Technical Specification Group Services and System Aspects **TSGS#19(03)0344**

Meeting #20, Hämeenlinna, Finland
09-12 June 2003

Source: **TSG SA WG2**
Title: **CRs on 23.171 and 23.271 (LCS Stage 2)**
Agenda Item: **7.2.3**

The following Change Requests (CRs) have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #20.

Tdoc #	Title	Spec	CR #	cat	Version in	REL	WI	S2 meeting
S2-031573	Exception procedures in 23.171	23.171	29r2	F	3.9.0	99	LCS2	S2-31
S2-031574	Exception procedures in 23.271	23.271	167r2	F	4.8.0	4	LCS2	S2-31
S2-031575	Exception procedures in 23.271	23.271	168r2	A	5.6.0	5	LCS2	S2-31
S2-031576	Exception procedures in 23.271	23.271	169r2	A	6.3.0	6	LCS2	S2-31
S2-031752	CR on 23.271: Correction to NI-LR for Emergency Services	23.271	175	F	4.8.0	4	TEI4	S2-32
S2-031753	CR on 23.271: Correction to NI-LR for Emergency Services	23.271	176	A	5.6.0	5	TEI4	S2-32
S2-031754	CR on 23.271: Correction to NI-LR for Emergency Services	23.271	177	A	6.3.0	6	TEI4	S2-32
S2-031787	Addition of Position Method Used, to attributes returned with location estimate.	23.271	181r3	F	5.6.0	5	LCS2	S2-32
S2-031788	Addition of Position Method Used, to attributes returned with location estimate.	23.271	182r3	F	6.3.0	6	LCS2	S2-32
S2-031789	Alignment of TS 23.271 with GERAN acceptance of U-TDOA location determination method	23.271	185r2	B	6.3.0	6	LCS2, UTDOA CS	S2-32
S2-031781	Clarification of Annex E	23.271	178r2	F	6.3.0	6	LCS2	S2-32
S2-031195	Clarification on privacy check procedures with PPR	23.271	171r2	F	6.3.0	6	LCS2	S2-31
S2-032182	Clarification on privacy procedure	23.271	183r3	F	6.3.0	6	LCS2	S2-32
S2-031170	Clarification on pseudonym mediation device functionality	23.271	172	F	6.3.0	6	LCS2	S2-31
S2-031156	CR on 23.271. Correction to GMLC Definition	23.271	163	D	6.3.0	6	LCS2	S2-31
S2-031180	CR on 23.271: Clarification of UE Available event Defintion	23.271	164r1	F	6.3.0	6	LCS2	S2-31
S2-031192	Including pseudonym in the LCS authorisation request	23.271	166r2	C	6.3.0	6	LCS2	S2-31
S2-031179	Pseudonym attachment options	23.271	170r1	F	6.3.0	6	LCS2	S2-31
S2-031757	Request to response correction	23.271	179	F	6.3.0	6	LCS2	S2-32

The following CR is the merge version of 155r10 and 184r3.

SP-030345	Addition of mobile based change of area event to deferred location request	23.271	155r11	B	6.3.0	6	LCS2	SP-20

3GPP TSG-SA2 Meeting #31
Seoul, Korea, 7 – 11 April 2003

Tdoc ⌘S2-031156

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **163** ⌘ **rev** **-** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	CR on 23.271: Correction to GMLC definition
Source:	⌘	Vodafone
Work item code:	⌘	LCS2
Date:	⌘	01/04/2003
Category:	⌘	**D**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	This CR aims to clarify the role of the GMLC in location services.
Summary of change:	⌘	The GMLC is referred to as a gateway to a GSM PLMN and has been changed to refer to any PLMN. Additional clarification that the Home GMLC should reside within the UE's home PLMN. Clarification of which GMLCs may be the Home GMLC is made.
Consequences if not approved:	⌘	Unclear roles and location of the various types of GMLC.

Clauses affected:	⌘	6.3.3

Other specs affected:	⌘	Y	N		⌘
			N	Other core specifications	
			N	Test specifications	
			N	O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

6.3.3 Gateway Mobile Location Center, GMLC

The Gateway Mobile Location Center (GMLC) contains functionality required to support LCS. In one PLMN, there may be more than one GMLC.

~~The~~ A GMLC is the first node an external LCS client accesses in a ~~GSM~~ PLMN (i.e. the Le reference point is supported by the GMLC). The GMLC may request routing information from the HLR or HSS via the Lh interface. After performing registration authorization, it sends positioning requests to either VMSC, SGSN or MSC Server and receives final location estimates from the corresponding entity via Lg interface. Information needed for authorisation, location service requests and location information may be communicated between GMLCs, located in the same or different PLMNs, via the Lr ~~-~~interface. The target UE's privacy profile settings shall always be checked in the UE's home PLMN prior to delivering a location estimate. In order to allow location request from a GMLC outside the HPLMN while having privacy check in the HPLMN, the Lr interface is needed.

The "Requesting GMLC" is the GMLC, which receives the request from LCS client

The "Visited GMLC" is the GMLC, which is associated with the serving node of the target mobile.

The "Home GMLC" is the GMLC residing in the target mobile's home PLMN, which is responsible ~~to~~for the control of ~~the~~ privacy checking of the target mobile.

The Requesting GMLC can be the Visited GMLC, and either one or both of which can be the Home GMLC at~~in~~ the same time.

3GPP TSG-SA2 Meeting #31
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CHANGE REQUEST

⌘ **23.271** **CR** **172** ⌘ **rev** **-** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Clarification on pseudonym mediation device functionality
Source:	⌘	NEC
Work item code:	⌘	LCS2
Date:	⌘	31/03/2003
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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Use one of the following releases:

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R97	*(Release 1997)*
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R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The current definition of PMD functionality includes both encryption and decryption between verinym and pseudonym. However, the encryption is outside the scope of our specification.
Summary of change:	⌘	The definition of PMD is corrected.
Consequences if not approved:	⌘	The functionality of PMD may be misunderstood.

Clauses affected:	⌘	3.1, 6.3.12			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

CAMEL: CAMEL is a network functionality, which provides the mechanisms of Intelligent Network to a mobile user

Call Related: any LCS related operation which is associated with an established call in CS domain and a session via an active PDP context in PS domain.

Codeword: access code, which is used by a Requestor or LCS Client in order to gain acceptance of a location request for a Target UE. The codeword is part of the privacy information that may be registered by a Target UE user.

Current Location: after a location attempt has successfully delivered a location estimate and its associated time stamp, the location estimate and time stamp is referred to as the "current location" at that point in time

Deferred location request: location request where the location response (responses) is (are) not required immediately

Global Positioning System: Global Positioning System (GPS) consists of three functional elements: Space Segment (satellites), User Segment (receivers), and Control Segment (maintenance etc.). The GPS receiver calculates its own position based on the received time differences for several satellites

Immediate location request: location request where a single location response only is required immediately

Initial Location: in the context of an originating emergency call the location estimate and the associated time stamp at the commencement of the call set-up is referred to as "initial location"

Last Known Location: current location estimate and its associated time stamp for Target UE stored in the LCS Server is referred to as the "last known location" and until replaced by a later location estimate and a new time stamp is referred to as the "last known location"

LCS (LoCation Services): LCS is a service concept in system (e.g. GSM or UMTS) standardization. LCS specifies all the necessary network elements and entities, their functionalities, interfaces, as well as communication messages, due to implement the positioning functionality in a cellular network. Note that LCS does not specify any location based (value added) services except locating of emergency calls

LCS Client: software and/or hardware entity that interacts with a LCS Server for the purpose of obtaining location information for one or more Mobile Stations. LCS Clients subscribe to LCS in order to obtain location information. LCS Clients may or may not interact with human users. The LCS Client is responsible for formatting and presenting data and managing the user interface (dialogue). The LCS Client may reside in the Mobile Station (UE)

LCS Client Access barring list: optional list of MSISDNs per LCS Client where the LCS Client is not allowed to locate any MSISDN therein

LCS Client Subscription Profile: collection of subscription attributes of LCS related parameters that have been agreed for a contractual period of time between the LCS client and the service provider

LCS Feature: capability of a PLMN to support LCS Client/server interactions for locating Target UEs

LCS Server: software and/or hardware entity offering LCS capabilities. The LCS Server accepts requests, services requests, and sends back responses to the received requests. The LCS server consists of LCS components, which are distributed to one or more PLMN and/or service provider

Local Information: information related to a given location, or general information, which is made available in a given location

Local Service: service, which can be exclusively provided in the current serving network by a Value added Service Provider

Location (Based) Application: location application is an application software processing location information or utilizing it in some way. The location information can be input by a user or detected by network or UE. Navigation is one location application example

Location Based Service (LBS): service provided either by teleoperator or a 3rd party service provider that utilizes the available location information of the terminal. Location Application offers the User Interface for the service. LBS is either a pull or a push type of service (see Location Dependent Services and Location Independent Services). In ETSI/GSM documentation of SoLSA, LBS is called "Location Related Service". ETSI and/or 3GPP -wide terminology harmonization is expected here

Location Dependent Service: service provided either by teleoperator or a 3rd party service provider that is available (pull type) or is activated (push type) when the user arrives to a certain area. It doesn't require any subscription in advance, but the push type activation shall be confirmed by the user. The offered service itself can be any kind of service (e.g. a public Xerox machine or the discount list in a store)

Location Estimate: geographic location of an UE and/or a valid Mobile Equipment (ME), expressed in latitude and longitude data. The Location Estimate shall be represented in a well-defined universal format. Translation from this universal format to another geographic location system may be supported, although the details are considered outside the scope of the primitive services

Location Independent Service: service provided either by teleoperator or a 3rd party service provider that is available and therefore can be activated anywhere in the network coverage. It is activated by the user's request or by other user's activated service, and therefore it requires a subscription in advance (pull type). The offered service itself can be any kind of service (e.g. MMS, SWDL, or LBS!)

Mobile Assisted positioning: any mobile centric positioning method (e.g. IPDL-OTDOA, E-OTD, GPS) in which the UE provides position measurements to the network for computation of a location estimate by the network. The network may provide assistance data to the UE to enable position measurements and/or improve measurement performance

Mobile Based positioning: any mobile centric positioning method (e.g. IPDL-OTDOA, E-OTD, GPS) in which the UE performs both position measurements and computation of a location estimate and where assistance data useful or essential to one or both of these functions is provided to the UE by the network. Position methods where an UE performs measurements and location computation without network assistance data are not considered within this category

Mobile Station: mobile station (MS) consists of Mobile or User Equipment (ME or UE) with a valid SIM or USIM attached. The abbreviation "UE" in this specification refers both to MS and User Equipment, see below.

PLMN Access barring list: optional list of MSISDN per PLMN where any LCS Client is not allowed to locate any MSISDN therein except for certain exceptional cases

Positioning (/location detecting): positioning is a functionality, which detects a geographical location (of e.g. a mobile terminal)

Positioning method (/locating method): principle and/or algorithm which the estimation of geographical location is based on, e.g. AOA, TOA, TDOA. For example, GPS is based on TOA, whilst OTDOA and E-OTD (on GSM) are based on TDOA

Positioning technology (/locating technology): technology or system concept including the specifications of RF interfaces, data types, etc. to process the estimation of a geographical location, e.g. GPS, E-OTD (GSM), and OTDOA (WCDMA)

Predefined area: geographical area, which is not related to cell or radio coverage. The mobile may take special action when it recognises it has entered or left a predefined area

Privacy Class: list of LCS Clients defined within a privacy exception class to which permission may be granted to locate the target UE. The permission shall be granted either on activation by the target UE or permanently for a contractual period of time agreed between the target UE and the service provider

Privacy Exception List: list consisting of various types of privacy classes (i.e. operator related, personal etc.). Certain types of classes may require agreement between the service provider and the target UE

Privacy Profile Register, PPR: The PPR stores privacy information of the target mobile. The PPR also executes privacy checks and sends the privacy check results to other network elements using the Lpp interface. PPR may be a standalone network entity or the PPR functionality may be integrated in H-GMLC.

Prohibited area: area where the mobile must not activate its transmitter. The Prohibited area may be a Predefined area described above or related to radio cell(s)

Pseudo-external identity: The pseudo-external identity is not the identity of real external LCS client but the identity, which is used for notifying the result of the enhanced privacy check. The pseudo-external identity shall keep the compatibility with pre Rel-6 privacy mechanisms, which does not understand privacy check result made by H-GMLC/PPR. Each operator defines its own the pseudo-external identities.

Pseudonym: A fictitious identity, which may be used to conceal the true identity (i.e. MSISDN and IMSI) of a target UE from the requestor and the LCS client.

Pseudonym mediation device: functionality that ~~generates pseudonyms and~~ verifies pseudonyms to verinyms

Requestor: the originating entity which has requested the location of the target UE from the LCS client.

Requestor Identity: This identifier is identifying the Requestor and can be e.g. MSISDN or logical name.

Service coverage: a list of country codes where an LCS client offers its location services.

Service Type: attribute of specific location based service provided by the LCS client, as defined in TS 22.071.

Subscription Profile: profile detailing the subscription to various types of privacy classes

Target UE: UE being positioned

User Equipment: term 'User Equipment', or 'UE', should for GSM be interpreted as 'MS', as defined in GSM TS 04.02 [19]. UE in this specification may also refer to a Mobile Equipment or User Equipment used for emergency calls, that do not have valid SIM or USIM

Verinym: True identity, i.e. MSISDN or IMSI, of the target UE

Further UMTS related definitions are given in 3G TS 22.101.

<< Next Change >>

6.3.12 Pseudonym Mediation Device, PMD

The pseudonym mediation device (PMD) functionality ~~maps or encrypts the target UE's verinym IMSI and /or MSISDN into the corresponding pseudonym and~~ maps or decrypts the pseudonym into the corresponding verinym (i.e. IMSI or MSISDN). PMD functionality may be a standalone network entity or the PMD functionality may be integrated in PPR, GMLC or other network entity. If PMD functionality is not part of GMLC it may be accessed using the Lid interface. The detail of PMD functionality is out of scope, and only the interface between GMLC and PMD functionality is specified in this specification.

3GPP TSG-SA WG 2 Meeting #31
Seoul, Korea, 7 – 11 April 2003

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(revised S2-031167)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **170** ⌘ **rev** **1** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Pseudonym attachment options
Source:	⌘	Siemens
Work item code:	⌘	LCS2
Date:	⌘	09/04/2003
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The definition of the pseudonym (in clause 3.1) does not include other information, e.g. the address of the issuing network element or H-GMLC address. These addresses may be attached to the pseudonym and may not be en- / decrypted.
Summary of change:	⌘	For the optional addressing purposes of the UE in clause 6.4.2, the address of the pseudonym issuing network element and the address of the H-GMLC are separated from the pseudonym and should be attached to it.
Consequences if not approved:	⌘	It remains unclear, what belongs to the pseudonym and may be decrypted or not.

Clauses affected:	⌘	6.4.2

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

********** Modified Section **********

6.4.2 Pseudonyms for the target UE

National regulations require support for the anonymity of the target mobile user in some countries. It shall therefore be possible to address and indicate the target UE using a pseudonym. The pseudonym may be the IMSI or MSISDN of the target UE encrypted e.g. using the public key of the home operator. The ~~pseudonym may contain the~~ address of the network element that issued the pseudonym, i.e. the PMD address, shall either be attached to the pseudonym, if required or ~~it shall be possible to~~ can deduce this ~~information~~ address from the pseudonym . The H-GMLC address may also either be attached to the pseudonym ~~contained~~ or ~~can~~ be deduced from the pseudonym. It is outside the scope of this specification how the requestor and the LCS client will receive and handle the pseudonym, but some examples are described in the informative Annex ~~D~~E.

3GPP TSG-SA2 Meeting #31
Seoul, Korea, 7-11 April 2003

Tdoc ⌘S2-031180
Revised Tdoc S2-031157

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **164** ⌘**rev** **1** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	CR on 23.271: Clarification of UE Available event Defintion
Source:	⌘	Vodafone UK
Work item code:	⌘	LCS2
Date:	⌘	09/04/2003
Category:	⌘	**F**
Release:	⌘	Rel-6

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Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The definition of the UE Available event is unclear as to the number of triggers that may occur for this event. It was agreed in SA2 30 that the number of responses to triggers was intended to be only 1. This CR proposes to change this definition.
Summary of change:	⌘	The definition of UE Available is modified in clause 4.4.2.1
Consequences if not approved:	⌘	It is possible to misinterpret this definition as many triggers and therefore may trigger a very large number of location requests thereby swamping the system.

Clauses affected:	⌘	4.4.2.1			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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*****FIRST MODIFIED SECTION*****

4.4.2 Deferred Location Request

Request for location contingent on some current or future events where the response from the LCS Server to the LCS Client may occur some time after the request was sent.

4.4.2.1 Types of event

a) UE available: Any event in which the MSC/SGSN has established a contact with the UE. Note, this event is considered to be applicable when the UE is temporarily unavailable due to inaction by the UE user, temporarily loss of radio connectivity or IMSI detach and so on. Note that IMSI detach is only applicable in the case UE has previously been registered and information is still kept in the node. The UE Available event only requires one response and after the one response, the UE Available event is concluded.

b) Other events are FFS ~~(Release 5)~~

*****END OF CHANGES*****

3GPP TSG SA WG2 Meeting # 31
Seoul, Korea, 7th – 11th April

Tdoc ⌘ S2-031192
(Revised S2-031178, S2-031162)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **166** ⌘ **rev** **2** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Including pseudonym in the LCS authorisation request
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	2.4.2003
Category:	⌘	**C**
Release:	⌘	REL-6

Use one of the following categories:
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Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The current version of the TS 23.271 contains a new Pseudonym Mediation Device (PMD), which can be integrated in the PPR. In this case there is no need to perform Idenity Request and LCS Authorisation Request separately, so therefore the Identity request should be a part of the LCS Authorisation Request in this case.
Summary of change:	⌘	It shall be possible to request target UE's verinym in the LCS Authorisation Request in case the PMD functionality is integrated in the PPR.
Consequences if not approved:	⌘	In case the PMD functionality is integrated in the PPR there would be no possibility to combine Idenity Request and LCS Authorisation Request, which would cause unnecessary signalling between H-GMLC and PPR.

Clauses affected:	⌘	9.1.1

Other specs affected: ⌘	Y	N		⌘
		X	Other core specifications	
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<< First changed clause >>

7.4 Lpp interface

Lpp is the interface between H-GMLC and PPR. If the UE subscribers LCS privacy information is kept in the PPR this interface is used by the H-GMLC to request the PPR to perform a privacy check. The Lpp interface shall conform to the protocol as specified in (reference to be added) and the procedures defined in clause 9 of this specification.

7.4.1 LCS Authorisation Request

Via the LCS Authorisation Request, the H-GMLC can request the PPR to perform the privacy check. There exist two types of LCS Authorisation Request:

- LCS Authorisation Request without location estimate (send by H-GMLC before location request);
- LCS Authorisation Request with location estimate (to check location related privacy settings).

The following attributes are identified for LCS Authorisation Request information flow:

- Target UE identity, (one or both of MSISDN and IMSI), if needed;
- If PPR contains PMD functionality the LCS Authorisation Request may contain the same information as the LCS Identity request, i.e. the pseudonym of the target UE, if needed.
- Indication on call/session related MT-LR;
- LCS Client identity, i.e. LCS client external identity or internal identity;
- LCS Client type, (i.e. Value added, Emergency, PLMN operator or Lawful interception);
- LCS Client name, if needed (and type of LCS client name if available);
- Service type, if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Type of location, i.e. “current location”, “current or last known location” or “initial location”;
- LCS capability sets of serving nodes, if needed;
- Location estimate, if needed and available (This is only relevant for LCS Authorisation Request with location estimate).

7.4.2 LCS Authorisation Response

The LCS Authorisation request is sent to the H-GMLC as the result of the LCS Authorisation Request by the PPR.

The following attributes are identified for the LCS Authorisation Request information flow:

- Indicator of privacy check related actions;
  - positioning allowed without notifying the UE user;
  - positioning allowed with notification to the UE user;
  - positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
  - positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.

- Indicator for call/session related class of privacy check related actions, if needed;
  - positioning allowed without notifying the UE user;
  - positioning allowed with notification to the UE user;
  - positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
  - positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.
- Pseudo external ID, if needed (see Annex C);
- Indicator on additional privacy check with location estimate, if needed;
- Same information as in the LCS Identity Response, in case the PMD is integrated in PPR, if needed.

<< First added clause >>

7.5 Lid interface

Lid is the interface between H-GMLC and PMD. If the UE subscribers pseudonym can be mapped or decrypted to the corresponding verinym in the standalone PMD. The Lid interface shall conform to the protocol as specified in (reference to be added) and the procedures defined in clause 9 of this specification.

7.5.1 LCS Identity Request

Via the LCS Identity Request, the H-GMLC can request the PMD to retrieve the verinym of the subscriber.

The following attribute is identified for the LCS Identity Request:

- Pseudonym;

7.5.2 LCS Identity Response

The PMD sends the LCS Identity Response to the H-GMLC as a result of the LCS Identity Request by the H-GMLC.

The following attribute is identified for the LCS Identity Response information flow:

- Target UE identity, (one or both of MSISDN and IMSI);

9.1.1 Common MT-LR procedure in PS and CS domain

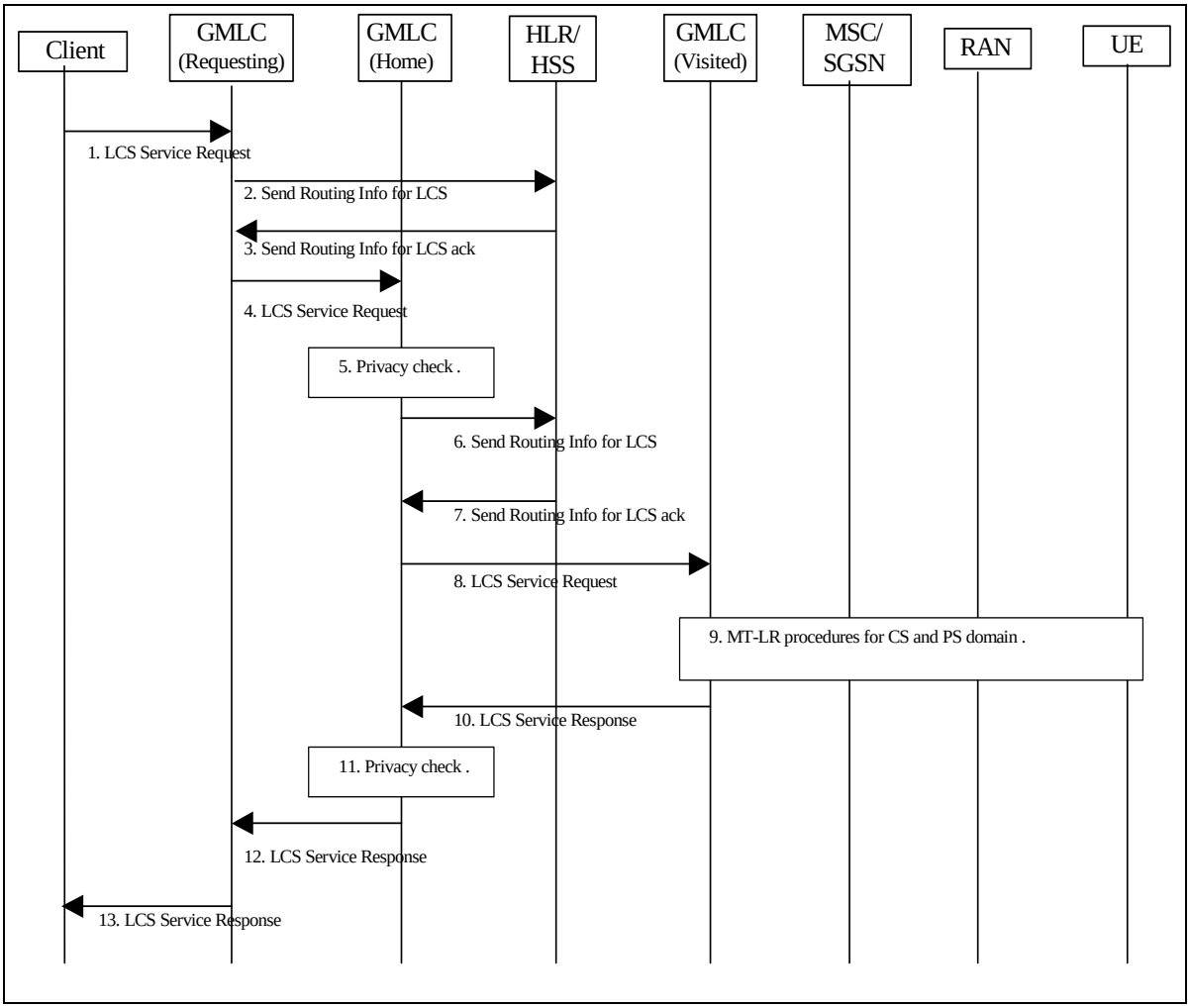

Figure 9.1: General Network Positioning for a MT-LR

1) An external LCS client requests the current location of a target UE from a GMLC. The LCS Client may also request a deferred location request, i.e. based on event. The R-GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI or pseudonym or PDP address, (NOTE: IP addressing in this context is FFS, one reason is the dynamic IP addressing used in IPv4.) of the target UE to be located and the LCS QoS from either subscription data or data supplied by the LCS client. For a call related location request, the LCS client includes the LCS client's called party number, as dialled by the target mobile user, in the LCS service request. For a session related location request, the LCS client includes the APN-NI of the LCS client, as used by the target UE, in the LCS service request. For a call/session related request the R-GMLC may verify that the called party number or APN-NI is correct for the LCS client in question. The LCS client's dialled number or APN-NI are checked in step 9 for the call/session related class.
   The LCS request may carry also the Service Identity and the Codeword and the service coverage information. The R-GMLC may verify that the Service Identity received in the LCS request matches one of the service identities allowed for the LCS client. If the service identity does not match one of the service identities for the LCS client, the R-GMLC shall reject the LCS request. Otherwise, the R-GMLC can map the received service identity in a corresponding service type.
   If the location request is originated by a Requestor, the Requestor Identity may be added to the LCS service request. The LCS client should authenticate the Requestor Identity but this is outside the scope of this specification. The LCS service request may also contain the type of the Requestor identity if the requestor identity was included.
   If the H-GMLC address is not contained in the pseudonym or cannot deduced from the pseudonym, the R-GMLC shall determine the verinym for the pseudonym. In this case the R-GMLC may access to its associated PMD as described in 9.1.1.3.

The R-GMLC verifies whether it stores the privacy profile of the target UE. If the R-GMLC stores the UE's privacy profile, (this means the R-GMLC is the H-GMLC of the target UE), then step 2, 3, 4 and 12 are skipped. If location is required for more than one UE, or if periodic location is requested, the steps following below may be repeated.

Note: This means that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain.

2) If the R-GMLC already knows, (e.g. from a previous location request or an internal lookup table), or is able to determine, (e.g. it is possible to use a DNS lookup mechanism similar to IETF RFC 2916), the network address of H-GMLC of the target UE, or in case the location service request contains the target UE's pseudonym, which includes the target UE's Home-GMLC address, or a pseudonym from which the target UE's Home-GMLC address can be deduced, then this step and step 3 may be skipped.
Otherwise, the R-GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI or MSISDN of the UE.
The details of the alternative methods of retrieving H-GMLC address other than the sending SEND_ROUTING_INFO_FOR_LCS message to the HLR/HSS, (e.g. internal lookup table, DNS lookup mechanism), are not in the scope of this specification.

Editor´s note: According to the current version of TS29.002 the PDP address cannot be transferred by using the SEND_ROUTING_INFO_FOR_LCS message, so this is for ffs.

Editor´s note: The support for number portability with these alternative solutions of retrieving H-GMLC address still needs further study and should be in line with the general solution to support number portability in Rel-6.

3) The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned.
Otherwise the HLR/HSS returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes if available and whichever of the IMSI and MSISDN that was not provided in step 2. The HLR/HSS returns the address of the H-GMLC. The HLR/HSS also returns the address of the PPR and V-GMLC, if available.

Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to the GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

4) If R-GMLC finds out that it is the H-GMLC, the signalling steps 4 and 12 are skipped.
If the R-GMLC did not receive the H-GMLC address in step 3 and can not retrieve the H-GMLC address in some other way (e.g. DNS lookup), then steps 4, 5, 6, 7, 8, 10, 11 and 12 are skipped and the R-GMLC directly sends the PSL message to the serving node.
Otherwise, the R-GMLC sends the location request to the H-GMLC. If one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes, IMSI and MSISDN for the target UE and the address of the V-GMLC and the PPR have been retrieved in Step 3, the R-GMLC shall pass the information with the location request to the H-GMLC. The R-GMLC shall also send the service coverage information to the H-GMLC, if the information is available.

5) The H-GMLC verifies whether the R-GMLC is authorized to request UE location information. If the R-GMLC is not authorized, an error response is returned.
If the LCS service request contains the pseudonym of the target UE and the H-GMLC cannot resolve the PMD address from the pseudonym, the H-GMLC itself determines the verinym (MSISDN or IMSI) of the target UE. If the H-GMLC can resolve the address of PMD from the pseudonym, the H-GMLC requests the verinym from its associated PMD, see clause 9.1.1.3. In case H-GMLC knows that the PMD functionality is integrated in PPR, it can include the information from the LCS Identity Request in the LCS authorisation request to the PPR, see clause 9.1.1.1. In this case, if H-GMLC is not able to obtain the verinym of the target UE, the H-GMLC shall cancel the location request.
The H-GMLC performs privacy check on the basis of the UE user's privacy profile stored in the H-GMLC and the capabilities of the serving nodes (MSC/VLR and/or SGSN), if available. The H-GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1. If the key of the UE user's privacy profile (i.e. MSISDN or IMSI) is not available, the privacy check in this step shall be performed after step 7. The H-GMLC/PPR verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC/PPR. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If the location service request is to be barred, an error response is returned to the R-GMLC or the LCS client. As a result of the privacy check, the H-GMLC/PPR selects an indicator of the privacy check related

action and/or a pseudo-external identity. (The details of the indicator of the privacy check related action and the pseudo-external identity are described in Annex C). If the requested type of location is "current or last known location" and the requested maximum age of location information is available, the H-GMLC verifies whether it stores the previously obtained location estimate of the target UE. If the H-GMLC stores the location estimate and the location estimate satisfies the requested accuracy and the requested maximum age of location, the H-GMLC checks the result of the privacy check. In case the result of the privacy check for call/session unrelated class is "Location allowed without notification" then steps 6, 7, 8, 9 and 10 may be skipped.

6) If the H-GMLC already knows IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), and the VMSC/MSC server address or SGSN address, the rest of this step and step 7 may be skipped. Otherwise, the H-GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI, PDP address or MSISDN of this UE.

Editor´s note: According to the current version of TS29.002 the PDP address cannot be transferred by using the SEND_ROUTING_INFO_FOR_LCS message, so this is for ffs.

7) The HLR/HSS then returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes and whichever of the IMSI and MSISDN that was not provided in step (6) for the particular UE. The HLR/HSS may also return the address of the PPR and the V-GMLC, if available.

Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to the GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

8) If step 6 and step 7 were performed, the H-GMLC/PPR may do a new privacy check.
Also if the location request is an immediate location request and the service coverage information (i.e. list of country codes) was sent from R-GMLC, the H-GMLC checks the country codes of the serving node addresses. If the H-GMLC finds out the current SGSN and/or VMSC/MSC server locates out of the service coverage, the H-GMLC returns an appropriate error message to the R-GMLC or the LCS client.
In the cases when the H-GMLC did not receive the address of the V-GMLC, or when the V-GMLC address is the same as the H-GMLC address, or when both PLMN operators agree not to use the Lr interface, the H-GMLC does not send the location request to the V-GMLC and step 10 is skipped. In this case, the H-GMLC sends the location service request message to the serving node.
If the H-GMLC received the address of the V-GMLC from the HLR/HSS and the V-GMLC address is different from the H-GMLC address, the H-GMLC may send the location request to the V-GMLC. The location request shall contain one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN of the target UE. The location request may also carry the requested action of the VPLMN as the result of the privacy check in the H-GMLC (e.g. by using the pseudo-external identity as described in Annex C). The V-GMLC first authenticates that the location request is allowed from this GMLC, PLMN or from this country. If not, an error response is returned.

Editor's note: The case when the V-GMLC is the same as the R-GMLC may need further elaboration.

9) In case the GMLC (H-GMLC, R-GMLC or V-GMLC) receives only the MSC/VLR address, the MT LR proceeds as the CS-MT-LR procedure described in 9.1.2. In case GMLC receives only the SGSN address, the MT LR proceeds as the PS-MT-LR procedure described in 9.1.6. In case the GMLC receives several of the following addresses, SGSN, VMSC and/or MSC Server, it has to decide where to send the location request. If the requested MT-LR is known to be associated with a CS call, the CS-MT-LR procedure shall be invoked. If the requested MT-LR is associated with a PS session, the PS-MT-LR procedure shall be invoked. Otherwise, both CS-MT-LR and PS-MT-LR are applicable. If LCS Client indicated deferred location request, GMLC shall indicate this together with applicable event type (e.g. UE available) in the requested PS/CS-MT-LR, see 9.1.8.

NOTE: The order in which these procedures are invoked and whether one or both procedures are used may depend on information in the LCS service request, subscription information for the LCS client, possible priority information returned by the HSS or information already stored in the GMLC (e.g. obtained from previous location requests).

10) The V-GMLC sends the location service response to the H-GMLC.

11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check or the GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1. If the location request from the R-GMLC or the LCS client contained the pseudonym, the H-GMLC shall use the pseudonym of the target UE in the location response to the R-GMLC

or the LCS client. One example when this additional privacy check is needed is when the target UE user has defined different privacy settings for different geographical locations.

12) The H-GMLC sends the location service response to the R-GMLC. The H-GMLC may store the location information and its age.

13) R-GMLC sends the location service response to the LCS client. If the location request from the LCS client contained the pseudonym and the R-GMLC resolved the verinym from the pseudonym in the step 1, the R-GMLC shall use the pseudonym of the target UE in the location response to the LCS client. If the LCS client requires it, the R-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system. The GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN or MSC/MSC server's network.

The detailed CS-MT-LR and PS-MT-LR procedures in step 9 of figure 9.1 are described in 9.1.2 and 9.1.6.The detailed procedure for deferred PS/CS-MT-LR is described in 9.1.8.

<< Next changed clause >>

9.1.1.1 LCS Authorisation request

If the UE subscribers LCS privacy information is kept in the PPR the GMLC (H-GMLC) shall send a LCS Authorisation request to PPR, see figure 9.1.B.

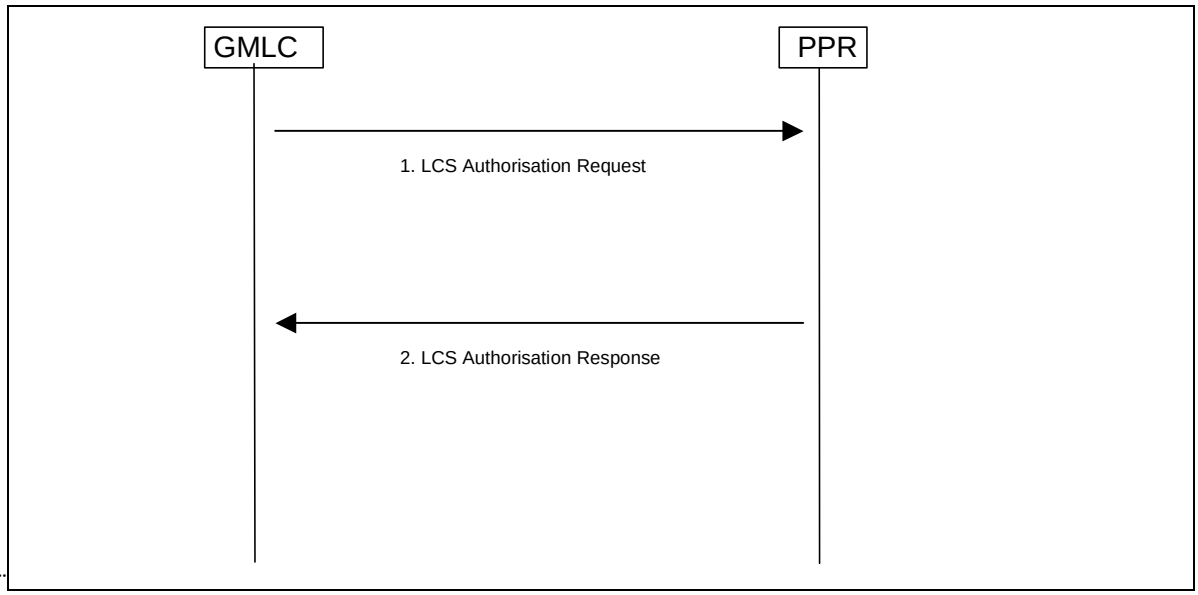

Figure 9.1B: LCS authorisation in PPR

1) The GMLC sends the LCS authorisation request to the PPR. The LCS authorisation request carries the type of location information requested (e.g. current location), the UE subscriber's identity ~~(one or both of MSISDN and IMSI)~~ and indication whether the request is call/session related or call/session unrelated. The UE subscriber's identity can be one or both of MSISDN and IMSI. If PMD functionality is integrated in PPR, the LCS authorization request may carry the pseudonum of the target UE, instead of the verinym. In case GMLC received the LCS client's called party number or the APN-NI of the target mobile's session, GMLC shall request both call/session related and call/session unrelated privacy checks in PPR. In case GMLC did not receive the LCS client's called party number or the APN-NI of the target mobile's session, GMLC requests only a call/session unrelated privacy check in PPR. For a value added LCS client, the message shall carry the client's name, the external identity of the LCS client and the requestor identity (if that is both supported and available). Moreover the message may also carry the Service Type and the Codeword. This message shall also carry the LCS capabilities of the SGSN or VMSC/MSC server.

In case the additional privacy check was requested to be performed after the positioning procedure the LCS Authorisation Request shall also include the location estimate.

2) If the LCS authorization request contains the pseudonym of the target UE, the PPR with PMD functionality seeks to determine the verinym of the target UE. PPR performs the privacy check based on the target UE's privacy profile. The result of that privacy check is sent to GMLC in the LCS Authorisation response. If requested by the GMLC the PPR shall include two privacy check results for the LCS Authorisation response, both call/session related and call/session unrelated privacy check results. The response may also contain information if an additional privacy check is needed when the GMLC has received the location information of the target UE (e.g. if the target UE allows its location information to be given to the LCS client only when it is located in certain areas).

If the LCS authorisation request contains the pseudonym of the target UE and the PPR has integrated PMD functionality, the PPR shall return the target UE's IMSI and/or MSISDN corresponding to the pseudonym in the LCS authorisation response.

If PPR received information that the visited MSC/SGSN is pre Rel-6 it shall convert the external LCS client ID into a pseudo external ID which shall carry the response of the privacy check. For more information on pseudo external Ids, see Annex C.
In case the subscriber changed his privacy information the LCS authorisation response shall be also used to indicate this to the GMLC.

3GPP TSG-SA2 Meeting #31
Seoul, Korea, 7th – 11th April 2003

Tdoc ⌘S2-031195
(revised S2-031169, S2-031188)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **171** ⌘ **rev** **2** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Clarification on privacy check procedures with PPR
Source:	⌘	NEC
Work item code:	⌘	LCS2
Date:	⌘	10/04/2003
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	In the current specification, H-GMLC asks the privacy check to PPR in step 5 of chapter 9.1.1. However, H-GMLC may have to send SRI for LCS to HLR/HSS in order to get the network address of PPR. In this case, H-GMLC cannot ask the privacy check to PPR in the step 5.
Summary of change:	⌘	The privacy check procedures with PPR are clarified.
Consequences if not approved:	⌘	When R-GMLC does not send SRI for LCS to HLR/HSS and the privacy profile is stored in PPR, the H-GMLC cannot ask privacy check to PPR and the location request fails.

Clauses affected:	⌘	9.1.1

Other specs affected: ⌘	Y	N	
		X	Other core specifications
		X	Test specifications
		X	O&M Specifications

⌘

Other comments:	⌘	

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downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

9.1.1 Common MT-LR procedure in PS and CS domain

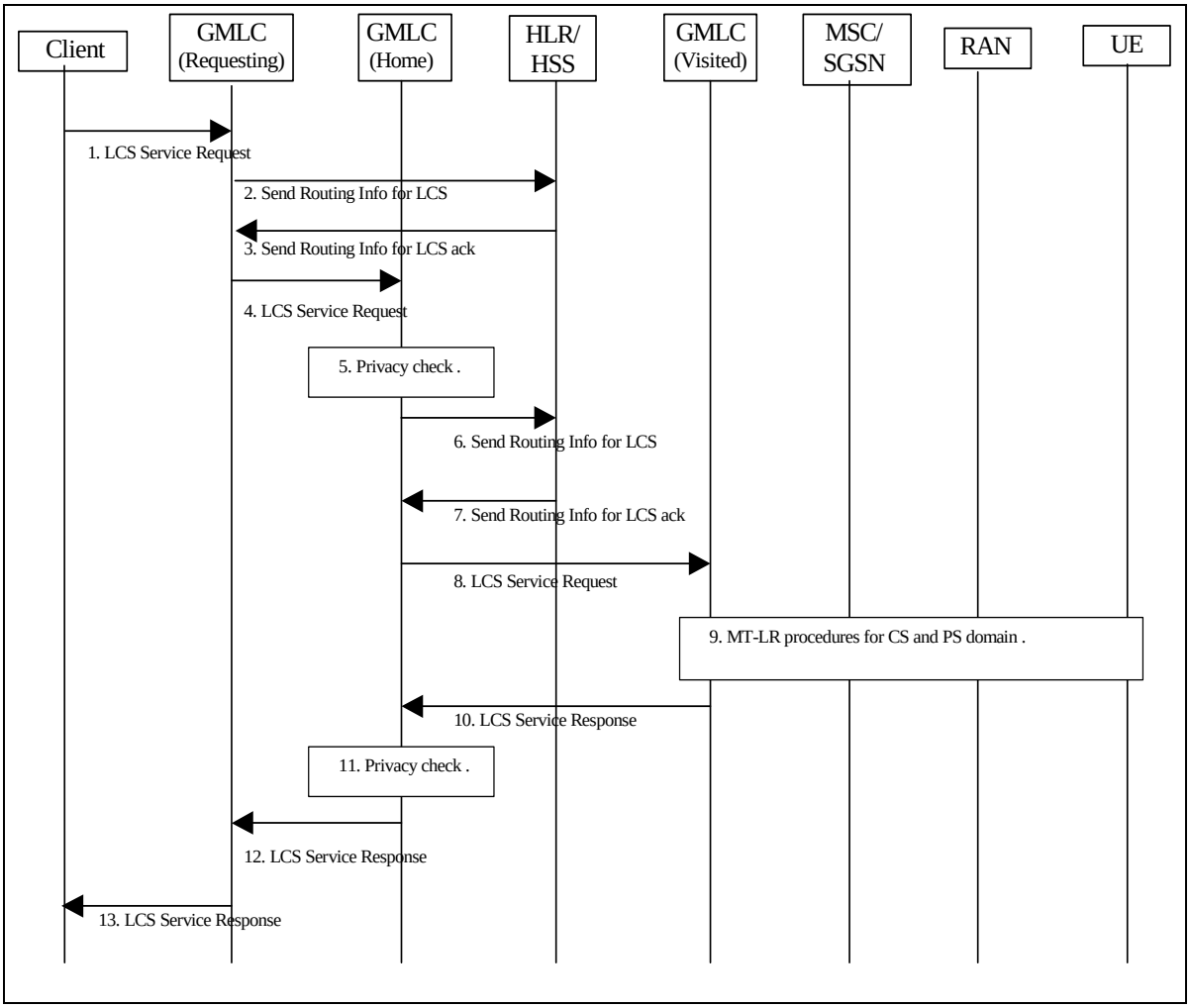

Figure 9.1: General Network Positioning for a MT-LR

1) An external LCS client requests the current location of a target UE from a GMLC. The LCS Client may also request a deferred location request, i.e. based on event. The R-GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI or pseudonym or PDP address, (NOTE: IP addressing in this context is FFS, one reason is the dynamic IP addressing used in IPv4.) of the target UE to be located and the LCS QoS from either subscription data or data supplied by the LCS client. For a call related location request, the LCS client includes the LCS client's called party number, as dialled by the target mobile user, in the LCS service request. For a session related location request, the LCS client includes the APN-NI of the LCS client, as used by the target UE, in the LCS service request. For a call/session related request the R-GMLC may verify that the called party number or APN-NI is correct for the LCS client in question. The LCS client's dialled number or APN-NI are checked in step 9 for the call/session related class.
   The LCS request may carry also the Service Identity and the Codeword and the service coverage information. The R-GMLC may verify that the Service Identity received in the LCS request matches one of the service identities allowed for the LCS client. If the service identity does not match one of the service identities for the LCS client, the R-GMLC shall reject the LCS request. Otherwise, the R-GMLC can map the received service identity in a corresponding service type.
   If the location request is originated by a Requestor, the Requestor Identity may be added to the LCS service request. The LCS client should authenticate the Requestor Identity but this is outside the scope of this specification. The LCS service request may also contain the type of the Requestor identity if the requestor identity was included.
   If the H-GMLC address is not contained in the pseudonym or cannot deduced from the pseudonym, the R-GMLC shall determine the verinym for the pseudonym. In this case the R-GMLC may access to its associated

PMD as described in 9.1.1.3.
The R-GMLC verifies whether it stores the privacy profile of the target UE. If the R-GMLC stores the UE's privacy profile, (this means the R-GMLC is the H-GMLC of the target UE), then step 2, 3, 4 and 12 are skipped.
If location is required for more than one UE, or if periodic location is requested, the steps following below may be repeated.
Note: This means that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain.

2) If the R-GMLC already knows, (e.g. from a previous location request or an internal lookup table), or is able to determine, (e.g. it is possible to use a DNS lookup mechanism similar to IETF RFC 2916), the network address of H-GMLC of the target UE, or in case the location service request contains the target UE's pseudonym, which includes the target UE's Home-GMLC address, or a pseudonym from which the target UE's Home-GMLC address can be deduced, then this step and step 3 may be skipped.
Otherwise, the R-GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI or MSISDN of the UE.
The details of the alternative methods of retrieving H-GMLC address other than the sending SEND_ROUTING_INFO_FOR_LCS message to the HLR/HSS, (e.g. internal lookup table, DNS lookup mechanism), are not in the scope of this specification.

Editor´s note: According to the current version of TS29.002 the PDP address cannot be transferred by using the SEND_ROUTING_INFO_FOR_LCS message, so this is for ffs.

Editor´s note: The support for number portability with these alternative solutions of retrieving H-GMLC address still needs further study and should be in line with the general solution to support number portability in Rel-6.

3) The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned.
Otherwise the HLR/HSS returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes if available and whichever of the IMSI and MSISDN that was not provided in step 2. The HLR/HSS returns the address of the H-GMLC. The HLR/HSS also returns the address of the PPR and V-GMLC, if available.

Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to the GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

4) If R-GMLC finds out that it is the H-GMLC, the signalling steps 4 and 12 are skipped.
If the R-GMLC did not receive the H-GMLC address in step 3 and can not retrieve the H-GMLC address in some other way (e.g. DNS lookup), then steps 4, 5, 6, 7, 8, 10, 11 and 12 are skipped and the R-GMLC directly sends the PSL message to the serving node.
Otherwise, the R-GMLC sends the location request to the H-GMLC. If one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes, IMSI and MSISDN for the target UE and the address of the V-GMLC and the PPR have been retrieved in Step 3, the R-GMLC shall pass the information with the location request to the H-GMLC. The R-GMLC shall also send the service coverage information to the H-GMLC, if the information is available.

5) The H-GMLC verifies whether the R-GMLC is authorized to request UE location information. If the R-GMLC is not authorized, an error response is returned.
If the LCS service request contains the pseudonym of the target UE and the H-GMLC cannot resolve the PMD address from the pseudonym, the H-GMLC itself determines the verinym (MSISDN or IMSI) of the target UE. If the H-GMLC can resolve the address of PMD from the pseudonym, the H-GMLC requests the verinym from its associated PMD, see clause 9.1.1.3. In this case, if H-GMLC is not able to obtain the verinym of the target UE, the H-GMLC shall cancel the location request.
The H-GMLC performs privacy check on the basis of the UE user's privacy profile stored in the H-GMLC and the capabilities of the serving nodes (MSC/VLR and/or SGSN), if available. If the privacy profile of the target UE is stored in a PPR and the H-GMLC received the network address of the PPR from R-GMLC or is able to determine the PPR address (e.g. from a previous location request or an internal lookup table), ~~T~~the H-GMLC ~~may~~ shall ask the PPR to perform the privacy check as described in the 9.1.1.1. If the privacy profile is stored in a PPR but the network address of the PPR is not available, the H-GMLC shall send SRI for LCS message to HLR/HSS in step 6 in order to get the PPR address and the privacy check in this step shall be performed after step 7. Also ~~I~~if the key of the UE user's privacy profile (i.e. MSISDN or IMSI) is not available, the privacy check in this step shall be performed after step 7.

The H-GMLC/PPR verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC/PPR. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If the location service request is to be barred, an error response is returned to the R-GMLC or the LCS client. As a result of the privacy check, the H-GMLC/PPR selects an indicator of the privacy check related action and/or a pseudo-external identity. (The details of the indicator of the privacy check related action and the pseudo-external identity are described in Annex C). If the requested type of location is "current or last known location" and the requested maximum age of location information is available, the H-GMLC verifies whether it stores the previously obtained location estimate of the target UE. If the H-GMLC stores the location estimate and the location estimate satisfies the requested accuracy and the requested maximum age of location, the H-GMLC checks the result of the privacy check. In case the result of the privacy check for call/session unrelated class is "Location allowed without notification" then steps 6, 7, 8, 9 and 10 may be skipped.

6) If the H-GMLC ~~already~~ does not know~~s~~ IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), and the VMSC/MSC server address or SGSN address, ~~the rest of this step and step 7 may be skipped. Otherwise~~, the H-GMLC shall send~~s~~ a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI, PDP address or MSISDN of this UE. Also if the privacy profile is stored in a PPR but the network address of the PPR was not available in the step 5, the H-GMLC shall send the SRI for LCS message to HLR/HSS. Otherwise, this step and step 7 may be skipped.

Editor´s note: According to the current version of TS29.002 the PDP address cannot be transferred by using the SEND_ROUTING_INFO_FOR_LCS message, so this is for ffs.

7) The HLR/HSS then returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes and whichever of the IMSI and MSISDN that was not provided in step (6) for the particular UE. The HLR/HSS may also return the address of the PPR and the V-GMLC, if available.

Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to the GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

8) If step 6 and step 7 were performed, the H-GMLC/PPR may do a new privacy check~~.~~, or if the privacy profile is stored in a PPR but the network address of the PPR was not available in step 5 and the PPR address is obtained in step 7, the H-GMLC shall ask the PPR to perform the privacy check as described in the 9.1.1.1.
Also if the location request is an immediate location request and the service coverage information (i.e. list of country codes) was sent from R-GMLC, the H-GMLC checks the country codes of the serving node addresses. If the H-GMLC finds out the current SGSN and/or VMSC/MSC server locates out of the service coverage, the H-GMLC returns an appropriate error message to the R-GMLC or the LCS client.
In the cases when the H-GMLC did not receive the address of the V-GMLC, or when the V-GMLC address is the same as the H-GMLC address, or when both PLMN operators agree not to use the Lr interface, the H-GMLC does not send the location request to the V-GMLC and step 10 is skipped. In this case, the H-GMLC sends the location service request message to the serving node.
If the H-GMLC received the address of the V-GMLC from the HLR/HSS and the V-GMLC address is different from the H-GMLC address, the H-GMLC may send the location request to the V-GMLC. The location request shall contain one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN of the target UE. The location request may also carry the requested action of the VPLMN as the result of the privacy check in the H-GMLC (e.g. by using the pseudo-external identity as described in Annex C). The V-GMLC first authenticates that the location request is allowed from this GMLC, PLMN or from this country. If not, an error response is returned.

Editor's note: The case when the V-GMLC is the same as the R-GMLC may need further elaboration.

9) In case the GMLC (H-GMLC, R-GMLC or V-GMLC) receives only the MSC/VLR address, the MT LR proceeds as the CS-MT-LR procedure described in 9.1.2. In case GMLC receives only the SGSN address, the MT LR proceeds as the PS-MT-LR procedure described in 9.1.6. In case the GMLC receives several of the following addresses, SGSN, VMSC and/or MSC Server, it has to decide where to send the location request. If the requested MT-LR is known to be associated with a CS call, the CS-MT-LR procedure shall be invoked. If the requested MT-LR is associated with a PS session, the PS-MT-LR procedure shall be invoked. Otherwise, both CS-MT-LR and PS-MT-LR are applicable. If LCS Client indicated deferred location request, GMLC shall indicate this together with applicable event type (e.g. UE available) in the requested PS/CS-MT-LR, see 9.1.8.

NOTE: The order in which these procedures are invoked and whether one or both procedures are used may depend on information in the LCS service request, subscription information for the LCS client, possible priority information returned by the HSS or information already stored in the GMLC (e.g. obtained from previous location requests).

10) The V-GMLC sends the location service response to the H-GMLC.

11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check or the GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1. If the location request from the R-GMLC or the LCS client contained the pseudonym, the H-GMLC shall use the pseudonym of the target UE in the location response to the R-GMLC or the LCS client. One example when this additional privacy check is needed is when the target UE user has defined different privacy settings for different geographical locations.

12) The H-GMLC sends the location service response to the R-GMLC. The H-GMLC may store the location information and its age.

13) R-GMLC sends the location service response to the LCS client. If the location request from the LCS client contained the pseudonym and the R-GMLC resolved the verinym from the pseudonym in the step 1, the R-GMLC shall use the pseudonym of the target UE in the location response to the LCS client. If the LCS client requires it, the R-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system. The GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN or MSC/MSC server's network.

The detailed CS-MT-LR and PS-MT-LR procedures in step 9 of figure 9.1 are described in 9.1.2 and 9.1.6.The detailed procedure for deferred PS/CS-MT-LR is described in 9.1.8.

3GPP TSG SA WG2 Meeting # 31
Seoul, Korea, 7th – 11th April

Tdoc ⌘ S2-031573
(Revised S2-031187, S2-031163)

CR-Form-v7

CHANGE REQUEST

⌘ **23.171** **CR** **29** ⌘ **rev** **2** ⌘ Current version: **3.9.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Exception procedures in 23.171
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	11.4.2003
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	Some of the text describing exception procedures for LCS in this specification is temporary, ambiguous and partly not in line with existing Stage 3 specifications, so therefore there is a risk for varying implementations, which could result in interoperation problems. The existing stage 2 text implies that at SRNS relocation etc, the location procedure is stopped and has to be restarted by the GMLC or the LCS client. However, this is incorrect: the VMSC should buffer the request and only abort the Iu procedure, and then restart the location request on the new Iu after the relocation is complete. This change aligns the stage 2 with the current stage 3 specifications for Rel-99.
Summary of change:	⌘	The table summarizing the LCS Error Recovery Procedures in VMSC for different handover cases is corrected to be in line with the corresponding stage 3 specifications. The temporary text in an Editor's note is revised and changed into mandatory text to describe handover handling in accordance with existing Rel-99 stage 3 specifications.
Consequences if not approved:	⌘	The temporary text in this specification, which is ambiguous and partly not in line with existing Stage 3 specifications, would be left uncorrected and this would increase the risk of varying implementation that could cause interoperation problems.

Clauses affected:	⌘	8.10			
Other specs	⌘	Y: ☐ N: ☒	Other core specifications	⌘	

affected:	X	Test specifications
	X	O&M Specifications
Other comments: ⌘		

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<< First changed clause >>

8.10 Exception Procedures

The procedures in this subclause apply to all variants of an MT-LR, NI-LR and MO-LR where a RANAP Location reporting control message has been sent to an SRNC requesting some location service (e.g. provision of a location estimate for a target UE or transfer of assistance data to a target UE).

8.10.1 Procedures in the VMSC

After the VMSC has requested a location service for a particular UE from the SRNC, certain events may occur that may temporarily or permanently interfere with the location service attempt. For each such event notified to the VMSC, the VMSC shall employ one of the following error recovery actions.

Restart the Location Service

This action shall be employed for any event that temporarily impedes a location service attempt and cannot be delayed until the location service attempt is complete. When such an event is notified to the 3G-VMSC, it shall immediately cancel the location service attempt and the associated RANAP dialogue with SRNC, if this still exists by releasing all resources specifically allocated for the location attempt and ignoring the location attempt response when received.

After aborting the location request dialogue with the SRNC, the 3G-VMSC may queue the location service request until the event causing the restart has terminated (if not already terminated). The 3G-VMSC may optionally wait for an additional time period (e.g. if the queuing delay is minimal) to ensure that any resources allocated in and by the SRNC have time to be released. The 3G-VMSC may then send another location service request to the SRNC associated with the target UE.

Abort the Location Service

This action shall be employed for any event that permanently impedes a location service attempt, such as loss of the dedicated signaling channel to the target MS. When such an event is notified to the 3G-VMSC, it shall cancel the current location service attempt and the associated RANAP dialogue with the SRNC, if still existing, by releasing all resources specifically allocated for the location attempt and ignoring the location attempt response when received. The 3G-VMSC shall then return an error response to the client or network entity from which the location request was originally received.

The following table indicates the appropriate error recovery procedure for certain events. For events not listed in the table, the 3G-VMSC need take no action.

Table 8.1: LCS Error Recovery Procedures in the VMSC for certain Events

Event	VMSC Error Recovery
Release of radio channel to the UE	Abort
Any error response from the SRNC, except for inter-SRNC or inter-MSC handover	Abort
Inter RNC hard handovers, SRNC relocation, inter- MSC handovers and InterSystem handovers ~~Inter-SRNC Handover~~	Abort on Iu level Restart after process is ~~handover~~ completed
~~Inter-MSC Handover~~	~~Restart after handover completed~~

If the RNC is in an overload condition, it may reject a location request by indicating congestion. The MSC may reduce the frequency of future location service requests until rejection due to overload has ceased.

8.10.2 Handover handling ~~Further Procedures for Handover~~

In case of hard handovers, e.g. inter RNC hard handover, or Serving RNC relocation, and inter- MSC handovers, the ongoing positioning process is aborted on Iu level. In soft handovers where the Serving RNS and Iu are relocated, any ongoing positioning process is also aborted on Iu level. The VMSC shall restart the Iu aborted location requests with the new Serving RNC. During intra and inter RNC soft and softer handovers where there is no SRNS relocation the existing RRC connection can normally be used without any need to abort the on-going positioning process on Iu level.

[Editor's note: During soft and softer handovers in WCDMA (inter Node B, inter RNC) the existing RRC connection can be used with no need for aborting the on-going positioning process. In case of hard handovers, e.g. inter RNC hard handover (or SRNC relocation) and inter CN (MSC, SGSN) handovers the same approach can be followed as for any service connection (e.g. call handover). Therefore, aborting the service requests, including LCS request, because of handovers is not needed.
The exception procedures and error cases in UMTS need to be further studied.]

8.10.2.1 MSC procedure for Inter-MSC hHandover

[When a location estimate is required for a target UE with an established call in a state of inter-MSC handover, the serving location area ID shall be used by the visited MSC to identify the correct SRNC to serveperform the location request. All lLocation request related messages that are transferred over the Iu interface shall now be sent via MAP/E interface piggy-backed in MAP_FORWARD_ACCESS_SIGNALLING and MAP PROCESS_ACCESS_SIGNALLING between the visited and serving MSCs. The handling of LCS request during Inter-MSC handover in UMTS is FFS.]

8.10.2.2 Handling of an ongoing handover while a request for positioning arrives at MSC/VLR

[If during an ongoing radio handover procedure a request for location information arrives at the SRNC, the request shall be suspended until the handover is completed. On completion of the handover, the SRNC shall continue with location preparation procedure shall continue.]

3GPP TSG SA WG2 Meeting # 31
Seoul, Korea, 7th – 11th April

Tdoc ⌘ S2-031574
(Revised S2-031184, S2-031164)

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CHANGE REQUEST

⌘ **23.271** **CR** **167** ⌘ **rev** **2** ⌘ Current version: **4.8.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Exception procedures in 23.271
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	11.4.2003
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘

Some of the text describing exception procedures for LCS in this specification is temporary, ambiguous and partly not in line with existing Stage 3 specifications, so therefore there is a risk for varying implementations, which could result in interoperation problems.

The existing stage 2 text implies that at SRNS relocation etc, the location procedure is stopped and has to be restarted by the GMLC or the LCS client. However, this is incorrect: the VMSC, MSC server or 3G-SGSN should buffer the request and only abort the Iu procedure, and then restart the location request on the new Iu after the relocation is complete.
It has been clarified that the location request shall be aborted after Inter SGSN Routing Area Update and Inter SGSN relocation, since is not possible to initiate the location request in the new SGSN, according to the current GTP specification 29.060.

This change aligns the stage 2 with the current stage 3 specifications for Rel-4.

Summary of change: ⌘

The descriptions of the exception procedures for Iu mode are corrected and the MSC server exception procedures are combined with the MSC exception procedures.

The tables summarizing the LCS Error Recovery Procedures in VMSC/MSC server and in 3G-SGSN for different handover cases is corrected to be in line with the corresponding stage 3 specifications. The temporary text in an Editor's note is revised and changed into mandatory text to describe handover handling in accordance with current stage 3 specifications for Rel-4.

Consequences if ⌘

The temporary text in this specification, which is ambiguous and partly not in line

not approved:	with existing Stage 3 specifications, would be left uncorrected and this would increase the risk of varying implementation that could cause interoperation problems.

Clauses affected:	⌘	9.4			
Other specs affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<< First changed clause >>

9.4 Exception Procedures

The procedures in this clause apply to all variants of an MT-LR, NI-LR and MO-LR where a Location Request message has been sent to RAN requesting some location service (e.g. provision of a location estimate for a target UE or transfer of assistance data to a target UE).

9.4.1 Procedures in the VMSC, MSC server

After the ~~VMSC~~VMSC /MSC server has requested a location service for a particular UE from RAN, certain events may occur that may temporarily or permanently interfere with the location service attempt. For each such event notified to the ~~VMSC~~VMSC /MSC server, the ~~VMSC~~VMSC /MSC server shall employ one of the following error recovery actions.

Restart the Location Service

This action shall be employed for any event that temporarily impedes a location service attempt and cannot be delayed until the location service attempt is complete. When such an event is notified to the ~~VMSC~~VMSC /MSC server, it shall immediately cancel the location service attempt and the associated signaling dialogue with RAN, if this still exists by sending a "stop reporting" message to RAN. The "stop reporting" message shall contain the reason for the location procedure cancellation in ~~case of GERAN in~~ A/Gb mode or the indication about the type of location request to cancel (e.g. direct) in ~~case of GERAN and UTRAN in~~ Iu mode.

After aborting the location request dialogue with RAN, the ~~VMSC~~VMSC /MSC server may queue the location service request until the event causing the restart has terminated (if not already terminated). The ~~VMSC~~VMSC /MSC server may optionally wait for an additional time period (e.g. if the queuing delay is minimal) to ensure that any resources allocated in and by RAN have time to be released. The ~~VMSC~~VMSC /MSC server may then send another location service request to RAN associated with the target UE.

Abort the Location Service

This action shall be employed for any event that permanently impedes a location service attempt, such as loss of the dedicated signaling channel to the target UE. When such an event is notified to the ~~VMSC~~VMSC /MSC server, it shall cancel the current location service attempt and the associated signaling dialogue with RAN, if still existing, by sending a "stop reporting" message to RAN. The "stop reporting" message shall contain the reason for the location procedure cancellation in ~~case of GERAN in~~ A/Gb mode or the indication about the type of location request to cancel (e.g. direct) in ~~case of GERAN and UTRAN in~~ Iu mode. The ~~VMSC~~VMSC /MSC server shall then return an error response to the client or network entity from which the location request was originally received. The ~~VMSC~~VMSC /MSC server shall also release all resources specifically allocated for the location attempt.

The following table indicates the appropriate error recovery procedure for certain events. For events not listed in the table, the ~~VMSC~~VMSC /MSC server need take no action.

Table 9.1: LCS Error Recovery Procedures in the ~~VMSC~~VMSC /MSC server for certain Events

Event	~~VMSC~~VMSC /MSC server Error Recovery
Release of radio channel to the UE	Abort
Any error response from RAN except for SRNC relocation or inter-MSC handover	Abort
In Iu mode~~UMTS~~ inter RNC hard handover, SRNC relocation and inter- MSC or MSC server handover	Abort on Iu level Restart after process is completed ~~[Note: This is being discussed in RAN WG2 and RAN WG3.]~~
In A/Gb mode ~~GSM~~ inter-MSC Handover and inter-BSC handover	Restart after handover is completed
InterSystem handover	Restart after handover is completed

If ~~the~~ RAN~~RNC~~ is in an overload condition, it may reject a location request by indicating congestion. The VMSC /MSC server may reduce the frequency of future location service requests until rejection due to overload has ceased.

9.4.2 VoidProcedures in the MSC Server

9.4.3 Procedures in the 3G-SGSN

After the SGSN has requested a location service for a particular UE from RAN, certain events may occur that may temporarily or permanently interfere with the location service attempt. For each such event notified to the SGSN, the SGSN shall employ one of the following error recovery actions.

Restart the Location Service

This action shall be employed for any event that temporarily impedes a location service attempt and cannot be delayed until the location service attempt is complete. When such an event is notified to the SGSN, it shall immediately cancel the location service attempt and the associated signaling dialogue with RAN, if this still exists by sending a "stop reporting" message to RAN. The "stop reporting" message shall contain the reason for the location procedure cancellation.

After aborting the location request dialogue with RAN, the SGSN may queue the location service request until the event causing the restart has terminated (if not already terminated). The SGSN may optionally wait for an additional time period (e.g. if the queuing delay is minimal) to ensure that any resources allocated in and by RAN have time to be released. The SGSN may then send another location service request to RAN associated with the target UE.

Abort the Location Service

This action shall be employed for any event that permanently impedes a location service attempt, such as loss of the radio channel to the target UE. When such an event is notified to the SGSN, it shall cancel the current location service attempt and the associated signaling dialogue with RAN, if still existing, by sending a "stop reporting" message to RAN. The "stop reporting" message shall contain the reason for the location procedure cancellation. The SGSN shall then return an error response to the client or network entity from which the location request was originally received. The SGSN shall also release all resources specifically allocated for the location attempt.

The following table indicates the appropriate error recovery procedure for certain events. For events not listed in the table, the SGSN need take no action.

Table 9.2: LCS Error Recovery Procedures in the SGSN for certain Events

Event	SGSN Error Recovery
Release of radio channel to the UE	Abort
Any error response from RAN causing unavailable signalling connections	Abort
Inter RNC hard handover, Inter SRNC relocation (Iu-modeUMTS only)	Abort on Iu level Restart after process is completed [Note: This is being discussed in RAN WG2 and RAN WG3.]
Inter SGSN Routing Area Update, Inter SGSN relocation	Abort (Note: GMLC may restart)

9.4.4 Procedures in the UE

9.4.5 Further Procedures for Handover handling

[Editor's note: During soft and softer handovers in WCDMA (inter Node B, inter RNC) the existing RRC connection can be used with no need for aborting the on-going positioning process. In case of hard handovers, e.g. inter RNC hard handover (or SRNC relocation) and inter CN (MSC, SGSN) handovers the same approach can be followed as for any service connection (e.g. call handover). Therefore, aborting the service requests, including LCS request, because of handovers is not needed.
The exception procedures and error cases in UMTS need to be further studied.
It is currently being discussed between RAN WG2 and WG3 how to handle the LCS request during SRNC relocation.]

9.4.5.1 MSCVMSC /MSC server procedure for Inter-MSCVMSC /MSC server hHandover

[When a location estimate is required for a target UE with an established call in a state of inter-MSCVMSC /MSC server handover, the serving location area ID shall be used by the visited MSC /MSC server to identify the correct RAN to serveperform the location request. All lLocation request related messages that are transferred over the Iu interface shall now be sent via MAP/E interface piggy-backed in MAP_FORWARD_ACCESS_SIGNALLING and MAP PROCESS_ACCESS_SIGNALLING between the visited and serving MSCs/MSC servers. The handling of LCS request during Inter-MSC handover in UMTS is FFS.]

9.4.5.2 Handling of an ongoing handover while a request for positioning arrives at MSC/VLR

[If during an ongoing radio handover procedure a request for location information arrives at RAN, the request shall be suspended until the handover is completed. On completion of the handover, RAN shall continue with the location preparation procedure shall continue.]

<< New added clause >>

9.4.5.3 Handover handling in Iu mode

In case of hard handovers in Iu mode, e.g. inter RNC hard handover, or Serving RNC relocation and inter- MSC, MSC Server or SGSN handovers, the ongoing positioning process is aborted on Iu level. In soft handovers where the Serving RNS and Iu are relocated, any ongoing positioning process is also aborted on Iu level. The MSC, MSC Server or SGSN shall restart the Iu aborted location requests with the new Serving RNC. The new SGSN, however, shall not restart the location request after inter SGSN Routing Area Update or inter SGSN relocation. During intra and inter RNC soft and softer handovers the existing RRC connection can normally be used without any need to abort the on-going positioning process on Iu level.

3GPP TSG SA WG2 Meeting # 31
Seoul, Korea, 7th – 11th April

Tdoc ⌘ S2-031575
(revised S2-031185, S2-031165)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **168** ⌘ **rev** **2** ⌘ Current version: **5.6.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Exception procedures in 23.271
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	11.4.2003
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘

Some of the text describing exception procedures for LCS in this specification is temporary, ambiguous and partly not in line with existing Stage 3 specifications, so therefore there is a risk for varying implementations, which could result in interoperation problems.

The existing stage 2 text implies that at SRNS relocation etc, the location procedure is stopped and has to be restarted by the GMLC or the LCS client. However, this is incorrect: the VMSC, MSC server or SGSN should buffer the request and only abort the Iu procedure, and then restart the location request on the new Iu after the relocation is complete.
It has been clarified that the location request shall be aborted after Inter SGSN Routing Area Update and Inter SGSN relocation, since is not possible to initiate the location request in the new SGSN, according to the current GTP specification 29.060.

This change aligns the stage 2 with the current stage 3 specifications for Rel-5.

Summary of change: ⌘

The descriptions of the exception procedures for Iu mode are corrected and the MSC server exception procedures are combined with the MSC exception procedures.

The tables summarizing the LCS Error Recovery Procedures in VMSC/MSC server and in SGSN for different handover cases is corrected to be in line with the corresponding stage 3 specifications. The temporary text in an Editor's note is revised and changed into mandatory text to describe handover handling in accordance with current stage 3 specifications for Rel-5

Consequences if ⌘

The temporary text in this specification, which is ambiguous and partly not in line

not approved:	with existing Stage 3 specifications, would be left uncorrected and this would increase the risk of varying implementation that could cause interoperation problems.

Clauses affected:	⌘	9.4			
Other specs affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<< First changed clause >>

9.4 Exception Procedures

The procedures in this clause apply to all variants of an MT-LR, NI-LR and MO-LR where a Location Request message has been sent to RAN requesting some location service (e.g. provision of a location estimate for a target UE or transfer of assistance data to a target UE).

9.4.1 Procedures in the VMSC, MSC server

After the VMSC/ MSC server has requested a location service for a particular UE from RAN, certain events may occur that may temporarily or permanently interfere with the location service attempt. For each such event notified to the ~~VMSC~~VMSC /MSC server, the ~~VMSC~~VMSC /MSC server shall employ one of the following error recovery actions.

Restart the Location Service

This action shall be employed for any event that temporarily impedes a location service attempt and cannot be delayed until the location service attempt is complete. When such an event is notified to the ~~VMSC~~VMSC /MSC server, it shall immediately cancel the location service attempt and the associated signaling dialogue with RAN, if this still exists by sending a "stop reporting" message to RAN. The "stop reporting" message shall contain the reason for the location procedure cancellation in ~~case of GERAN in~~ A/Gb mode or the indication about the type of location request to cancel (e.g. direct) ~~in case of GERAN and UTRAN~~ in Iu mode.

After aborting the location request dialogue with RAN, the ~~VMSC~~VMSC /MSC server may queue the location service request until the event causing the restart has terminated (if not already terminated). The ~~VMSC~~VMSC /MSC server may optionally wait for an additional time period (e.g. if the queuing delay is minimal) to ensure that any resources allocated in and by RAN have time to be released. The ~~VMSC~~VMSC /MSC server may then send another location service request to RAN associated with the target UE.

Abort the Location Service

This action shall be employed for any event that permanently impedes a location service attempt, such as loss of the dedicated signaling channel to the target UE. When such an event is notified to the ~~VMSC~~VMSC /MSC server, it shall cancel the current location service attempt and the associated signaling dialogue with RAN, if still existing, by sending a "stop reporting" message to RAN. The "stop reporting" message shall contain the reason for the location procedure cancellation in ~~case of GERAN in~~ A/Gb mode or the indication about the type of location request to cancel (e.g. direct) in ~~case of GERAN and UTRAN in~~ Iu mode. The ~~VMSC~~VMSC /MSC server shall then return an error response to the client or network entity from which the location request was originally received. The ~~VMSC~~VMSC /MSC server shall also release all resources specifically allocated for the location attempt.

The following table indicates the appropriate error recovery procedure for certain events. For events not listed in the table, the ~~VMSC need take no action.~~

Table 9.1: LCS Error Recovery Procedures in the ~~VMSC~~VMSC /MSC server for certain Events

Event	~~VMSC~~VMSC /MSC server Error Recovery
Release of radio channel to the UE	Abort
Any error response from RAN, except for SRNC relocation or inter-MSC handover	Abort
In Iu mode~~UMTS~~ inter RNC hard handover, SRNC relocation and inter- MSC or MSC server handover	Abort on Iu level Restart after process is completed ~~[Note: This is being discussed in RAN WG2 and RAN WG3.]~~
In A/Gb mode~~GSM~~ inter-MSC Handover and inter-BSC handover	Restart after handover is completed
InterSystem handover	Restart after handover is completed

If ~~the~~ RAN ~~RNC~~ is in an overload condition, it may reject a location request by indicating congestion. The VMSC /MSC server may reduce the frequency of future location service requests until rejection due to overload has ceased.

9.4.2 VoidProcedures in the MSC Server

9.4.3 Procedures in the SGSN

After the SGSN has requested a location service for a particular UE from RAN, certain events may occur that may temporarily or permanently interfere with the location service attempt. For each such event notified to the SGSN, the SGSN shall employ one of the following error recovery actions.

Restart the Location Service

This action shall be employed for any event that temporarily impedes a location service attempt and cannot be delayed until the location service attempt is complete. When such an event is notified to the SGSN, it shall immediately cancel the location service attempt and the associated signaling dialogue with RAN, if this still exists by sending a "stop reporting" (Iu mode) or "location abort" (A/Gb mode) message to RAN. The "stop reporting"/"location abort" message shall contain the reason for the location procedure cancellation.

After aborting the location request dialogue with RAN, the SGSN may queue the location service request until the event causing the restart has terminated (if not already terminated). The SGSN may optionally wait for an additional time period (e.g. if the queuing delay is minimal) to ensure that any resources allocated in and by RAN have time to be released. The SGSN may then send another location service request to RAN associated with the target UE.

Abort the Location Service

This action shall be employed for any event that permanently impedes a location service attempt, such as loss of the radio channel to the target UE. When such an event is notified to the SGSN, it shall cancel the current location service attempt and the associated signaling dialogue with RAN, if still existing, by sending a "stop reporting"/"location abort" message to RAN. The "stop reporting"/"location abort" message shall contain the reason for the location procedure cancellation. The SGSN shall then return an error response to the client or network entity from which the location request was originally received. The SGSN shall also release all resources specifically allocated for the location attempt.

The following table indicates the appropriate error recovery procedure for certain events. For events not listed in the table, the SGSN need take no action.

Table 9.2: LCS Error Recovery Procedures in the SGSN for certain Events

Event	SGSN Error Recovery
Release of radio channel to the UE	Abort
Any error response from RAN causing unavailable signalling connections	Abort
Inter RNC hard handover, Inter SRNC relocation (Iu mode only)	Abort on Iu level Restart after process is completed [Note: This is being discussed in RAN WG2 and RAN WG3.]
Suspend of GPRS services (A/Gb mode only)(During CS connection for class B UE)	Abort
Intra SGSN Routing Area Update (A/Gb mode only)	Restart
Inter SGSN Routing Area Update, Inter SGSN relocation	Abort (Note: GMLC may restart)
Standalone P-TMSI Reallocation (A/Gb mode only)	Restart

9.4.4 Procedures in the UE

9.4.5 Handover handling Further Procedures for Handover

[Editor's note: During soft and softer handovers in WCDMA (inter Node B, inter RNC) the existing RRC connection can be used with no need for aborting the on-going positioning process. In case of hard handovers, e.g. inter RNC hard handover (or SRNC relocation) and inter CN (MSC, SGSN) handovers the same approach can be followed as for any service connection (e.g. call handover). Therefore, aborting the service requests, including LCS request, because of handovers is not needed.
The exception procedures and error cases in UMTS need to be further studied.
It is currently being discussed between RAN WG2 and WG3 how to handle the LCS request during SRNC relocation.]

9.4.5.1 VMSC /MSC server procedure for Inter-VMSC /MSC server hHandover

[When a location estimate is required for a target UE with an established call in a state of inter-VMSC /MSC server handover, the serving location area ID shall be used by the visited MSC /MSC server to identify the correct RAN to serveperform the location request. All lLocation request related messages that are transferred over the Iu interface shall now be sent via MAP/E interface piggy-backed in MAP_FORWARD_ACCESS_SIGNALLING and MAP PROCESS_ACCESS_SIGNALLING between the visited and serving MSCs /MSC servers. The handling of LCS request during Inter-MSC handover in UMTS is FFS.]

9.4.5.2 Handling of an ongoing handover while a request for positioning arrives at MSC/VLR

[If during an ongoing radio handover procedure a request for location information arrives at RAN, the request shall be suspended until the handover is completed. On completion of the handover, RAN shall continue with the location preparation procedure shall continue.]

<< New added clause >>

9.4.5.3 Handover handling in Iu mode

In case of hard handovers in Iu mode, e.g. inter RNC hard handover, or Serving RNC relocation and inter- MSC, MSC Server or SGSN handovers, the ongoing positioning process is aborted on Iu level. In soft handovers where the Serving RNS and Iu are relocated, any ongoing positioning process is also aborted on Iu level. The MSC, MSC Server or SGSN shall restart the Iu aborted location requests with the new Serving RNC. The new SGSN, however, shall not restart the location request after inter SGSN Routing Area Update or inter SGSN relocation. During intra and inter RNC soft and softer handovers the existing RRC connection can normally be used without any need to abort the on-going positioning process on Iu level.

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **169** ⌘ **rev** **2** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Exception procedures in 23.271
Source:	⌘	Nokia
Work item code:	⌘	LCS2 ***Date:*** ⌘ 11.4.2003
Category:	⌘	**A** ***Release:*** ⌘ Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Some of the text describing exception procedures for LCS in this specification is temporary, ambiguous and partly not in line with existing Stage 3 specifications, so therefore there is a risk for varying implementations, which could result in interoperation problems. The existing stage 2 text implies that at SRNS relocation etc, the location procedure is stopped and has to be restarted by the GMLC or the LCS client. However, this is incorrect: the VMSC, MSC server or SGSN should buffer the request and only abort the Iu procedure, and then restart the location request on the new Iu after the relocation is complete. It has been clarified that the location request shall be aborted after Inter SGSN Routing Area Update and Inter SGSN relocation, since is not possible to initiate the location request in the new SGSN, according to the current GTP specification 29.060. This change aligns the stage 2 with the current stage 3 specifications.
Summary of change:	⌘	The descriptions of the exception procedures for Iu mode are corrected and the MSC server exception procedures are combined with the MSC exception procedures. The tables summarizing the LCS Error Recovery Procedures in VMSC/MSC server and in SGSN for different handover cases is corrected to be in line with the corresponding stage 3 specifications. The temporary text in an Editor's note is revised and changed into mandatory text to describe handover handling in accordance with current stage 3 specifications.
Consequences if not approved:	⌘	The temporary text in this specification, which is ambiguous and partly not in line with existing Stage 3 specifications, would be left uncorrected and this would increase the risk of varying implementation that could cause interoperation problems.

Clauses affected:	⌘	9.4

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments: ⌘

How to create CRs using this form:

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<< First changed clause >>

9.4 Exception Procedures

The procedures in this clause apply to all variants of an MT-LR, NI-LR and MO-LR where a Location Request message has been sent to RAN requesting some location service (e.g. provision of a location estimate for a target UE or transfer of assistance data to a target UE).

9.4.1 Procedures in the ~~VMSC~~VMSC /MSC server

After the ~~VMSC~~VMSC /MSC server has requested a location service for a particular UE from RAN, certain events may occur that may temporarily or permanently interfere with the location service attempt. For each such event notified to the ~~VMSC~~VMSC /MSC server, the ~~VMSC~~VMSC /MSC server shall employ one of the following error recovery actions.

Restart the Location Service

This action shall be employed for any event that temporarily impedes a location service attempt and cannot be delayed until the location service attempt is complete. When such an event is notified to the ~~VMSC~~VMSC /MSC server, it shall immediately cancel the location service attempt and the associated signaling dialogue with RAN, if this still exists by sending a "stop reporting" message to RAN. The "stop reporting" message shall contain the reason for the location procedure cancellation in ~~case of GERAN in~~ A/Gb mode or the indication about the type of location request to cancel (e.g. direct) in ~~case of GERAN and UTRAN in~~ Iu mode.

After aborting the location request dialogue with RAN, the ~~VMSC~~VMSC /MSC server may queue the location service request until the event causing the restart has terminated (if not already terminated). The ~~VMSC~~VMSC /MSC server may optionally wait for an additional time period (e.g. if the queuing delay is minimal) to ensure that any resources allocated in and by RAN have time to be released. The ~~VMSC~~VMSC /MSC server may then send another location service request to RAN associated with the target UE.

Abort the Location Service

This action shall be employed for any event that permanently impedes a location service attempt, such as loss of the dedicated signaling channel to the target UE. When such an event is notified to the ~~VMSC~~VMSC /MSC server, it shall cancel the current location service attempt and the associated signaling dialogue with RAN, if still existing, by sending a "stop reporting" message to RAN. The "stop reporting" message shall contain the reason for the location procedure cancellation in ~~case of GERAN in~~ A/Gb mode or the indication about the type of location request to cancel (e.g. direct) in ~~case of GERAN and UTRAN in~~ Iu mode. The ~~VMSC~~VMSC /MSC server shall then return an error response to the client or network entity from which the location request was originally received. The ~~VMSC~~VMSC /MSC server shall also release all resources specifically allocated for the location attempt.

The following table indicates the appropriate error recovery procedure for certain events. For events not listed in the table, the ~~VMSC~~VMSC /MSC server need take no action.

Table 9.1: LCS Error Recovery Procedures in the ~~VMSC~~VMSC /MSC server for certain Events

Event	~~VMSC~~VMSC /MSC server Error Recovery
Release of radio channel to the UE	Abort
Any error response from RAN except for SRNC relocation or inter-MSC handover	Abort
In Iu mode~~UMTS~~ inter RNC hard handover, SRNC relocation and inter- MSC or MSC server handover	Abort on Iu level Restart after process is completed ~~[Note: This is being discussed in RAN WG2 and RAN WG3.]~~
In A/Gb mode ~~GSM~~ inter-MSC Handover and inter-BSC handover	Restart after handover is completed
InterSystem handover	Restart after handover is completed

If ~~the~~RAN ~~RNC~~ is in an overload condition, it may reject a location request by indicating congestion. The ~~MSC~~VMSC /MSC server may reduce the frequency of future location service requests until rejection due to overload has ceased.

9.4.2 Procedures in the MSC Server

9.4.3 Procedures in the SGSN

After the SGSN has requested a location service for a particular UE from RAN, certain events may occur that may temporarily or permanently interfere with the location service attempt. For each such event notified to the SGSN, the SGSN shall employ one of the following error recovery actions.

Restart the Location Service

This action shall be employed for any event that temporarily impedes a location service attempt and cannot be delayed until the location service attempt is complete. When such an event is notified to the SGSN, it shall immediately cancel the location service attempt and the associated signaling dialogue with RAN, if this still exists by sending a "stop reporting" (Iu mode) or "location abort" (A/Gb mode) message to RAN. The "stop reporting"/"location abort" message shall contain the reason for the location procedure cancellation.

After aborting the location request dialogue with RAN, the SGSN may queue the location service request until the event causing the restart has terminated (if not already terminated). The SGSN may optionally wait for an additional time period (e.g. if the queuing delay is minimal) to ensure that any resources allocated in and by RAN have time to be released. The SGSN may then send another location service request to RAN associated with the target UE.

Abort the Location Service

This action shall be employed for any event that permanently impedes a location service attempt, such as loss of the radio channel to the target UE. When such an event is notified to the SGSN, it shall cancel the current location service attempt and the associated signaling dialogue with RAN, if still existing, by sending a "stop reporting"/"location abort" message to RAN. The "stop reporting"/"location abort" message shall contain the reason for the location procedure cancellation. The SGSN shall then return an error response to the client or network entity from which the location request was originally received. The SGSN shall also release all resources specifically allocated for the location attempt.

The following table indicates the appropriate error recovery procedure for certain events. For events not listed in the table, the SGSN need take no action.

Table 9.2: LCS Error Recovery Procedures in the SGSN for certain Events

Event	SGSN Error Recovery
Release of radio channel to the UE	Abort
Any error response from RAN causing unavailable signalling connections	Abort
Inter RNC hard handover, Inter SRNC relocation (Iu mode only)	Abort on Iu level Restart after process is completed ~~[Note: This is being discussed in RAN WG2 and RAN WG3.]~~
Suspend of GPRS services (A/Gb mode only)(During CS connection for class B UE)	Abort
Intra SGSN Routing Area Update (A/Gb mode only)	Restart
Inter SGSN Routing Area Update, inter SGSN relocation	Abort (Note: GMLC may restart)
Standalone P-TMSI Reallocation (A/Gb mode only)	Restart

9.4.4 Procedures in the UE

9.4.5 ~~Further Procedures for~~ Handover handling

~~[Editor's note: During soft and softer handovers in WCDMA (inter Node B, inter RNC) the existing RRC connection can be used with no need for aborting the on-going positioning process. In case of hard handovers, e.g. inter RNC hard handover (or SRNC relocation) and inter CN (MSC, SGSN) handovers the same approach can be followed as for any service connection (e.g. call handover). Therefore, aborting the service requests, including LCS request, because of handovers is not needed.~~
~~The exception procedures and error cases in UMTS need to be further studied.~~
~~It is currently being discussed between RAN WG2 and WG3 how to handle the LCS request during SRNC relocation.]~~

9.4.5.1 ~~MSC~~VMSC /MSC server procedure for Inter-~~MSC~~VMSC /MSC server Handover

~~[~~When a location estimate is required for a target UE with an established call in a state of inter-~~MSC~~VMSC /MSC server handover, the serving location area ID shall be used by the visited ~~MSC~~MSC /MSC server to identify the correct RAN to serve~~perform~~ the location request. All l~~L~~ocation request related messages ~~that are transferred over the Iu interface~~ shall ~~now~~ be sent via MAP/E interface piggy-backed in MAP_FORWARD_ACCESS_SIGNALLING and MAP PROCESS_ACCESS_SIGNALLING between the visited and serving MSCs /MSC servers. ~~The handling of LCS request during Inter-MSC handover in UMTS is FFS.]~~

9.4.5.2 Handling of an ongoing handover while a request for positioning arrives ~~at MSC/VLR~~

~~[~~If during an ongoing ~~radio~~ handover procedure a request for location information arrives ~~at RAN~~, the request shall be suspended until the handover is completed. On completion of the handover, ~~RAN shall continue with~~ the location preparation procedure shall continue.~~]~~

<< New added clause >>

9.4.5.3 Handover handling in Iu mode

In case of hard handovers in Iu mode, e.g. inter RNC hard handover, or Serving RNC relocation, and inter- MSC, MSC Server or SGSN handovers, the ongoing positioning process is aborted on Iu level. In soft handovers where the Serving RNS and Iu are relocated, any ongoing positioning process is also aborted on Iu level. The MSC, MSC Server or SGSN shall restart the Iu aborted location requests with the new Serving RNC. The new SGSN, however, shall not restart the location request after inter SGSN Routing Area Update or inter SGSN relocation. During intra and inter RNC soft and softer handovers the existing RRC connection can normally be used without any need to abort the on-going positioning process on Iu level.

3GPP TSG-SA2 Meeting #32
San Diego, USA, 12th – 16th May 2003

Tdoc ⌘S2-031752

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **175** ⌘ **rev** **-** ⌘ Current version: **4.8.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network **X** Core Network **X**

Title:	⌘	CR on 23.271: Correction to NI-LR for Emergency Services
Source:	⌘	Vodafone UK
Work item code:	⌘	TEI-4
Date:	⌘	30/04/2003
Category:	⌘	**F**
Release:	⌘	Rel-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The procedure for NI-LR for emergency services do not currently request the RAN/GERAN to calculate a location request. This CR introduces the calculation into the procedure.
Summary of change:	⌘	To replace the existing step 5 with text copied from step 7 of clause 9.1.2.
Consequences if not approved:	⌘	An UE's location cannot be obtained for Network Induced Location Requests for emergency services if the procedures are followed.

Clauses affected:	⌘	9.1.5			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

9.1.5 Network Induced Location Request (NI-LR)

Figure 9.4 illustrates positioning for an emergency service call.

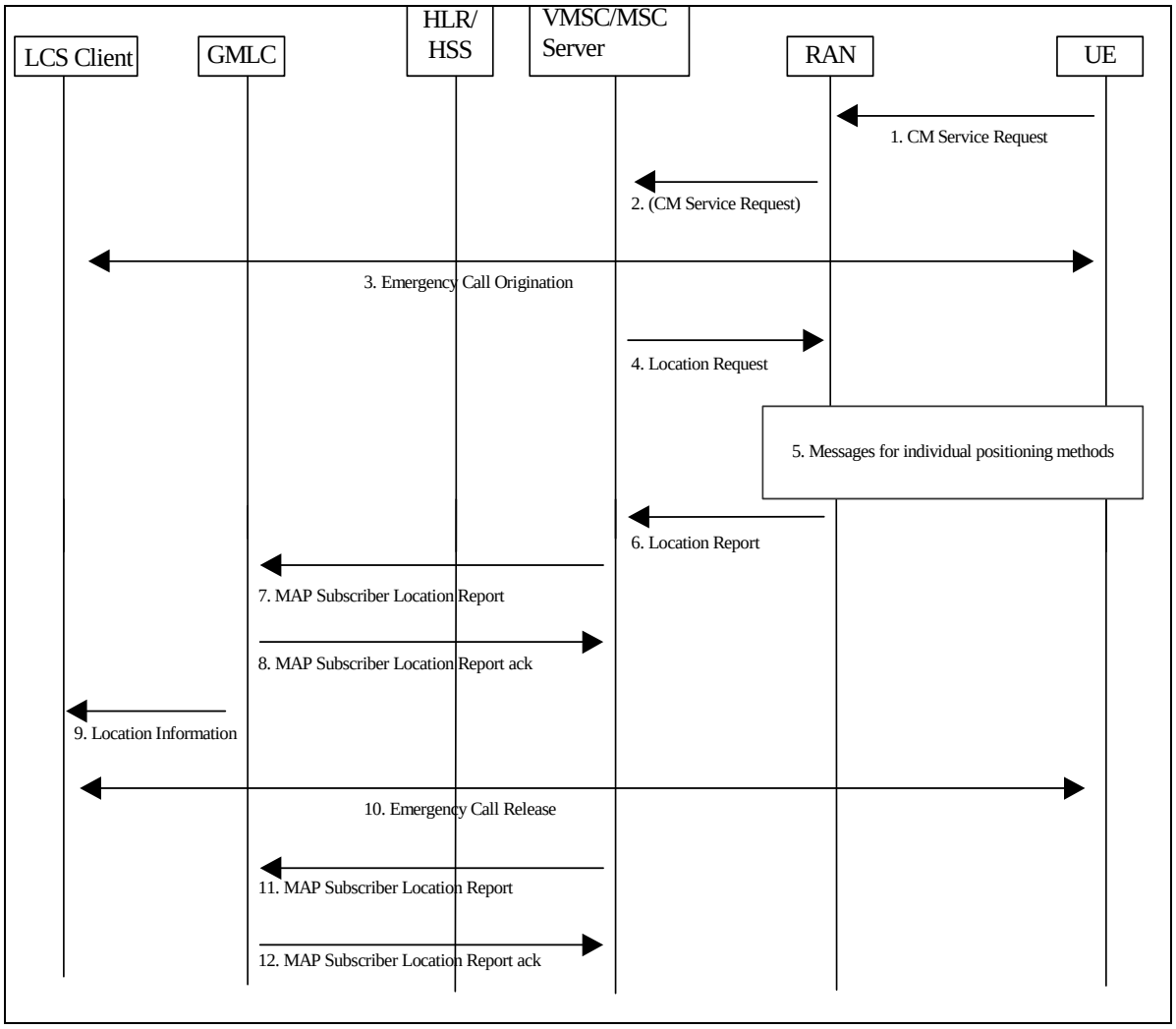

Figure 9.4: Positioning for a NI-LR Emergency Service Call

9.1.5.1 Location Preparation Procedure

1) An initially idle UE requests radio connection setup indicating a request for an Emergency Service call to the VMSC/MSC server via RAN.

2) RAN shall convey the CM service request to the core network. (Before having a CM connection there must be a radio connection.) The UE may identify itself using a TMSI, IMSI or IMEI.

3) The emergency call procedure is applied. The VMSC/MSC server, RAN and UE continue the normal procedure for emergency call origination towards the appropriate emergency services client. Depending on local regulatory requirements, the sending of call setup information into the PSTN may be delayed until either the UE's location has been obtained or the location attempt has failed or a PLMN defined timer has expired before location was obtained. Call setup information sent into the PSTN may include the UE location (if already obtained) plus information that will enable the emergency service provider to request UE location at a later time (e.g. NA-ESRD and NA-ESRK in North America).

4) At any time after step 1, the VMSC/MSC server may initiate procedures to obtain the UE's location. These procedures may run either in parallel with the emergency call origination or while emergency call origination is suspended to delay sending of call setup information into the PSTN according to step 3. The VMSC/MSC server

sends a Location Request message to RAN associated with the UE's current location area (see step 6 for a MT-LR). This message includes the QoS required for an emergency call.

9.1.5.2 Positioning Measurement Establishment Procedure

5) RAN determines the positioning method and instigates the particular message sequence for this method, as specified in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16].~~When a location estimate best satisfying the requested QoS has been obtained, the RAN returns it to the MSC server in a location response. If a location estimate could not be obtained, the RAN returns a location response containing a failure cause and no location estimate.~~

9.1.5.3 Location Calculation and Release Procedure

6) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the VMSC/MSC server. If a location estimate could not be obtained, the RAN returns a location response containing a failure cause and no location estimate.

7) Depending on local regulatory requirements, the VMSC/MSC server may send a MAP Subscriber Location report to a GMLC associated with the emergency services provider to which the emergency call has been or will be sent. This message shall carry any location estimate returned in step 6, the age of this estimate and may carry the MSISDN, IMSI and IMEI of the calling UE. In North America, any NA-ESRD and any NA-ESRK that may have been assigned by the VMSC/MSC server shall be included. The message shall also indicate the event that triggered the location report. If location failed (i.e. an error result was returned by RAN in step 6), an indication of failure rather than a location estimate may be sent to the GMLC: the indication of failure is conveyed by not including a location estimate in the MAP Subscriber Location Report.

8) The GMLC acknowledges receipt of the location information. For a North American Emergency Services call, the GMLC shall store the location information for later retrieval by the emergency services LCS client.

9) The GMLC may optionally forward the information received in step 8 to the emergency services LCS client. For a North American emergency services call the client is expected to obtain the location information by requesting it from the GMLC.

10) At some later time, the emergency services call is released.

11) For a North American Emergency Services call, the MSC/MSC server sends another MAP Subscriber Location Report to the GMLC. This message may include the same parameters as before except that there is no position estimate and an indication of emergency call termination is included.

12) The GMLC acknowledges the MSC/MSC server notification and may then release all information previously stored for the emergency call.

Editorial Note: The procedure for Network Induced Location Request (NI-LR and PS-NI-LR) for a Target UE in dedicated mode should be defined in UTRAN system stage 2 [1] and GERAN Stage 2 specifications [16].

3GPP TSG-SA2 Meeting #32
San Diego, USA, 12th – 16th May 2003

Tdoc ⌘S2-031753

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **176** ⌘ **rev** **-** ⌘ Current version: **5.6.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network **X** Core Network **X**

Title:	⌘	CR on 23.271: Correction to NI-LR for Emergency Services
Source:	⌘	Vodafone UK
Work item code:	⌘	TEI-4
Date:	⌘	30/04/2003
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The procedure for NI-LR for emergency services do not currently request the RAN/GERAN to calculate a location request. This CR introduces the calculation into the procedure.
Summary of change:	⌘	To replace the existing step 5 with text copied from step 7 of clause 9.1.2.
Consequences if not approved:	⌘	An UE's location cannot be obtained for Network Induced Location Requests for emergency services if the procedures are followed.

Clauses affected:	⌘	9.1.5			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

9.1.5 Network Induced Location Request (NI-LR)

Figure 9.4 illustrates positioning for an emergency service call.

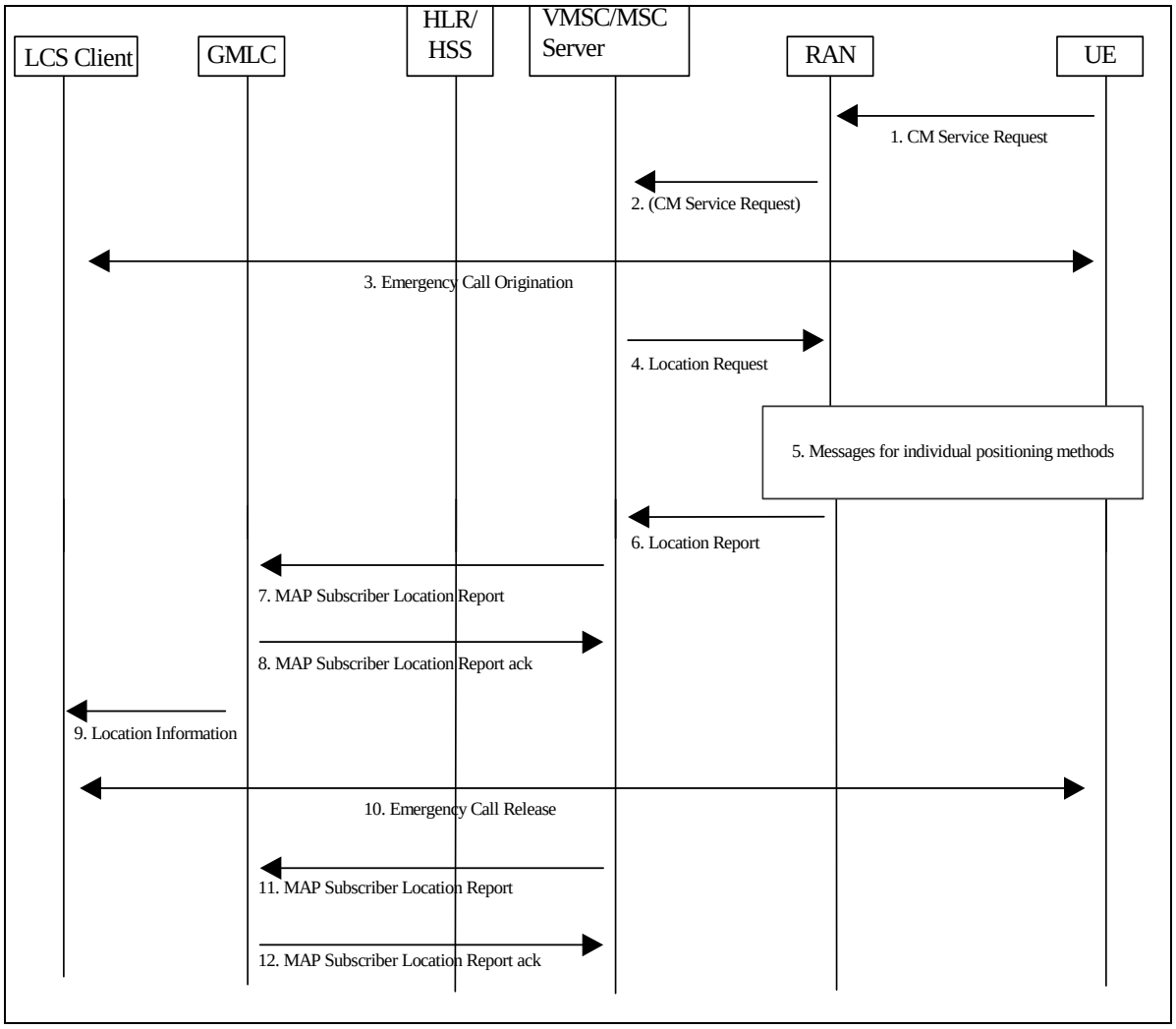

Figure 9.4: Positioning for a NI-LR Emergency Service Call

9.1.5.1 Location Preparation Procedure

1) An initially idle UE requests radio connection setup indicating a request for an Emergency Service call to the VMSC/MSC server via RAN.

2) RAN shall convey the CM service request to the core network. (Before having a CM connection there must be a radio connection.) The UE may identify itself using a TMSI, IMSI or IMEI.

3) The emergency call procedure is applied. The VMSC/MSC server, RAN and UE continue the normal procedure for emergency call origination towards the appropriate emergency services client. Depending on local regulatory requirements, the sending of call setup information into the PSTN may be delayed until either the UE's location has been obtained or the location attempt has failed or a PLMN defined timer has expired before location was obtained. Call setup information sent into the PSTN may include the UE location (if already obtained) plus information that will enable the emergency service provider to request UE location at a later time (e.g. NA-ESRD and NA-ESRK in North America).

4) At any time after step 1, the VMSC/MSC server may initiate procedures to obtain the UE's location. These procedures may run either in parallel with the emergency call origination or while emergency call origination is suspended to delay sending of call setup information into the PSTN according to step 3. The VMSC/MSC server

sends a Location Request message to RAN associated with the UE's current location area (see step 6 for a MT-LR). This message includes the QoS required for an emergency call.

9.1.5.2 Positioning Measurement Establishment Procedure

5) RAN determines the positioning method and instigates the particular message sequence for this method, as specified in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16].~~When a location estimate best satisfying the requested QoS has been obtained, the RAN returns it to the MSC server in a location response. If a location estimate could not be obtained, the RAN returns a location response containing a failure cause and no location estimate.~~

9.1.5.3 Location Calculation and Release Procedure

6) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the VMSC/MSC server. If a location estimate could not be obtained, the RAN returns a location response containing a failure cause and no location estimate.

7) Depending on local regulatory requirements, the VMSC/MSC server may send a MAP Subscriber Location report to a GMLC associated with the emergency services provider to which the emergency call has been or will be sent. This message shall carry any location estimate returned in step 6, the age of this estimate and may carry the MSISDN, IMSI and IMEI of the calling UE. In North America, any NA-ESRD and any NA-ESRK that may have been assigned by the VMSC/MSC server shall be included. The message shall also indicate the event that triggered the location report. If location failed (i.e. an error result was returned by RAN in step 6), an indication of failure rather than a location estimate may be sent to the GMLC: the indication of failure is conveyed by not including a location estimate in the MAP Subscriber Location Report.

8) The GMLC acknowledges receipt of the location information. For a North American Emergency Services call, the GMLC shall store the location information for later retrieval by the emergency services LCS client.

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10) At some later time, the emergency services call is released.

11) For a North American Emergency Services call, the MSC/MSC server sends another MAP Subscriber Location Report to the GMLC. This message may include the same parameters as before except that there is no position estimate and an indication of emergency call termination is included.

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Editorial Note: The procedure for Network Induced Location Request (NI-LR and PS-NI-LR) for a Target UE in dedicated mode should be defined in UTRAN system stage 2 [1] and GERAN Stage 2 specifications [16].

3GPP TSG-SA2 Meeting #32
San Diego, USA, 12th – 16th May 2003

Tdoc ⌘S2-031754

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **177** ⌘ **rev** **-** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network **X** Core Network **X**

Title:	⌘	CR on 23.271: Correction to NI-LR for Emergency Services
Source:	⌘	Vodafone UK
Work item code:	⌘	TEI-4
Date:	⌘	30/04/2003
Category:	⌘	**A**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	The procedure for NI-LR for emergency services do not currently request the RAN/GERAN to calculate a location request. This CR introduces the calculation into the procedure.
Summary of change:	⌘	To replace the existing step 5 with text copied from step 7 of clause 9.1.2.
Consequences if not approved:	⌘	An UE's location cannot be obtained for Network Induced Location Requests for emergency services if the procedures are followed.

Clauses affected:	⌘	9.1.5			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

9.1.5 Network Induced Location Request (NI-LR)

Figure 9.4 illustrates positioning for an emergency service call.

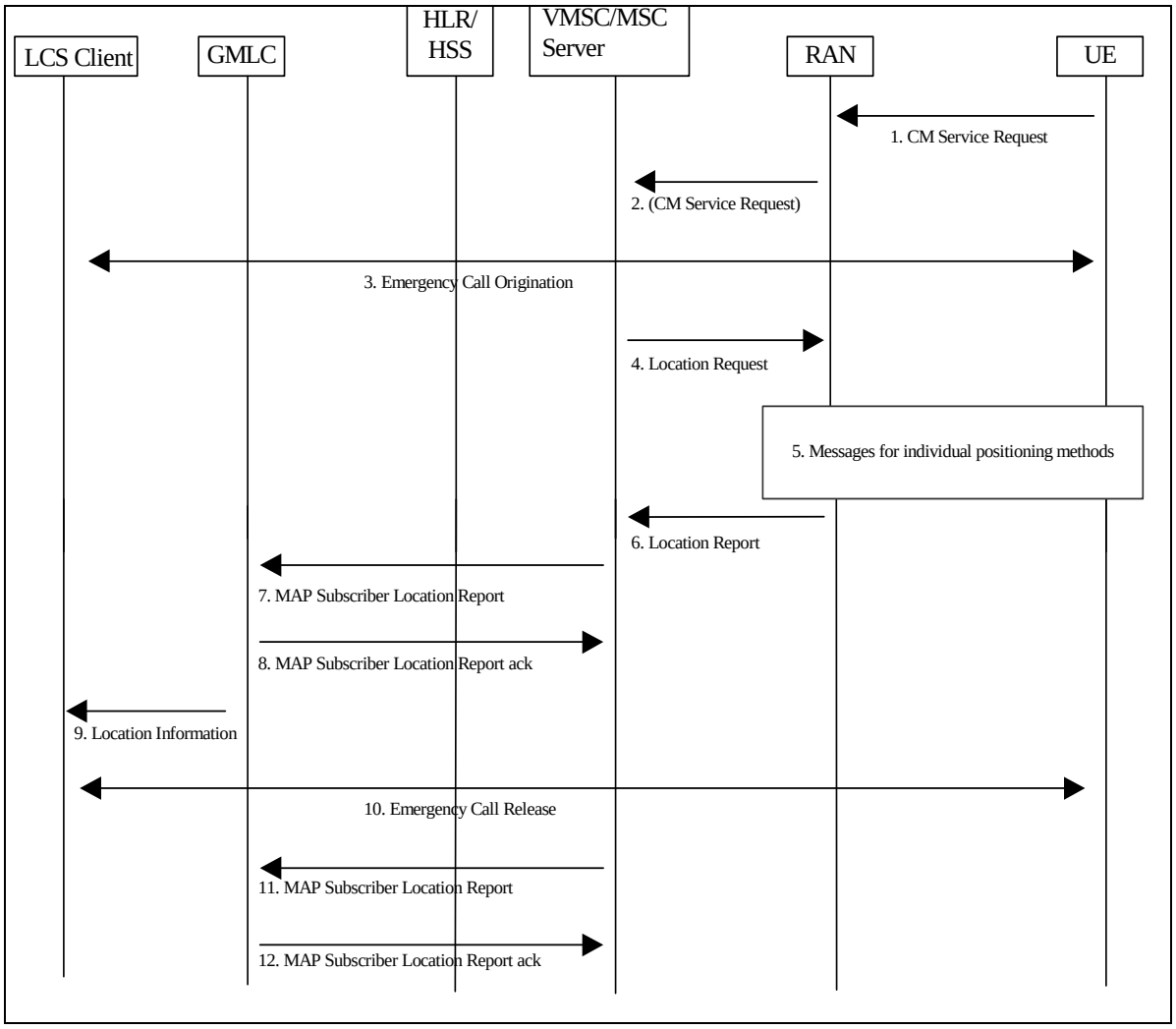

Figure 9.4: Positioning for a NI-LR Emergency Service Call

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4) At any time after step 1, the VMSC/MSC server may initiate procedures to obtain the UE's location. These procedures may run either in parallel with the emergency call origination or while emergency call origination is suspended to delay sending of call setup information into the PSTN according to step 3. The VMSC/MSC server

sends a Location Request message to RAN associated with the UE's current location area (see step 6 for a MT-LR). This message includes the QoS required for an emergency call.

9.1.5.2 Positioning Measurement Establishment Procedure

5) RAN determines the positioning method and instigates the particular message sequence for this method, as specified in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16].~~When a location estimate best satisfying the requested QoS has been obtained, the RAN returns it to the MSC server in a location response. If a location estimate could not be obtained, the RAN returns a location response containing a failure cause and no location estimate.~~

9.1.5.3 Location Calculation and Release Procedure

6) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the VMSC/MSC server. If a location estimate could not be obtained, the RAN returns a location response containing a failure cause and no location estimate.

7) Depending on local regulatory requirements, the VMSC/MSC server may send a MAP Subscriber Location report to a GMLC associated with the emergency services provider to which the emergency call has been or will be sent. This message shall carry any location estimate returned in step 6, the age of this estimate and may carry the MSISDN, IMSI and IMEI of the calling UE. In North America, any NA-ESRD and any NA-ESRK that may have been assigned by the VMSC/MSC server shall be included. The message shall also indicate the event that triggered the location report. If location failed (i.e. an error result was returned by RAN in step 6), an indication of failure rather than a location estimate may be sent to the GMLC: the indication of failure is conveyed by not including a location estimate in the MAP Subscriber Location Report.

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Editorial Note: The procedure for Network Induced Location Request (NI-LR and PS-NI-LR) for a Target UE in dedicated mode should be defined in UTRAN system stage 2 [1] and GERAN Stage 2 specifications [16].

CR-Form-v7

CHANGE REQUEST

⌘ 23.271 CR 179 ⌘rev - ⌘ Current version: 6.3.0 ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Request to response correction
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	7.5.2003
Category:	⌘	**F**
Release:	⌘	REL-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The request message should be a response message
Summary of change:	⌘	The word ‘request’ is replaced by ‘response’ in clause 7.4.2
Consequences if not approved:	⌘	Clause 7.4.2 would be meaningless and contradict clause 7.4.1.

Clauses affected:	⌘	7.4.2			
		Y	**N**		
Other specs Affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<< Changed clause >>

7.4.2 LCS Authorisation Response

The LCS Authorisation Response~~request~~ is sent by the PPR to the H-GMLC as the result for~~of~~ the LCS Authorisation Request ~~by the PPR~~.

The following attributes are identified for the LCS Authorisation Response~~Request~~ information flow:

- Indicator of privacy check related actions;
  - positioning allowed without notifying the UE user;
  - positioning allowed with notification to the UE user;
  - positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
  - positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.
- Indicator for call/session related class of privacy check related actions, if needed;
  - positioning allowed without notifying the UE user;
  - positioning allowed with notification to the UE user;
  - positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user or if there is no response to the notification;
  - positioning requires notification and verification by the UE user; positioning is allowed only if granted by the UE user.
- Pseudo external ID, if needed (see Annex C);
- Indicator on additional privacy check with location estimate, if needed;

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **178** ⌘ **rev** **2** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Clarification of Annex E
Source:	⌘	Nokia
Work item code:	⌘	LCS2
Date:	⌘	14.5.2003
Category:	⌘	**F**
Release:	⌘	REL-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
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R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Annex E in 23.271 does not describe in sufficient detail how the Liberty Alliance approach may be used to support anonymity in location services in a 3GPP network
Summary of change:	⌘	The description how to support the anonymity of the target UE user is expanded with more details to make it more understandable.
Consequences if not approved:	⌘	Annex E does not offer information enough to get a decent understanding of how the Liberty Alliance approach could be used in order to support anonymity for the target UE user.

Clauses affected:	⌘	Annex E			
Other specs Affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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Annex E (Informative): Handling of pseudonyms in location services

There is a requirement in place on anonymity for both the requestor and the target in the LCS Stage 1, TS22.071, and there are or will be regulatory requirements to support anonymity in location services in some countries. It is seen as a basic service requirement that the user should be able to request anonymity at will.

There are various methods available for providing anonymity-support for LCS. One model has been described by the GSM Association in the LS in tdoc S2-021104 to 3GPP. In short, GSMA's model introduces the following logical architecture.

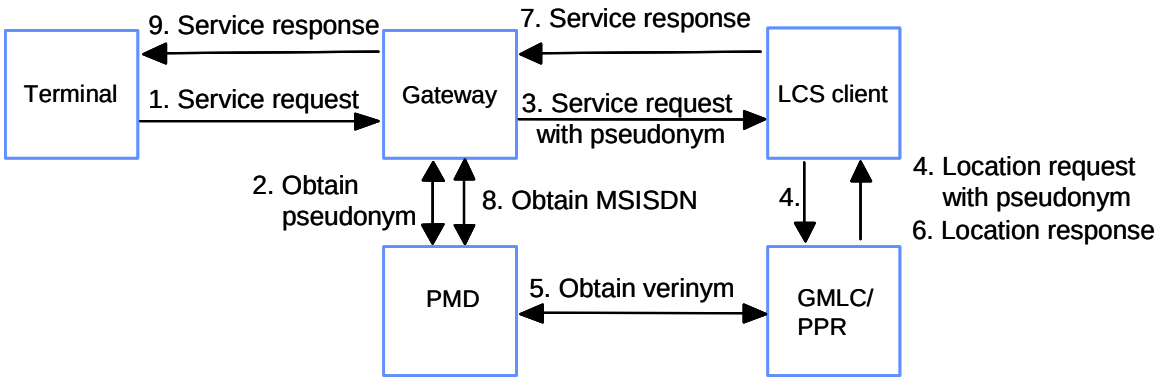

Figure ~~Annex~~ E.1; GSMA logical model to support anonymity

In this PUSH model the pseudonym of the target UE is always generated for certain LCS clients on behalf of the terminal's subscriber without a specific request.

The PUSH model describes the case when the target UE requests its own location using e.g. SMS or WAP. SMS and WAP functions currently have problems in supporting anonymity, because the SMS/WAP gateways forward the originating MSISDN to the receiver. This weakness may be resolved in practise e.g. such that the SMS or WAP Gateway requests pseudonyms from a common device (PMD), as shown in Figure E~~D~~.1. In this process the gateway requests a pseudonym from PMD in signalling step 2 and in signalling step 3 the gateway uses the pseudonym in the service request that it sends to the LCS client. The gateway includes the requesting terminal's verinym, i.e. the MSISDN, in the service response it sends to the terminal in step 9. In this way the LCS client only knows the pseudonym of the terminal and not the verinym. This solution is not LCS specific, since the SMS/WAP gateway inserts pseudonyms in all SMS/WAP messages, which the gateway forwards to the receivers (LCS clients) defined by the operator in advance.

The Liberty Alliance Project has standardized methods~~An alternative approach~~ that can be used to ensure~~support~~ the anonymity of the target UE in location services using pseudonyms as shown by the example ~~is shown~~ in Figure E.2 below. ~~This approach is being studied in the Liberty Alliance Project , see~~The specifications of the Liberty Alliance project are publicly available at http://www.projectliberty.org/.

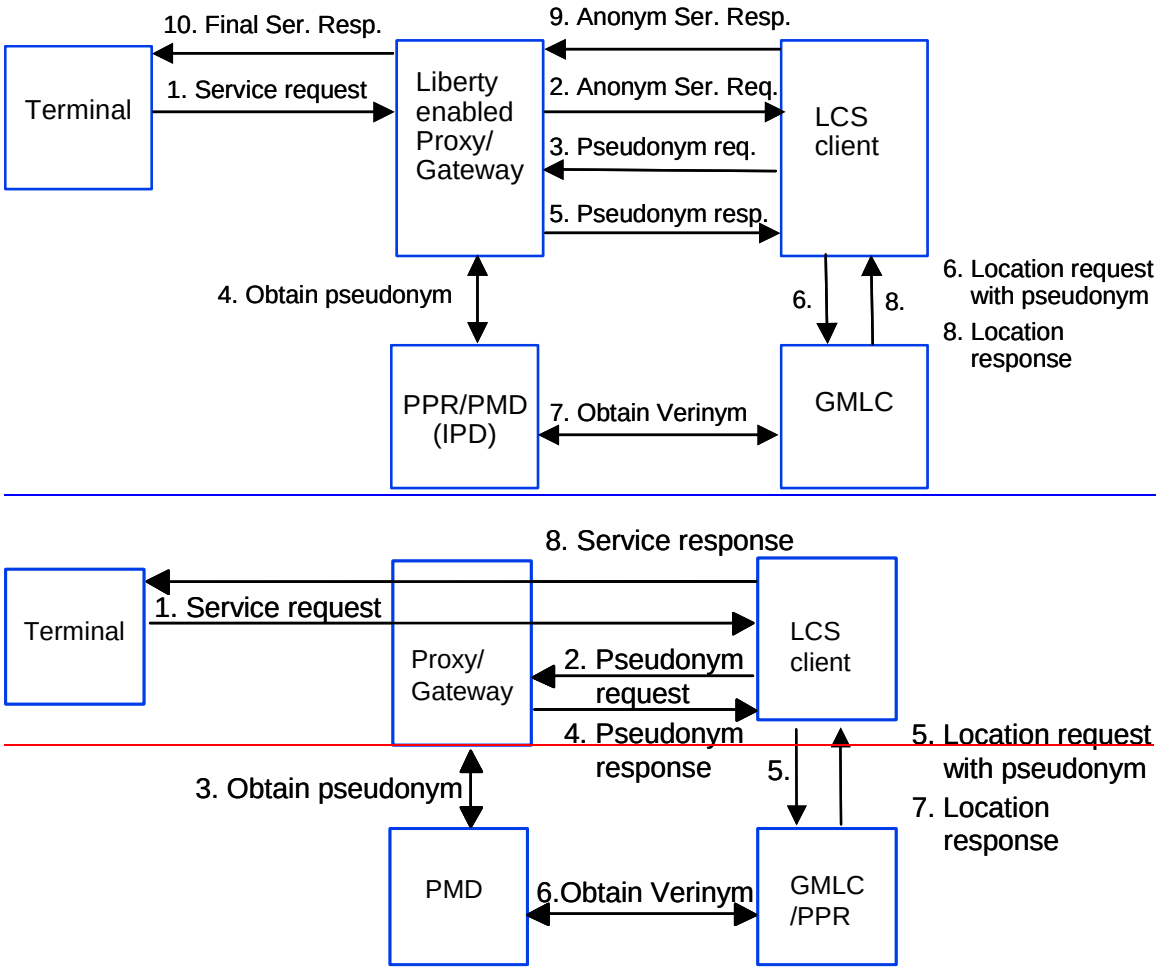

Figure ~~Annex~~ E.2; Logical model to support anonymity

In this PULL model the LCS client requests the pseudonym from the Gateway before accepting the service request from the terminal. ~~The pseudomym is generated in the PMD (IDP) and forwarded by the Gateway to the LCS client. The LCS client includes the pseudonym in the location service request to GMLC. Step 6 is not needed in case GMLC decrypts the pseudonym itself.~~The proxy/gateway is a so-called Liberty Enabled Client/Proxy, which also may support standard WAP proxy/gateway functions as described in the appropriate WAP Forum specifications.

1. The terminal (UE) sends a standard Wireless Transport Protocol (WTP) –request to the Proxy/Gateway.
2. The proxy/gateway converts the service request into an HTTP-request with a dynamic IP address. This HTTP-request does not contain the MSISDN of the terminal, so it is totally anonymous to the LCS-client.
3. The LCS-client needs to get an assertion, i.e. a pseudonym, before it can accept to provide location services to the terminal, so it sends a HTTP-response to the Proxy/Gateway, which includes a request for a pseudonym.
4. The proxy/gateway maps the LCS client's HTTP-response to the HTTP-request it sent in step 2 and thus the proxy/gateway also knows to which terminal the LCS client's HTTP-response is related. The proxy/gateway intercepts and interprets the HTTP-response and finds the pseudonym request. It forwards the pseudonym request to PMD and attaches the terminal's MSISDN to allow the PMD to provide a pseudonym related to this MSISDN. In case PMD needs to contact the target UE user for some reason, e.g. to ask for consent to deliver the pseudonym to this specific LCS-client, this interaction is fully supported in the Liberty Enabled Client/Proxy specification.
5. The proxy/gateway sends an HTTP-request containing the pseudonym to the LCS-client.
6. The LCS-client sends a location service request to GMLC using the pseudonym of the target terminal.

7. The PMD may include the MSISDN in the pseudonym by encrypting it in such a way that GMLC is able to determine the MSISDN itself and in such a case step 7 is not needed. In case GMLC cannot find out the verinym of the terminal itself, it requests from PMD the MSISDN that corresponds to the pseudonym it received from the LCS-client.

8. GMLC provides location information to the LCS-client using the pseudonym of the target terminal.

9. The LCS-client sends an HTTP-response to the proxy/gateway containing the requested location specific service content.

10. The proxy/gateway maps the response to the outstanding request sent in step 1 and delivers the result to the correct terminal using MSISDN.

Note that the mechanism described above is a generalized solution to the problem of transporting something from party 1 (PMD) to party 3 (GMLC) so that intermediate party 2 (LCS-client) cannot find out the real content transferred between party 1 and party 3 (verinym in this case). Also note that since the proxy/gateway does not push any pseudonym in step 2, it is not required to understand the destination application and what information it may need. Step 3 allows any application to request a pseudonym or any information it may need, thus making this a generalized solution, which may be used for many types of applications, not only LCS.

It is to be noted that the Liberty release 1.1 specification has been carefully studied by the EU article 29 committee and found to be in accordance with the current EU privacy requirements. It is stressed, however, that it is the responsibility of someone implementing or deploying a system in accordance with the Liberty Alliance specifications to comply with EU directives and requirements on privacy.

For roaming cases chapter 9.1.1 in this specification describes the cases where the pseudonym contains the address(es) of the target UE's Home-GMLC so that the Requesting-GMLC can forward the location request to H-GMLC, which may determine the corresponding verinym itself or request the verinym from its associated PMD.

3GPP TSG-SA2 Meeting #32 ***S2-031787***
San Diego, USA, 12th – 16th May, 2003 **(was *S2-031783, S2-031776, S2-031760, S2-031002*)**

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **181** ⌘ **rev** **3** ⌘ Current version: **5.6.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Addition of Position Method Used, to attributes returned with location estimate.
Source:	⌘	AT&T Wireless Services, Ericsson, Nortel Networks
Work item code:	⌘	LCS2 ***Date:*** ⌘ 12/05/2003
Category:	⌘	**F** ***Release:*** ⌘ Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	When reporting location information for emergency and other calls, there is no way for the location services client to know what type of positioning method was used to obtain the longtitude and latitude that has been returned. This information would be useful as it would give an indication as to the relative accuracy of that information to the emergency and other location client services, should they have to rely on it. This is especially significant and important for North American operators since TIA/EIA/IS-J-STD-036 (2000): "Emergency Services Data Communications" requires the conveyance of Positioning Method to the Emergency Center to provide a sanity check on the *Uncertainty* and *Confidence* information, which are derived based on non-standard vendor-based algorithms and not considered very reliable. This information could also be used to provide the ability for operators to provide value add services based on accurate location reporting. This is a R5 CR which applies only to the case when the access network is GERAN in the A/Gb mode. Note: TS 49.031 already specifies the conveyance of Positioning Method information to the GMLC (for GERAN in A/Gb mode).
Summary of change:	⌘	Text is added at appropriate parts of the TS to indicate that the positioning method used to determine the location estimate is also returned with the location estimate.
Consequences if not approved:	⌘	There would be no indication of the positioning method used to obtain a location estimate. Location clients would not be able to accurately and fully interpret the significance of the *Uncertainty* and *Confidence* information available in the

	network, resulting in misinterpretation of the reported location, as has been observed in actual field trials.

Clauses affected:	⌘	3.1, 4.2, 5.5.2, 7.1.2, 9.1.1, 9.1.2, 9.1.3, 9.1.5, 9.1.6			
Other specs affected:	⌘	**Y** / **N**	Other core specifications	⌘	TS 29.002
		X /	Other core specifications		
		/ **X**	Test specifications		
		/ **X**	O&M Specifications		
Other comments:	⌘	OMA MLP protocol over Le interface might be affected.			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

********** FIRST CHANGE **********

Positioning method (/locating method): method or technical solution, which is used to get an estimate of the target mobile's geographical location. For example positioning methods based on radio cell coverage, GPS or Assisted GPS methods, which are based on the Time-Of-Arrival (TOA) algorithm, and OTDOA or E-OTD methods, which are based on the Time-Difference-Of-Arrival (TDOA) algorithm. The positioning methods are further described in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16]. ~~principle and/or algorithm which the estimation of geographical location is based on, e.g. AOA, TOA, TDOA. For example, GPS is based on TOA, whilst OTDOA and E-OTD (on GSM) are based on TDOA~~

~~**Positioning technology (/locating technology):** technology or system concept including the specifications of RF interfaces, data types, etc. to process the estimation of a geographical location, e.g. GPS, E-OTD (GSM), and OTDOA (WCDMA)~~

********** NEXT CHANGE **********

4.2 Location Services Categories

Generally there are four categories of usage of the location service. These are the Commercial LCS, the Internal LCS, the Emergency LCS and the Lawful Intercept LCS. The definition of these services and their categories is outside the scope of the present document.

- The Commercial LCS (or Value Added Services) will typically be associated with an application that provides a value-added service to the subscriber of the service, through knowledge of the UE location and if available, and at the operator's discretion, the positioning method used to obtain the location estimate. ~~to the subscriber of the service~~. This may be, for example, a directory of restaurants in the local area of the UE, together with directions for reaching them from the current UE location.

- The Internal LCS will typically be developed to make use of the location information of the UE for Access Network internal operations. This may include; for example, location assisted handover and traffic and coverage measurement. This may also include support certain O&M related tasks, supplementary services, IN related services and GSM bearer services and teleservices.

- The Emergency LCS will typically be part of a service provided to assist subscribers who place emergency calls. In this service, the location of the UE caller and, if available, the positioning method used to obtain the location estimate is provided to the emergency service provider to assist them in their response. This service may be mandatory in some jurisdictions. In the United States, for example, this service is mandated for all mobile voice subscribers.

- The Lawful Intercept LCS will use the location information to support various legally required or sanctioned services.

********** NEXT CHANGE **********

5.5.2 Location Service Response

The LCS server (GMLC) sends the Location Service Response to the LCS client either as an:

- Immediate Response; or a

- Deferred Response, these deferred responses can be either single or periodic.

The following attributes are identified for the Location Service Response information flow:

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032 or local coordinate system;
- The information about the positioning method used to obtain the location estimate of the UE, if it is available at the LCS server and if needed;
- Indication when UE enters or leaves the Geographical area, if needed;
- Acknowledgement for a deferred location request, if needed.

In addition the information attributes of the location service request may be used also in the location service response.

********** NEXT CHANGE **********

7.1.2 Location Report

The access network reports the location of the Target UE to the core network entities. The location report may contain the following information as defined in the corresponding location request:

- the geographical co-ordinates of the Target UE;
- the positioning method used to obtain the location estimate, if the access network is GERAN in the A/Gb mode;
- the service area in which the Target UE is located;
- achieved quality level of the location estimate.

********** NEXT CHANGE **********

9.1 Mobile Terminating Location Request

9.1.1 MT-LR routing procedure in PS and CS domain

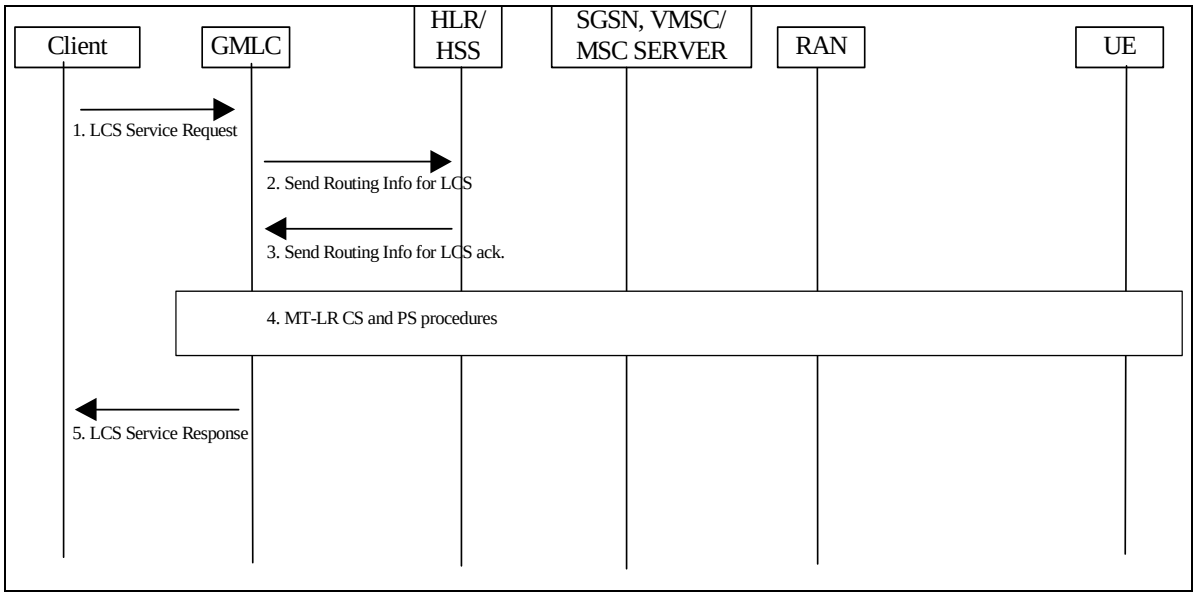

Figure 9.1: General Network Positioning for a MT-LR

1) An external LCS client requests the current location of a target UE from a GMLC. The LCS Client may also request a deferred location request, i.e. based on event. The GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI or PDP address, (NOTE: IP addressing in this context is FFS, one reason is the dynamic IP addressing used in IPv4.) of the target UE to be located and the LCS QoS from either subscription data or data supplied by the LCS client. For a call related location request, the GMLC obtains and authenticates the called party number of the LCS client.

   The LCS request may carry also the Service Identity and the Codeword. The GMLC may verify that the Service Identity received in the LCS request matches one of the service identities allowed for the LCS client. If the service identity does not match one of the service identities for the LCS client, the GMLC shall reject the LCS request. Otherwise, the GMLC can map the received service identity in a corresponding service type.
   If the GMLC supports the codeword mechanism and receives a codeword from a value added LCS client, the GMLC checks the target UE's codeword handling information stored in the GMLC in order to know whether the target UE user wants to be protected by the codeword mechanism or not. If the codeword handling information indicates that the codeword shall be checked in the network, then the GMLC shall verify whether the Codeword received in the LCS request matches one of the target UE's Codewords. If the codeword handling information indicates that the codeword shall be checked in the network but the GMLC does not store the list of Codewords for the target UE or the received Codeword does not match one of the Codewords for the target UE, the GMLC shall reject the LCS request.

   If the location request is originated by a Requestor, the Requestor Identity may be added to the LCS service request. LCS client should authenticate the Requestor Identity but this is outside the scope of this specification.

   For a session related location request, the GMLC obtains and authenticates the APN-NI of the LCS client.
   If location is required for more than one UE, or if periodic location is requested, the steps following below may be repeated.
   Note: This means that GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain.

2) If the GMLC already knows both the VMSC/MSC server or SGSN location and IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), this step and step 3 may be skipped. Otherwise, the GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI, PDP address or MSISDN of this UE.

Editor´s note: The use of the PDP address for identifying the subscriber is ffs.

3) The HLR/HSS verifies that the calling party SCCP address of the GMLC corresponds to a known GSM/UMTS network element that is authorized to request UE location information. The HLR/HSS then returns one or several of the addresses, the current SGSN and/or VMSC/MSC server and whichever of the IMSI and MSISDN was not provided in step (2) for the particular UE.

   Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

4) In case GMLC receives only the MSC/VLR address, the MT LR proceeds as the CS-MT-LR procedure described in 9.1.2. In case GMLC receives only the SGSN address, the MT LR proceeds as the PS-MT-LR procedure described in 9.1.6. In case the GMLC receives several of the following addresses, SGSN, VMSC and/or MSC Server, it has to decide where to send the location request. If the requested MT-LR is known to be associated with a CS call, the CS-MT-LR procedure shall be invoked. If the requested MT-LR is associated with a PS session, the PS-MT-LR procedure only shall be invoked. Otherwise, both CS-MT-LR and PS-MT-LR are applicable. If LCS Client indicated deferred location request, GMLC shall indicate this together with applicable event type (ex. MS available) in requested PS/CS-MT-LR, see 9.1.8.

NOTE: The order in which these procedures are invoked and whether one or both procedures are used may depend on subscription information for the LCS client, possible priority information returned by the HSS or information already stored in the GMLC (e.g. obtained from previous location requests).

5) GMLC sends the location service response to the LCS client. If the LCS client requires it, the GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system. The GMLC may record billing for both the LCS client and inter-network revenue charges

from the SGSN or MSC/MSC server's network. The LCS Service Response from the GMLC to the LCS client may contain the information about the positioning method used.

The detailed CS-MT-LR and PS-MT-LR procedures in step 4 of figure 9.1 are described in 9.1.2 and 9.1.6.

The detailed procedure for deferred PS/CS-MT-LR is described in 9.1.8.

9.1.2 Circuit Switched Mobile Terminating Location Request (CS-MT-LR)

Figure 9.2 illustrates general network positioning for LCS clients external to the PLMN. In this scenario, it is assumed that the target UE is identified using either an MSISDN or IMSI.

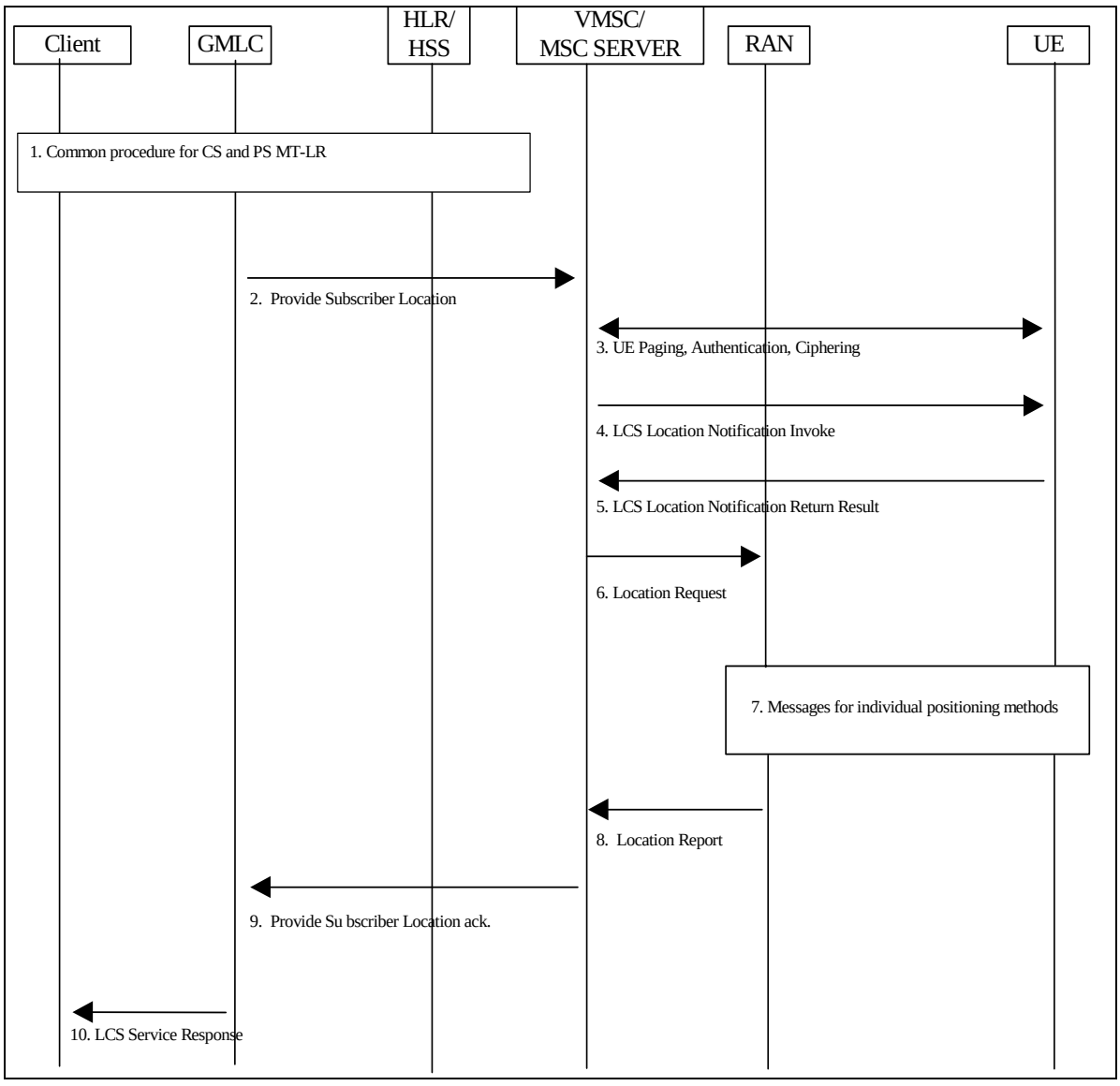

Figure 9.2: Network Positioning for a CS-MT-LR

9.1.2.1 Location Preparation Procedure

1) Common PS and CS MT-LR procedure as described in 9.1.1.

2) The GMLC sends a PROVIDE_ SUBSCRIBER _LOCATION message to the MSC/MSC server indicated by the HLR/HSS. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a call related location request, the message also carries the LCS client's called party number. For a value added LCS client, the message shall carry the client name, the external identity of the LCS client and the Requestor Identity (if that is both supported and available). For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. Moreover the message may also carry the Service Type**.** If the target UE's codeword handling information indicates that the codeword shall be sent to the UE user for checking, the message may carry also the codeword received from the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. If the Requestor Identity is provided, the GMLC shall send it as separate information. In addition, in order to display the requestor identity in case of pre rel-5 network elements (i.e. MSC and/or UE), the requestor identity may be also added to the LCS client name by the GMLC. When the Requestor identity is added to the LCS client name the practise described in the Annex C should be followed.

3) If the GMLC is located in another PLMN or another country, the VMSC/MSC server first authenticates that a location request is allowed from this PLMN or from this country. If not, an error response is returned. The VMSC/MSC server then verifies LCS barring restrictions in the UE user's subscription profile in the MSC server. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If LCS is to be barred without notifying the target UE and a LCS client accessing a GMLC in the same country does not have the override capability, an error response is returned to the GMLC. Otherwise, if the UE is in idle mode, the Core Network performs paging, authentication and ciphering. The MSC will page a GPRS attached UE either through A/Iu or Gs interface, depending on the presence of the Gs interface (see Note).The UE will inform the network about its LCS capabilities, as described in chapter 6.3.4.. If the UE is instead in dedicated mode, the VMSC/MSC server will already have UE classmark information. In GSM this is supported by controlled early classmark sending.

[Note 1: In GSM, if the target UE has an established circuit call other than speech, the location request may be denied and an error response is then returned to the GMLC. If the location request is allowed for a non-speech circuit call, it shall be up to RAN to decide, on the basis of the applicable position methods and requested QoS, whether positioning is possible. This is FFS]

Note: In some network mode of operation, a GPRS capable UE may not receive the CS paging. In addition, upon receipt of a CS paging, a GPRS capable UE may immediately answer to the Paging Request or delay the answer, as defined in 3GPP TS 22.060 and 23.060. A GPRS UE in class B mode may also suspend its GPRS traffic, sending a GPRS Suspension Request to the network.

4) If the location request comes from a value added LCS client and the UE subscription profile indicates that the UE must either be notified or notified with privacy verification and the UE supports notification of LCS (according to the UE Capability information), an LCS Location Notification Invoke message is sent to the target UE indicating the type of location request (e.g. current location) and the identity of the LCS client, the Requestor Identity (if that is both supported and available) and whether privacy verification is required. Moreover, the message may carry also the service type and the codeword.

   [FFS: For a call related location request, the LCS client identity shall be set to the LCS client's called party number if no separate LCS client identity was received from the GMLC.] Optionally, the VMSC/MSC server may after sending the LCS Location Notification Invoke message continue in parallel the location process, i.e. continue to step 6 without waiting for a LCS Location Notification Return Result message in step 5.

NOTE 2: This step is for further study, it should be investigated e.g. which client identities to include in the Privacy Notification message to be shown to the end-user.

5) The target UE notifies the UE user of the location request. If privacy verification was requested, the target UE indicates to the UE user whether the location request will be allowed or not allowed in the absence of a response and waits for the user to grant or withhold permission. The UE then returns an LCS Location Notification Return Result to the VMSC/MSC server indicating, if privacy verification was requested, whether permission is granted or denied. Optionally, the LCS Location Notification Return Result message can be returned some time after step 4, but before step 9. If the UE user does not respond after a predetermined time period, the VMSC/MSC server shall infer a "no response" condition. The VMSC/MSC server shall return an error response to the GMLC

if privacy verification was requested and either the UE user denies permission or there is no response with the UE subscription profile indicating barring of the location request in the absence of a response.

6) The MSC/MSC server sends a Location Request message to RAN. This message includes the type of location information requested and requested QoS and, in GSM, the UE's location capabilities.

9.1.2.2 Positioning Measurement Establishment Procedure

7) RAN determines the positioning method and instigates the particular message sequence for this method, as specified in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16].

9.1.2.3 Location Calculation and Release Procedure

8) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the MSC/MSC server in a Location Report message. The information about the positioning method used may be returned with the location estimate if the access network is GERAN in the A/Gb mode. If a location estimate could not be obtained, RAN returns a Location Report message containing a failure cause and no location estimate.

9) The MSC/MSC server returns the location information and its age to the GMLC, if the VMSC/MSC server has not initiated the Privacy Verification process in step 4. If step 4 has been performed for privacy verification, the VMSC/MSC server returns the location information, only if it has received a LCS Location Notification Return Result indicating that permission is granted. In these cases, the information about the positioning method used may be sent with the location information. If a LCS Location Notification Return Result message indicating that permission is not granted is received, or there is no response, with the UE subscription profile indicating barring of location in the absence of a response, the VMSC/MSC server shall return an error response to the GMLC. If RAN did not return a successful location estimate, but the privacy checks in steps 4 - 5 were successfully executed, the VMSC/MSC server may return the last known location of the target UE if this is known and the LCS client is requesting the current or last known location. The MSC server may then release the Mobility Management connection to the UE, if the UE was previously idle, and the MSC/MSC server may record billing information.

10) The GMLC returns the UE location estimate to the requesting LCS client as described in chapter 9.1.1. The LCS Service Response from the GMLC to the LCS client may contain the information about the positioning method used.

********** NEXT CHANGE **********

9.1.3 CS-MT-LR without HLR Query - applicable to North America Emergency Calls only

Figure 9.3 illustrates current or last known location requests for a North American Emergency Services call, where an emergency services client (i.e., a Public Safety Answering Point) identifies the target UE and the serving GMLC using either an NA-ESRK, or an MSISDN and NA-ESRD that were previously provided to it by the VMSC. This allows the GMLC to request location from the VMSC without first querying the home HLR of the target UE. This scenario presumes that the initial location, as well as UE and VMSC identifying information had been pushed to the GMLC as per [32].

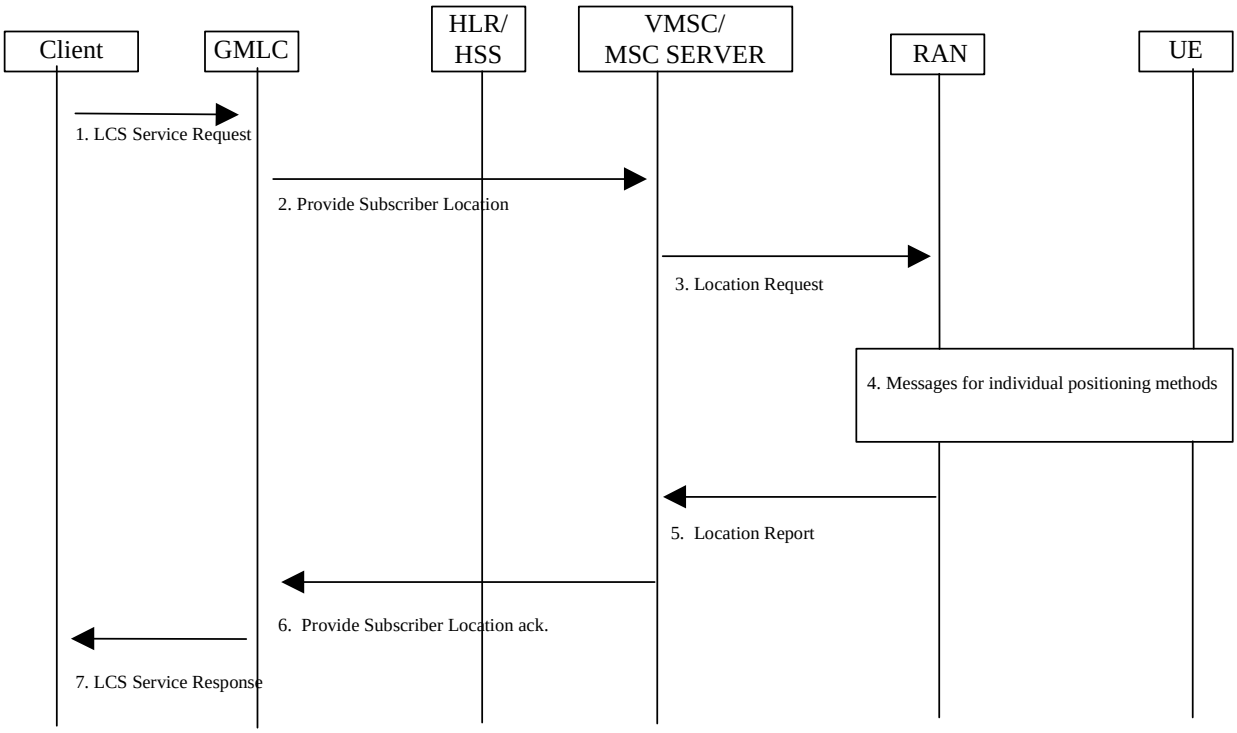

Figure 9.3: Positioning for a Emergency Services MT-LR without HLR Query

1) Same as step 1 in figure 9.1 but with the LCS client identifying first the target UE and the serving GMLC by an - NA-ESRK or MSISDN and NA-ESRD.

2) If the GMLC already has stored information for the target UE (e.g. from a prior location estimate delivery to the LCS client), the GMLC may determine the VMSC from this information. Otherwise, the GMLC determines the VMSC using the NA-ESRK or NA-ESRD - with use of the NA-ESRK taking priority over that of the NA-ESRD. The MAP_PROVIDE_SUBSCRIBER_LOCATION message sent to the VMSC carries the MSISDN and, if provided, the IMSI and IMEI for the target UE, as well as the required QoS and an indication of a location request from an emergency services client. The VMSC identifies the target UE using the IMSI or MSISDN and, if provided, the IMEI. In the case of a SIM-less UE making the emergency call, the MSISDN will have been populated with a non-dialable callback number consisting of the digits: 911, and the last seven digits of the IMEI provided in the emergency call.

3) The MSC verifies that UE privacy is overridden by the emergency services provider and that positioning is not prevented for other reasons (e.g. unreachable UE, inapplicable call type to the UE). The VMSC then sends a Location Request to the RAN, as for a normal MT-LR.

4) RAN performs positioning as for a normal CS-MT-LR.

5) RAN returns a location estimate to the VMSC as for a normal CS-MT-LR.

6) Same as step~~s~~ 9 for a normal CS-MT-LR.

7) Same as step~~s~~ 10 for a normal CS-MT-LR.

********** NEXT CHANGE **********

9.1.5 Network Induced Location Request (NI-LR)

Figure 9.4 illustrates positioning for an emergency service call.

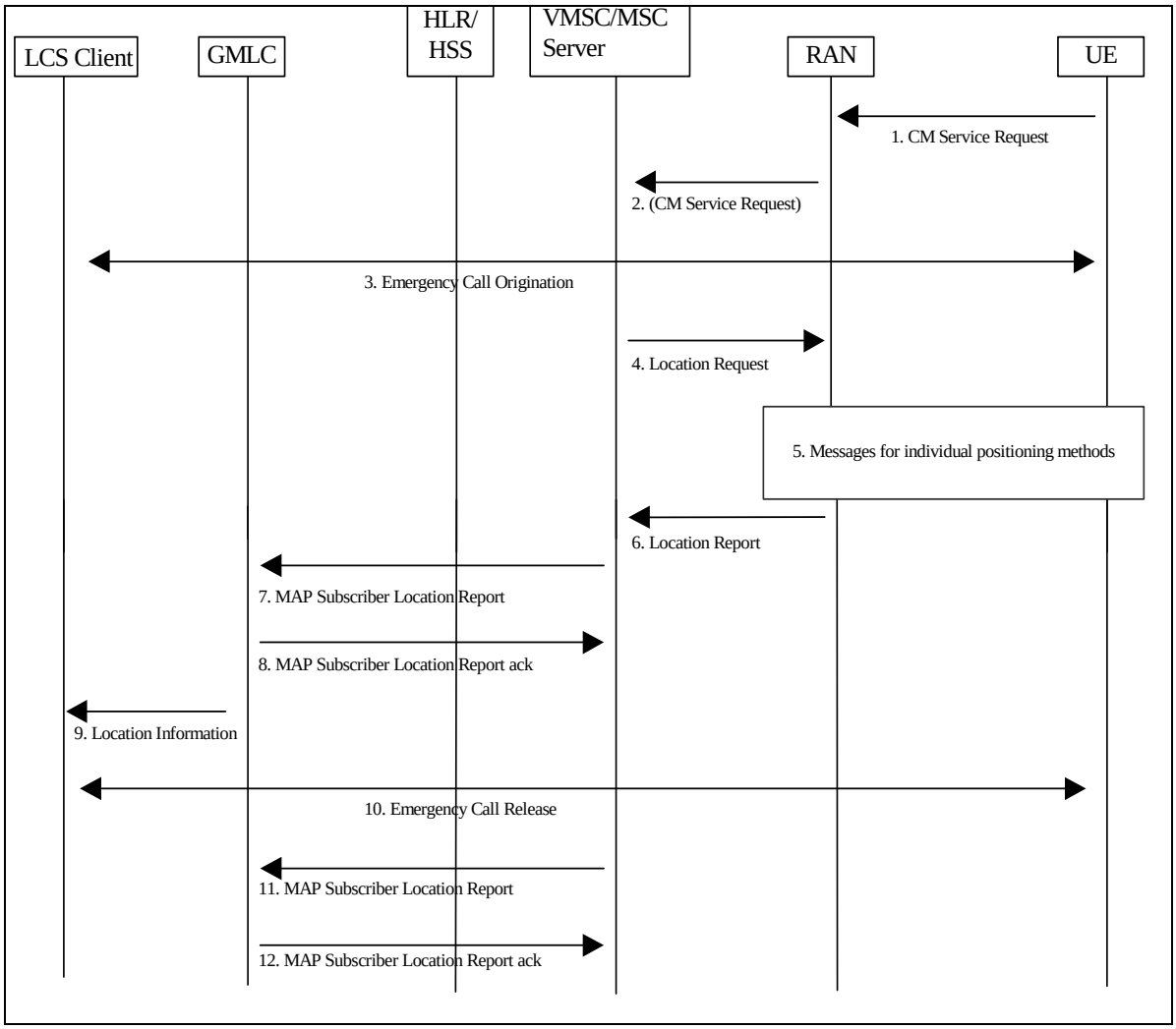

Figure 9.4: Positioning for a NI-LR Emergency Service Call

9.1.5.1 Location Preparation Procedure

1) An initially idle UE requests radio connection setup indicating a request for an Emergency Service call to the VMSC/MSC server via RAN.

2) RAN shall convey the CM service request to the core network. (Before having a CM connection there must be a radio connection.) The UE may identify itself using a TMSI, IMSI or IMEI.

3) The emergency call procedure is applied. The VMSC/MSC server, RAN and UE continue the normal procedure for emergency call origination towards the appropriate emergency services client. Depending on local regulatory requirements, the sending of call setup information into the PSTN may be delayed until either the UE's location has been obtained or the location attempt has failed or a PLMN defined timer has expired before location was obtained. Call setup information sent into the PSTN may include the UE location (if already obtained) plus information that will enable the emergency service provider to request UE location at a later time (e.g. NA-ESRD and NA-ESRK in North America).

4) At any time after step 1, the VMSC/MSC server may initiate procedures to obtain the UE's location. These procedures may run either in parallel with the emergency call origination or while emergency call origination is suspended to delay sending of call setup information into the PSTN according to step 3. The VMSC/MSC server sends a Location Request message to RAN associated with the UE's current location area (see step 6 for a MT-LR). This message includes the QoS required for an emergency call.

9.1.5.2 Positioning Measurement Establishment Procedure

5) When a location estimate best satisfying the requested QoS has been obtained, the RAN returns it to the MSC server in a location response. If a location estimate could not be obtained, the RAN returns a location response containing a failure cause and no location estimate.

9.1.5.3 Location Calculation and Release Procedure

6) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the VMSC/MSC server in a Location Report. The information of the positioning method used may be returned with the location estimate if the access network is GERAN in the A/Gb mode.

7) Depending on local regulatory requirements, the VMSC/MSC server may send a MAP Subscriber Location report to a GMLC associated with the emergency services provider to which the emergency call has been or will be sent. This message shall carry any location estimate returned in step 6, the age of this estimate and may carry the MSISDN, IMSI and IMEI of the calling UE, and the information about the positioning method used. In North America, any NA-ESRD and any NA-ESRK that may have been assigned by the VMSC/MSC server shall be included. The message shall also indicate the event that triggered the location report. If location failed (i.e. an error result was returned by RAN in step 6), an indication of failure rather than a location estimate may be sent to the GMLC: the indication of failure is conveyed by not including a location estimate in the MAP Subscriber Location Report.

8) The GMLC acknowledges receipt of the location information. For a North American Emergency Services call, the GMLC shall store the location information for later retrieval by the emergency services LCS client.

9) The GMLC may optionally forward the information received in step 8 to the emergency services LCS client. For a North American emergency services call the client is expected to obtain the location information by requesting it from the GMLC. The information about the positioning method used may be sent with the location information from the GMLC to the LCS client.

10) At some later time, the emergency services call is released.

11) For a North American Emergency Services call, the MSC/MSC server sends another MAP Subscriber Location Report to the GMLC. This message may include the same parameters as before except that there is no position estimate and an indication of emergency call termination is included.

12) The GMLC acknowledges the MSC/MSC server notification and may then release all information previously stored for the emergency call.

Editorial Note: The procedure for Network Induced Location Request (NI-LR and PS-NI-LR) for a Target UE in dedicated mode should be defined in UTRAN system stage 2 [1] and GERAN Stage 2 specifications [16].

********** LAST CHANGE **********

9.1.6 Packet Switched Mobile Terminating Location Request (PS-MT-LR)

Figure 9.5 illustrates the general network positioning for LCS clients external to the PLMN for packet switched services. In this scenario, it is assumed that the target UE is identified using an MSISDN, PDP address or IMSI.

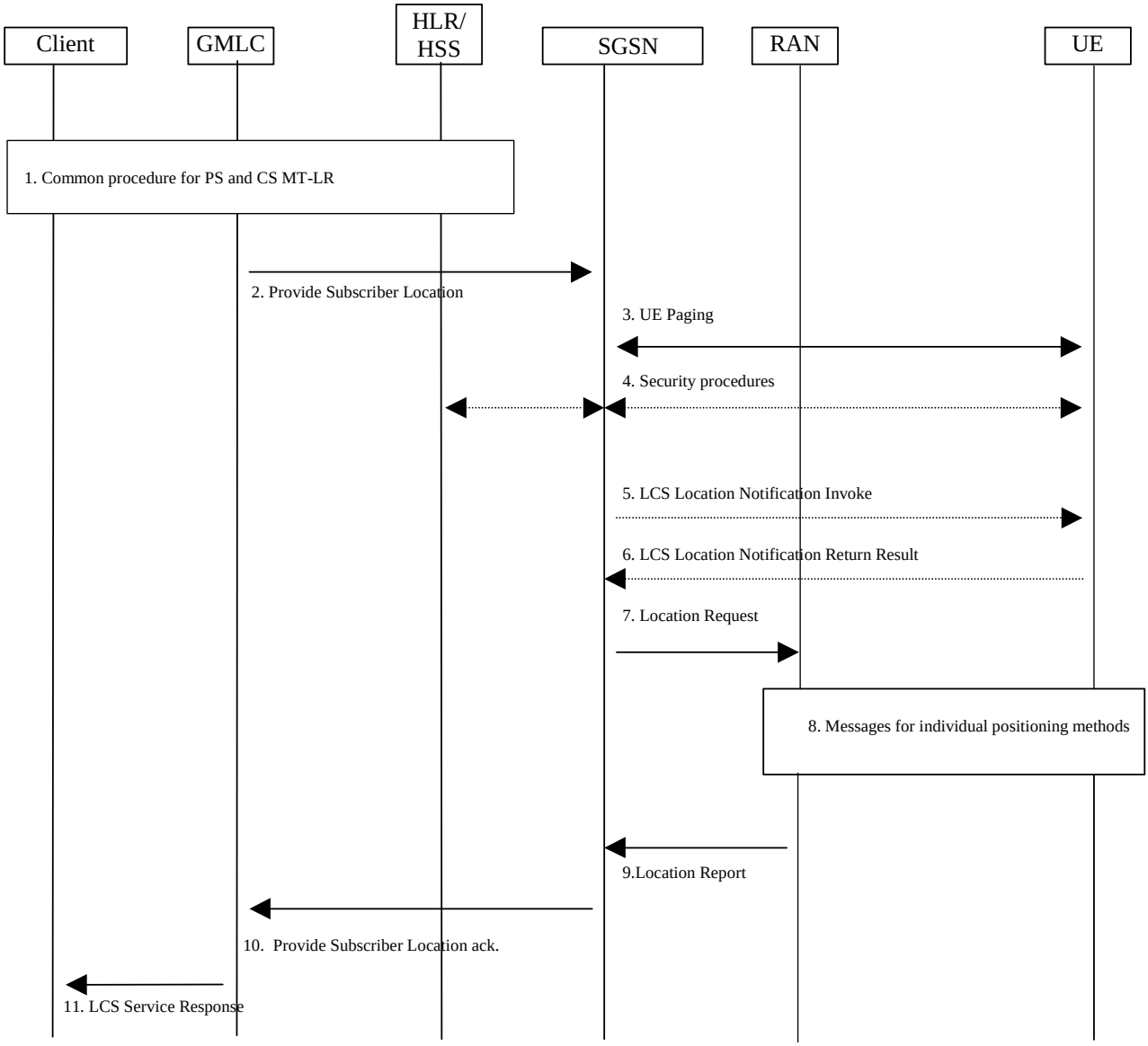

Figure 9.5: General Network Positioning for Packet Switched MT-LR

9.1.6.1 Location Preparation Procedure

1) Common PS and CS MT-LR procedure as described in 9.1.1.

2) GMLC sends a Provide Subscriber Location message to the SGSN indicated by the HLR/HSS. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a session related location request, the message also carries the APN-NI to which the user has established the session. For a value added LCS client, the message shall carry the client name, the external identity of the LCS client and the Requestor Identity (if that is both supported and available), optionally the message may also carry the Service Type. If the target UE's codeword handling information indicates that the codeword shall be sent to the UE user for checking, the message may carry also the codeword received from the

LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. If the Requestor Identity is provided, the GMLC shall send it as separate information. In addition, in order to display the requestor identity in case of pre rel-5 network elements (i.e. SGSN and/or UE), the requestor identity may be also added to the LCS client name by the GMLC. When the Requestor identity is added to the LCS client name the practise described in the Annex C should be followed.

3) If the GMLC is located in another PLMN or another country, the SGSN first authenticates that a location request is allowed from this PLMN or from this country. If not, an error response is returned. The SGSN then verifies LCS barring restrictions in the UE user's subscription profile in the SGSN. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If LCS is to be barred without notifying the target UE and a LCS client accessing a GMLC in the same country does not have the override capability, an error response is returned to the GMLC.
Otherwise, if the UE is in idle mode, the SGSN performs paging. The paging procedure is defined in TS 23.060[15].

   FFS: The UE may be paged for location services even when in UMTS a signaling connection between mobile station and the network is established and in GSM when in Ready Mode. This makes it possible for the UE to start preparing an anticipated location service coming later by e.g. starting to measure GPS signals.

4) Security functions may be executed. These procedures are defined in TS 23.060 [15].

5) If the location request comes from a value added LCS client and the UE subscription profile indicates that the UE must either be notified or notified with privacy verification and the UE supports notification of LCS, a notification invoke message is sent to the target UE indicating the type of location request (e.g. current location) and the identity of the LCS client and the Requestor Identity (if that is both supported and available), whether privacy verification is required. Moreover, the message may carry also the service type and the codeword. Optionally, the SGSN may after sending the LCS Location Notification Invoke message continue in parallel the location process, i.e. continue to step 7 without waiting for a LCS Location Notification Return Result message in step 6.

6) The target UE notifies the UE user of the location request and, if privacy verification was requested, waits for the user to grant or withhold permission. The UE then returns a notification result to the SGSN indicating, if privacy verification was requested, whether permission is granted or denied. Optionally, this message can be returned some time after step 5, but before step 10. If the UE user does not respond after a predetermined time period, the SGSN shall infer a "no response" condition. The SGSN shall return an error response to the GMLC if privacy verification was requested and either the UE user denies permission or there is no response with the UE subscription profile indicating barring of the location request.

7) The SGSN sends a Location Request message to the RAN. This message includes the type of location information requested, the requested QoS and any other location information received in paging response.

9.1.6.2 Positioning Measurement Establishment Procedure

8) If the requested location information and the location accuracy within the QoS can be satisfied based on parameters received from the SGSN and the parameters obtained by the RAN e.g. cell coverage and timing information (i.e. RTT or TA), the RAN may send a Location Report immediately. Otherwise, the RAN determines the positioning method and instigates the particular message sequence for this method in UTRAN Stage 2 TS 25.305 and in GERAN Stage 2 TS 43.059. If the position method returns position measurements, the RAN uses them to compute a location estimate. If there has been a failure to obtain position measurements, the RAN may use the current cell information and, if available, RTT or TA value to derive an approximate location estimate. If an already computed location estimate is returned for an UE based position method, the RAN may verify consistency with the current cell and, if available, RTT or TA. If the location estimate so obtained does not satisfy the requested accuracy and sufficient response time still remains, the RAN may instigate a further location attempt using the same or a different positioning method. If a vertical location co-ordinate is requested but the RAN can only obtain horizontal co-ordinates, these may be returned.

9.1.6.3 Location Calculation and Release Procedure

9) When location information best satisfying the requested location type and QoS has been obtained, the RAN returns it to the SGSN in a Location Report message. The information about the positioning method used may be returned with the location information if the access network is GERAN in the A/Gb mode. If a location estimate could not be obtained, the RAN returns a Location Report message containing a failure cause and no location estimate.

10) The SGSN returns the location information and its age to the GMLC, if the SGSN has not initiated the Privacy Verification process in step 5. If step 5 has been performed for privacy verification, the SGSN returns the location information, only~~,~~ if it has received a LCS Location Notification Return Result indicating that permission is granted. In these cases, the information about the positioning method used may be sent with the location information. If a LCS Location Notification Return Result message indicating that permission is not granted is received, or there is no response, with the UE subscription profile indicating barring of location, the SGSN shall return an error response to the GMLC. If the SGSN did not return a successful location estimate, but the privacy checks were successfully executed, the SGSN may return the last known location of the target UE if this is known and the LCS client is requesting the current or last known location. The SGSN may record billing information.

11) The GMLC returns the UE location information to the requesting LCS client. If the LCS client requires it, the GMLC may first transform the universal location co-ordinates provided by the SGSN into some local geographic system. The GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN's network. The LCS Service Response from the GMLC to the LCS client may contain the information about the positioning method used.

~ ~ ~

3GPP TSG-SA2 Meeting #32 ***S2-031788***
San Diego, USA, 12th – 16th May, 2003 **(was *S2-031784, S2-031777, S2-031761, S2-031003*)**

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **182** ⌘ **rev** **3** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☒

Title:	⌘	Addition of Position Method Used, to attributes returned with location estimate.
Source:	⌘	AT&T Wireless Services, Ericsson, Nortel Networks
Work item code:	⌘	LCS2
Date:	⌘	12/05/2003
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘

When reporting location information for emergency and other calls, there is no way for the location services client to know what type of positioning method was used to obtain the longtitude and latitude that has been returned. This information would be useful as it would give an indication as to the relative accuracy of that information to the emergency and other location client services, should they have to rely on it.

This is especially significant and important for North American operators since TIA/EIA/IS-J-STD-036 (2000): "Emergency Services Data Communications" requires the conveyance of Positioning Method to the Emergency Center to provide a sanity check on the *Uncertainty* and *Confidence* information, which are derived based on non-standard vendor-based algorithms and not considered very reliable.

This information could also be used to provide the ability for operators to provide value add services based on accurate location reporting.

This is a R6 CR which applies to the cases when the access network is either GERAN in the A/Gb mode, GERAN in the Iu mode or UTRAN in the Iu mode. Note: TS 49.031 already specifies the conveyance of Positioning Method information to the GMLC (for GERAN in A/Gb mode).

It is left up to RAN and GERAN experts to determine the best way to provide the positioning method information over the Iu interface. No restrictions are placed on the actual format of this information.

Summary of change: ⌘ Text is added at appropriate parts of the TS to indicate that the positioning method used to determine the location estimate is also returned with the location

		estimate.
Consequences if not approved:	⌘	There would be no indication of the positioning method used to obtain a location estimate. Location clients would not be able to accurately and fully interpret the significance of the *Uncertainty* and *Confidence* information available in the network, resulting in misinterpretation of the reported location, as has been observed in actual field trials.

Clauses affected:	⌘	3.1, 4.2, 5.5.2, 5.6.2, 7.1.2, 9.1.1, 9.1.1A, 9.1.2, 9.1.5, 9.1.6			
Other specs affected:	⌘	**Y** / **N**		⌘	TSs 25.305, 25.413, 29.002
		X /	Other core specifications		
		/ **X**	Test specifications		
		/ **X**	O&M Specifications		
Other comments:	⌘	OMA MLP protocol over Le interface and OMA RLP protocol over Lr interface might be affected.			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

********** FIRST CHANGE **********

Positioning method (/locating method): method or technical solution, which is used to get an estimate of the target mobile's geographical location. For example positioning methods based on radio cell coverage, GPS or Assisted GPS methods, which are based on the Time-Of-Arrival (TOA) algorithm, and OTDOA or E-OTD methods, which are based on the Time-Difference-Of-Arrival (TDOA) algorithm. The positioning methods are further described in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16].~~principle and/or algorithm which the estimation of geographical location is based on, e.g. AOA, TOA, TDOA. For example, GPS is based on TOA, whilst OTDOA and E-OTD (on GSM) are based on TDOA~~

~~**Positioning technology (/locating technology):** technology or system concept including the specifications of RF interfaces, data types, etc. to process the estimation of a geographical location, e.g. GPS, E-OTD (GSM), and OTDOA (WCDMA)~~

********** NEXT CHANGE **********

4.2 Location Services Categories

Generally there are four categories of usage of the location service. These are the Commercial LCS, the Internal LCS, the Emergency LCS and the Lawful Intercept LCS. The definition of these services and their categories is outside the scope of the present document.

- The Commercial LCS (or Value Added Services) will typically be associated with an application that provides a value-added service to the subscriber of the service, through knowledge of the UE location and if available, and at the operator's discretion, the positioning method used to obtain the location estimate~~ to the subscriber of the service~~. This may be, for example, a directory of restaurants in the local area of the UE, together with directions for reaching them from the current UE location.

- The Internal LCS will typically be developed to make use of the location information of the UE for Access Network internal operations. This may include; for example, location assisted handover and traffic and coverage measurement. This may also include support certain O&M related tasks, supplementary services, IN related services and GSM bearer services and teleservices.

- The Emergency LCS will typically be part of a service provided to assist subscribers who place emergency calls. In this service, the location of the UE caller and, if available, the positioning method used to obtain the location estimate is provided to the emergency service provider to assist them in their response. This service may be mandatory in some jurisdictions. In the United States, for example, this service is mandated for all mobile voice subscribers.

- The Lawful Intercept LCS will use the location information to support various legally required or sanctioned services.

********** NEXT CHANGE **********

5.5.2 Location Service Response

The LCS server (GMLC) sends the Location Service Response to the LCS client either as an:

- Immediate Response; or a

- Deferred Response, these deferred responses can be either single or periodic.

The following attributes are identified for the Location Service Response information flow:

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032 or local coordinate system;
- The information about the positioning method used to obtain the location estimate of the UE, if it is available at the LCS server and if needed;
- Time stamp of location estimate;
- Indication when UE enters or leaves the Geographical area, if needed;
- Acknowledgement for a deferred location request, if needed.

In addition the information attributes of the location service request may be used also in the location service response.

********** NEXT CHANGE **********

5.6.2 Location Service Response

The Location Service Response is sent to the source LCS server as the result of the Location Service Request by the destination LCS Server:

- Immediate Response; or a
- Deferred Response, these deferred responses can be either single or periodic.

The following attributes are identified for the Location Service Response information flow:

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032;
- The information about the positioning method used to obtain the location estimate of the UE, if it is available at the LCS server and needed;
- Age of location estimate;
- Acknowledgement for a deferred location request, if needed.

In addition the information attributes of the location service request may be used also in the location service response.

********** NEXT CHANGE **********

7.1.2 Location Report

The access network reports the location of the Target UE to the core network entities. The location report may contain the following information as defined in the corresponding location request:

- the geographical co-ordinates of the Target UE;
- the positioning method used to obtain the location estimate if the access network is either GERAN in the A/Gb mode, GERAN in the Iu mode or UTRAN in the Iu mode.
- the service area in which the Target UE is located;
- achieved quality level of the location estimate.

********** NEXT CHANGE **********

9.1 Mobile Terminating Location Request

The MT-LR procedures for the location request from the LCS client which does not have the privacy override capability are described in the chapter 9.1.1.
The MT-LR procedures for the location request from the LCS client which has privacy the override capability (e.g. the request is come from the emergency service provider) are described in the chapter 9.1.1A. In this case the H-GMLC is not involved to the location procedures and the privacy check procedures in H-GMLC/PPR is skipped.

9.1.1 Common MT-LR procedure in PS and CS domain

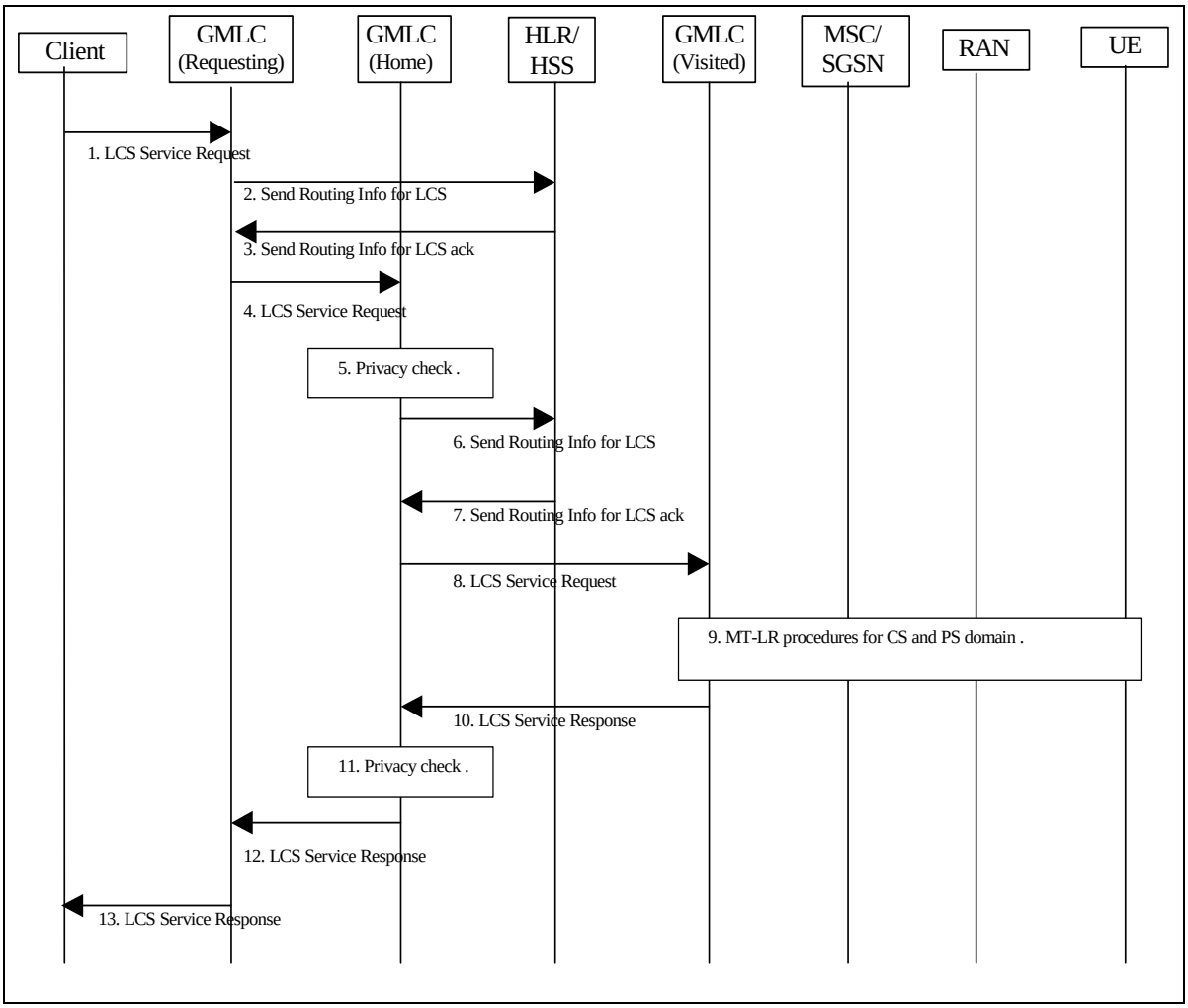

Figure 9.1: General Network Positioning for a MT-LR

1) An external LCS client requests the current location of a target UE from a GMLC. The LCS Client may also request a deferred location request, i.e. based on event. The R-GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI or pseudonym or PDP address, (NOTE: IP addressing in this context is FFS, one reason is the dynamic IP addressing used in IPv4.) of the target UE to be located and the LCS QoS from either subscription data or data supplied by the LCS client. For a call related location request, the LCS client includes the LCS client's called party number, as dialled by the target mobile user, in the LCS service request. For a session related location request, the LCS client includes the APN-NI of the LCS client, as used by the target UE, in the LCS service request. For a call/session related request the R-GMLC may verify that the called party number or APN-NI is correct for the LCS client in question. The LCS client's dialled number or APN-NI are checked in step 9 for the call/session related class.
The LCS request may carry also the Service Identity and the Codeword and the service coverage information. The R-GMLC may verify that the Service Identity received in the LCS request matches one of the service identities allowed for the LCS client. If the service identity does not match one of the service identities for the

LCS client, the R-GMLC shall reject the LCS request. Otherwise, the R-GMLC can map the received service identity in a corresponding service type.
If the location request is originated by a Requestor, the Requestor Identity may be added to the LCS service request. The LCS client should authenticate the Requestor Identity but this is outside the scope of this specification. The LCS service request may also contain the type of the Requestor identity if the requestor identity was included.
If the H-GMLC address is not contained in the pseudonym or cannot deduced from the pseudonym, the R-GMLC shall determine the verinym for the pseudonym. In this case the R-GMLC may access to its associated PMD as described in 9.1.1.3.
The R-GMLC verifies whether it stores the privacy profile of the target UE. If the R-GMLC stores the UE's privacy profile, (this means the R-GMLC is the H-GMLC of the target UE), then step 2, 3, 4 and 12 are skipped.
If location is required for more than one UE, or if periodic location is requested, the steps following below may be repeated.

Note: This means that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain.

2) If the R-GMLC already knows, (e.g. from a previous location request or an internal lookup table), or is able to determine, (e.g. it is possible to use a DNS lookup mechanism similar to IETF RFC 2916), the network address of H-GMLC of the target UE, or in case the location service request contains the target UE's pseudonym, which includes the target UE's Home-GMLC address, or a pseudonym from which the target UE's Home-GMLC address can be deduced, then this step and step 3 may be skipped.
Otherwise, the R-GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI or MSISDN of the UE.
The details of the alternative methods of retrieving H-GMLC address other than the sending SEND_ROUTING_INFO_FOR_LCS message to the HLR/HSS, (e.g. internal lookup table, DNS lookup mechanism), are not in the scope of this specification.

Editor´s note: According to the current version of TS29.002 the PDP address cannot be transferred by using the SEND_ROUTING_INFO_FOR_LCS message, so this is for ffs.

Editor´s note: The support for number portability with these alternative solutions of retrieving H-GMLC address still needs further study and should be in line with the general solution to support number portability in Rel-6.

3) The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned.
Otherwise the HLR/HSS returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes if available and whichever of the IMSI and MSISDN that was not provided in step 2. The HLR/HSS returns the address of the H-GMLC. The HLR/HSS also returns the address of the PPR and V-GMLC, if available.

Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to the GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

4) If R-GMLC finds out that it is the H-GMLC, the signalling steps 4 and 12 are skipped.
If the R-GMLC did not receive the H-GMLC address in step 3 and can not retrieve the H-GMLC address in some other way (e.g. DNS lookup), then steps 4, 5, 6, 7, 8, 10, 11 and 12 are skipped and the R-GMLC directly sends the PSL message to the serving node.
Otherwise, the R-GMLC sends the location request to the H-GMLC. If one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes, IMSI and MSISDN for the target UE and the address of the V-GMLC and the PPR have been retrieved in Step 3, the R-GMLC shall pass the information with the location request to the H-GMLC. The R-GMLC shall also send the service coverage information to the H-GMLC, if the information is available.

5) The H-GMLC verifies whether the R-GMLC is authorized to request UE location information. If the R-GMLC is not authorized, an error response is returned.
If the LCS service request contains the pseudonym of the target UE and the H-GMLC cannot resolve the PMD address from the pseudonym, the H-GMLC itself determines the verinym (MSISDN or IMSI) of the target UE. If the H-GMLC can resolve the address of PMD from the pseudonym, the H-GMLC requests the verinym from its associated PMD, see clause 9.1.1.3. In this case, if H-GMLC is not able to obtain the verinym of the target UE, the H-GMLC shall cancel the location request.
The H-GMLC performs privacy check on the basis of the UE user's privacy profile stored in the H-GMLC and

the capabilities of the serving nodes (MSC/VLR and/or SGSN), if available. The H-GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1. If the key of the UE user's privacy profile (i.e. MSISDN or IMSI) is not available, the privacy check in this step shall be performed after step 7. The H-GMLC/PPR verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC/PPR. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If the location service request is to be barred, an error response is returned to the R-GMLC or the LCS client. As a result of the privacy check, the H-GMLC/PPR selects an indicator of the privacy check related action and/or a pseudo-external identity. (The details of the indicator of the privacy check related action and the pseudo-external identity are described in Annex C). If the requested type of location is "current or last known location" and the requested maximum age of location information is available, the H-GMLC verifies whether it stores the previously obtained location estimate of the target UE. If the H-GMLC stores the location estimate and the location estimate satisfies the requested accuracy and the requested maximum age of location, the H-GMLC checks the result of the privacy check. In case the result of the privacy check for call/session unrelated class is "Location allowed without notification" then steps 6, 7, 8, 9 and 10 may be skipped.

6) If the H-GMLC already knows IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), and the VMSC/MSC server address or SGSN address, the rest of this step and step 7 may be skipped. Otherwise, the H-GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI, PDP address or MSISDN of this UE.

Editor´s note: According to the current version of TS29.002 the PDP address cannot be transferred by using the SEND_ROUTING_INFO_FOR_LCS message, so this is for ffs.

7) The HLR/HSS then returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes and whichever of the IMSI and MSISDN that was not provided in step (6) for the particular UE. The HLR/HSS may also return the address of the PPR and the V-GMLC, if available.

Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to the GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

8) If step 6 and step 7 were performed, the H-GMLC/PPR may do a new privacy check.
Also if the location request is an immediate location request and the service coverage information (i.e. list of country codes) was sent from R-GMLC, the H-GMLC checks the country codes of the serving node addresses. If the H-GMLC finds out the current SGSN and/or VMSC/MSC server locates out of the service coverage, the H-GMLC returns an appropriate error message to the R-GMLC or the LCS client.
In the cases when the H-GMLC did not receive the address of the V-GMLC, or when the V-GMLC address is the same as the H-GMLC address, or when both PLMN operators agree not to use the Lr interface, the H-GMLC does not send the location request to the V-GMLC and step 10 is skipped. In this case, the H-GMLC sends the location service request message to the serving node.
If the H-GMLC received the address of the V-GMLC from the HLR/HSS and the V-GMLC address is different from the H-GMLC address, the H-GMLC may send the location request to the V-GMLC. The location request shall contain one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN of the target UE. The location request may also carry the requested action of the VPLMN as the result of the privacy check in the H-GMLC (e.g. by using the pseudo-external identity as described in Annex C). The V-GMLC first authenticates that the location request is allowed from this GMLC, PLMN or from this country. If not, an error response is returned.

Editor's note: The case when the V-GMLC is the same as the R-GMLC may need further elaboration.

9) In case the GMLC (H-GMLC, R-GMLC or V-GMLC) receives only the MSC/VLR address, the MT LR proceeds as the CS-MT-LR procedure described in 9.1.2. In case GMLC receives only the SGSN address, the MT LR proceeds as the PS-MT-LR procedure described in 9.1.6. In case the GMLC receives several of the following addresses, SGSN, VMSC and/or MSC Server, it has to decide where to send the location request. If the requested MT-LR is known to be associated with a CS call, the CS-MT-LR procedure shall be invoked. If the requested MT-LR is associated with a PS session, the PS-MT-LR procedure shall be invoked. Otherwise, both CS-MT-LR and PS-MT-LR are applicable. If LCS Client indicated deferred location request, GMLC shall indicate this together with applicable event type (e.g. UE available) in the requested PS/CS-MT-LR, see 9.1.8.

NOTE: The order in which these procedures are invoked and whether one or both procedures are used may depend on information in the LCS service request, subscription information for the LCS client, possible priority information returned by the HSS or information already stored in the GMLC (e.g. obtained from previous location requests).

10) The V-GMLC sends the location service response to the H-GMLC. The location service response may contain the information about the positioning method used.

11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check or the GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1. If the location request from the R-GMLC or the LCS client contained the pseudonym, the H-GMLC shall use the pseudonym of the target UE in the location response to the R-GMLC or the LCS client. One example when this additional privacy check is needed is when the target UE user has defined different privacy settings for different geographical locations.

12) The H-GMLC sends the location service response to the R-GMLC. The H-GMLC may store the location information and its age. The location service response may contain the information about the positioning method used.

13) R-GMLC sends the location service response to the LCS client. If the location request from the LCS client contained the pseudonym and the R-GMLC resolved the verinym from the pseudonym in the step 1, the R-GMLC shall use the pseudonym of the target UE in the location response to the LCS client. If the LCS client requires it, the R-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system. The GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN or MSC/MSC server's network. The location service response from the R-GMLC to the LCS client may contain the information about the positioning method used.

The detailed CS-MT-LR and PS-MT-LR procedures in step 9 of figure 9.1 are described in 9.1.2 and 9.1.6.The detailed procedure for deferred PS/CS-MT-LR is described in 9.1.8.

********** NEXT CHANGE **********

9.1.1A Common MT-LR procedure in PS and CS domain for Emergency MT-LR

NOTE: The network induced location request as described in chapter 9.1.5 may be used in some cases to determine the location of the UE used for an emergency call. This chapter describes the case when the emergency centre initiates an emergency MT-LR.

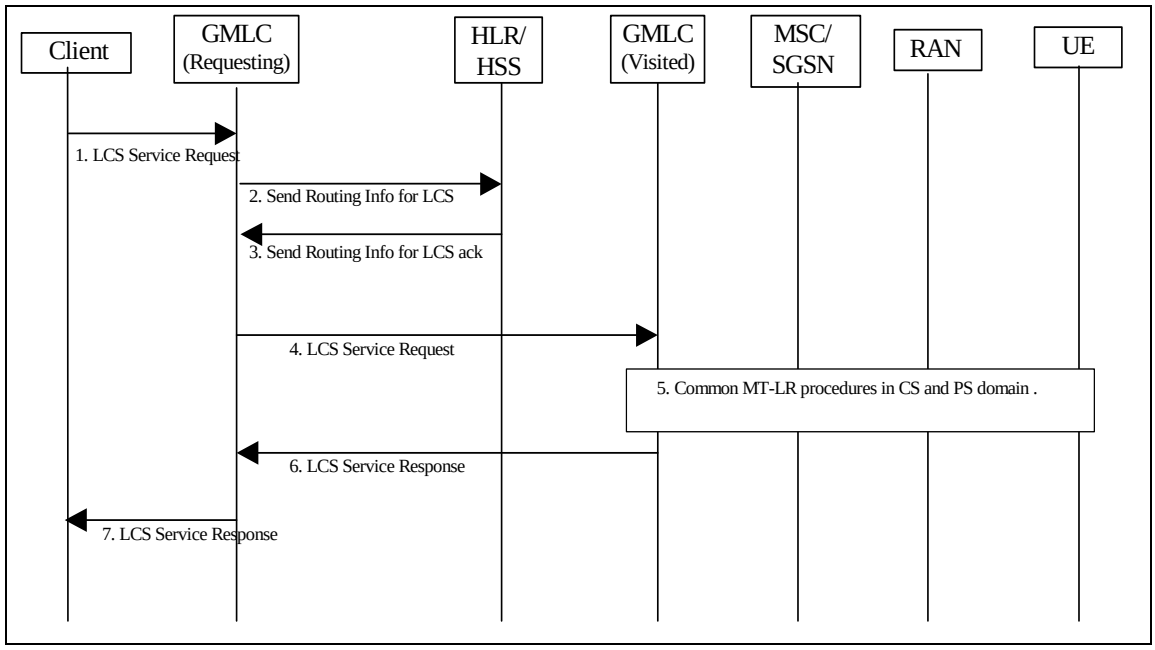

Figure 9.1A: Network Positioning for an Emergency MT-LR

1) An external LCS client which has the privacy override capability, (e.g. Emergency service provider), requests the location of a target UE from a GMLC. The R-GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI of the target UE to be located and the LCS QoS from either subscription data or data supplied by the LCS client.

2) If the R-GMLC already knows IMSI for the particular MSISDN, (e.g. from a previous location request) and the VMSC/MSC server address or SGSN address, this step and step 3 may be skipped. Otherwise, the R-GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI or MSISDN of this UE.

3) The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned.
Otherwise the HLR/HSS returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server and whichever of the IMSI and MSISDN that was not provided in step 2. The HLR/HSS also returns the address of the V-GMLC, if available.

Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to the GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

4) In the cases when the R-GMLC did not receive the address of the V-GMLC, or when the V-GMLC address is the same as the R-GMLC address, or when both PLMN operators agree not to use the Lr interface, the R-GMLC does not send the location request to the V-GMLC and the step 6 is skipped. In this case, the R-GMLC sends the location service request message directly to the serving node.
If the R-GMLC received the address of the V-GMLC from the HLR/HSS and the V-GMLC address is different from the R-GMLC address, the R-GMLC sends the location request to the V-GMLC. The location request shall contain one or several of the network addresses of the current SGSN and/or MSC/VLR, the IMSI and MSISDN of the target UE and the privacy override indicator. The V-GMLC first authenticates that the location request is allowed from this GMLC, PLMN or from this country. If not, an error response is returned.

5) In case the GMLC receives only the MSC/VLR address, the MT LR proceeds as the CS-MT-LR procedure described in 9.1.2. In case GMLC receives only the SGSN address, the MT LR proceeds as the PS-MT-LR procedure described in 9.1.6. In case the GMLC receives several of the following addresses, SGSN, VMSC and/or MSC Server, it has to decide where to send the location request.

NOTE: The order in which these procedures are invoked and whether one or both procedures are used may depend on information in the LCS service request, subscription information for the LCS client, possible priority information returned by the HLR/HSS or information already stored in the GMLC (e.g. obtained from previous location requests).

6) The V-GMLC sends the location service response to the R-GMLC. The location service response may contain the information about the positioning method used.

7) R-GMLC sends the location service response to the LCS client. If the LCS client requires it, the R-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system. The location service response from the GMLC to the LCS client may contain the information about the positioning method used.

The detailed CS-MT-LR and PS-MT-LR procedures in step 5 of figure 9.1A are described in 9.1.2 and 9.1.6.

********** NEXT CHANGE **********

9.1.2 Circuit Switched Mobile Terminating Location Request (CS-MT-LR)

Figure 9.2 illustrates general network positioning for LCS clients external to the PLMN. In this scenario, it is assumed that the target UE is identified using either an MSISDN or IMSI.

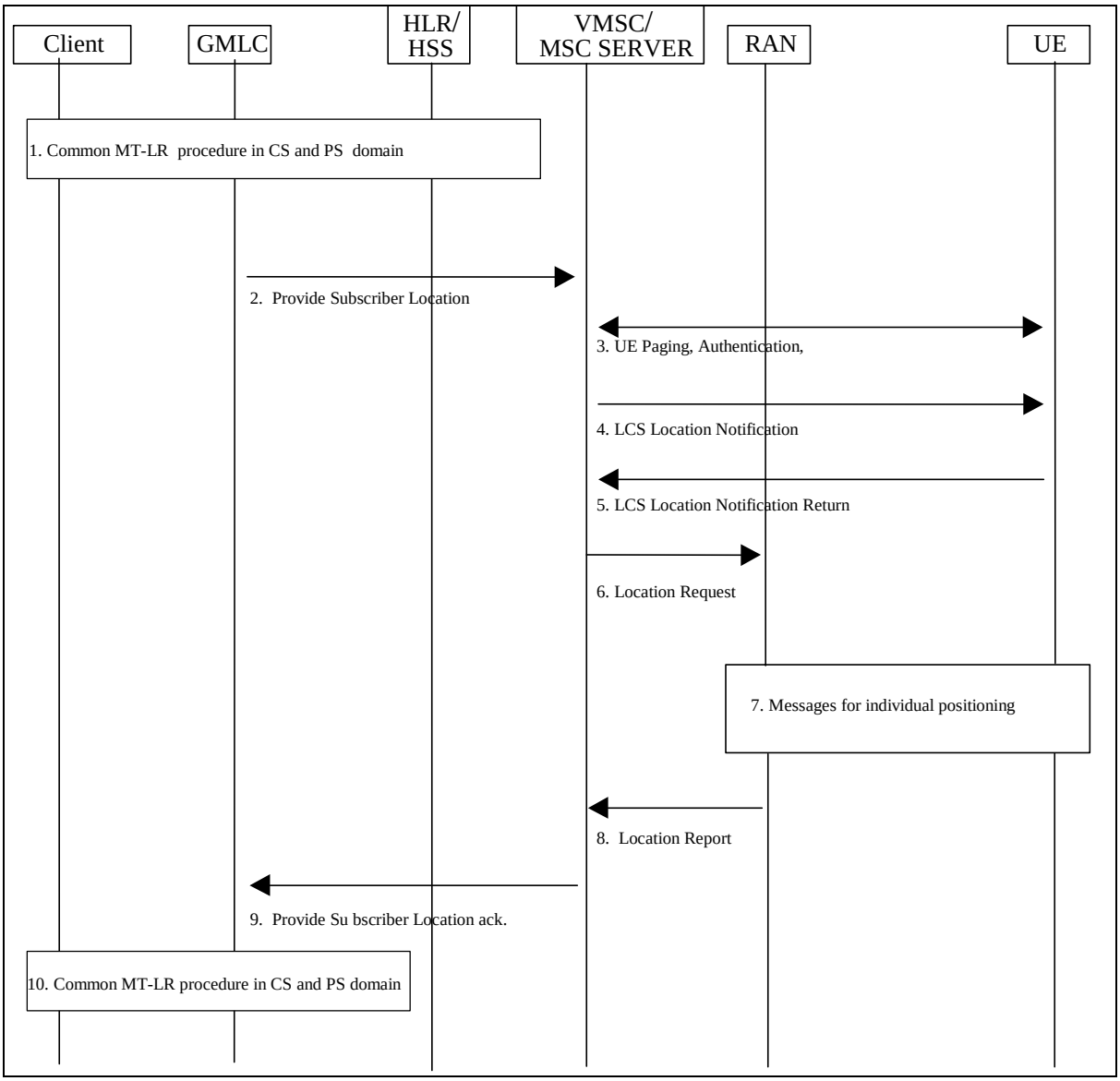

Figure 9.2: Network Positioning for a CS-MT-LR

9.1.2.1 Location Preparation Procedure

1) Common PS and CS MT-LR procedure as described in 9.1.1.

2) The GMLC sends a PROVIDE_ SUBSCRIBER _LOCATION message to the MSC/MSC server indicated by the HLR/HSS. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a call related location request, the message also carries the LCS client's called party number. For a value added LCS client, the message shall carry the client name, the external identity of the LCS client and the Requestor Identity (if that is both supported and available). Also the message may carry the type of the LCS client name and also the type of the Requestor identity if the requestor identity was included. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. Moreover the message may also carry the Service Type**.** If the result of the privacy check at H-GMLC/PPR indicated that the codeword shall be sent to the UE user, the message may carry also the codeword received from the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. If the Requestor Identity is provided, the GMLC shall send it as separate information. In addition, in order to display the requestor identity in case of pre rel-5 network elements (i.e. MSC and/or UE), the requestor identity may be also added to the LCS client name by the GMLC. When the Requestor identity is added to the LCS client name the practise described in the Annex D should be followed. The message also shall carry the indication of the requested privacy related action (i.e. checking the on-going call/session and/or notification/verification procedures) in the MSC, which is provided by H-GMLC.

3) If the GMLC is located in another PLMN or another country, the VMSC/MSC server first authenticates that a location request is allowed from this PLMN or from this country. If not, an error response is returned. If the PSL message from the GMLC does not include the indication of the requested privacy related action, the VMSC/MSC server then verifies LCS barring restrictions in the UE user's subscription profile in the MSC server. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If LCS is to be barred without notifying the target UE and a LCS client accessing a GMLC in the same country does not have the override capability, an error response is returned to the GMLC.
   Otherwise, if the UE is in idle mode, the Core Network performs paging, authentication and ciphering. The MSC will page a GPRS attached UE either through A/Iu or Gs interface, depending on the presence of the Gs interface (see Note).The UE will inform the network about its LCS capabilities, as described in chapter 6.3.4.. If the UE is instead in dedicated mode, the VMSC/MSC server will already have UE classmark information. In GSM this is supported by controlled early classmark sending.

[Note 1: In GSM, if the target UE has an established circuit call other than speech, the location request may be denied and an error response is then returned to the GMLC. If the location request is allowed for a non-speech circuit call, it shall be up to RAN to decide, on the basis of the applicable position methods and requested QoS, whether positioning is possible. This is FFS]

Note: In some network mode of operation, a GPRS capable UE may not receive the CS paging. In addition, upon receipt of a CS paging, a GPRS capable UE may immediately answer to the Paging Request or delay the answer, as defined in 3GPP TS 22.060 and 23.060. A GPRS UE in class B mode may also suspend its GPRS traffic, sending a GPRS Suspension Request to the network.

4) If the location request comes from a value added LCS client and the requested privacy action or the UE subscription profile indicates that the UE must either be notified or notified with privacy verification and the UE supports notification of LCS (according to the UE Capability information), an LCS Location Notification Invoke message is sent to the target UE indicating the type of location request (e.g. current location) and the identity of the LCS client, the Requestor Identity (if that is both supported and available) and whether privacy verification is required. Also the message may indicate the type of the LCS client name and also the type of the Requestor identity if the requestor identity was included. Moreover, the message may carry also the service type and the codeword.

   [FFS: For a call related location request, the LCS client identity shall be set to the LCS client's called party number if no separate LCS client identity was received from the GMLC.] Optionally, the VMSC/MSC server may after sending the LCS Location Notification Invoke message continue in parallel the location process, i.e. continue to step 6 without waiting for a LCS Location Notification Return Result message in step 5.

NOTE 2: This step is for further study, it should be investigated e.g. which client identities to include in the Privacy Notification message to be shown to the end-user.

5) The target UE notifies the UE user of the location request. If privacy verification was requested, the target UE indicates to the UE user whether the location request will be allowed or not allowed in the absence of a response and waits for the user to grant or withhold permission. The UE then returns an LCS Location Notification Return Result to the VMSC/MSC server indicating, if privacy verification was requested, whether permission is granted or denied. Optionally, the LCS Location Notification Return Result message can be returned some time after step 4, but before step 9. If the UE user does not respond after a predetermined time period, the VMSC/MSC server shall infer a "no response" condition. The VMSC/MSC server shall return an error response to the GMLC if privacy verification was requested and either the UE user denies permission or there is no response with the UE subscription profile indicating barring of the location request in the absence of a response.

6) The MSC/MSC server sends a Location Request message to RAN. This message includes the type of location information requested and requested QoS and, in GSM, the UE's location capabilities.

9.1.2.2 Positioning Measurement Establishment Procedure

7) RAN determines the positioning method and instigates the particular message sequence for this method, as specified in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16].

9.1.2.3 Location Calculation and Release Procedure

8) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the MSC/MSC server in a Location Report message. The information about the positioning method used may be returned with the location estimate. If a location estimate could not be obtained, RAN returns a Location Report message containing a failure cause and no location estimate.

9) The MSC/MSC server returns the location information and its age to the GMLC, if the VMSC/MSC server has not initiated the Privacy Verification process in step 4. If step 4 has been performed for privacy verification, the VMSC/MSC server returns the location information only, if it has received a LCS Location Notification Return Result indicating that permission is granted. In these cases, the information about the positioning method used may be sent with the location information. If a LCS Location Notification Return Result message indicating that permission is not granted is received, or there is no response, with the requested privacy action or the UE subscription profile indicating barring of location in the absence of a response, the VMSC/MSC server shall return an error response to the GMLC. If RAN did not return a successful location estimate, but the privacy checks in steps 4 - 5 were successfully executed, the VMSC/MSC server may return the last known location of the target UE if this is known and the LCS client is requesting the current or last known location. The MSC server may then release the Mobility Management connection to the UE, if the UE was previously idle, and the MSC/MSC server may record billing information.

10) Common MT-LR procedure in PS and CS domain as described in 9.1.1.

********** NEXT CHANGE **********

9.1.3 CS-MT-LR without HLR Query - applicable to North America Emergency Calls only

Figure 9.3 illustrates current or last known location requests for a North American Emergency Services call, where an emergency services client (i.e., a Public Safety Answering Point) identifies the target UE and the serving GMLC using either an NA-ESRK, or an MSISDN and NA-ESRD that were previously provided to it by the VMSC. This allows the GMLC to request location from the VMSC without first querying the home HLR of the target UE. This scenario presumes that the initial location, as well as UE and VMSC identifying information had been pushed to the GMLC as per [36].

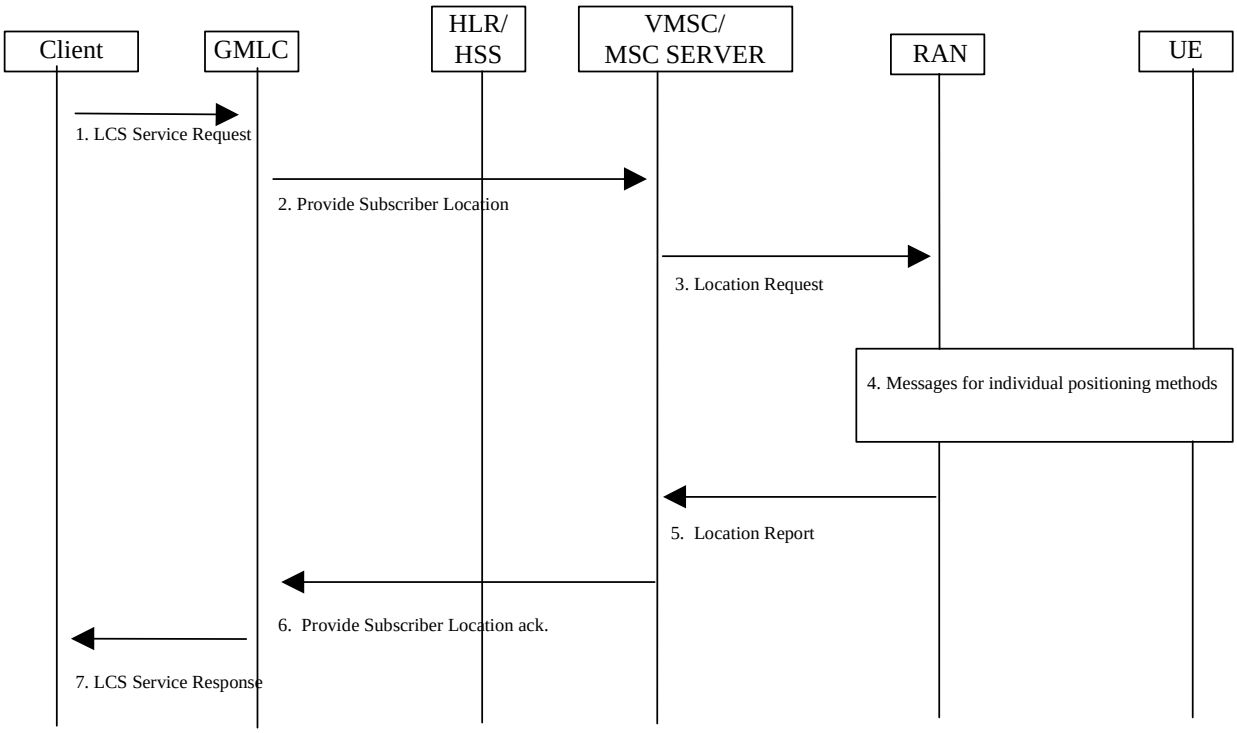

Figure 9.3: Positioning for a Emergency Services MT-LR without HLR Query

1) Same as step 1 in figure 9.1 but with the LCS client identifying first the target UE and the serving GMLC by an - NA-ESRK or MSISDN and NA-ESRD.

2) If the GMLC already has stored information for the target UE (e.g. from a prior location estimate delivery to the LCS client), the GMLC may determine the VMSC from this information. Otherwise, the GMLC determines the VMSC using the NA-ESRK or NA-ESRD - with use of the NA-ESRK taking priority over that of the NA-ESRD. The MAP_PROVIDE_SUBSCRIBER_LOCATION message sent to the VMSC carries the MSISDN and, if provided, the IMSI and IMEI for the target UE, as well as the required QoS and an indication of a location request from an emergency services client. The VMSC identifies the target UE using the IMSI or MSISDN and, if provided, the IMEI. In the case of a SIM-less UE making the emergency call, the MSISDN will have been populated with a non-dialable callback number consisting of the digits: 911, and the last seven digits of the IMEI provided in the emergency call.

3) The MSC verifies that UE privacy is overridden by the emergency services provider and that positioning is not prevented for other reasons (e.g. unreachable UE, inapplicable call type to the UE). The VMSC then sends a Location Request to the RAN, as for a normal MT-LR.

4) RAN performs positioning as for a normal CS-MT-LR.

5) RAN returns a location estimate to the VMSC as for a normal CS-MT-LR.

6) Same as step~~s~~ 9 for a normal CS-MT-LR.

7) Same as step~~s~~ 10 for a normal CS-MT-LR.

********** NEXT CHANGE **********

9.1.5 Network Induced Location Request (NI-LR)

Figure 9.4 illustrates positioning for an emergency service call.

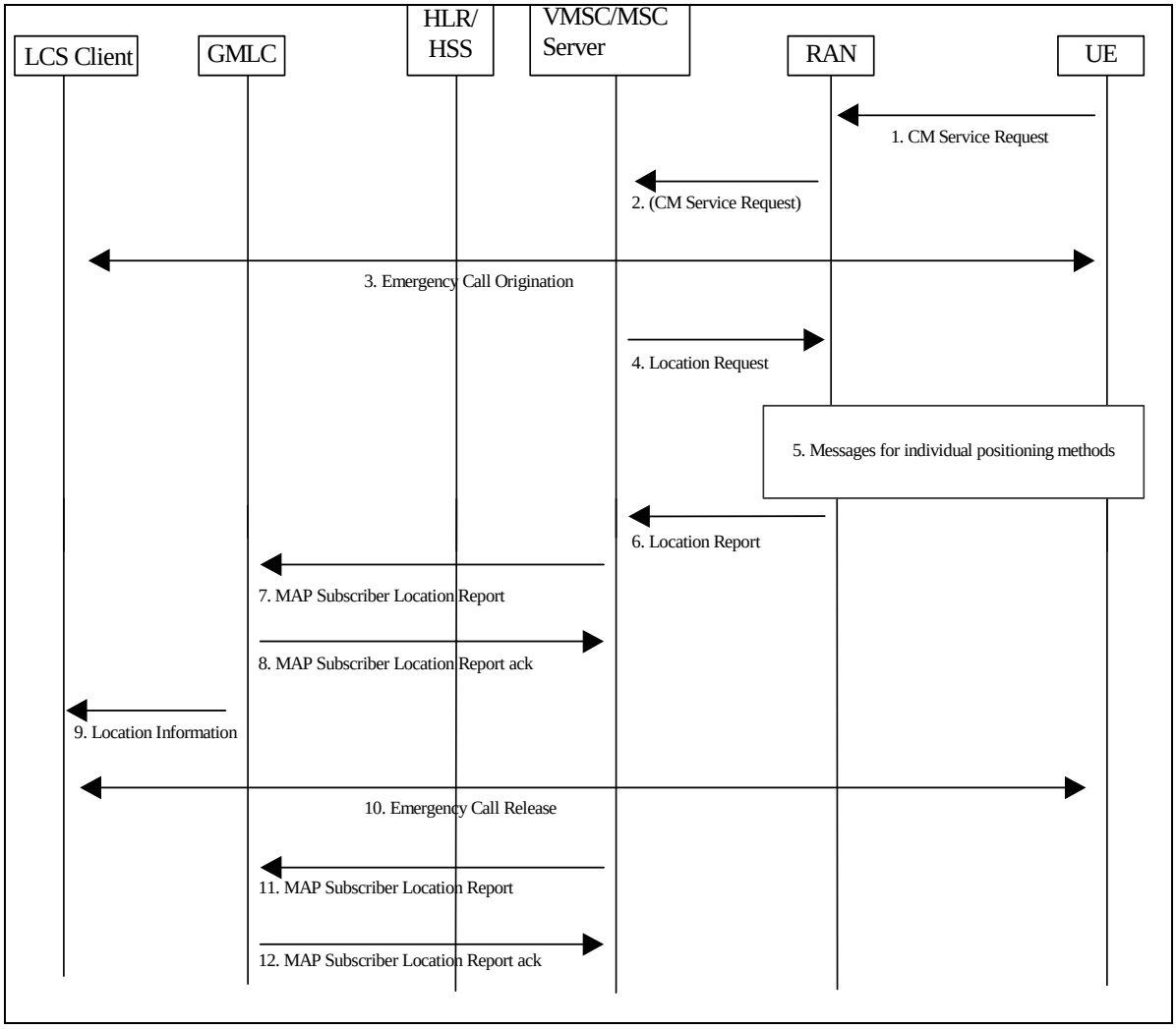

Figure 9.4: Positioning for a NI-LR Emergency Service Call

9.1.5.1 Location Preparation Procedure

1) An initially idle UE requests radio connection setup indicating a request for an Emergency Service call to the VMSC/MSC server via RAN.

2) RAN shall convey the CM service request to the core network. (Before having a CM connection there must be a radio connection.) The UE may identify itself using a TMSI, IMSI or IMEI.

3) The emergency call procedure is applied. The VMSC/MSC server, RAN and UE continue the normal procedure for emergency call origination towards the appropriate emergency services client. Depending on local regulatory requirements, the sending of call setup information into the PSTN may be delayed until either the UE's location has been obtained or the location attempt has failed or a PLMN defined timer has expired before location was obtained. Call setup information sent into the PSTN may include the UE location (if already obtained) plus information that will enable the emergency service provider to request UE location at a later time (e.g. NA-ESRD and NA-ESRK in North America).

4) At any time after step 1, the VMSC/MSC server may initiate procedures to obtain the UE's location. These procedures may run either in parallel with the emergency call origination or while emergency call origination is

suspended to delay sending of call setup information into the PSTN according to step 3. The VMSC/MSC server sends a Location Request message to RAN associated with the UE's current location area (see step 6 for a MT-LR). This message includes the QoS required for an emergency call.

9.1.5.2 Positioning Measurement Establishment Procedure

5) When a location estimate best satisfying the requested QoS has been obtained, the RAN returns it to the MSC server in a location response. If a location estimate could not be obtained, the RAN returns a location response containing a failure cause and no location estimate.

9.1.5.3 Location Calculation and Release Procedure

6) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the VMSC/MSC server in a Location Report. The information of the positioning method used may be returned with the location estimate.

7) Depending on local regulatory requirements, the VMSC/MSC server may send a MAP Subscriber Location report to a GMLC associated with the emergency services provider to which the emergency call has been or will be sent. This message shall carry any location estimate returned in step 6, the age of this estimate and may carry the MSISDN, IMSI and IMEI of the calling UE, and the information about the positioning method used. In North America, any NA-ESRD and any NA-ESRK that may have been assigned by the VMSC/MSC server shall be included. The message shall also indicate the event that triggered the location report. If location failed (i.e. an error result was returned by RAN in step 6), an indication of failure rather than a location estimate may be sent to the GMLC: the indication of failure is conveyed by not including a location estimate in the MAP Subscriber Location Report.

8) The GMLC acknowledges receipt of the location information. For a North American Emergency Services call, the GMLC shall store the location information for later retrieval by the emergency services LCS client.

9) The GMLC may optionally forward the information received in step 8 to the emergency services LCS client. For a North American emergency services call the client is expected to obtain the location information by requesting it from the GMLC. The information about the positioning method used may be sent with the location information from the GMLC to the LCS client.

10) At some later time, the emergency services call is released.

11) For a North American Emergency Services call, the MSC/MSC server sends another MAP Subscriber Location Report to the GMLC. This message may include the same parameters as before except that there is no position estimate and an indication of emergency call termination is included.

12) The GMLC acknowledges the MSC/MSC server notification and may then release all information previously stored for the emergency call.

Editorial Note: The procedure for Network Induced Location Request (NI-LR and PS-NI-LR) for a Target UE in dedicated mode should be defined in UTRAN system stage 2 [1] and GERAN Stage 2 specifications [16].

********** LAST CHANGE **********

9.1.6 Packet Switched Mobile Terminating Location Request (PS-MT-LR)

Figure 9.5 illustrates the general network positioning for LCS clients external to the PLMN for packet switched services. In this scenario, it is assumed that the target UE is identified using an MSISDN, PDP address or IMSI.

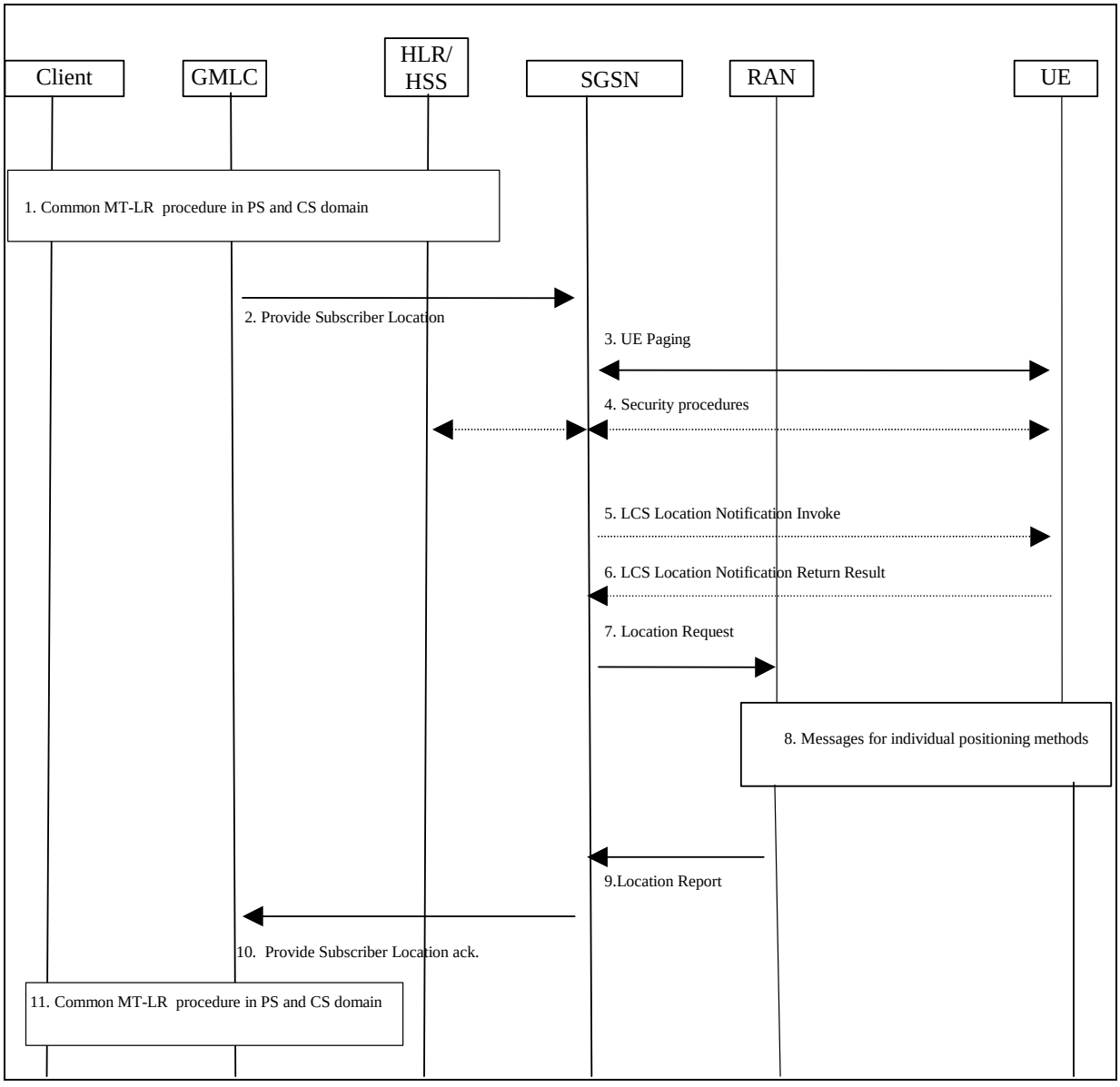

Figure 9.5: General Network Positioning for Packet Switched MT-LR

9.1.6.1 Location Preparation Procedure

1) Common PS and CS MT-LR procedure as described in 9.1.1.

2) GMLC sends a Provide Subscriber Location message to the SGSN indicated by the HLR/HSS. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a session related location request, the message also carries the APN-NI to which the user has established the session. For a value added LCS client, the message shall carry the client name, the external identity of the LCS client and the Requestor Identity (if that is both supported and available), optionally the message may also carry the Service Type. Also the message may carry the type of the LCS client name and also

the type of the Requestor identity if the requestor identity was included. If the result of the privacy check at H-GMLC/PPR indicated that the codeword shall be sent to the UE user, the message may carry also the codeword received from the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. If the Requestor Identity is provided, the GMLC shall send it as separate information. In addition, in order to display the requestor identity in case of pre rel-5 network elements (i.e. SGSN and/or UE), the requestor identity may be also added to the LCS client name by the GMLC. When the Requestor identity is added to the LCS client name the practise described in the Annex D should be followed. The message also shall carry the indication of the requested privacy related action (i.e. checking the on-going call/session and/or notification/verification procedures) in the SGSN, which is provided by H-GMLC.

3) If the GMLC is located in another PLMN or another country, the SGSN first authenticates that a location request is allowed from this PLMN or from this country. If not, an error response is returned. If the PSL message from the GMLC does not include the indication of the requested privacy related action, the SGSN then verifies LCS barring restrictions in the UE user's subscription profile in the SGSN. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If LCS is to be barred without notifying the target UE and a LCS client accessing a GMLC in the same country does not have the override capability, an error response is returned to the GMLC.
Otherwise, if the UE is in idle mode, the SGSN performs paging. The paging procedure is defined in TS 23.060[15].

   FFS: The UE may be paged for location services even when in UMTS a signaling connection between mobile station and the network is established and in GSM when in Ready Mode. This makes it possible for the UE to start preparing an anticipated location service coming later by e.g. starting to measure GPS signals.

4) Security functions may be executed. These procedures are defined in TS 23.060 [15].

5) If the location request comes from a value added LCS client and the requested privacy action or the UE subscription profile indicates that the UE must either be notified or notified with privacy verification and the UE supports notification of LCS, a notification invoke message is sent to the target UE indicating the type of location request (e.g. current location) and the identity of the LCS client and the Requestor Identity (if that is both supported and available), whether privacy verification is required. Also the message may indicate the type of the LCS client name and also the type of the Requestor identity if the requestor identity was included. Moreover, the message may carry also the service type and the codeword. Optionally, the SGSN may after sending the LCS Location Notification Invoke message continue in parallel the location process, i.e. continue to step 7 without waiting for a LCS Location Notification Return Result message in step 6.

6) The target UE notifies the UE user of the location request and, if privacy verification was requested, waits for the user to grant or withhold permission. The UE then returns a notification result to the SGSN indicating, if privacy verification was requested, whether permission is granted or denied. Optionally, this message can be returned some time after step 5, but before step 10. If the UE user does not respond after a predetermined time period, the SGSN shall infer a "no response" condition. The SGSN shall return an error response to the GMLC if privacy verification was requested and either the UE user denies permission or there is no response with the UE subscription profile indicating barring of the location request.

7) The SGSN sends a Location Request message to the RAN. This message includes the type of location information requested, the requested QoS and any other location information received in paging response.

9.1.6.2 Positioning Measurement Establishment Procedure

8) If the requested location information and the location accuracy within the QoS can be satisfied based on parameters received from the SGSN and the parameters obtained by the RAN e.g. cell coverage and timing information (i.e. RTT or TA), the RAN may send a Location Report immediately. Otherwise, the RAN determines the positioning method and instigates the particular message sequence for this method in UTRAN Stage 2 TS 25.305 and in GERAN Stage 2 TS 43.059. If the position method returns position measurements, the RAN uses them to compute a location estimate. If there has been a failure to obtain position measurements, the RAN may use the current cell information and, if available, RTT or TA value to derive an approximate location estimate. If an already computed location estimate is returned for an UE based position method, the RAN may verify consistency with the current cell and, if available, RTT or TA. If the location estimate so obtained does not satisfy the requested accuracy and sufficient response time still remains, the RAN may instigate a further location attempt using the same or a different position method. If a vertical location co-ordinate is requested but the RAN can only obtain horizontal co-ordinates, these may be returned.

9.1.6.3 Location Calculation and Release Procedure

9) When location information best satisfying the requested location type and QoS has been obtained, the RAN returns it to the SGSN in a Location Report message. The information of the positioning method used may be returned with the location information. If a location estimate could not be obtained, the RAN returns a Location Report message containing a failure cause and no location estimate.

10) The SGSN returns the location information and its age to the GMLC, if the SGSN has not initiated the Privacy Verification process in step 5. If step 5 has been performed for privacy verification, the SGSN returns the location information only, if it has received a LCS Location Notification Return Result indicating that permission is granted. In these cases, the information about the positioning method used may be sent with the location information. If a LCS Location Notification Return Result message indicating that permission is not granted is received, or there is no response, with the requested privacy action or the UE subscription profile indicating barring of location, the SGSN shall return an error response to the GMLC. If the SGSN did not return a successful location estimate, but the privacy checks were successfully executed, the SGSN may return the last known location of the target UE if this is known and the LCS client is requesting the current or last known location. The SGSN may record billing information.

11) Common MT-LR procedure in PS and CS domain as described in 9.1.1.

~ ~ ~

3GPP TSG-SA WG2 Meeting #32
San Diego, USA, 12-16 May 2003

Tdoc* ⌘*S2-031789
(revised S2-031779, S2-031766)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **185** ⌘ **rev** **2** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [ ] Radio Access Network [X] Core Network [ ]

Title:	⌘	Alignment of TS 23.271 with GERAN acceptance of U-TDOA location determination method
Source:	⌘	AWS, TruePosition
Work item code:	⌘	LCS2, UTDOA CS
Date:	⌘	15/5/2003
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Align 23.271 with GERAN 43.059 to reflect inclusion of Uplink TDOA
Summary of change:	⌘	Add U-TDOA as an additional location method
Consequences if not approved:	⌘	Misalignment of TS 23.271 with GERAN's TS 43.059

Clauses affected:	⌘	3.3, 4.3.2

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	

Other comments: ⌘

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<<**First changed section**>>

3.3 Abbreviations

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

2G-	Second Generation
3G-	Third Generation
AC	Admission Control
AI	Application Interface (prefix to interface class method)
ANM	Answer Message (ISUP)
APN	Access Point Name
APN-NI	APN Network Identifier
ARIB	Association of Radio Industries and Business
ATD	Absolute Time Difference
BCCH	Broadcast Control Channel
BER	Bit Error Rate
BSS	Base Station Subsystem
BTS	Base Transceiver Station
CAMEL	Customised Application For Mobile Network Enhanced Logic
CAP	CAMEL Application Part
CM	Connection Management
CN	Core Network
CSE	Camel Service Environment
DL	Downlink
DRNC	Drift RNC
E-OTD	Enhanced Observed Time Difference
FER	Frame Error Rate
GERAN	GSM EDGE Radio Access Network
GGSN	Gateway GPRS Support Node
GMLC	Gateway MLC
GPRS	General Packet Radio Service
GPS	Global Positioning System
HE	Home Environment
H-GMLC	Home-GMLC
HSS	Home Subscriber Server
HLR	Home Location Register
HPLMN	Home Public Land Mobile Network
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IP	Internet Protocol
IPDL	Idle Period Downlink
LA	Location Application
LAF	Location Application Function
LBS	Location Based Services
LCAF	Location Client Authorization Function
LCCF	Location Client Control Function
LCCTF	Location Client Co-ordinate Transformation Function
LCF	Location Client Function
LCS	LoCation Services
LDR	Location Deferred Request
LIR	Location Immediate Request,
LMU	Location Measurement Unit
LSAF	Location Subscriber Authorization Function
LSBcF	Location System Broadcast Function
LSBF	Location System Billing Function
LSCF	Location System Control Function
LSOF	Location System Operation Function
LSPF	Location Subscriber Privacy Function
LSTF	Location Subscriber Translation Function

MAP	Mobile Application Part
ME	Mobile Equipment
MExE	Mobile Execution Environment
MLC	Mobile Location Center
MLP	Mobile Location Protocol
MM	Mobility Management
MO-LR	Mobile Originated Location Request
MS	Mobile Station
MSC	Mobile services Switching Centre
MSISDN	Mobile Station Integrated Services Data Network
MT-LR	Mobile Terminated Location Request
NA-ESRD	North American Emergency Service Routing Digits
NA-ESRK	North American Emergency Service Routing Key
NI-LR	Network Induced Location Request
OSA	Open Service Architecture
OTDOA	Observed Time Difference Of Arrival
PC	Power Control
PCF	Power Calculation Function
PLMN	Public Land Mobile Network
PMD	Pseudonym mediation device functionality
POI	Privacy Override Indicator
PPR	Privacy Profile Register
PRCF	Positioning Radio Co-ordination Function
PRRM	Positioning Radio Resource Management
PSE	Personal Service Environment
PSMF	Positioning Signal Measurement Function
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RA	Routing Area
RACH	Random Access Channel
RAN	Radio Access Network
RANAP	Radio Access Network Application Part
R-GMLC	Requesting-GMLC
RIS	Radio Interface Synchronization
RNC	Radio Network Controller
RRM	Radio Resource Management
RTD	Real Time Difference
SAT	SIM Application Tool-Kit
SCCP	Signalling Connection Control Part
SCS	Service Capability Server
SGSN	Serving GPRS Support Node
SI	Service Interface (prefix to interface class method)
SIM	Subscriber Identity Module
SIR	Signal Interference Ratio
SLPP	Subscriber LCS Privacy Profile
SMLC	Serving Mobile Location Center
SMS	Short Message Service
SP	Service Point
SRNC	Serving RNC
SS7	Signaling System No 7
TA	Timing Advance
TMSI	Temporary Mobile Subscriber Identity
TOA	Time Of Arrival
UDT	SCCP Unitdata message
UE	User Equipment
UL	Uplink
UMTS	Universal Mobile Telecommunication System
USIM	Universal Subscriber Identity Module
U-TDOA	Uplink Time Difference of Arrival
UTRAN	Universal Terrestrial Radio Access Network
VASP	Value Added Service Provider
V-GMLC	Visited -GMLC

VHE	Virtual Home Environment
WCDMA	Wideband Code Division Multiple Access

Further GSM related abbreviations are given in GSM 01.04. Further UMTS related abbreviations are given in 3G TS 21.905 [3].

<<Last changed section>>

4.3.2 Standard LCS Methods in GERAN

The specification TS 43.059 GERAN LCS Stage 2 specificies the locating methods to be supported in GERAN:

- cell coverage based positioning method;
- Enhanced Observed Time Difference (E-OTD) positioning method;
- GPS based positioning methods;
- Uplink Time Difference of Arrival (U-TDOA) positioning method.

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San Diego, USA, 12th – 16th May, 2003

Tdoc ⌘S2-032182
(revised S2-031763,1775, 1786)

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CHANGE REQUEST

⌘ **23.271** **CR** **183** ⌘ **rev** **3** ⌘ Current version: **6.3.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Clarification on privacy procedure
Source:	⌘	Ericsson
Work item code:	⌘	LCS2
Date:	⌘	19/05/2003
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	It is not clearly defined that the privacy mechanisms for privacy related actions in rel-6 (indicator for privacy related action and pseudo external identity) are two separate mechanisms. Therefore, the privacy mechanisms are separately described.
Summary of change:	⌘	The privacy mechanisms that indicate the privacy related actions are separately described. Note: The changes are not intended to change Stage 3 specification
Consequences if not approved:	⌘	The privacy mechanisms for privacy related actions will continue to be mixed.

Clauses affected:	⌘	9.1.1, 9.1.2.1, 10.1.1, new section 9.5.4, Annex C

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	29.002
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

**********First Modified Section **********

9.1.1 Common MT-LR procedure in PS and CS domain

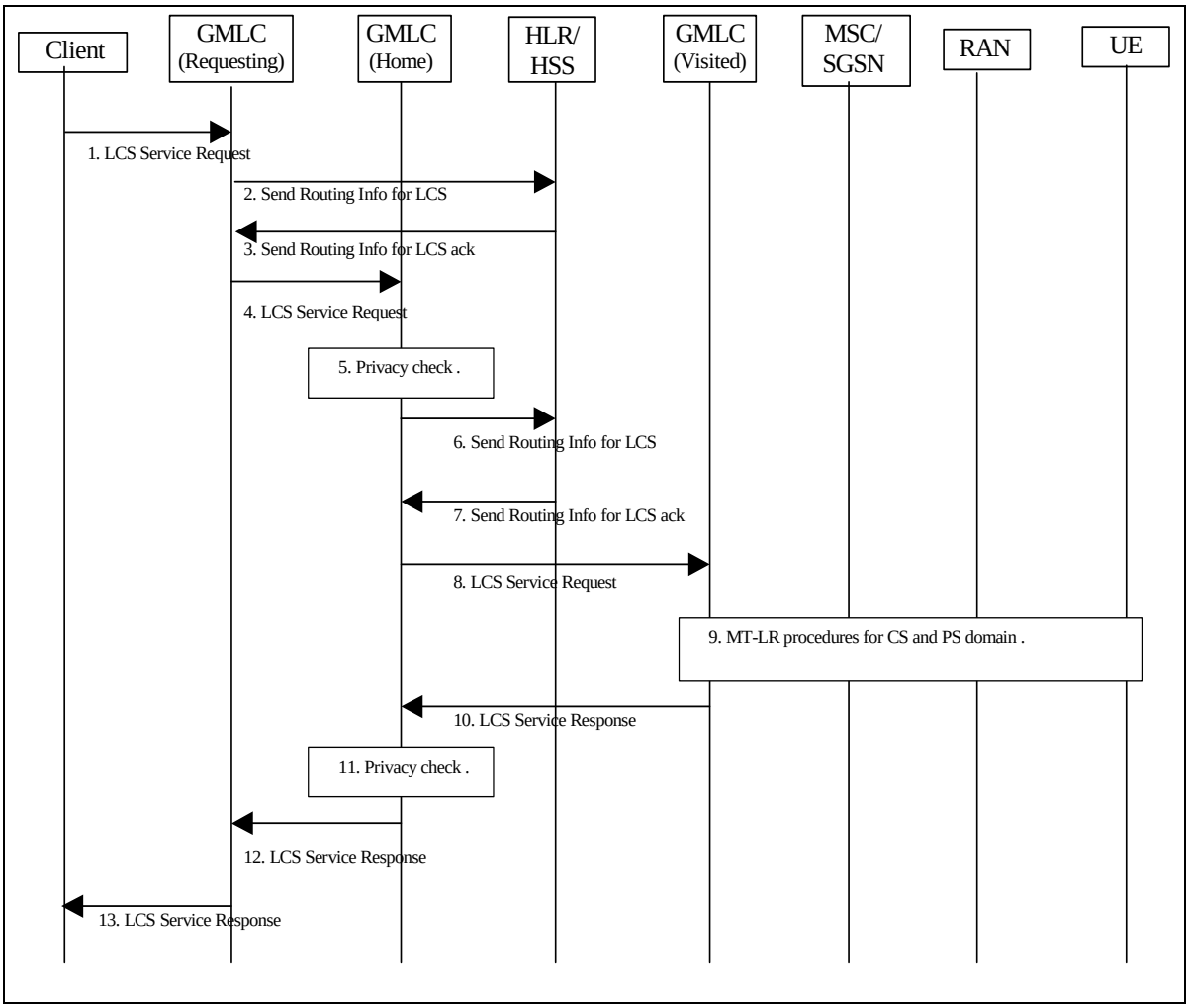


Figure 9.1: General Network Positioning for a MT-LR

1) An external LCS client requests the current location of a target UE from a GMLC. The LCS Client may also request a deferred location request, i.e. based on event. The R-GMLC verifies the identity of the LCS client and its subscription to the LCS service requested and derives the MSISDN or IMSI or pseudonym or PDP address, (NOTE: IP addressing in this context is FFS, one reason is the dynamic IP addressing used in IPv4.) of the target UE to be located and the LCS QoS from either subscription data or data supplied by the LCS client. For a call related location request, the LCS client includes the LCS client's called party number, as dialled by the target mobile user, in the LCS service request. For a session related location request, the LCS client includes the APN-NI of the LCS client, as used by the target UE, in the LCS service request. For a call/session related request the R-GMLC may verify that the called party number or APN-NI is correct for the LCS client in question. The LCS client's dialled number or APN-NI are checked in step 9 for the call/session related class.
The LCS request may carry also the Service Identity and the Codeword and the service coverage information. The R-GMLC may verify that the Service Identity received in the LCS request matches one of the service identities allowed for the LCS client. If the service identity does not match one of the service identities for the LCS client, the R-GMLC shall reject the LCS request. Otherwise, the R-GMLC can map the received service identity in a corresponding service type.
If the location request is originated by a Requestor, the Requestor Identity may be added to the LCS service request. The LCS client should authenticate the Requestor Identity but this is outside the scope of this

specification. The LCS service request may also contain the type of the Requestor identity if the requestor identity was included.
If the H-GMLC address is not contained in the pseudonym or cannot deduced from the pseudonym, the R-GMLC shall determine the verinym for the pseudonym. In this case the R-GMLC may access to its associated PMD as described in 9.1.1.3.
The R-GMLC verifies whether it stores the privacy profile of the target UE. If the R-GMLC stores the UE's privacy profile, (this means the R-GMLC is the H-GMLC of the target UE), then step 2, 3, 4 and 12 are skipped.
If location is required for more than one UE, or if periodic location is requested, the steps following below may be repeated.
Note: This means that R-GMLC handles the periodicity of location requests as requested by the LCS client both in CS and PS domain.

2) If the R-GMLC already knows, (e.g. from a previous location request or an internal lookup table), or is able to determine, (e.g. it is possible to use a DNS lookup mechanism similar to IETF RFC 2916), the network address of H-GMLC of the target UE, or in case the location service request contains the target UE's pseudonym, which includes the target UE's Home-GMLC address, or a pseudonym from which the target UE's Home-GMLC address can be deduced, then this step and step 3 may be skipped.
Otherwise, the R-GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI or MSISDN of the UE.
The details of the alternative methods of retrieving H-GMLC address other than the sending SEND_ROUTING_INFO_FOR_LCS message to the HLR/HSS, (e.g. internal lookup table, DNS lookup mechanism), are not in the scope of this specification.

Editor´s note: According to the current version of TS29.002 the PDP address cannot be transferred by using the SEND_ROUTING_INFO_FOR_LCS message, so this is for ffs.

Editor´s note: The support for number portability with these alternative solutions of retrieving H-GMLC address still needs further study and should be in line with the general solution to support number portability in Rel-6.

3) The HLR/HSS verifies whether the R-GMLC is authorized to request UE location information. If not, an error response is returned.
Otherwise the HLR/HSS returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes if available and whichever of the IMSI and MSISDN that was not provided in step 2. The HLR/HSS returns the address of the H-GMLC. The HLR/HSS also returns the address of the PPR and V-GMLC, if available.

Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to the GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

4) If R-GMLC finds out that it is the H-GMLC, the signalling steps 4 and 12 are skipped.
If the R-GMLC did not receive the H-GMLC address in step 3 and can not retrieve the H-GMLC address in some other way (e.g. DNS lookup), then steps 4, 5, 6, 7, 8, 10, 11 and 12 are skipped and the R-GMLC directly sends the PSL message to the serving node.
Otherwise, the R-GMLC sends the location request to the H-GMLC. If one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes, IMSI and MSISDN for the target UE and the address of the V-GMLC and the PPR have been retrieved in Step 3, the R-GMLC shall pass the information with the location request to the H-GMLC. The R-GMLC shall also send the service coverage information to the H-GMLC, if the information is available.

5) The H-GMLC verifies whether the R-GMLC is authorized to request UE location information. If the R-GMLC is not authorized, an error response is returned.
If the LCS service request contains the pseudonym of the target UE and the H-GMLC cannot resolve the PMD address from the pseudonym, the H-GMLC itself determines the verinym (MSISDN or IMSI) of the target UE. If the H-GMLC can resolve the address of PMD from the pseudonym, the H-GMLC requests the verinym from its associated PMD, see clause 9.1.1.3. In this case, if H-GMLC is not able to obtain the verinym of the target UE, the H-GMLC shall cancel the location request.
The H-GMLC performs privacy check on the basis of the UE user's privacy profile stored in the H-GMLC and the capabilities of the serving nodes (MSC/VLR and/or SGSN), if available. The H-GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1. If the key of the UE user's privacy profile (i.e. MSISDN or IMSI) is not available, the privacy check in this step shall be performed after step 7. The H-GMLC/PPR verifies LCS barring restrictions in the UE user's privacy profile in the H-GMLC/PPR. In verifying the barring

restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If the location service request is to be barred, GMLC shall terminate the request towards ~~an error response is returned to~~ the R-GMLC or the LCS client with the appropriate error code. As a result of the privacy check, the H-GMLC/PPR selects an indicator of the privacy check related action and/or a pseudo-external identity. (The details of the indicator of the privacy check related action and the pseudo-external identity are described in chapter 9.5.4 and Annex C). If the requested type of location is "current or last known location" and the requested maximum age of location information is available, the H-GMLC verifies whether it stores the previously obtained location estimate of the target UE. If the H-GMLC stores the location estimate and the location estimate satisfies the requested accuracy and the requested maximum age of location, the H-GMLC checks the result of the privacy check. In case the result of the privacy check for call/session unrelated class is "Location allowed without notification" then steps 6, 7, 8, 9 and 10 may be skipped.

6) If the H-GMLC already knows IMSI for the particular MSISDN or PDP address, (e.g. from a previous location request), and the VMSC/MSC server address or SGSN address, the rest of this step and step 7 may be skipped. Otherwise, the H-GMLC sends a SEND_ROUTING_INFO_FOR_LCS message to the home HLR/HSS of the target UE to be located with the IMSI, PDP address or MSISDN of this UE.

Editor´s note: According to the current version of TS29.002 the PDP address cannot be transferred by using the SEND_ROUTING_INFO_FOR_LCS message, so this is for ffs.

7) The HLR/HSS then returns one or several of the network addresses of the current SGSN and/or VMSC/MSC server, the LCS core network signalling capabilities of the serving nodes and whichever of the IMSI and MSISDN that was not provided in step (6) for the particular UE. The HLR/HSS may also return the address of the PPR and the V-GMLC, if available.

Note: HLR/HSS may prioritize between the MSC/VLR or SGSN address sent to the GMLC. The prioritisation might be based on information received from SGSN and/or MSC/VLR concerning the UE's capabilities for LCS. Other priority criteria are for further study.

8) If step 6 and step 7 were performed, the H-GMLC/PPR may do a new privacy check.
Also if the location request is an immediate location request and the service coverage information (i.e. list of country codes) was sent from R-GMLC, the H-GMLC checks the country codes of the serving node addresses. If the H-GMLC finds out the current SGSN and/or VMSC/MSC server locates out of the service coverage, the H-GMLC returns an appropriate error message to the R-GMLC or the LCS client.
In the cases when the H-GMLC did not receive the address of the V-GMLC, or when the V-GMLC address is the same as the H-GMLC address, or when both PLMN operators agree not to use the Lr interface, the H-GMLC does not send the location request to the V-GMLC and step 10 is skipped. In this case, the H-GMLC sends the location service request message to the serving node.
If the H-GMLC received the address of the V-GMLC from the HLR/HSS and the V-GMLC address is different from the H-GMLC address, the H-GMLC may send the location request to the V-GMLC. The location request shall contain one or several of the network addresses of the current SGSN and/or MSC/VLR, and the IMSI and MSISDN of the target UE. The location request may also carry the requested action of the VPLMN as the result of the privacy check in the H-GMLC (e.g. by using the pseudo-external identity as described in Annex C). The V-GMLC first authenticates that the location request is allowed from this GMLC, PLMN or from this country. If not, an error response is returned.

Editor's note: The case when the V-GMLC is the same as the R-GMLC may need further elaboration.

9) In case the GMLC (H-GMLC, R-GMLC or V-GMLC) receives only the MSC/VLR address, the MT LR proceeds as the CS-MT-LR procedure described in 9.1.2. In case GMLC receives only the SGSN address, the MT LR proceeds as the PS-MT-LR procedure described in 9.1.6. In case the GMLC receives several of the following addresses, SGSN, VMSC and/or MSC Server, it has to decide where to send the location request. If the requested MT-LR is known to be associated with a CS call, the CS-MT-LR procedure shall be invoked. If the requested MT-LR is associated with a PS session, the PS-MT-LR procedure shall be invoked. Otherwise, both CS-MT-LR and PS-MT-LR are applicable. If LCS Client indicated deferred location request, GMLC shall indicate this together with applicable event type (e.g. UE available) in the requested PS/CS-MT-LR, see 9.1.8.

NOTE: The order in which these procedures are invoked and whether one or both procedures are used may depend on information in the LCS service request, subscription information for the LCS client, possible priority information returned by the HSS or information already stored in the GMLC (e.g. obtained from previous location requests).

10) The V-GMLC sends the location service response to the H-GMLC.

11) If the privacy check in step 5 indicates that further privacy checks are needed, or on the basis of the privacy profile, the H-GMLC shall perform an additional privacy check or the GMLC may ask the PPR to perform the privacy check as described in the 9.1.1.1. If the location request from the R-GMLC or the LCS client contained the pseudonym, the H-GMLC shall use the pseudonym of the target UE in the location response to the R-GMLC or the LCS client. One example when this additional privacy check is needed is when the target UE user has defined different privacy settings for different geographical locations.

12) The H-GMLC sends the location service response to the R-GMLC. The H-GMLC may store the location information and its age.

13) R-GMLC sends the location service response to the LCS client. If the location request from the LCS client contained the pseudonym and the R-GMLC resolved the verinym from the pseudonym in the step 1, the R-GMLC shall use the pseudonym of the target UE in the location response to the LCS client. If the LCS client requires it, the R-GMLC may first transform the universal location co-ordinates provided by the SGSN or MSC/MSC server into some local geographic system. The GMLC may record billing for both the LCS client and inter-network revenue charges from the SGSN or MSC/MSC server's network.

The detailed CS-MT-LR and PS-MT-LR procedures in step 9 of figure 9.1 are described in 9.1.2 and 9.1.6.The detailed procedure for deferred PS/CS-MT-LR is described in 9.1.8.

**********Next Modified Section **********

9.1.2.1 Location Preparation Procedure

1) Common PS and CS MT-LR procedure as described in 9.1.1.

2) The GMLC sends a PROVIDE_ SUBSCRIBER _LOCATION message to the MSC/MSC server indicated by the HLR/HSS. This message carries the type of location information requested (e.g. current location), the UE subscriber's IMSI, LCS QoS information (e.g. accuracy, response time) and an indication of whether the LCS client has the override capability. For a call related location request, the message also carries the LCS client's called party number. For a value added LCS client, the message shall carry the client name, the external identity of the LCS client and the Requestor Identity (if that is both supported and available). Also the message may carry the type of the LCS client name and also the type of the Requestor identity if the requestor identity was included. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. Moreover the message may also carry the Service Type**.** If the result of the privacy check at H-GMLC/PPR indicated that the codeword shall be sent to the UE user, the message may carry also the codeword received from the LCS client. For a PLMN operator LCS client, the message shall carry the internal identity of the LCS client. If the Requestor Identity is provided, the GMLC shall send it as separate information. In addition, in order to display the requestor identity in case of pre rel-5 network elements (i.e. MSC and/or UE), the requestor identity may be also added to the LCS client name by the GMLC. When the Requestor identity is added to the LCS client name the practise described in the Annex D should be followed. The message also shall carry the indication of the requested privacy related action (i.e. checking the on-going call/session and/or notification/verification procedures) in the MSC, which is provided by H-GMLC. In case the privacy checks have been performed in H-GMLC/PPR, the pseudo-external identity may be included in the message instead of the real external identity of the LCS client (the details of the pseudo-external identity are described in Annex C).

3) If the GMLC is located in another PLMN or another country, the VMSC/MSC server first authenticates that a location request is allowed from this PLMN or from this country. If not, an error response is returned. If the PSL message from the GMLC does not include the indication of the requested privacy related action, the VMSC/MSC server then verifies LCS barring restrictions in the UE user's subscription profile in the MSC server. In verifying the barring restrictions, barring of the whole location request is assumed if any part of it is barred or any requisite condition is not satisfied. If LCS is to be barred without notifying the target UE and a LCS client accessing a GMLC in the same country does not have the override capability, an error response is returned to the GMLC.

Otherwise, if the UE is in idle mode, the Core Network performs paging, authentication and ciphering. The MSC will page a GPRS attached UE either through A/Iu or Gs interface, depending on the presence of the Gs interface (see Note). The UE will inform the network about its LCS capabilities, as described in chapter 6.3.4. If the UE is instead in dedicated mode, the VMSC/MSC server will already have UE classmark information. In GSM this is supported by controlled early classmark sending.

[Note 1: In GSM, if the target UE has an established circuit call other than speech, the location request may be denied and an error response is then returned to the GMLC. If the location request is allowed for a non-speech circuit call, it shall be up to RAN to decide, on the basis of the applicable position methods and requested QoS, whether positioning is possible. This is FFS]

Note: In some network mode of operation, a GPRS capable UE may not receive the CS paging. In addition, upon receipt of a CS paging, a GPRS capable UE may immediately answer to the Paging Request or delay the answer, as defined in 3GPP TS 22.060 and 23.060. A GPRS UE in class B mode may also suspend its GPRS traffic, sending a GPRS Suspension Request to the network.

4) If the location request comes from a value added LCS client and the indication of requested privacy related action or the UE subscription profile indicates that the UE must either be notified or notified with privacy verification and the UE supports notification of LCS (according to the UE Capability information), an LCS Location Notification Invoke message is sent to the target UE indicating the type of location request (e.g. current location) and the identity of the LCS client, the Requestor Identity (if that is both supported and available) and whether privacy verification is required. Also the message may indicate the type of the LCS client name and also the type of the Requestor identity if the requestor identity was included. Moreover, the message may carry also the service type and the codeword.

   [FFS: For a call related location request, the LCS client identity shall be set to the LCS client's called party number if no separate LCS client identity was received from the GMLC.] Optionally, the VMSC/MSC server may after sending the LCS Location Notification Invoke message continue in parallel the location process, i.e. continue to step 6 without waiting for a LCS Location Notification Return Result message in step 5.

NOTE 2: ~~This step~~ It is for further study, ~~it should be investigated e.g. which~~ if all available client identities are to be included in the Privacy Notification message to be shown to the end-user.

5) The target UE notifies the UE user of the location request. If privacy verification was requested, the target UE indicates to the UE user whether the location request will be allowed or not allowed in the absence of a response and waits for the user to grant or withhold permission. The UE then returns an LCS Location Notification Return Result to the VMSC/MSC server indicating, if privacy verification was requested, whether permission is granted or denied. Optionally, the LCS Location Notification Return Result message can be returned some time after step 4, but before step 9. If the UE user does not respond after a predetermined time period, the VMSC/MSC server shall infer a "no response" condition. The VMSC/MSC server shall return an error response to the GMLC if privacy verification was requested and either the UE user denies permission or there is no response with the UE subscription profile indicating barring of the location request in the absence of a response.

6) The MSC/MSC server sends a Location Request message to RAN. This message includes the type of location information requested and requested QoS and, in GSM, the UE's location capabilities.

9.1.2.2 Positioning Measurement Establishment Procedure

7) RAN determines the positioning method and instigates the particular message sequence for this method, as specified in UTRAN Stage 2, TS 25.305 [1] and GERAN Stage 2, TS 43.059 [16].

9.1.2.3 Location Calculation and Release Procedure

8) When a location estimate best satisfying the requested QoS has been obtained, RAN returns it to the MSC/MSC server in a Location Report message. If a location estimate could not be obtained, RAN returns a Location Report message containing a failure cause and no location estimate.

9) The MSC/MSC server returns the location information and its age to the GMLC, if the VMSC/MSC server has not initiated the Privacy Verification process in step 4. If step 4 has been performed for privacy verification, the VMSC/MSC server returns the location information only, if it has received a LCS Location Notification Return Result indicating that permission is granted. If a LCS Location Notification Return Result message indicating that permission is not granted is received, or there is no response, with the requested privacy action or the UE subscription profile indicating barring of location in the absence of a response, the VMSC/MSC server shall

return an error response to the GMLC. If RAN did not return a successful location estimate, but the privacy checks in steps 4 - 5 were successfully executed, the VMSC/MSC server may return the last known location of the target UE if this is known and the LCS client is requesting the current or last known location. The MSC server may then release the Mobility Management connection to the UE, if the UE was previously idle, and the MSC/MSC server may record billing information.

10) Common MT-LR procedure in PS and CS domain as described in 9.1.1.

**********New Section **********

9.5.4 Indicator of privacy check related action

When the client type indicates value added service and the serving node supports LCS capability set 4, H-GMLC/PPR shall select indicators for privacy check related action and the indicators shall be included in the Provide_Subscriber_Location request towards the serving node. The indication is sent to the serving node directly from the H-GMLC or via V-GMLC. There shall be an indicator for the call/session unrelated. Another indicator for the call/session related is optional and it shall be sent only if call/session related identity, i.e. the number dialled by UE or APN-NI, is sent to the serving node.

The possible values of the indicator of privacy check related action for call/session unrelated case shall be:

- Location allowed without notification
- Location allowed with notification
- Location with notification and privacy verification; location allowed if no response
- Location with notification and privacy verification; location restricted if no response
- Location not allowed (only applicable when the indicator for call/session related case is sent.)

The possible values of the indicator of privacy check related action for call/session related case shall be:

- Location allowed without notification
- Location allowed with notification
- Location with notification and privacy verification; location allowed if no response
- Location with notification and privacy verification; location restricted if no response

If both indicators are sent but indicating different actions and the call/session related criteria met in the serving node then an action according to the indicator with the looser action according to the definition in Annex A shall be choosen.

**********Next Modified Section **********

10.1 HLR and HSS

The HLR/HSS holds LCS data for both UE subscribers and LMUs. If the privacy profile data for UE subscribers are stored in H-GMLC/PPR, HLR/HSS needs to store the corresponding pseudo-external identities and MO-LR related subscription data shown in Table 10.4 and 10.5. The pseudo-external identities are stored in the privacy exception list shown in Table 10.2. The details of the pseudo-external identity are described in Annex C.

10.1.1 LCS Data in the HLR/HSS for an UE Subscriber

The IMSI is the primary key for LCS UE subscription data in the HLR/HSS. This subscription data may be stored in a Multiple Subscriber Profile (MSP), with the HLR/HSS able to hold a number of MSPs per IMSI.

LCS UE subscription data includes a privacy exception list containing the privacy classes for which location of the target UE is permitted. Each privacy class is treated as a distinct supplementary service with its own supplementary service code. The following logical states are applicable to each privacy class (refer to TS 23.011 [22] for an explanation of the notation).

Table 10.1: Logical States for each LCS Privacy Class

Provisioning State	Registration State	Activation State	HLR Induction State
(Not Provisioned,	Not Applicable,	Not Active,	Not Induced)
(Provisioned,	Not Applicable,	Active and Operative,	Not Induced)

For each LCS privacy class, the HLR/HSS shall store the logical state of the class on a per-subscriber (or per subscriber MSP) basis. In addition, the permanent data indicated below shall be stored on a per subscriber (or per subscriber MSP) basis when the logical provisioning state of the associated LCS privacy class is "provisioned". For the meaning of each LCS privacy class, refer to clause 9 and to TS 22.071 [4].
Moreover a list of allowed service types may be stored. The meaning of service types is defined in TS 22.071 [4].

Table 10.2: LCS data stored in the HLR privacy exception list for an UE Subscriber (or UE Subscriber MSP)

LCS Privacy Class	Status	Additional HLR Data when Class is provisioned
Universal Class	-	No additional data
Call/session Related Class	M	Indication of one of the following mutually exclusive options for any LCS client not in the external LCS client list: • Location not allowed • Location allowed without notification (default case) • Location allowed with notification • Location with notification and privacy verification; location allowed if no response • Location with notification and privacy verification; location restricted if no response
	O	External LCS client list: a list of zero or more LCS clients, with the following data stored for each LCS client in the list:
	C	• International E.164 address identifying a single LCS client or a single group of LCS clients that are permitted to locate this target UE
	O	• Restriction on the GMLC. Possible values are: - Identified GMLCs only - Any GMLC in the home country
	C	• Indication of one of the following mutually exclusive options: - Location allowed without notification (default case) - Location allowed with notification - Location with notification and privacy verification; location allowed if no response - Location with notification and privacy verification; location restricted if no response
Call/session Unrelated Class	M	Indication of one of the following mutually exclusive options for any LCS client not in the external LCS client list: • Location not allowed (default case) • Location allowed with notification • Location with notification and privacy verification; location allowed if no response • Location with notification and privacy verification; location restricted if no response
	O	External LCS client list: a list of zero or more LCS clients, with the following data stored for each LCS client in the list:
	C	• International E.164 address identifying a single LCS client or a single group of LCS clients that are permitted to locate this target UE
	O	• Restriction on the GMLC. Possible values are: - Identified GMLCs only - Any GMLC in the home country
	C	• Indication of one of the following mutually exclusive options: - Location allowed without notification (default case) - Location allowed with notification - Location with notification and privacy verification; location allowed if no response - Location with notification and privacy verification; location restricted if no response
PLMN Operator Class	O	LCS client list: a list of one or more generic classes of LCS client that are allowed to locate the particular UE. The following classes are distinguished: • LCS client broadcasting location related information • O&M LCS client in the HPLMN • O&M LCS client in the VPLMN • LCS client recording anonymous location information • LCS Client supporting a bearer service, teleservice or

		supplementary service to the target UE

Table 10.3: LCS Service types stored in the HLR/HSS per UE subscriber

Service type indication	Status	Additional HLR data when the indication is stored
Service Types	O	Service types list: a list of one or more service types for which the LCS client is allowed to locate the particular UE. The possible service types are defined in 22.071. The following data may be present for each service type in the list:
	O	• Restriction on the GMLC. Possible values are: - Identified GMLCs only - Any GMLC in the home country
	C	• Indication of one of the following mutually exclusive options: - Location allowed without notification (default case) - Location allowed with notification - Location with notification and privacy verification; location allowed if no response - Location with notification and privacy verification; location restricted if no response

In case that UE's privacy profile is stored and is checked in the GMLC (H-GMLC) or in the PPR, pseudo-external identities may be set in the external LCS client list of the HLR privacy exception list shown in Table 10.~~1~~2. The pseudo-external identity is not the identity of real external LCS client but the identity which is used for notifying SGSN/MSC of the location request class (call/session related or non- call/session related) and the required type of indication for each class. Operator allocates E.164 addresses for the pseudo-external identities.

Fourteen pseudo-external identities are needed ~~shall~~ to be defined. The pseudo-external identities are summarized in the Table ~~10.4~~C.1. The pseudo-external identities are registered in SLPP of each UE in advance.

LCS UE subscription data may include a mobile originating list containing the LCS mobile originating classes that an UE is permitted to request. Each LCS mobile originating class is treated as a distinct supplementary service with its own supplementary service code. The following logical states are applicable to each mobile originating class (refer to TS 23.011 [22] for an explanation of the notation).

Table 10.4: Logical States for each Mobile Originating LCS Class

Provisioning State	Registration State	Activation State	HLR Induction State
(Not Provisioned,	Not Applicable,	Not Active,	Not Induced)
(Provisioned,	Not Applicable,	Active and Operative,	Not Induced)

For each LCS Mobile Originating class, the HLR/HSS shall store the logical state of the class on a per-subscriber (or per subscriber MSP) basis. In this version of LCS, there is no additional permanent data in the HLR. The table below shows the defined mobile originating classes. For the meaning of each LCS mobile originating class, refer to clause 8 and to TS 22.071 [4].

Table 10.5: Data stored in the HLR for the LCS Mobile Originating List for an UE (or UE Subscriber MSP)

LCS Mobile Originating Class	Status	Additional HLR Data when Class is provisioned
Basic Self Location	-	No additional data
Autonomous Self Location	-	No additional data
Transfer to Third Party	-	No additional data

In addition to the privacy exception list, the following other data itemsmay be stored in the UE subscription profile in the HLR to support LCS.

Table 10.6a: Temporary LCS data in the HLR

Other Data in the HLR	Status	Description
GMLC List	O	List of one or more E.164 addresses of the GMLCs from which a location request for an MT-LR is allowed, The addresses are only relevant to an LCS client that is restricted (in the UE privacy exception list) to making call/session related or call/session unrelated location requests.

**********Next Modified Section **********

Annex C (Informative): Pseudo external ID ~~and Indicator of privacy check action~~

In case that UE's privacy profile is stored and is checked in the GMLC (H-GMLC) or in the PPR, a pseudo-external identity ~~and/or an indicator of privacy check action is~~ may be selected as a result of the privacy check in GMLC/PPR.

The pseudo-external identities may be set in the external LCS client list of the HLR privacy exception list shown in Table 10.~~1~~2. The pseudo-external identity is not the identity of real external LCS client but the identity which is used for notifying SGSN/MSC of the location request class (call/session related or non-related) and the required type of indication for each class. Operator allocates E.164 addresses for the pseudo-external identities. The pseudo-external identities are used for interworking with pre Rel-6 serving nodes.

~~The indicator of privacy check action may be included in the Provide_Subscriber_Location request message. The indicator is sent to the serving node directly from the H-GMLC or via V-GMLC.~~

Fourteen pseudo-external identities and indicators shall be defined. The pseudo-external identities and the indicators are summarized in the Table C.1.

Table C.1: Pseudo-external identities ~~and Indicators of privacy check related action~~

Pseudo-external identity ~~and Indicator of privacy check related action~~	Privacy setting for Call/Session related class	Privacy setting for Call/Session unrelated class
Pseudo-external identity 1 ~~Indicator 1~~	N.A.	Location allowed without notification
Pseudo-external identity 2 ~~Indicator 2~~	N.A.	Location allowed with notification
Pseudo-external identity 3 ~~Indicator 3~~	N.A.	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 4 ~~Indicator 4~~	N.A.	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 5 ~~Indicator 5~~	Location with notification and privacy verification; location restricted if no response	Location not allowed
Pseudo-external identity 6 Indicator 6	Location with notification and privacy verification; location allowed if no response	Location not allowed
Pseudo-external identity 7 ~~Indicator 7~~		Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 8 ~~Indicator 8~~	Location allowed with notification	Location not allowed
Pseudo-external identity 9 ~~Indicator 9~~		Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 10 ~~Indicator 10~~		Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 11 ~~Indicator 11~~	Location allowed without notification	Location not allowed
Pseudo-external identity 12 ~~Indicator 12~~		Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 13 ~~Indicator 13~~		Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 14 ~~Indicator 14~~		Location allowed with notification

Usage of the pseudo-external identities are as follows:

- The pseudo-external identities are registered in SLPP of the HLR/HSS.
- The SLPP is sent to the serving nodes, during the Insert Subscriber Data procedures.
- After the privacy check in the H-GMLC, the H-GMLC selects an appropriate pseudo-external identity according to the required privacy related actions (i.e. checking the on-going call/session and/or notification/verification procedures) in the serving node.
- H-GMLC sends Provide Subscriber Location message to the serving node, which includes the pseudo-external identity instead of the real external client identity. The real external client identity may be included in the additional information element and is sent to serving node. The pseudo-external identity is sent to the serving node directly from H-GMLC or via V-GMLC.

Table C.2 and C.3 shows how the pseudo-external identities are set in the SLPP in HLR/HSS.

Table C.2: Example of SLPP in HLR/HSS for Call/Session unrelated Class

Pseudo-external identity	Privacy Setting

~~and Indicator of privacy check related action~~	
Pseudo-external identity 1 ~~Indicator 1~~	Location allowed without notification
Pseudo-external identity 2 ~~Indicator 2~~	Location allowed with notification
Pseudo-external identity 3 ~~Indicator 3~~	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 4 ~~Indicator 4~~	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 5 ~~Indicator 5~~	Location not allowed
Pseudo-external identity 6 ~~Indicator 6~~	Location not allowed
Pseudo-external identity 7 ~~Indicator 7~~	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 8 Indicator 8	Location not allowed
Pseudo-external identity 9 ~~Indicator 9~~	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 10 ~~Indicator 10~~	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 11 ~~Indicator 11~~	Location not allowed
Pseudo-external identity 12 ~~Indicator 12~~	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 13 ~~Indicator 13~~	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 14 ~~Indicator 14~~	Location allowed with notification

Table C.3: Example of SLPP in HLR/HSS for Call/Session related Class

Pseudo-external identity ~~and Indicator of privacy check related action~~	Privacy Setting
Pseudo-external identity 5 ~~Indicator 5~~	Location with notification and privacy verification; location restricted if no response
Pseudo-external identity 6 ~~Indicator 6~~	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 7 ~~Indicator 7~~	Location with notification and privacy verification; location allowed if no response
Pseudo-external identity 8 ~~Indicator 8~~	Location allowed with notification
Pseudo-external identity 9 ~~Indicator 9~~	Location allowed with notification
Pseudo-external identity 10 ~~Indicator 10~~	Location allowed with notification
Pseudo-external identity 11 ~~Indicator 11~~	Location allowed without notification
Pseudo-external identity 12 ~~Indicator 12~~	Location allowed without notification
Pseudo-external identity 13 ~~Indicator 13~~	Location allowed without notification
Pseudo-external identity 14 ~~Indicator 14~~	Location allowed without notification

The selection of pseudo-external identity is based on the result of the privacy check in the H-GMLC/PPR. Table C.4 shows the relation between privacy check result and the pseudo-external identities.

Table C.4: Pseudo-external identity selection at H-GMLC/PPR

Privacy related actions as a result of privacy check	Pseudo-external identity ~~and Indicator of privacy check related action~~
Location request is allowed without notification, regardless of on-going call/session.	Pseudo-external identity 1 ~~Indicator 1~~
Location request is allowed with notification, regardless of on-going call/session,	Pseudo-external identity 2 ~~Indicator 2~~
Location request is allowed with notification and privacy verification, regardless of on-going call/session. Location request is allowed even if there is no response from UE.	Pseudo-external identity 3 ~~Indicator 3~~
Location request is allowed with notification and privacy verification, regardless of on-going call/session. Location request is restricted if there is no response from UE.	Pseudo-external identity 4 ~~Indicator 4~~
If there is call/session with the client, location request is allowed with notification and privacy verification. Location request is restricted if there is no response from UE. If there is no call/session with the client, location request is restricted.	Pseudo-external identity 5 ~~Indicator 5~~
If there is call/session with the client, location request is allowed with notification and privacy verification. Location request is allowed even if there is no response from UE. If there is no call/session with the client, location request is restricted.	Pseudo-external identity 6 ~~Indicator 6~~
If there is call/session with the client, location request is allowed with notification and privacy verification. Location request is allowed even if there is no response from UE. If there is no call/session with the client, location request is allowed with notification and privacy verification. Location request is restricted if no response.	Pseudo-external identity 7 ~~Indicator 7~~
If there is call/session with the client, location request is allowed with notification. If there is no call/session with the client, location request is restricted.	Pseudo-external identity 8 ~~Indicator 8~~
If there is call/session with the client, location request is allowed with notification. If there is no call/session with the client, location request is with notification and privacy verification. Location request is restricted if no response.	Pseudo-external identity 9 ~~Indicator 9~~
If there is call/session with the client, location request is allowed with notification. If there is no call/session with the client, location request is allowed even if there is no response from UE.	Pseudo-external identity 10 ~~Indicator 10~~
If there is call/session with the client, location request is allowed without notification. If there is no call/session with the client, location request is restricted.	Pseudo-external identity 11 ~~Indicator 11~~
If there is call/session with the client, location request is allowed without notification. If there is no call/session with the client, location request is	Pseudo-external identity 12 ~~Indicator 12~~

with notification and privacy verification. Location request is restricted if no response.	
If there is call/session with the client, location request is allowed without notification. If there is no call/session with the client, location request is allowed even if there is no response from UE.	Pseudo-external identity 13 ~~Indicator 13~~
If there is call/session with the client, location request is allowed without notification. If there is no call/session with the client, location request is allowed with notification.	Pseudo-external identity 14 ~~Indicator 14~~

**********END of Modifications **********

3GPP TSG SA Meeting # 20
Hamenlinna, Finland, 9th – 12th June

Tdoc ⌘ SP-030345
(Revised S2-031194rev10, S2-031181, S2-031160, S2-030571)

CR-Form-v7

CHANGE REQUEST

⌘ **23.271** **CR** **155** ⌘ **rev** **11** ⌘ Current version: **6.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [X] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Addition of mobile based change of area event to deferred location request
Source:	⌘	Nokia, Vodafone, NEC, Lucent, Telecommunication Systems, Siemens
Work item code:	⌘	LCS2
Date:	⌘	10.6.2003
Category:	⌘	**B**
Release:	⌘	REL-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	According to LCS stage 1, 22.071, the LCS client shall be able to issue a deferred location request for the new event “change of area”. This CR introduces support for the deferred MT-LR at the change of area event.
Summary of change:	⌘	Description of change of area event type is added to the message flow diagram and a new clause is added to the describe the Location Deferred Request (LDR) for Change of Area.
Consequences if not approved:	⌘	The change of area event as described in LCS Stage 1 would not be supported.

Clauses affected:	⌘	3.1 3.3 4.4.2 5.2 5.4 5.5 5.6 6.2 7.1.1 9.1.8 New 9.1.9 11.1 11.2 New Annex F

Other specs Affected:	Y	N			
⌘	X		Other core specifications	⌘	TS 29.002, 24.030, 24.080, 24.008
		X	Test specifications		
		X	O&M Specifications		

Other comments:	⌘	This CR also incorporates the changes of CR#184 Rev3 (tdoc S2-031793) in sub-clause 9.1.9

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

<< First changed clause >>

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

….

Deferred location request: location request where the location response (responses) is (are) ~~not~~ required after a specific event has occurred. The event may or may not occur immediately

….

Target area: geographical area which is used for change of area type deferred location request. The target area is defined by LCS client and is expressed as geographical area using a shape defined in TS 23.032, as a geographical area using local coordinate system, as a country code, as a PLMN identity or as a geopolitical name of the area (e.g. London).

<< Next modified clause >>

3.3 Abbreviations

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

…

LSCTF Location System Co-ordinate Transformation Function

…

<< Next modified clause >>

4.4.2 Deferred Location Request

Request for location contingent on some current or future events where the response from the LCS Server to the LCS Client may occur some time after the request was sent.

4.4.2.1 Types of event

a) UE available: Any event in which the MSC/SGSN has established a contact with the UE. Note, this event is considered to be applicable when the UE is temporarily unavailable due to inaction by the UE user, temporarily loss of radio connectivity or IMSI detach and so on. Note that IMSI detach is only applicable in the case UE has previously been registered and information is still kept in the node.

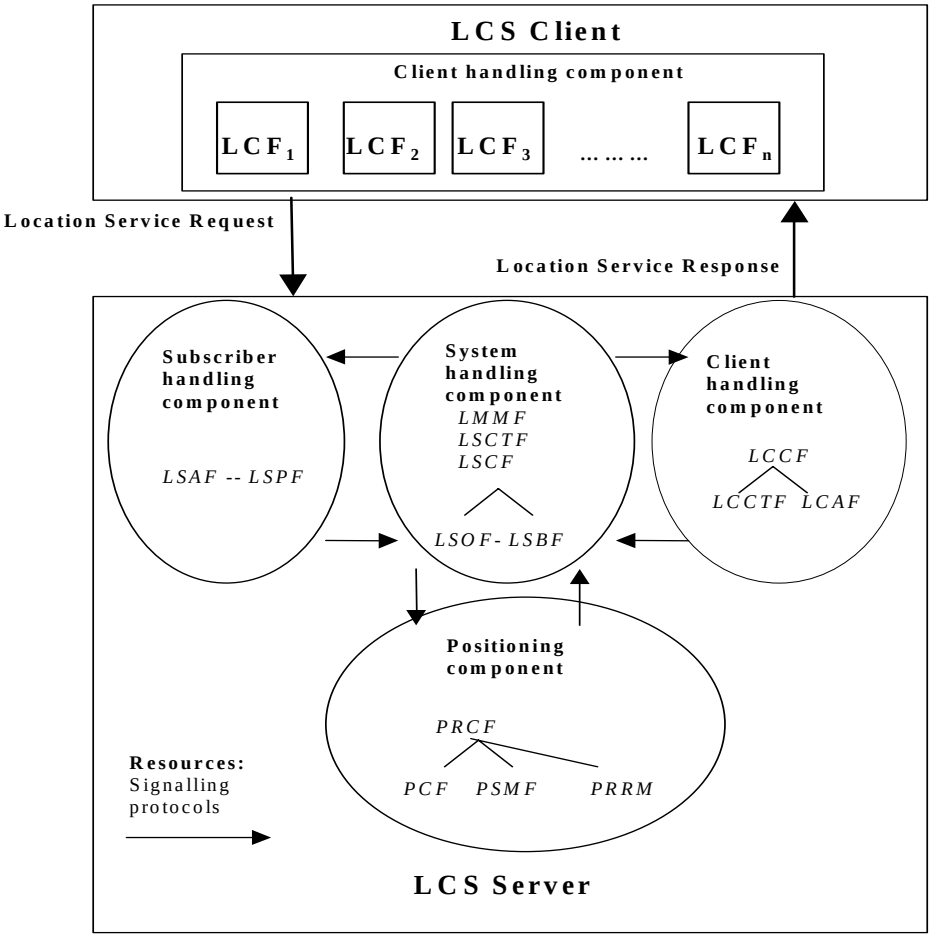
b) Change of Area: An event where the UE enters or leaves a pre-defined geographical area or if the UE is currently within the pre-defined geographical area. The LCS client defines the target area as a geographical area, as a country code, as a PLMN identity or as a geopolitical name of the area. The LCS server may translate and define the target area as the identities of one or more radio cells, location areas, routing areas, country code or PLMN identity. The target UE must not give the target UE user access to the area definitions and network identities. The change of area event may be reported one time only, or several times. The area event report must not be repeated more often than allowed by the LCS client. The change of area event report shall contain an indication of the event occurrence. The location estimate may be included in the report.

c) ~~b)~~ Other events are FFS ~~(Release 5)~~

<< Next modified clause >>

5.2 LCS Functional diagram, high level functions

TS 22.071 [4] describes LCS services from the LCS client point of view. In the present document, a more detailed description of LCS is given. The LCS functional diagram shown in figure 5.2 depicts the interaction of the LCS client and the LCS server within the PLMN. The PLMN uses the various LCS components within the LCS server to provide the target UE Location Information to the LCS client.



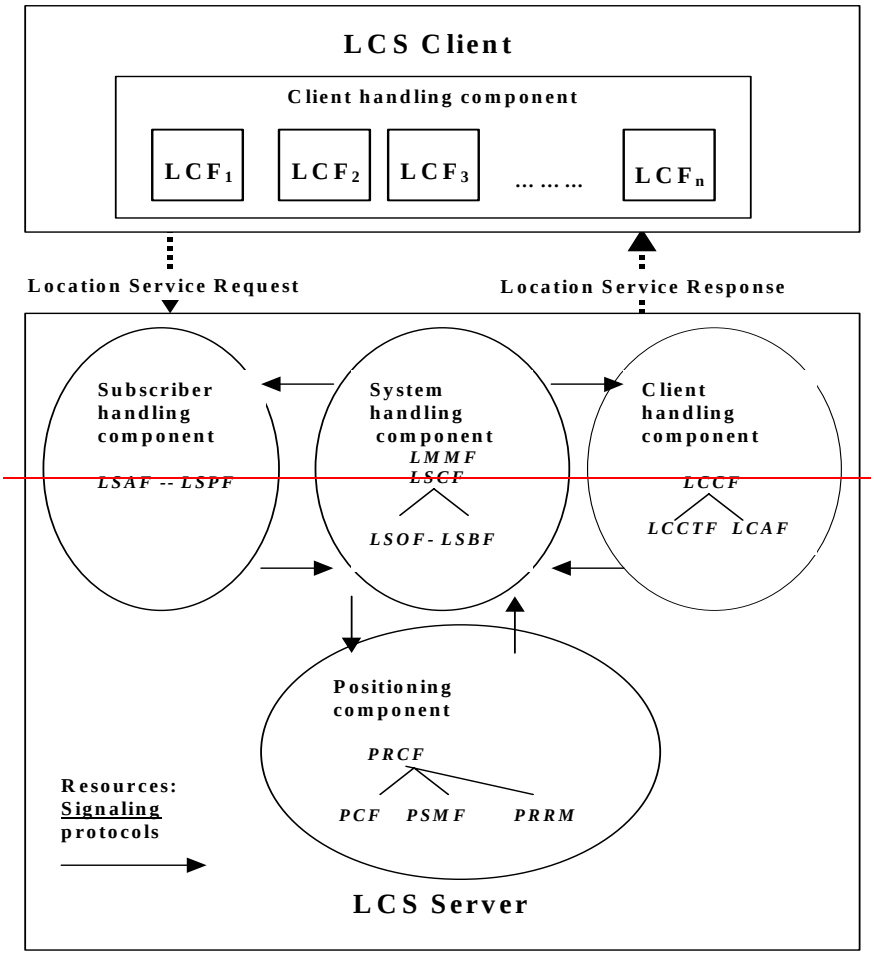


Figure 5.2: LCS capability server Functional Diagram

<< Next modified clause >>

5.4 LCS Server functional group

The LCS server functional group consists of the functions that are needed for GSM and UMTS to support Location Services.

5.4.1 Client handling component

5.4.1.1 Location Client Control Function (LCCF)

The Location Client Control Function (LCCF) manages the external interface towards LCF. The LCCF identifies the LCS client by requesting client verification and authorization (i.e. verifies that the LCS client is allowed to position the subscriber) through interaction with the Location Client Authorization Function (LCAF). The LCCF handles mobility management for location services (LCS) e.g., forwarding of positioning requests to VMSC or SGSN. The LCCF determines if the final positioning estimate satisfies the QoS for the purpose of retry/reject. The LCCF provides flow control of positioning requests between simultaneous positioning requests. It may order the Location Client Co-ordinate Transformation Function (LCCTF) to perform a transformation to local co-ordinates. It may also order a transformation of local co-ordinates to network identities via the Location System Co-ordinate Transformation Function (LSCTF). It also generates charging and billing related data for LCS via the Location System Billing Function (LSBF).

<< Next modified clause >>

5.4.1.3 Location Client Co-ordinate Transformation Function (LCCTF)

The Location Client Co-ordinate Transformation Function (LCCTF) provides conversion of a location estimate expressed according to a universal latitude and longitude system into an estimate expressed according to a local geographic system understood by the LCF and known as location information. The local system required for a particular LCF will be either known from subscription information or explicitly indicated by the LCF. The LCCTF also provides the conversion of a target area to either a shape as defined in TS23.032, a PLMN, or country code. This is performed only if target area information is received from the LCS Client.

<< Added clause >>

5.4.2.5 Location System Co-ordinate Transformation Function (LSCTF)

The Location System Co-ordinate Transformation Function (LSCTF) provides the conversion of an area definition, expressed in a geographic shape as defined in TS23.032, to network identities recognised only within a PLMN (such as Cell Identity, Location Area Identity). The area definition may convert to more than one network identity such as a collection of Cell Global Identities.

<< Next modified clause >>

5.5 Information Flows between Client and Server

Other types of national specific information flows may be supported in addition to the information flow specified here.

Any of the information flows here indicated may not be externally realized if the information does not flow over an open interface. On the other hand, if a flow goes over an open interface, it shall abide to a well-defined protocol, e.g. LIF TS 101 [31], Location Inter-Operability Forum 2001.

5.5.1 Location Service Request

Via the Location Service Request, the LCS client communicates with the LCS server to request for the location information of one or more than one UE within a specified quality of service. There exist two types of location service requests:

- Location Immediate Request (LIR); and
- Location Deferred Request (LDR).

The attributes for the information exchange between the LCS Client and the LCS Server have been standardized by LIF based on requirements set by TS 22.071 and TS 23.271.

The following attributes are identified for Location Service Request information flow:

- Target UE identity (either verinym or pseudonym);
- LCS Client identity;
- Service identity, if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Number dialled by the target mobile user or APN-NI, if the request is call or session related ;
- Type of Event definition, i.e. UE available or change of area, applicable to deferred location requests only;
- Definitions for change of area type deferred location requests. Following parameters may be defined, if needed;
  a) Indication for event trigger, i.e. UE enters, leaves or is within requested target area;
  b) Indication of either a single event report or multiple event reports;
  c) Start time, stop time and minimum interval time between area event reports, if multiple event reports is requested;
- Start time, stop time and interval, applicable to periodical ~~and deferred~~ requests only;
- Requested Quality of Service information, if needed;
- Requested type of location, i.e. current location or last known location applicable to LIR only (current location is only available for LDR);
- Priority, if needed;
- Service coverage (i.e. country codes), if needed;
- Requested maximum age of location, if needed;
- Local coordinate reference system, if needed;
- ~~Geographical area, if needed.~~
- Target area, i.e. geographical area expressed as one of the following format, if needed.
  a) a shape defined in TS 23.032

b) local coordinate system

c) country code

d) PLMN identity

e) geopolitical name of the area (e.g. London)

Some of the information may be stored in GMLC and the LCS client does not need to include such information in the location service request.

5.5.2 Location Service Response

The LCS server (GMLC) sends the Location Service Response to the LCS client either as an:

- Immediate Response; or a
- Deferred Response, these deferred responses can be either single or periodic.

The following attributes are identified for the Location Service Response information flow:

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032 or local coordinate system;
- Time stamp of location estimate;
- Indication when UE enters, is within or leaves the Geographical area, if needed;
- Acknowledgement for a deferred location request, if needed.

In addition the information attributes of the location service request may be used also in the location service response.

<< Next modified clause >>

5.6 Information Flows between LCS Servers

Other types of national specific information flows may be supported in addition to the information flow specified here.

Any of the information flows here indicated may not be externally realized if the information does not flow over an open interface. On the other hand, if a flow goes over an open interface, it shall abide to a well-defined protocol, which will be further specified in other relevant specifications.

When the LCS server's associated GMLC uses the Lr interface then this interface shall conform to the protocol as specified in (reference to be added) and the procedures defined in clause 9 of the current specification.

5.6.1 Location Service Request

Via the Location Service Request, the source LCS server communicates with the destination LCS server to request for the location information of one UE within a specified quality of service. There exist two types of location service requests:

- Location Immediate Request (LIR); and
- Location Deferred Request (LDR).

The following attributes are identified for Location Service Request information flow:

- Target UE identity, (either one or both of MSISDN and IMSI, or pseudonym);
- LCS Client identity, i.e. LCS client external identity or internal identity;
- LCS Client type, (i.e. Value added, Emergency, PLMN operator or Lawful interception);
- LCS Client name, if needed (and type of LCS client name if available);
- Service type, if needed;
- Codeword, if needed;
- Requestor identity, if needed (and type of Requestor identity if available);
- Number dialled by the target mobile user or APN-NI, if the request is call or session related ;
- Type of Event definition, i.e. UE available or change of area, applicable to deferred location requests only;
- Definitions for change of area type deferred location requests. Following parameters may be defined, if needed;
  - a) Indication for event trigger, i.e. UE enters, leaves or is within requested target area;
  - b) Indication of either a single event report or multiple event reports;
  - c) Minimum interval time between area event reports;
- Requested Quality of Service information, if needed;
- Requested type of location, i.e. "current location", "current or last known location" or "initial location" applicable to LIR only (current location is only available for LDR);
- Priority, if needed;
- Requested maximum age of location, if needed;
- Privacy override indicator, if needed;
- Service coverage (i.e. country codes), if needed;
- Indicator of privacy check related actions, if needed;
- Supported GAD shapes, if needed;

- Identity of the source LCS server of the Location Service Request, i.e. R-GMLC address;
- HPLMN LCS server address, i.e. H-GMLC address, if needed;
- VPLMN LCS server address, i.e. V-GMLC address, if needed;
- Network address of Privacy Profile Register, if needed;
- Network numbers of serving nodes;
- LCS capability sets of serving nodes, if needed.
- Target area, i.e. geographical area expressed as one of the following format, if needed.
  a) a shape defined in TS 23.032
  b) country code
  c) PLMN identity
- LDR reference number, if needed.

5.6.2 Location Service Response

The Location Service Response is sent to the source LCS server as the result of the Location Service Request by the destination LCS Server:

- Immediate Response; or a
- Deferred Response, these deferred responses can be either single or periodic.

The following attributes are identified for the Location Service Response information flow:

- Location indication of UE in geographical coordinates expressed as a shape as defined in TS 23.032 or local coordinate system;
- Indication when UE enters, is within or leaves the geographical area, if needed;
- Acknowledgement for a deferred location request, if needed.

In addition the information attributes of the location service request may be used also in the location service response.

<< Next modified clause >>

6.2 Allocation of LCS functions to network elements

Table 6.1 shows a summary of the Functional Groups and Functional Blocks for Location services. Table 6.2 and figure 6.2 show the generic configuration for LCS and the distribution of LCS functional blocks to network elements. Different positioning methods, including network-based, mobile-based, mobile-assisted and network-assisted positioning methods may be used. With this configuration both the network and the mobiles are able to measure the timing of signals and compute the mobile's location estimate. Depending on the applied positioning method it is possible to utilise the corresponding configuration containing all needed entities. For instance, if network-based positioning is applied, the entities that are involved in measuring the mobile's signal and calculating its location estimate are allocated to the network elements of the access stratum. On the other hand, in case mobile-based or network-assisted methods are used these entities should be allocated to the UE.

LCS is logically implemented on the network structure through the addition of one network node, the Mobile Location Center (MLC). It is necessary to name a number of new interfaces. The LCS generic architecture can be combined to produce LCS architecture variants.

Table 6.1: Summary of Functional Groups and Functional Blocks for Location services

Funct. Group	Functional component	Full name of Functional Block	Abbrev.
Loc. Client	Location Client Component	(External) Location Client Function	LCF
		Internal Location Client Function	LCF -internal
LCS Server in PLMN	Client handling component	Location Client Control Function	LCCF
		Location Client Authorization Function	LCAF
		Location Client Co-ordinate Transformation Function	LCCTF
	System handling component	Location System Control Function	LSCF
		Location System Billing Function	LSBF
		Location System Operations Function	LSOF
		Location System Co-ordinate Transformation Function	LSCTF
	Subscr. Handling component	Location Subscriber Authorization Function	LSAF
		Location Subscriber Privacy function	LSPF
	Positioning component	Positioning Radio Control Function	PRCF
		Positioning Calculation Function	PCF
		Positioning Signal Measurement Function	PSMF
		Positioning Radio Resource Management	PRRM

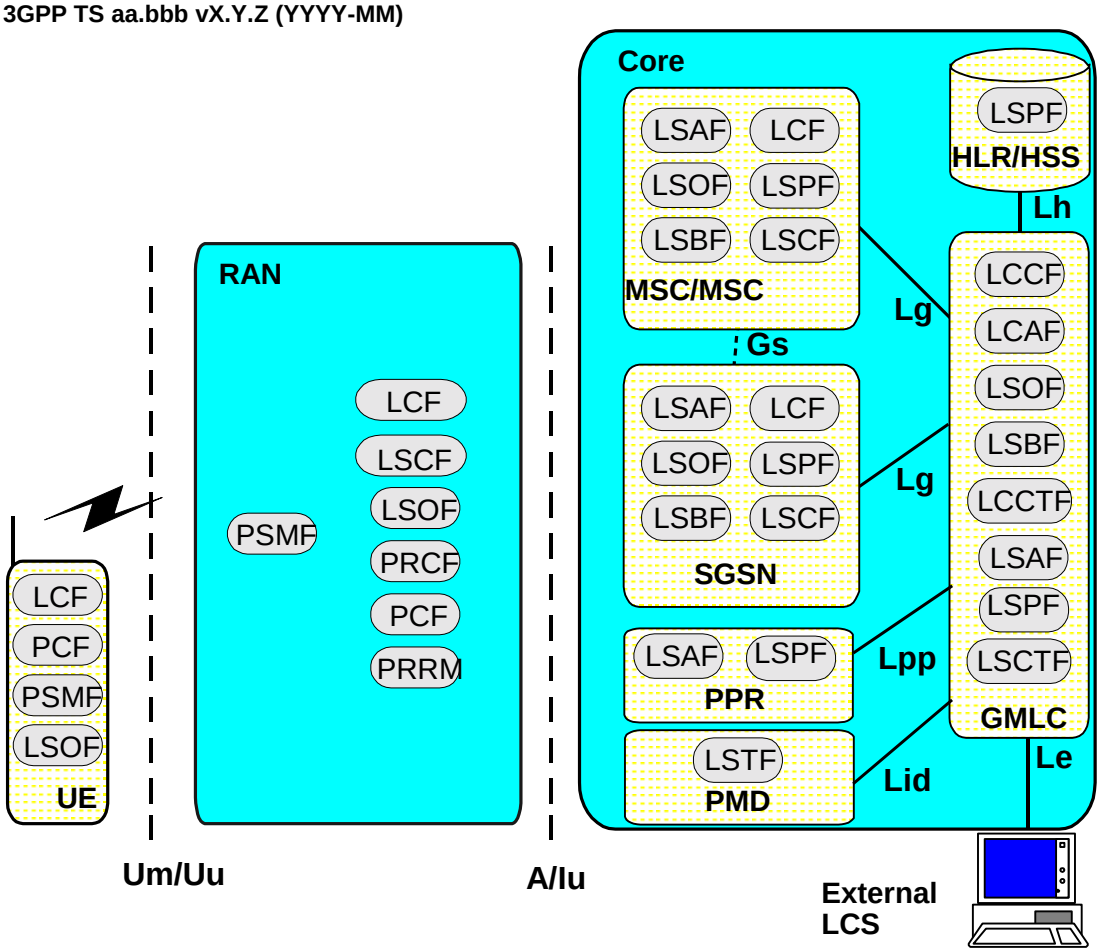
Table 6.2 and figure 6.2 illustrate the allocation of functional entities in the reference configuration of LCS. It is assumed that the CS and PS have either their own independent mobility management or use the joint mobility management through the optional Gs interface.

It is also seen that LCS may take benefit of the Iur interface between RNCs, when uplink radio information and measurement results are collected.

The functional model presented in the figure includes functional entities for both CS and PS related LCS. In addition, it consists of all the entities needed for different positioning methods, i.e. network based, mobile based, mobile assisted, and network assisted positioning, exploiting either uplink or downlink measurements. It is noted that the UE may use e.g. the GPS positioning mechanism, but still demand e.g. auxiliary measurements from the serving network. RAN specific functional entities are specified in TS 25.305 [1] for UTRAN and in TS 43.059 [16] for GERAN.

Table 6.2: Allocation of LCS functional entities to network elements

	UE	RAN	GMLC	SGSN	MSC/MSC Server	HLR/HSS	PPR	PMD	Client
Location client functions									
LCF	X			X	X				X
LCF Internal	Ffs	X							
Client handling functions									
LCCTF			X						
LCCF			X						
LCAF			X						
System handling functions									
LSCF		X		X	X				
LSBF			X	X	X				
LSOF	X	X	X	X	X				
LSCTF			X						
Subscriber handling functions									
LSAF			X	X	X		X		
LSPF			X	X	X	X	X		
LSTF								X	
Positioning functions									
PRCF		X							
PCF	X	X							
PSMF	X	X							
PRRM		X							
	UE	**RAN**	**GMLC**	**SGSN**	**MSC/MSC Server**	**HLR/HSS**	**PPR**	**PMD**	**Client**


Core
LSAF
LCF
LSOF
LSPF
LSBF
LSCF
MSC/MSC
Gs
SGSN
LSAF
LSPF
PPR
LSTF
PMD
LSPF
HLR/HSS
Lh
LCCF
LCAF
LSOF
LSBF
LCCTF
LSAF
LSPF
LSCTF
GMLC
Le
Lg
Lg
Lpp
Lid
RAN
LCF
LSCF
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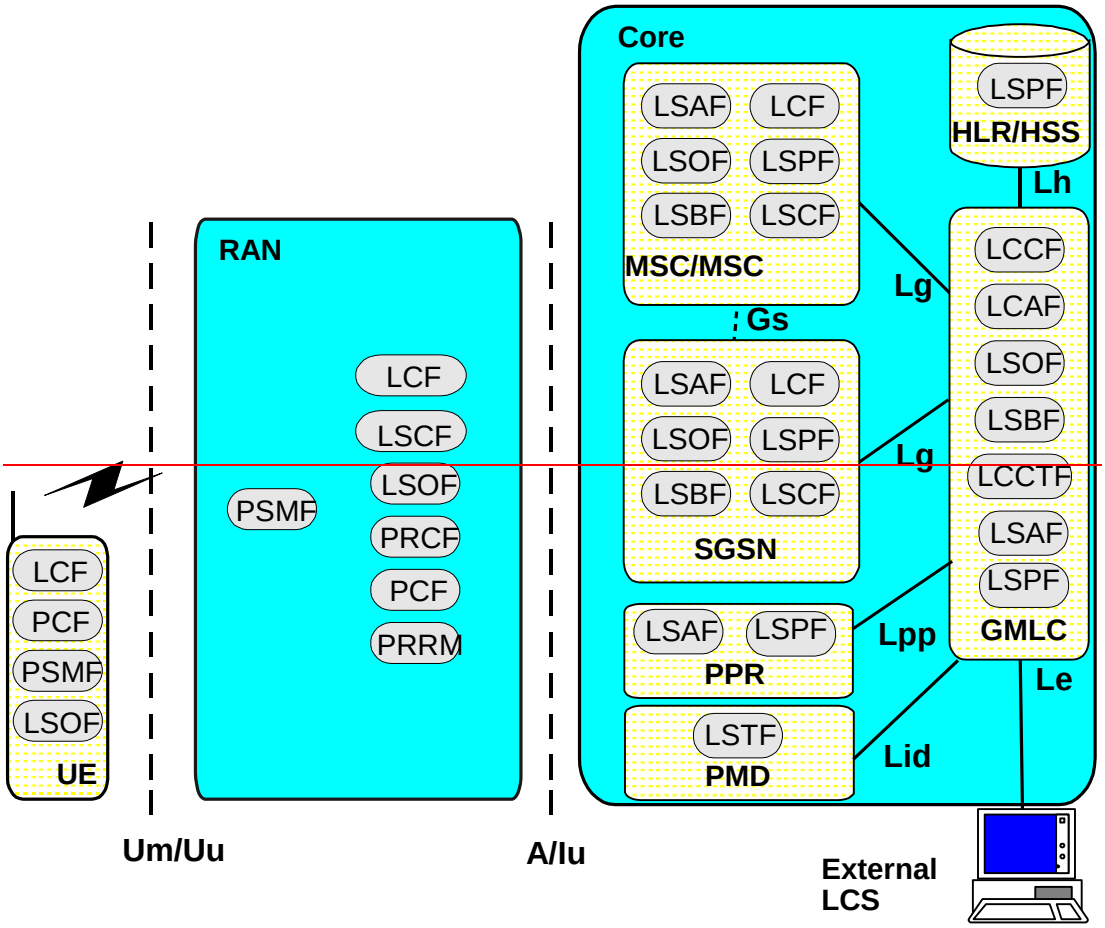
PSMF
LSOF
UE
Um/Uu
A/Iu
External
LCS


Core
LSAF
LCF
LSOF
LSPF
LSBF
LSCF
MSC/MSC
Gs
SGSN
LSAF
LSPF
PPR
LSTF
PMD
LSPF
HLR/HSS
Lh
LCCF
LCAF
LSOF
LSBF
LCCTF
LSAF
LSPF
GMLC
Le
Lg
Lg
Lpp
Lid
RAN
LCF
LSCF
LSOF
PRCF
PCF
PRRM
PSMF
LCF
PCF
PSMF
LSOF
UE
Um/Uu
A/Iu
External
LCS

<< Next modified clause >>

7.1.1 Core network Location Request

The core network request for a location estimate of a target UE shall contain sufficient information to enable location of the Target UE according to the required QoS using any positioning method supported by the PLMN and, where necessary, UE. For location services the core network may request the geographical co-ordinates of the Target UE.

In Iu mode~~UMTS~~ the core network may also request in which Service Area the Target UE is located. The Service Area information may be used for routing of corresponding Emergency calls, or for CAMEL services. (The MSC Server or SGSN shall not send the Service Area Identity to GMLC).

In A/Gb mode~~GSM~~ this corresponds to the usage of Cell ID in the core network.

<< Next modified clause >>

<< Next modified clause >>

9.1.8 Mobile Terminating Deferred Location Request – UE available event

Figure 9.6a illustrates the procedures for a Deferred Location Request, where the Location Report is returned based on a UE available event.

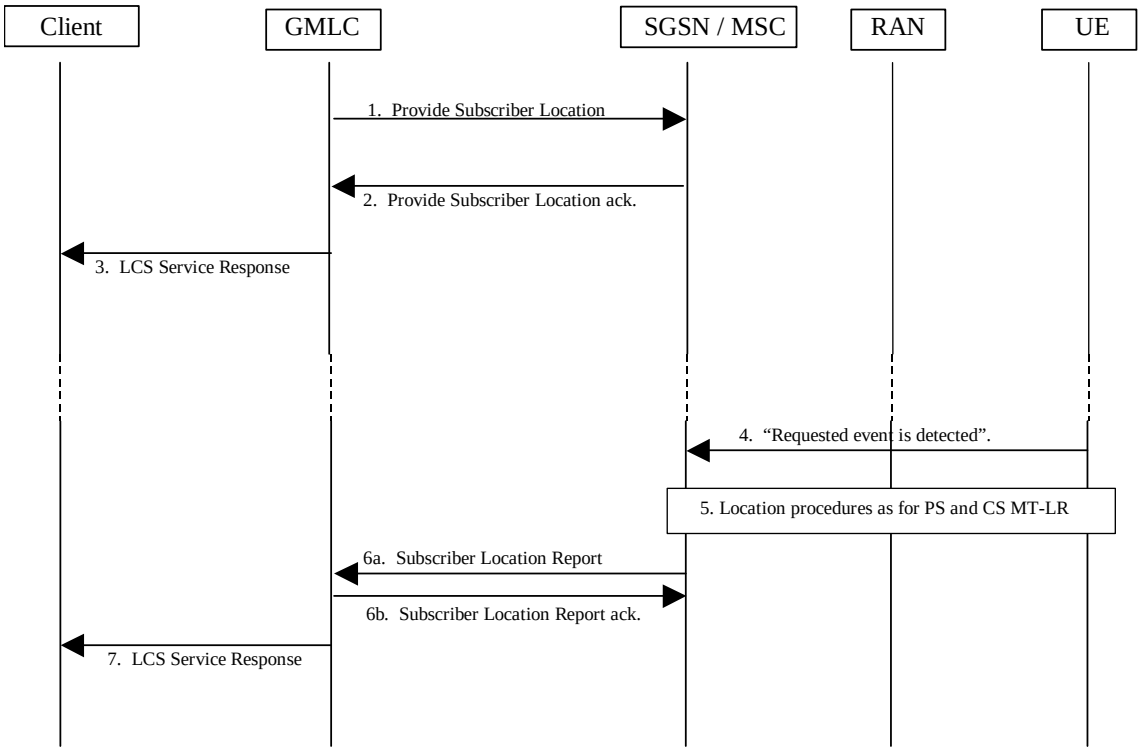


Figure 9.6a: General Network Positioning for a Deferred MT-LR with UE available event

9.1.8.1 Deferred Location Request Procedure

1) GMLC assigns a reference number to Provide Subscriber Location. Provide Subscriber Location is received in SGSN/MSC as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the reference number and the event that shall trigger the sending of Location Report.

Note: The GMLC shall send the Provide Subscriber Location for the UE regardless of the ongoing previous MT-LR for the same UE.

2) If the SGSN/MSC cannot support the deferred location request for the specified event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned with a suitable cause. If the SGSN/MSC can support the deferred location request for the specified event, a Provide Subscriber Location ack. shall be returned to the GMLC without a location estimate.

3) The GMLC then returns the LCS Service Response to the LCS Client via H-GMLC and R-GMLC to notify whether the request was successfully accepted or not.

9.1.8.2 Location Report Procedure

4) Immediately following step 3, the SGSN/MSC shall verify if the requested event is already satisfied (e.g. UE available inferred from a current transaction) or can be invoked immediately (e.g. by paging the UE and receiving a page response). If requested event is not existing the SGSN/MSC waits until it has occurred or until some maximum time has expired.

=> In case the SGSN/MSC receives an indication that the UE has moved to another SGSN/MSC while it is waiting for the requested event to happen, a Subscriber Location Report is directly sent to the GMLC with the reference

number that was included in the Provide Subscriber Location and the information that MT-LR must be re-initiated against the new SGSN/MSC. The address of the new SGSN/MSC is included in Subscriber Location Report if available. (If new SGSN/MSC address was included, the GMLC continues at step 1 above, otherwise it continues with an interrogation against HLR as described in 9.1.1.)
If V-GMLC is noticed that the UE has moved to another PLMN while it is waiting for the requested event to happen, a location report message shall be sent to the H-GMLC from V-GMLC with the information that MT-LR must be re-initiated against the new VPLMN. The H-GMLC continues with an interrogation against HLR/HSS as described in 9.1.1.

5) When the requested event is detected, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

If either security or privacy check related action fails, a Subscriber Location Report with the reference number that was included in the Provide Subscriber Location is returned with appropriate error cause indicating termination of the deferred location request.

6) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. The report shall indluced the reference number that was included in the Provide Subscriber Location and an indication that this is a response to a previously sent deferred location request.

If the location information could not be obtained, or the SGSN/MSC for some other reason decides to not wait any longer for the requested event to occur (ex. timer expires), the Subscriber Location Report with the reference number that was included in the Provide Subscriber Location will be returned with an appropriate error cause indicating termination of the deferred location request.

7) GMLC then returns the LCS Service Response to the LCS Client via H-GMLC and R-GMLC as in 9.1.1.

9.1.8.3 Combined Periodical/Deferred ~~Mobile Terminating~~ Location Request with UE available event

Figure 9.6b illustrates the procedures for a Combined Periodical/Deferred Mobile Terminating Location Request with UE available event, where the response to the LCS client is returned periodically and based on the event.

Note: In the current specification, it is assumed the LCS client issues the Periodical/Deferred MT-LR with only the location estimate type of “current location”.

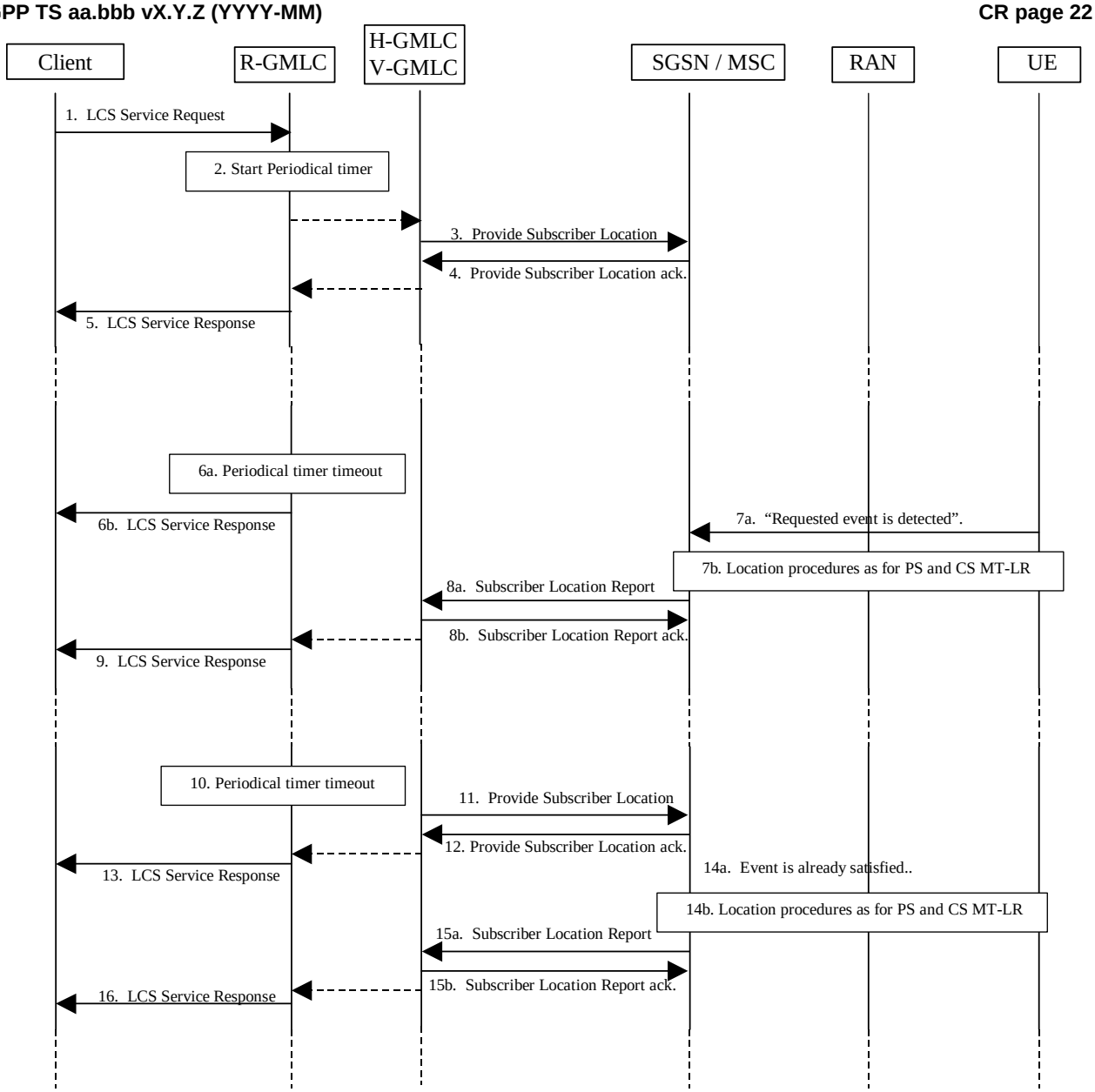


Figure 9.6b: General Network Positioning for a Combined Periodical/Deferred MT-LR

1) When a R-GMLC receives a LCS Service Request from a LCS client, the R-GMLC verifies the identity of the LCS client as described in 9.1.1.

2) The GMLC starts the periodical timer, and initiates the common LCS procedures as described in 9.1.1.

3) The GMLC sends a Deferred Location Request to the SGSN/MSC by means of Provide Subscriber Location as described in 9.1.2/9.1.6. In addition, the Deferred Location Request includes the reference number assigned by the GMLC and the event that shall trigger the sending of Subscriber Location Report.

4) If the SGSN/MSC cannot support the deferred location request for the specified event or the LCS client is not allowed to position the requested UE according to subscription information, a Provide Subscriber Location error is returned to the GMLC. If the SGSN/MSC can support the deferred location request for the specified event and the privacy checks are satisfied, a Provide Subscriber Location ack shall be returned to the GMLC without a location estimate.

5) The GMLC then returns the LCS Service Response to the LCS Client via H-GMLC and R-GMLC to notify whether the request was successfully accepted or not.

6) When the periodical timer expires, if the R-GMLC is still waiting for the event, the R-GMLC shall send a LCS Service Response to the LCS client, indicating that the location is not available at that moment.

7) When the requested event is detected, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

8) When location information has been obtained from the RAN, the SGSN/MSC returns the Subscriber Location Report. The report shall include the reference number included in the previously sent Provide Subscriber Location and an indication that this is a response to a previously sent deferred location request.

If the location information could not be obtained, or the SGSN/MSC for some other reason decides to not wait any longer for the requested event to occur (ex. timer expires), the Subscriber Location Report with the reference number included in the previously sent Provide Subscriber Location will be returned with an appropriate error cause indicating termination of the deferred location request.

9) The GMLC then returns the LCS Service Response to the LCS Client via H-GMLC and R-GMLC as in 9.1.2/9.1.6.

10) When the timer expires, if the R-GMLC is not waiting for the event, the R-GMLC initiates the common LCS procedures as described in 9.1.1.

11) Same as step 3.

12) Same as step 4.

13) Same as step 5.

14) If the requested event is already satisfied, the SGSN/MSC will proceed with the location request as described in 9.1.2/9.1.6.

15) Same as step 8.

16) Same as step 9.

9.1.8.4 Cancellation of a Deferred Location Request – UE available event

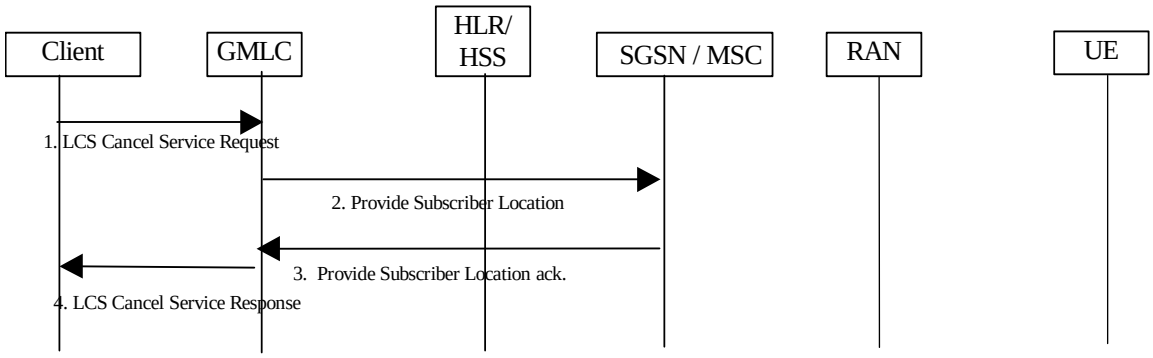


Figure 9.6c: Cancellation of a Deferred MT-LR – UE available event procedure

1) The LCS Client requests the cancellation of a previously requested Deferred Location Request. The cancellation could be initiated by the GMLC itself for some reasons (e.g. implementation dependent timer in the GMLC expired). If the UE's privacy profile stored in the H-GMLC or in the PPR was changed, any outstanding Deferred Location Request, which would not have been authorized with the new profile, shall be cancelled or the requested action for the VPLMN shall be changed. The H-GMLC initiates the cancellation and may send a new Deferred Location Request to the VPLMN. The event type to cancel must be indicated in the Cancellation procedure.

   If the previously requested Deferred Location Request was forwarded to other GMLC (H-GMLC or V-GMLC), the cancellation request from the LCS client shall be forwarded to the other GMLC.

Note: The GMLC shall know that the UE subscribers privacy profile has been changed in the PPR when the LCS Privacy Profile Update has been send from PPR to GMLC as described in 9.1.1.2.

2) The GMLC will indicate this cancellation request in the Provide Subscriber Location toward the SGSN/MSC. The Provide Subscriber Location shall include the reference number that was included in the previously sent Provide Subscriber Location.

3) When the SGSN/MSC completes the cancellation procedure, it notifies it to the GMLC in the Provide Subscriber Location Ack (with no location estimate included).

   If the cancellation request was forwarded to other GMLC (H-GMLC or V-GMLC), the GMLC (H-GMLC or V-GMLC) informs the GMLC (R-GMLC or H-GMLC) that the cancellation procedure has been successfully completed.

4) The GMLC informs the LCS Client that the cancellation procedure has been successfully completed.

<< New added clause >>

9.1.9 Deferred Location Request Procedure for the change of area event

Figure 9-6d illustrates the procedures for a Deferred Location Request where the Location Report is returned to the network by the UE following a change of area event. An change of area event occurs when the UE leaves, enters or is within a target area as defined by geographical area, PLMN identity, country code or geopolitical name of the area. Details of the target area are contained in the LCS Service Request message, see clause 5.5.1.

The PLMN operator may choose to use another mechanism (such as SIM Application Toolkit) for the transfer and detection mechanism of the Area Definition and change of area event information to the UE. In this case, the GMLCs handle steps 2 to 7 and 11 to 14 differently from that shown below. An alternative mechanism is detailed in Annex F

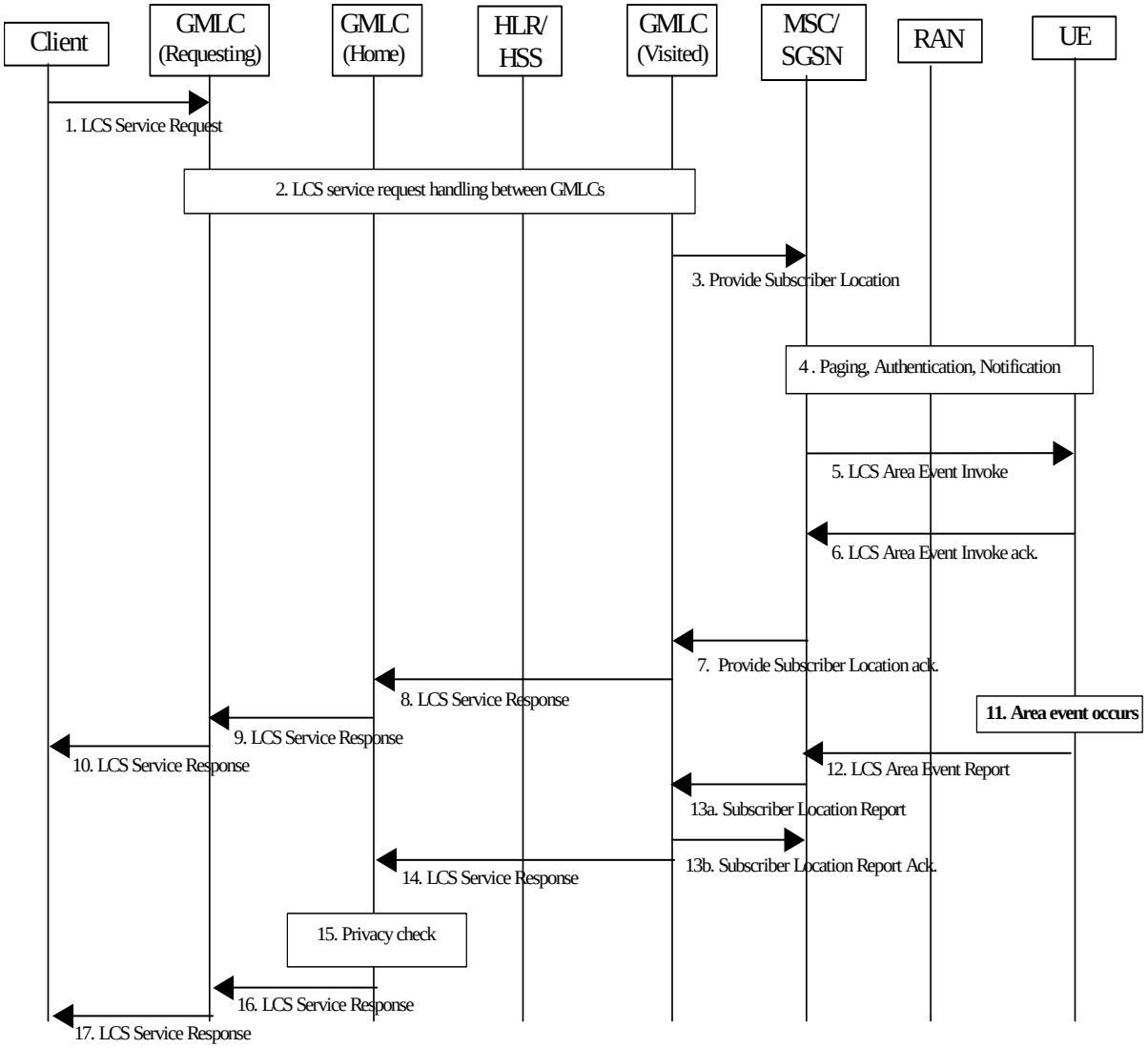


Figure 9.6d: Deferred MT-LR procedure for the Area event

1) The LCS Service Request contains the change of area type deferred location request information, i.e. details of the target area and the nature of the event, whether the event to be reported is the UE being inside, entering into or leaving the target area. The LCS service request may specify the validity time, i.e. start time and stop time, for the deferred location request and R-GMLC shall cancel the deferred location request as described in clause 9.1.9.1, when it is no longer valid. The LCS Service Request shall contain an indication of the minimum interval time between area event reports, if applicable. The LCS service request shall contain the information whether the deferred area event may be reported one time only, or several times. If the change of area event is reported one time only, the Location Service request shall be completed after the first area event has occurred. The R-GMLC assigns a LDR reference number to this LCS Service request. If the target area is expressed by

local coordinate system or geopolitical name, the R-GMLC shall convert the target area to geographical area expressed by a shape defined in TS23.032. In addition to the target area definition, the LCS Client may include the country code of the target area in the area event request.

2) LCS service request handling between GMLCs as described in clause 9.1.1. The information received by the R-GMLC is transferred to the V-GMLC via the H-GMLC, including the LDR reference number, the R-GMLC address and the H-GMLC address.

If the H-GMLC notices that the current visited PLMN does not serve the target area, it may generate a modified deferred LCS service request in order to get notified when the target UE enters a PLMN that serves the target area. The modified target area event is that the target UE enters one of the PLMNs that serve the original target area. Note that the new area event may include multiple PLMNs (identified by PLMN IDs) if there are more than one PLMN that serves the original target area, based on the stored PLMN list and the corresponding estimated coverage. The H-GMLC then generates a new location request with the new defined area event and the same rest of the information in the original request.

The new location request is sent to the target UE via the current V-GMLC. The H-GMLC keeps the original area event location service request pending for as long as determined by the validity time of the request. When the UE enters one of the pre-defined PLMNs, it sends an area event location report to H-GMLC. The H-GMLC then sends the original area event location service request to the UE via the new V-GMLC. If the H-GMLC cannot derive a list of PLMNs that may cover the target area, and the current visited network does not cover the target area, the H-GMLC may reject the request.

Editor's Note: There is an issue related to the scenario that, after the original area event was download to the target the UE, the UE may switch to a different network that also serves the target area. Solution to resolve this issue is for further study.

3) If the received target area is expressed by a shape defined in TS23.032, V-GMLC converts the target area into an Area Definition consisting of the corresponding list of cell identities, location areas or routing area. If the V-GMLC is not able to translate the target area into network identities, it shall reject the request and send an LCS service response to H-GMLC with the appropriate error cause.
If the received target area is expressed by country code or PLMN identity, the V-GMLC shall use the country code or PLMN identity as the Area Definition.
The V-GMLC sends the Area Definition to MSC/SGSN in the Provide Subscriber Location request (deferred) and includes the LDR reference number, the R-GMLC address and the H-GMLC address in the request.
The message shall define whether the event to be reported is the UE being inside, entering into or leaving the area. The message shall also include the minimum interval time between area event reports, the information whether the deferred area event may be reported one time only or several times, if applicable.

4) The MSC/SGSN verifies the UE capabilities with regard to the change of area event. If either the MSC/ SGSN or the UE does not support the deferred location request for the change of area event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned with a suitable cause in step 7. If the UE is in idle mode, the core network performs paging, authentication and ciphering. If privacy notification/verification is requested, the MSC/SGSN sends an LCS Location Notification Invoke message to the target UE indicating the change of area type deferred location request and whether privacy verification is required. LCS Location Notification is further specified in clauses 9.1.2 and 9.1.6. If privacy verification was requested, the UE returns an LCS Location Notification Return Result to the MSC/SGSN indicating whether permission is granted or denied.

5) The MSC/SGSN sends the LCS Area Event Invoke to the UE carrying the Area Definition, other area event information, the LDR reference number, the R-GMLC address and the H-GMLC address. The message shall also define whether the event to be reported is the UE being inside, entering into, leaving the area. The message shall also include the minimum interval time between area event reports and the information whether the deferred area event may be reported one time only, or several times, if applicable.

6) If the LCS Area Event Invoke is successfully received by the UE and the UE supports the change of area type deferred location request, the UE sends acknowledgement to MSC/SGSN and begins monitoring for the change of area event. The UE shall determine whether it is inside, entering into or leaving the target area by comparing the current serving cell identity, location area, routing area, PLMN identity or country code to the Area Definition received from the MSC/SGSN. In case of soft handover, it is sufficient if one of the cells belongs to the target area. In case the Area Definition consists of a location or routing area, PLMN or country identity the UE shall check for the area event during the normal location or routing area update procedure. The change of area event detection mechanism must not influence on the normal UE cell selection and reselection procedures. If the UE does not support the deferred location request (for temporary or permanent reasons), it shall send the LCS Area Event Invoke ack. with the appropriate error cause.

7) If either the MSC/ SGSN or the UE does not support the deferred location request for the change of area event (for temporary or permanent reasons), a Provide Subscriber Location return error shall be returned to the V-GMLC with a suitable cause. If both of the SGSN/MSC and UE supports the deferred location request for the change of area event, a Provide Subscriber Location ack. shall be returned to the V-GMLC without a location estimate. MSC/SGSN shall include the result of the notification/verification in the response to the V-GMLC, if the notification/verification is needed. The response message shall include the LDR reference number, the R-GMLC address and the H-GMLC address. The change of area event invoke result shall be also included, if necessary. After sending the Provide Subscriber Location ack to the V-GMLC, the deferred location request shall be completed in the MSC/SGSN.

8) to 10) V-GMLC returns the LCS Service Response via H-GMLC and R-GMLC to the LCS Client to notify whether the request was successfully accepted or not. After sending the LCS Service Response to the H-GMLC, the deferred location request shall be completed in the V-GMLC.

11) UE detects that the requested area event has occurred.

12) Before sending the LCS Area Event Report the UE shall establish either a CS radio connection or PS signalling connection as specified in clauses 9.2.1 and 9.2.2. The UE sends the LCS Area Event Report to the VMSC/SGSN including the original LDR reference number, the R-GMLC address and the H-GMLC address. The report shall also include the result of the notification/verification procedure, if the notification/verification is needed.
If the UE was requested to report the change of area event one time only, the deferred location request shall be completed. In case multiple reports were requested, the UE must not send a repeated LCS Area Event Report more often than the requested minimum interval indicated in the LCS Area Event Invoke.

Editor's Note: It could be useful to have MSC/SGSN repeat the notification procedure with the target UE after the UE has reported the change of area event, but this is for further study.

13) If the MSC/SGSN does not supports the deferred location request for the change of area event (for temporary or permanent reasons), the MSC/SGSN sends the subscriber location report to its associated V-GMLC with a suitable error cause. Otherwise, the MSC/SGSN sends the subscriber location report to its associated V-GMLC with an indication of the event occurrence, the LDR reference number, the R-GMLC address and the H-GMLC address. V-GMLC sends an acknowledgement to MSC/SGSN in step 13b and the MSC/SGSN may record billing information.

14) If the V-GMLC does not supports the deferred location request for the change of area event (for temporary or permanent reasons), the V-GMLC sends an LCS Service Response to the H-GMLC with a suitable error cause. Otherwise, the V-GMLC sends the LCS Service Response to the H-GMLC with an indication of the event occurrence, the LDR reference number, the R-GMLC address and the H-GMLC address. The LDR reference number, the R-GMLC address and the H-GMLC address will be used to identify the source of the original deferred location request in the case that the UE has relocated before the area event occurred.

15) The H-GMLC performs the privacy check as described in clause 9.1.1.

16) The H-GMLC sends the LCS Service Response to R-GMLC. Unless multiple reports were requested, the deferred location request shall be completed in the H-GMLC after sending the LCS Service Response to the R-GMLC.

17) The R-GMLC sends the LCS Service Response to the LCS client. Unless multiple reports were requested, the deferred location request shall be completed in the R-GMLC after sending the LCS Service Response to the LCS client.

< New added clause >>

9.1.9.1 Cancellation of a Deferred Location Request – Change of Area event

Figure 9-7b illustrates the procedure for cancelling the Deferred Location Request for the change of area event.

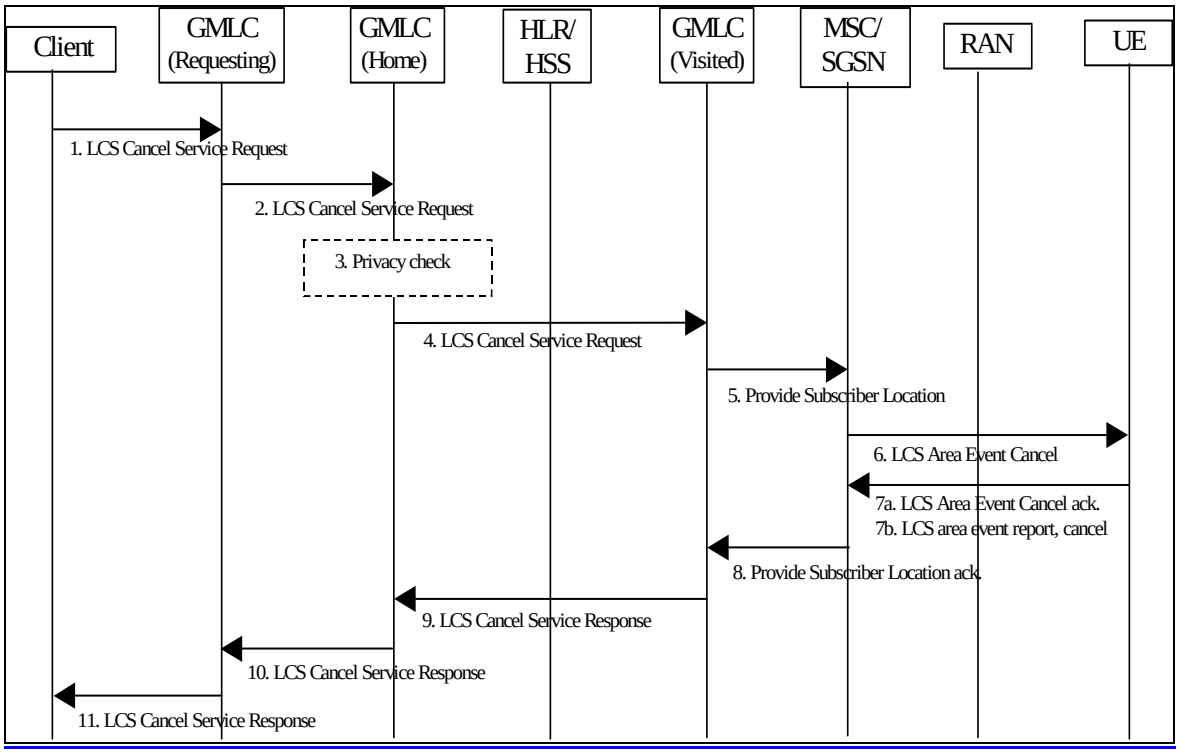


Figure 9.7b: Cancellation of a Deferred MT-LR with change of area event procedure

1. The LCS Client requests the cancellation of a previously requested Deferred Location Request.

2) The R-GMLC sends the cancellation request to H-GMLC, including the LDR reference number. R-GMLC may itself initiates the cancellation for some other reason, e.g. because a timer in the R-GMLC has expired.

3) If the UE's privacy profile stored in the H-GMLC or in the PPR was changed in such a way that it may impact on a specific deferred location request, H-GMLC shall cancel this deferred location request as described in step 4 and onwards. H-GMLC is made aware that the UE subscribers privacy profile has been changed in the PPR, as described in 9.1.1.2.

4) The H-GMLC forwards the LCS Cancel Service Request to V-GMLC with the LDR reference number which is received from the R-GMLC, and the H-GMLC address.

5) The V-GMLC sends the Provide Subscriber Location request to SGSN/MSC, indicating a cancellation of a deferred location request and including the LDR reference number and the H-GMLC address received from the H-GMLC.

6) The SGSN/MSC sends the LCS Area Event Cancellation, including the LDR reference number and the H-GMLC address, request to UE.

7a) The UE cancels the Area event deferred location request and sends the LCS Area Event cancellation ack., with no area event information included to VMSC/SGSN.

7b) While the UE is monitoring for the area event to occur, the UE may cancel or terminate the deferred location request for the change of area on its own behalf by sending the LCS Area Event report with the LDR reference number, an indication of the cancellation and an appropriate error cause.

8) The SGSN/MSC sends the cancellation acknowledgement to the V-GMLC in the Provide Subscriber Location Ack, with the LDR reference number and the H-GMLC address.

9) The V-GMLC sends the LCS Cancel Service Response to H-GMLC with the LDR reference number and the H-GMLC address.

10) H-GMLC sends the LCS Cancel Service Response to R-GMLC with the LDR reference number. H-GMLC may send the LCS Cancel Service Response to R-GMLC, even if the R-GMLC/LCS client has not requested the cancellation, see step 3.

11) R-GMLC sends the LCS Cancel Service Response to the LCS Client.

<< Next modified clause >>

11 Operational Aspects

11.1 Charging

Charging Information collected by the PLMN serving the LCS Client.

The following charging information shall be collected by the PLMN serving the LCS Client:

- type and identity of the LCS Client;
- identity of the target UE;
- results (e.g. success/failure, method used if known, response time, accuracy) - to be repeated for each instance of positioning for a deferred location request;
- identity of the visited PLMN;
- LCS request type (i.e. LDR or LIR);
- state;
- type of event (applicable to LDR requests only);
- time stamp;
- type of co-ordinate system used.

11.2 Charging Information Collected by the Visited PLMN

The following charging information shall be collected by the visited PLMN:

- date and time;
- type and identity of the LCS Client (if known);
- identity of the target UE;
- location of the target UE (e.g., MSC, MSC Server, SGSN, location area ID, cell ID, location co-ordinates);
- which location services were requested;
- results (e.g. success/failure, positioning method used, response time, accuracy) - to be repeated for each instance of positioning for a batch location request;
- identity of the GMLC or PLMN serving the LCS Client;
- state;
- type of event (applicable to LDR requests only).

<< New added Annex >>

Annex F (Informative): Mechanism for performing Change of Area Event Detection.

Note: the classification (i.e. normative or informative) of this Annex is FFS.

As described in section 9.1.9 that there may be alternative mechanisms to transfer the deferred MT-LR with Area Event request to the UE. This annex illustrates one mechanism. In this mechanism a Short Message Service (SMS) is used to transfer, to the UE/(U)SIM, the Area event detection request via an (U)SIM Application Toolkit application.

(U)SIM Application Toolkit (USAT) Based Solution

In this (U)SAT based solution, the area event detection mechanism relies on the proactive control of the UE by the (U)SIM using the (U)SAT commands controlled by a specific Change of Area Deferred Location application. Figure F.1 illustrates one possible method for downloading a change of area event application to the UE, but does not detail the operation of the application. The details of the application is outside the scope of this specification. Further information about the possible (U)SAT commands, can be found from TS 31.111.

The following procedure (shown in Figure F.1) replaces Figure 9.6d in clause 9.1.9.

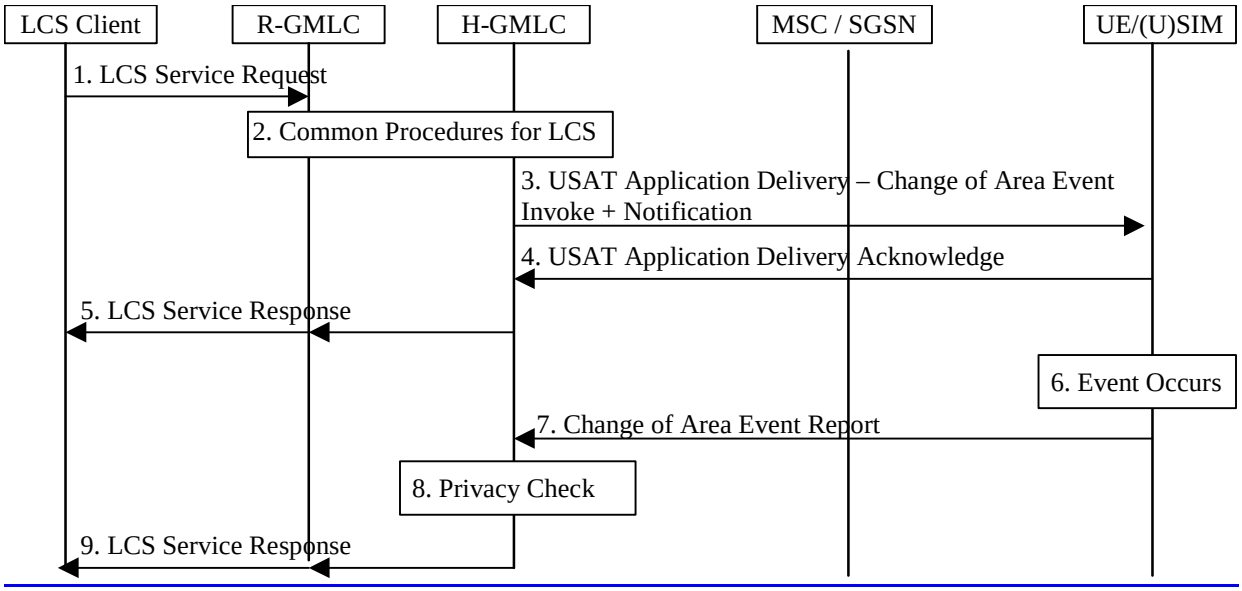


Figure F.1: (U)SAT Application Download and Change of Area Event Detection Procedure

1) This step is the same as step 1 in clause 9.1.9.

2) This step is similar to step 2 in clause 9.1.9, except the LCS Service Request does not reach the V-GMLC. Also the H-GMLC may request a translation of geographic shape to network identities from a GMLC in the network serving the target UE.

3) Information about the event, the (U)SAT application, that shall trigger the sending of the Location Report shall be sent to the UE/(U)SIM. If privacy action (notification and/or verification) was requested as a result of the privacy check, the H-GMLC shall also include the required action to the UE/(U)SIM. If notification/verification is required, the request shall indicate the identity of the LCS client, the Requestor Identity (if available), and the reference number. The mechanism by which the trigger detection is performed via (U)SAT application may be operator dependent. However, the (U)SAT Application shall contain the following information: reference number, H-GMLC address, validity period of request, and the area definition (of the target area).

4) If privacy verification was requested, the UE/(U)SIM indicates to its user whether the location request will be allowed or not allowed in the absence of a response and waits for the user to grant or deny permission. If privacy verification was requested and the user grants permission, the USAT Application shall be installed and the UE/(U)SIM then returns an acknowledgement to the H-GMLC indicating permission is granted and (U)SAT application is successfully installed. If the UE user does not respond after a predetermined time period (and the request is not allowed in the absence of a response) or denies permission, the UE/(U)SIM shall infer a "no response" condition, the USAT Application is not installed, an appropriate error response is returned to the GMLC/LCS Client and the remaining steps are skipped. Otherwise the UE/(U)SIM notifies the UE user of the location request (if required by the privacy action) and shall install the (U)SAT application and acknowledge successful installation to the H-GMLC, including an indication of “no response” but request is allowed if necessary. If at any point the (U)SAT application fails to install, due to lack of support or otherwise, the UE/(U)SIM shall inform the H-GMLC using an appropriate error cause.

5) The H-GMLC returns a LCS Service Response to the LCS Client to notify whether the request was successfully accepted/installed or not, without a location estimate.

6) The UE/(U)SIM detects the desired change of area event.

7) The UE/(U)SIM reports the change of area event.

8) The H-GMLC may perform another privacy check as described in clause 9.1.1.

9) The H-GMLC then returns a LCS Service Response to the LCS Client via the R-GMLC, if applicable, as in 9.1.1. If the GMLC for some other reason decides to not wait any longer for the requested event to occur (e.g. timer expires), an LCS Service Response shall be returned with an appropriate error cause indicating termination of the deferred location request.

H-GMLC may be the origination point of the SMS-DELIVER and the USAT Application messages.

<< Modified Annex >>

Annex GF (informative): Change history

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