
<lev_conf>*nnn*</lev_conf>	LIF optional but required by 112service - Indicates the probability as a percentage that the phone is located within the position area defined
</pd>	
</eme_pos>	
</eme_lia>	
</svc_result>	

7 Emergency Location Reporting service (LIF defined service)

The emergency location reporting service is used by the Mobile Operator to push the position of a mobile subscriber that has initiated an emergency call to the Emergency Operator. (NB without a request from the Emergency Operator)

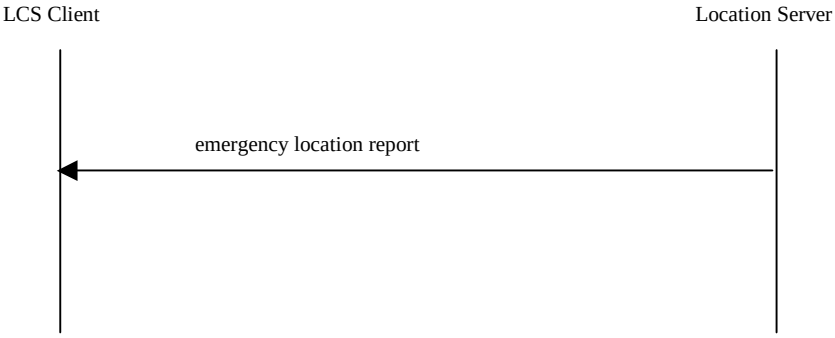
NOTE: Report triggered by the user either originating or releasing a call to 112.

The service consists of the following messages:

- Emergency Location Report.

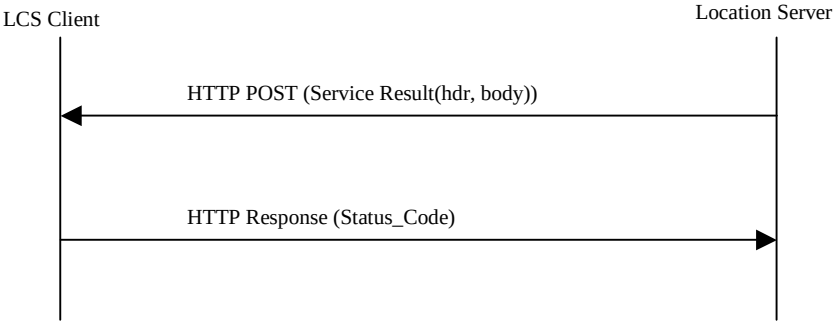
The following message flow encapsulates this service:

Emergency Operator / Mobile Operator



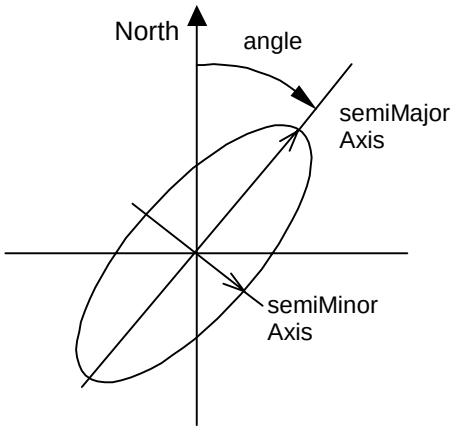
Request and Answer implemented as:

Emergency Operator / Mobile Operator



7.1 Emergency Location report (subset of LIF defined request)

XML Code	Notes
<?xml version="1.0" ?>	
<!DOCTYPE svc_init SYSTEM "MLP_SVC_RESULT_300.DTD" [	
<!ENTITY % extension SYSTEM	Utilize the LIF extension mechanism to point to the DTD defining the National Regulatory Organization
'http://www.oftel.gov.uk/UK999_MLP_address_extension.dtd'>	Name and Address extension
%extension; (note this is an example of a dtd)	
]>	
<svc_result ver="3.0.0">	Service result for MLP Version 3.0.0
<emerep ver="3.0.0">	Emergency Location Report for MLP Version 3.0.0
<eme_event eme_trigger='EME_ORG'>	What triggered this pushed report - Either emergency service user originated the emergency call (EME_ORG) or released the emergency call (EME_REL)
<Caller_Location>	Name and address data elements as defined by the referenced DTD above
<CustomerName>*aaaaa…a*</CustomerName>	Registered Customer Name
<Line1>*aaaaa.a*</Line_1>	Address of current location
<Line2>*aaaaa.a*</Line_2>	Notes -
<Line3>*aaaaa.a*</Line_3>	All elements could be defined as optional
etc	Elements could be defined differently
etc>	This is only an example of how to include additional fields
<Line6>*aaaaa.a*</Line_n>	
<PostCode>*aaaaa…..a*</PostCode>	Post Code
</Caller_Location>	
<eme_pos>	Position information
<msid type="MSISDN">*ccc*ppppppppppp</msid>	Position is for this MSISDN (formatted as Country Code + Phone Number) (GSM/3GPP should conform to TS 123 003)
<pd>	Position description

XML Code	Notes
<time utc_off="±*hhmm*">*yyyymmddhhmmss*</time>	Local Date and Time of phone when position was measured.
<shape>	Shape of uncertainty area
<EllipticalArea>	It is an ellipse!  Note circle can be described by making semiMajor axis = semiMinor axis Default WGS84 Coordinate Reference System is defined by LIF to be 4326 by the EPSG authority (see clause 12).
<coord>	Coordinate of the centre of the ellipse
<X>*addd.ddd*</X>	Latitude in decimal degrees prefixed with N or S
<Y>*addd.ddd*</Y>	Longitude in decimal degrees prefixed with E or W
</coord>	
<angle>*nnn.nn*</angle>	Angle in degrees of rotation of the ellipse measured clockwise from north
<semiMajor>*nnnnn*</semiMajor>	Length of semiMajor axis in metres
<semiMinor>*nnnnn*</semiMinor>	Length of semiMinor axis in metres
<angularUnit>aaaaaa</angularUnit>	Unit for <angle> (Required LIF parameter but default unit is degrees!)
<distanceUnit>*nnnnn*</distanceUnit>	Optional - default unit is meter
</ EllipticalArea >	
</shape>	
<alt>±*nnn*</alt>	Optional - Altitude of phone if available (in respect to coordinate ellipsoid NOT actual height))
<speed>*nnnn*</speed>	Optional - speed in meters/sec if available
<direction>*nnnn*</direction>	Optional - Direction phone is moving if available
<lev_conf>*nnn*</lev_conf>	LIF optional but required by 112service - Indicates the probability as a percentage that the phone is located within the position area defined
</pd>	
</eme_pos>	
</eme_event>	
</emerep>	
</svc_result>	

8 Emergency Location - Error responses (subset of LIF defined response)

8.1 Generic error response

Response for an error when requesting location (i.e. request not accepted).

XML Code	Notes
<?xml version="1.0" ?>	
<!DOCTYPE svc_init SYSTEM "MLP_SVC_RESULT_300.DTD">	
<svc_result ver="3.0.0">	Service result for MLP Version 3.0.0
<eme_lia ver="3.0.0">	Emergency Location Immediate Answer for MLP Version 3.0.0
<result resid='*nnn*'>aaaa...a</result>	Error code no and error code text - see LIF defined errors table below
<add_info>*aaaa…a*</add_info>	Optional - Additional information about the result
</eme_lia>	
</svc_result>	

8.2 Position error response

Response for an error when trying to obtain location (i.e. request accepted but location not available).

XML Code	Notes
<?xml version="1.0" ?>	
<!DOCTYPE svc_init SYSTEM "MLP_SVC_RESULT_300.DTD">	
<svc_result ver="3.0.0">	Service result for MLP Version 3.0.0
<eme_lia ver="3.0.0">	Emergency Location Immediate Answer for MLP Version 3.0.0
<eme_pos>	Position answer
<msid type="MSISDN">*cccppppppppppp*</msid>	Position is for this MSISDN (formatted as Country Code + Phone Number) (GSM/3GPP should conform to TS 123 003)
<poserr>	
<result resid='*nnn*'>aaaa...a</result>	Error code no and error code text - see LIF defined errors table below
<add_info>*aaaa…a*</add_info>	Optional - Additional information about the result
<time utc_off="*±hhmm*">*yyyymmddhhmmss*</time>	Local Date and Time of phone when position attempt was made
</poserr>	
</eme_pos>	
</eme_lia>	
</svc_result>	

9 Result codes (LIF defined)

This table defines the result codes that indicate the result of the request or individual positioning.

The error codes are divided in ranges:

0	-	99	Location server specific errors
100	-	199	Request specific errors
200	-	299	Network specific errors
300	-	499	Reserved for future use
500	-	599	Vendor specific errors

NOTE: For privacy reasons it might be needed to not report certain specific errors. In this case it is up to the implementation or configuration of the location server which errors will be reported.

These are the errors defined in LIF MLP V3.0.0. They may well change in later versions.

Resid	Slogan	Description
0	OK	No error occurred while processing the request
1	SYSTEM FAILURE	The request can not be handled because of a general problem in the location server or the underlying network
2	UNSPECIFIED ERROR	An unspecified error used in case none of the other errors applies. This can also be used in case privacy issues prevent certain errors from being presented
3	UNAUTHORIZED APPLICATION	The requesting location-based application is not allowed to access the location server or a wrong password has been supplied
4	UNKNOWN SUBSCRIBER	Unknown subscriber. The user is unknown, i.e. no such subscription exists
5	ABSENT SUBSCRIBER	Absent subscriber. The user is currently not reachable
6	POSITION METHOD FAILURE	Position method failure. The location service failed to obtain the user's position
101	CONGESTION IN LOCATION SERVER	The request can not be handled due to congestion in the location server
102	CONGESTION IN MOBILE NETWORK	The request can not be handled due to congestion in the mobile network
103	UNSUPPORTED VERSION	The Location server does not support the indicated protocol version
104	TOO MANY POSITION ITEMS	Too many position items have been specified in the request
105	FORMAT ERROR	A protocol element in the request has invalid format. The invalid element is indicated in ADD_INFO
106	SYNTAX ERROR	The position request has invalid syntax. Details may be indicated in ADD_INFO
107	PROTOCOL ELEMENT NOT SUPPORTED	A protocol element specified in the position request is not supported by the Location Server. The element is indicated in ADD_INFO
108	SERVICE NOT SUPPORTED	The requested service is not supported in the Location Server. The service is indicated in ADD_INFO
109	PROTOCOL ELEMENT ATTRIBUTE NOT SUPPORTED	A protocol element attribute is not supported in the Location Server. The attribute is indicated in ADD_INFO
110	INVALID PROTOCOL ELEMENT VALUE	A protocol element in the request has an invalid value. The element is indicated in ADD_INFO
111	INVALID PROTOCOL ELEMENT ATTRIBUTE VALUE	A protocol element attribute in the request has a wrong value. The element is indicated in ADD_INFO
112	PROTOCOL ELEMENT VALUE NOT SUPPORTED	A specific value of a protocol element is not supported in the Location Server. The element and value are indicated in ADD_INFO
113	PROTOCOL ELEMENT ATTRIBUTE VALUE NOT SUPPORTED	A specific value of a protocol element attribute is not supported in the Location Server. The attribute and value are indicated in ADD_INFO

Resid	Slogan	Description
201	QOP NOT ATTAINABLE	The requested QoP cannot be provided.
202	POSITIONING NOT ALLOWED	The subscriber does not allow the application to position him/her for whatever reason (privacy settings in location server, LCS privacy class).
204	DISALLOWED BY LOCAL REGULATIONS	The location request is disallowed by local regulatory requirements.
207	MISCONFIGURATION OF LOCATION SERVER	The location server is not completely configured to be able to calculate a position.
300 - 499		Reserved for future use
500 - 599		Vendor specific errors

10 Proposed additional functionality - Position fix type

10.1 Background

From the proposed implementation of this functionality in July 2003 or soon after it is likely that some operators will be offering multiple position fix technologies. For example Cell-ID based plus EOTD and/or A-GPS.

The Emergency Operator has two functional requirements:

1) **A very quick response to location request** (accuracy not as important as response speed)

   This enables the Emergency Operator to route the call to the correct Emergency Authority based on approximate geographic location, to question the caller more appropriately to establish the exact location using approximate location details and in most cases to despatch the nearest response vehicle.

2) **A most accurate response to a location request** (accuracy more important then response speed)

   This may be required if the Emergency Authority cannot determine exactly where the caller is, for example after talking to the caller.

10.2 Issue

In a network providing more than one location technology, (e.g. both Cell-ID and A-GPS) these two requirements require two different requests.

By utilizing the standard LIF optional QOP (Quality Of Position) parameters (e.g. horizontal accuracy and how long before a response is required) it may be possible for the Emergency Operator to request a Cell-ID fix and then a A-GPS fix but this would require the Emergency Operator to know the capabilities and necessary parameters for each network and each caller's handset and configure these in their software client.

This appears to be an unnecessary burden on the parties involved to implement the parameters and maintain the parameters over time.

10.3 Proposed solution

The Mobile Operator knows both the capability of his network (e.g. Cell-ID + A-GPS) and the capability of the handset being utilized by the E112 caller (e.g. has or does not have A-GPS or EOTD capability).

The proposed solution is therefore that the Emergency Operator tells the Mobile Operator what type of fix is required (as in clause 10.1) and the Mobile Operator maps that request to the Operator's appropriate location fix technology with whatever parameters are required for that Operators implementation).

This functionality could be included in the protocol described in the present document by utilizing the LIF optional <loc_type> element and the addition of two new values to the element as follows.

LIF 3.0 possible values	Response Required
<loc_type type='CURRENT' />	Refer to TS 122 071 and TS 129 002 for definition
<loc_type type='LAST' />	Refer to TS 122 071 and TS 129 002 for definition
<loc_type type='CURRENT_OR_LAST' />	Refer to TS 122 071 and TS 129 002 for definition
<loc_type type='INITIAL' />	Refer to TS 122 071 and TS 129 002 for definition
Proposed New Additions	
<loc_type type='CURRENT_FAST' />	Fastest possible current location fix is required
<loc_type type='CURRENT_ACCURATE' />	Most accurate current location fix is required

Note that in situations where:

- only Cell-ID implemented;
- or where EOTD or A-GPS is implemented but a fix is not available at the time;
- the response to both requests may in fact be the same (e.g. Cell-ID).

The response elements <EllipticalArea> and <lev_conf> will enable the Emergency Operator to determine the accuracy of the response.

The Emergency Location Immediate Request (see clause 6.1) would then become (addition in *italics*).

XML Code	Notes
<?xml version="1.0" ?>	
<!DOCTYPE svc_init SYSTEM "MLP_SVC_INIT_300.DTD">	
<svc_init ver="3.0.0">	Service initiation for MLP Version 3.0.0
<hdr ver="3.0.0">	Header for MLP Version 3.0.0
<client>	Who is requesting this location fix
<id>*aaaa….a*</id>	Emergency operator registered user name for login
<pwd>*aaaa…a*</pwd>>	Optional - Emergency operator password for login
</client>	
</hdr>	
<eme_lir ver="3.0.0">	Emergency Location Immediate Request for MLP Version 3.0.0
<msids>	Identifier of device to be located
<msid type="MSISDN">*ccppppppppppp*</msid>	Identifier is a MSISDN formatted as Country Code + Phone Number (GSM/3GPP should conform to TS 123 003)
</msids>	
<loc_type type='tttt....t' />	*Where "tttt....t" is either "CURRENT_FAST" or "CURRENT_ACCURATE"*
</eme_lir	
</svc_init>	

10.4 Proposed action

Propose the addition of the CURRENT_FAST and CURRENT_ACCURATE values to the <loc_type> element within MLP at the LIF meeting in September 2002.

11 Proposed additional functionality - HTTP 1.1 pipelining

11.1 Background

Emergency services require the quickest possible response to requests for the location of a caller.

It is therefore proposed that the Emergency Operator will utilize pipelining as defined the HTTP 1.1 to enable them to submit requests for location sequentially without waiting for a response.

Under HTTP 1.1 responses should be returned in the same order as the requests were received.

11.2 Issue

For emergency operators the following use case is unacceptable.

Assume that an operator has implemented both Cell-ID and A-GPS based positioning technologies.

If the emergency operator submits a location request for one MSISDN which causes the network to initiate an A-GPS fix and then immediately follows it with a request for another MSISDN which causes the network to initiate a Cell-ID based fix, then following the HTTP 1.1 standard the operator cannot return the cell-ID based location result until it has returned the A_GPS based location result.

As the A-GPS based fix may take 30 s to 60 s and the Cell-ID based fix may take only 1 s to 2 s the potential delay of 28 s 59 s in returning the cell-id based result to the emergency operator in unacceptable.

11.3 Proposed solution

11.3.1 HTTP 1.1 non conformance

Return results to emergency operator from network as each result is available. This implies that the results returned may not be in the same order that the requests were received as required by HTTP 1.1.

11.3.2 Utilize a transaction ID

In order that the emergency operator can match potentially out of order responses with the appropriate request a transaction ID needs to be added by the emergency operator to each request and the same transaction ID returned by the operator with each valid response or error response.

Note that because of dropped calls it is possible that the emergency operator may submit a request for an MSISDN before a previous request for the same MSISDN has been responded to. Therefore the MSIDN is not sufficient to match requests and responses.

11.4 Proposed action

Add a transaction ID element to MLP.

12 European petroleum survey group

12.1 Background

The European Petroleum Survey Group (EPSG) was formed in 1986. It comprises specialist surveyors, geodesists and cartographers from European Oil Companies. Meetings are held twice yearly to discuss survey and positioning topics within those areas of oil industry business where cooperation is generally agreed to be mutually beneficial.

A geodesy working group maintains a relational database of EPSG geodetic parameters.

The EPSG aims to help member companies, and where relevant others, by the dissemination of information which by generally improving oil industry survey practices and procedures, will contribute to increased efficiency, enhanced quality, improved safety of operations and the protection of the environment.

Through its membership of specialist professionals, the EPSG is qualified to offer collective expert advice to member companies within the fields of geodesy, surveying, positioning and cartography where they relate to oil exploration, development and production operations.

12.2 EPSG geodetic parameters

EPSG, through its geodesy working group, maintains and publishes a data set of parameters for coordinate system and coordinate transformation description. The data is supported through formulae given in guidance note number 7. The EPSG geodetic parameters have been included as reference data in the GeoTIFF data exchange specifications, in Iris21 (Petroconsultant's data model) and in Epicentre (the POSC data model). The parameters are maintained in an MS Access relational database and may be consulted on this site.

12.3 EPSG guidance notes

EPSG produces an occasional series of Guidance Notes for its member use. Some are made publicly available from this site.

Associations with other organizations PSG has:

- category A liaison membership of the International Standards Organization (ISO) Technical Committee 211, Geographic Information/Geomatics;
- a strong, but informal, relationship with the UKOOA Survey and Positioning Committee;
- a strong, but informal, relationship with the Petrotechnical Open Software Corporation (POSC) to which it provides geodetic advice and support through the EPSG geoesy working group;
- EPSG geodesy working group members maintain a liaison with the Open GIS Consortium over spatial referencing and coordinate transformation;
- EPSG maintains links with the Americas Petroleum Survey Group (APSG).

12.4 EPSG Geodesy Parameters V 6.3

In February 2002, the European Petroleum Survey Group (EPSG) completed and released the ISO-compliant Version 6.1 data model and data set. The move to the new model was made to encourage standardisation both across the Exploration and Production segment of the oil industry and in the geodetic community at large. Since that release, much new data has come available.

This new Version 6.3 [
] is the current EPSG release, distributed in an MS Access 97 database. It incorporates data received and verified since the release of Version 6.1. There are no changes in the data model from Version 6.1.

NOTE: Version 6.3 [relational] database is only available in MS Access v97 but can be converted to Access 2000.
Note that this zipped file is comprised of the v6.3 database (MS Access 97) and associated documentation (in both Adobe Acrobat PDF and MS Word 97-2000& 6/95-rtf formats). The zipped file is approximately 2 Mb in size.

There are no significant changes in content from the v6.2.2, v6.2.1 and v6.2 versions of the database that are superseded by this v6.3 database. Some changes were made primarily to form controls to assist user conversion to Access 2000.

Annex A (informative): Bibliography

EPSG guidance notes documentation (See Guidance Notes).

ETSI TS 123 003: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Numbering, Addressing and Identification (3GPP TS 23.003)".

ETSI TS 122 071: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Location Services (LCS); Service description, Stage 1 (3GPP TS 22.071)".

ETSI TS 129 002: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Mobile Application Part (MAP) specification (3GPP TS 29.002)".

History

Document history		
V1.1.1	April 2003	Publication